Stormwater Management and Servicing Report

Proposed Warehouse Development
363 Entrepreneur Crescent
Ottawa, Ontario

Prepared for:

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TABLE OF CONTENTS

APPENDICES

Appendix A	**Pre-consultation / Correspondence**
Appendix B	**Water Supply Calculations**
Appendix C	**Septic Permit Application**
Appendix D	**Stormwater Management Calculations**
Appendix E	**Civil Engineering Drawings**
Drawings/Figures	**Proposed Site Plan**
	Legal Survey

1 INTRODUCTION AND SITE DESCRIPTION

LRL Associates Ltd. was retained by Dustin Wilson to complete a Stormwater Management Analysis and Servicing Brief for a proposed warehouse development located at 363 Entrepreneur Crescent in Ottawa, Ontario. The legal description of the property is PIN 14558-0401, Part of Block 3, Registered Plan 50M-136**,** City of Ottawa.

Figure 1: Aerial View of Proposed Site

The site has approximately 36.8 metres of frontage along Entrepreneur Cres and an average depth of approximately 81.4 metres. The overall lot area is approximately **0.300 ha.** The property is designated as Rural on Schedule B of the City of Ottawa Official Plan and is zoned RG2 (Rural General Industrial Zone, Subzone 2) In the City of Ottawa Comprehensive Zoning By-law No. 2008-250.

Currently the site is serving as a parking lot and storage yard, mostly paved in gravel. A gravel driveway provides access to the southwest corner of the lot, off Entrepreneur Crescent. The site is bordered by Entrepreneur Cres and a roadside ditch to the south, commercial / industrial lots to the west and east, and a commercial / industrial lot with surrounding ditch to the north. The balance of the site, small buffers along the property lines and ditches, are grassed area.

The development proposed consists of an industrial warehouse. The warehouse will serve predominantly as storage but will also be used in the construction and maintenance of props & equipment. An entrance branching off Entrepreneur Crescent will provide vehicular access to the site. A gravel driveway has been proposed along the east face of the building, providing access

to the rear paved loading and vehicle maneuverability area. Parking will be provided within the gravel area in front of the south face of the building. The balance of the site will be grassed area and landscaping elements.

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 0.300ha and consists of parking lot and storage yard, mostly paved in gravel. A gravel driveway provides access to the southwest corner of the lot, off Entrepreneur Crescent. The site is currently un-serviced.

As per the topographical survey provided by Annis, O'Sullivan, Vollebekk LTD (dated Dec 14th, 2022), the site is generally flat. Elevations do tend to lower slightly along the property lines, allowing for drainage around the borders of the site to either the rear watercourse or front roadside ditch.

No sewers or watermain are present within Entrepreneur Crescent.

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.
- Demonstrate how the target quality treatment objectives will be achieved.

Water services

- Calculate the expected water supply demand at average and peak conditions.
- Describe the proposed water servicing distribution system

Sanitary services

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

4 Regulatory Approvals

The South Nation Conservation Authority will need to be consulted in order to obtain municipal approval for site development. Since this is an industrial-use site, an Environmental Compliance

Approval (ECA) is required. No other approval requirements from other regulatory agencies beyond the City of Ottawa are anticipated.

5 WATER SUPPLY

5.1 Water Supply Servicing Design

There is no watermain located within Entrepreneur Cres.

For the purposes of this report, water demand calculations were calculated based on the Ontario Building Code (OBC), 2012, Sewage System Design Flows.

Table 1 below summarizes the Ontario Building Code design parameters utilized in the preparation of the daily water demand estimate.

Design Parameter	Value
15. Office Building	
a) per each 9.3m2 of office space	75 L/day
26. Warehouse	
a) per water closet	950 L/day
b) per loading bay	150 L/day
**Table updated to reflect OBC, 2012, Table 8.2.1.3.B. Other Occupancies*	

Table 1: ***Ontario Building Code – Sewage System Design Flows***

The interior layout and architectural floor plans of the industrial building were reviewed, and it had been determined that the building would include the following parameters;

- 21.37m2 of office space
- One (1) water closet
- One (1) loading bay

Based on parameters, the required water supply requirement (the average daily demand) for the proposed industrial building was calculated to be 1273 L/day.

Using industrial maximum daily demand and maximum hourly demand peaking factors of 1.5 and 1.8, respectively, as per Table 4.2 of the City of Ottawa Design Guidelines – Water Distribution 2010;

- The maximum daily demand was calculated to be 1910 L/day.
- The maximum hourly demand was calculated to be 3437 L/day.

The proposed warehouse is proposed to be serviced via 13mm diameter Type K copper service lateral (to be confirmed by the mechanical engineer) connected to a private drilled well proposed on-site.

Refer to ***Appendix B*** for relevant correspondence, water demand calculations and water service sizing.

6 SANITARY SERVICE

6.1 Sanitary Sewer Servicing Design

The site is currently unserviced, and there is no sanitary sewer located within Entrepreneur Crescent.

The proposed development will be serviced via a septic treatment system and leaching bed, to be installed at the front (south) of the property.

The septic system design had been performed by an accredited septic designer in April 2023 and approved by the Ottawa Septic System Office (OSSO). The system was to be an Eljen type system, equipped with a tank and pump to convey treated flow to a partially raised leaching bed.

The septic designer is currently in coordination with the OSSO to amend the current septic permit, as the footprint and floor plan of the proposed building has changed since the last permit application. Despite the changes, there is only minimal change in the design flows, having only dropped from 1310 L/day to 1273 L/day. Considering this, the septic designer has proposed in the septic permit amendment keep the same septic treatment system as previously proposed.

The septic designer will update the City once a revised permit has been received.

Refer to ***Appendix C*** for the previous septic design, calculations & permit application.

7 STORMWATER MANAGEMENT

7.1 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 south half of the property will flow uncontrolled to the nearest property line, and ultimately to the Entrepreneur Crescent roadside ditch.

The Entrepreneur Cres north roadside ditch has been reviewed to ensure it has sufficient capacity for stormwater. Minor sediment accumulation and weed overgrowth can be seen along the length of the roadside ditch. The existing roadside ditch along Entrepreneur varies from 3m to 4m in width, 0.60m to 0.8m in depth, generally steep cross slopes, and averages a mild longitudinal slope of ±0.21% from east to west. Entrance culverts along Entrepreneur are generally 450mm or 500mm in diameter. The Entrepreneur roadside ditch conveys stormwater through the Tradesman Road and Indcum Road ditches to ultimately outlet to the Boundary Road east roadside ditch.

Design capacity for the ditch is reasonably assumed to be at least 181 L/s. This was calculated using Mannings Equation for Open Channel Flow.

Mannings Equation - Open Channel Flow

$$V = \frac{1}{n} x\ R^{2/3}\ x\ s^{1/2}$$

V = Water Mass Flow Rate (m/s)
n = Manning's Roughness Coefficient
R = Channel Hydraulic Radius (m)
s = Channel Longitudinal Slope (height/length)

Channel Hydraulic Radius

$$R = A/P$$

A = Channel Cross Sectional Area (m2)
P = Channel Wetted Perimiter (m)

Volumetric Flow Rate

$$Q = VA$$

V = Water Mass Flow Rate (m/s)
A = Channel Cross Sectional Area (m2)

Calculations were performed with the following conservative assumptions:

- Mannings runoff coefficient of 0.045 (natural channel, straight w/ overgrowth)
- Channel hydraulic radius of 0.208m2
  - Channel cross sectional area of 0.504m2 (2.24m width x 0.45m depth, considering a 0.15m freeboard)
  - Channel wetted perimeter of 2.42m
- Channel longitudinal slope of 0.21%

The balance of the site's stormwater flows uncontrolled to the nearest property line, and ultimately to the north watercourse.

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

7.2 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).

7.2.1 Water Quality

The proposed development lot is subject to review by the South Nation Conservation Authority (SNCA). It was determined that site stormwater management quality criteria for the site will follow the SNCA'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),

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

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

7.2.2 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 2yr pre-development allowable release rate for the subject site was calculated to be **32.08L/s**.

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

7.3 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.

7.4 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;

- Industrial warehouse
- Paved driveway, sidewalk/curbs and parking lot
- Grassed and naturalized areas, and planters

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 (0.300 ha), consisting of gravel paving and grassed area (total runoff coefficient of 0.76).
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 125VHV-2 Flow Control Device (or approved equivalent). Storage required as a result of quantity control measures will be accomplished minor surface ponding, but mostly via underground storage chambers (enclosed chambers due to expected high groundwater levels). Stormwater will be captured by one of the proposed catch basins or manholes within the gravel areas, controlled/stored, conveyed to the treatment unit and ultimately pumped up to the Entrepreneur Cres roadside ditch.

The proposed site storm service 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 (0.080 ha), consisting of the rear (north) gravel loading and vehicle maneuverability area, will be captured by catch basin CB01.
- Watershed WS-02 (0.027 ha), consisting of the north portion of the driveway and small grassed area, will be captured by catch basin manhole CBMH02.
- Watershed WS-03 (0.078 ha), consisting of the proposed warehouse roof and central portion of the driveway, will be captured by catch basin manhole CBMH03.
- Watershed WS-04 (0.052 ha), consisting of the front (south) yard grassed area and parking lot, will be captured by catch basin CB04.
- Watershed WS-05 (0.017 ha), consisting of the south portion of the driveway, will be captured by catch basin manhole CBMH05.
- Watershed WS-06 (0.046 ha), consisting of the grassed portion of the site along all property lines and naturalized buffer at the north (rear) of the property, 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 2: Post Development *Drainage Areas*

Drainage Area Name	Area (ha)	Weighted Runoff Coefficient (C)	100 Year Weighted Runoff Coefficient (25% increase)
WS-01 (controlled)	0.080	0.80	1.00
WS-02 (controlled)	0.027	0.73	0.92
WS-03 (controlled)	0.078	0.88	1.00
WS-04 (controlled)	0.052	0.48	0.60
WS-05 (controlled)	0.017	0.76	0.96
WS-06 (uncontrolled)	0.046	0.21	0.27

Table 5 below summarizes the release rates and storage volumes required to meet the allowable release rate of 32.08 L/s for 100-year flow.

Table 3: ***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, WS-03, WS-04, WS-05 (controlled via ICD)	0.254	26.00	87.94*	89.67
WS-06 (uncontrolled)	0.046	6.08	0.00	0.00
TOTAL	**0.300**	**32.08**	**87.94**	**89.67**

*as stormwater storage is occurring underground, the controlled release rate was halved to 13.00 L/s for storage volume calculations

The 100-year maximum ponding depths can be found on drawing "C401 – Servicing & Stormwater Management Plan" of ***Appendix E***.

As per previous discussion, the conservative estimate for the ditch design load was calculated to be ±181 L/s. Based on the proposed maximum controlled release rate of 26.00 L/s, we can conclude our site runoff would only occupy roughly 14.4% of the ditch capacity.

8 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. Straw bale check dams are to be installed in the downstream end of the roadside ditch. The rear yard watercourse will be protected as per the EIS recommendations. 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.

9 LOW IMPACT DEVELOPMENT

As per the EIS performed for this site, the proposed development should occur with large focus towards Low Impact Development (LID).

At the rear of the property is located an existing watercourse. A 5m naturalized setback was proposed from the watercourse as a means of protecting the sensitive resource. This setback was respected in the site design, grading & stormwater management design for the site.

All controlled runoff is ultimately being treated by the Stormceptor stormwater treatment unit (or approved equivalent). The uncontrolled runoff, specifically the runoff from the east, south and west buffer zones, will flow over a grassed buffer prior to reaching their intended point of conveyance.

In addition, additional landscaping elements will be incorporated to the site to improve site aesthetic.

10 CONCLUSION

This Stormwater Management and Servicing Report for the development proposed at 363 Entrepreneur Crescent 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 average daily water demand, maximum daily water demand & maximum hourly water demand for the proposed warehouse was calculated to be **3600 L/day**, **5400 L/day** and **9720 L/day**, respectively.
- The proposed development will be serviced by a new 13 mm diameter water service to be connected to a private drilled well.

Sanitary Service

- 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 **32.08 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.

11 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.

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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