STORMWATER MANAGEMENT REPORT

126 Iber Road, Ottawa, Ontario

Prepared for:
Dextor A. Edwards, Architect
DAE Architecte
88 Centrepointe Drive, Suite 100
Ottawa, Ontario K2G 6B1 | E-mail: dae.architecte@xplornet.ca

Prepared by:
Reliance Engineering Canada Limited
6850 Millcreek Drive
Mississauga, ON L5N 2H4
E: ochani@relianceengineering.ca

Submitted to:
City of Ottawa

Date: October 13, 2026
Reference No.: RE-2026-027

RELIANCE ENGINEERING

1. Introduction

This report outlines the stormwater management approach for the proposed redevelopment. The report has been prepared to reflect the City of Ottawa pre-consultation feedback for File PC2026-0161, the Study and Plan Identification List, the current survey information, and the historical site grading and drainage plan prepared for the property in 2005. This report addresses Phase 1 only, comprising the alteration and change of use of the existing building together with the associated site works.

The future Phase 2 building addition will be addressed under a separate stormwater management submission when it proceeds.

The purpose of this report is to document the existing stormwater management system, establish the applicable quantity and quality control criteria, evaluate the drainage and storage requirements associated with the proposed works, and present the proposed stormwater management design for the site.

2. Existing Conditions

The site is currently developed with a single-storey industrial building having an existing gross floor area of approximately 644.48 m². The building was constructed in approximately 2005 and was previously used as an audio/video warehouse/showroom. The current application proposes alteration and change of use of the existing building to an automobile body shop.

No increase to the existing building footprint is proposed.

The historical Site Grading and Drainage Plan dated April 26, 2005 shows that the site was designed with an on-site surface stormwater management system. The system consists of a depressed stormwater storage/retention area west and southwest of the existing building and parking area, connected to a linear stormwater storage swale along the south side of the property.

The record drawing / Site Grading and Drainage Plan shows the storage swale with 1.5 m bottom width and 3H:1V side slopes. The plan also identifies a 300 mm diameter PVC outlet pipe with a removable plug-type inlet control device (ICD) discharging to the existing roadside ditch. The recorded ICD opening size is 226 mm.

3. Proposed Development

The proposed works consist primarily of alteration and change of use of the existing 644.48 m² building to an automobile body shop. The existing building footprint and roof area will remain unchanged.

The proposed stormwater management strategy will retain and utilize the existing surface storage system, supplemented by the proposed swale and bioretention improvements. Runoff from paved areas will be directed to the existing and proposed swales for quantity control, with bioretention providing water-quality treatment for contributing runoff.

The proposed grading will maintain existing drainage patterns, accommodate off-site runoff, and provide a safe emergency overland flow route toward the existing outlet without adversely affecting adjacent properties.

4. Stormwater Management Criteria

The stormwater management design criteria for the site are based on the City of Ottawa pre-consultation comments for File PC2026-0161.

Quantity Control: The post-development stormwater release rate shall be controlled to the pre-development release rate. The City has directed that the pre-development condition be considered landscaped with a runoff coefficient of C = 0.20. Runoff exceeding the allowable release rate shall be temporarily stored on site and discharged through a controlled outlet.

Quality Control: Stormwater runoff from paved areas, including parking areas, drive aisles and other vehicle-access areas, shall receive treatment providing a minimum of 80% Total Suspended Solids (TSS) removal prior to discharge.

5. Stormwater Quantity Control

Based on the criteria established in Section 4, the following calculations determine the allowable release rate, post-development runoff, required on-site storage, and outlet-control requirements.

5.1 Allowable Release Rate

The allowable release rate is based on the 5-year pre-development condition using C = 0.20.

Q = 0.00278 C I A

C = 0.20, I = 104.2 mm/h, A = 1.1416 ha

Qallow = 0.00278 × 0.20 × 104.2 × 1.1416 = **0.0661 m³/s**

Post-Development Runoff Coefficient

Surface Type	Area (m²)	Runoff Coefficient, C	Weighted Area (C × A)
Roof surfaces	644.48	0.90	580.03
Paved / hard surfaces	1,800.00	0.90	1,620.00
Landscaped / pervious	8,971.42	0.20	1,794.28
Total	11,415.90		3,994.32

Cpost = 3,994.31 / 11,415.90 = 0.350

For the 100-year storm event: Cpost,100 = 0.350 × 1.25 = 0.438

City of Ottawa Rainfall Intensity-Duration-Frequency (IDF) Data

Duration (min)	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
5	102.8	140.2	165	196	219	242.6
10	77.1	104.2	122.5	145.3	162.2	179
15	63.3	85.6	100.4	119.1	133	142.9
30	39.9	53.9	63.1	74.7	83.4	91.9
60	24.2	32	37.1	43.6	48.5	53.2
120	14.3	18.9	22	25.8	28.7	31.5

5.2 Post-Development Storage Requirement

Required storage was estimated using the Modified Rational Method:

Qpost = 0.00278 C I A

V = (Qpost - Qallow) × Duration × 60

Duration (min)	100-Year Intensity (mm/h)	Qpost (m³/s)	Qallow (m³/s)	Required Storage (m³)
5	242.7	0.3374	0.0661	81.4
10	178.6	0.2483	0.0661	109.3
15	**142.9**	**0.1986**	**0.0661**	**119.3**
30	91.9	0.1277	0.0661	111.0
60	55.9	0.0777	0.0661	41.8
120	32.9	0.0457	0.0661	0.0

Maximum required storage = 119.3 m³, say 120 m³, based on the 15-minute 100-year storm event.

5.3 Outlet Control / Orifice Sizing

Based on the proposed Site Grading Plan, stormwater runoff will be conveyed through the existing swale system toward the existing 300 mm diameter outlet pipe discharging to the roadside ditch. The existing plug-type inlet control device (ICD) will be removed and replaced with a new calculated orifice size.

The allowable release rate is 0.0661 m³/s (66.1 L/s), based on the 5-year pre-development condition.

Orifice Sizing Calculation

$Q = Cd \times A \times \sqrt{(2gh)}$

Where:
Q = Allowable discharge = 0.0661 m³/s
Cd = Discharge coefficient = 0.62
A = Required orifice area (m²)
g = Gravitational acceleration = 9.81 m/s²
h = Design head = 0.28 m

Required Orifice Area:
$A = Q / [Cd \times \sqrt{(2gh)}] = 0.0661 / [0.62 \times \sqrt{(2 \times 9.81 \times 0.28)}] = 0.0455$ m²

Required Orifice Diameter:

$D = \sqrt{(4A / \pi)} = \sqrt{(4 \times 0.0455 / 3.1416)} = 0.241 \text{ m} \approx 240 \text{ mm}$

Therefore, a 240 mm diameter orifice is proposed to restrict the discharge to 0.0661 m³/s, based on a maximum design head of 0.28 m and a required storage volume of 120 m³.

5.4 Available Storage in Existing Swale

Based on the existing grading plan and surveyed swale geometry, the existing swale provides approximately 33 m³ of storage. The swale has an approximate 1.5 m bottom width, 2.97 m top width, 3H:1V side slopes and 60 m length.

Existing Swale Storage Calculation

Bottom width = 1.50 m
Top width at design storage elevation = 2.97 m
Side slopes = 3H:1V
Swale length = 60 m

Storage depth:

$T = b + 2zd$

$2.97 = 1.50 + 2(3)(d)$

$d = (2.97 - 1.50) / 6$

$d = 0.245 \text{ m}$

Cross-sectional area:

$A = b \times d + 3d^2$

$A = (1.50 \times 0.245) + 3(0.245)^2 = 0.548 \text{ m}^2$

Existing swale storage volume:

$V = A \times L$

$V = 0.548 \times 60 = 32.9 \text{ m}^3 \approx 33 \text{ m}^3$

Additional storage required:

$120 - 33 = 87 \text{ m}^3$

5.5 Proposed Swale Extension

The required additional 87 m³ of storage will be provided within the landscaped area west of the existing swale by regrading the area to form an elongated dry storage depression.

Proposed Swale Storage Calculation

Overall swale length = 40.00 m
Maximum top width = 10.30 m
Maximum storage depth = 0.30 m
Side slopes = 3H:1V
Low-flow swale bottom width = 1.50 m

Top Surface Area:
$A_1 = 0.7854 \times 40.00 \times 10.30 = 323\ m^2$
Bottom Surface Area:
Bottom length = 40.00 − 1.80 = 38.20 m
Bottom width = 10.30 − 1.80 = 8.50 m
$A_2 = 0.7854 \times 38.20 \times 8.50 = 255\ m^2$

Proposed Storage Volume (Approximate):

$V = [(A_1 + A_2) / 2] \times \text{Depth} = [(323.58 + 255.02) / 2] \times 0.30 = 86.79\ m^3 \approx 87\ m^3$

The area will remain normally dry. It will temporarily detain runoff during major storm events before draining toward the existing outlet.

6. Stormwater Quality Control

The City of Ottawa requires 80% Total Suspended Solids (TSS) removal from paved areas. An engineered bioretention swale is proposed within proposed swale system following the Ontario MOE Stormwater Management Planning and Design Manual (2003).

The asphalt drainage area is approximately 1,800 m² (0.18 ha). The bioretention swale will incorporate vegetation, engineered filter media and drainage provisions for stormwater quality treatment.

Water Quality Storage Calculation

Using MOE Table 3.2, the Enhanced Protection storage criterion of 40 m³/ha at 85% imperviousness is adopted as a preliminary sizing reference.
Required water quality storage:
V = 0.18 ha × 40 m³/ha = 7.2 m³

Proposed Bioretention Swale Design

Total proposed swale length = 40 m
Bioretention section length = 25 m
Bottom width = 1.50 m
Side slopes = 3H:1V
Water quality ponding depth = 0.15 m
Top width = 1.50 + 2(3 × 0.15) = 2.40 m
Cross-sectional area = [(1.50 + 2.40) / 2] × 0.15 = 0.29 m²
Available surface storage = 0.29 × 25 = 7.31 m³
The proposed 25m long bioretention section provides approximately 7.31 m³ of gross surface storage, exceeding the preliminary 7.2 m³ water quality storage target, assuming a level storage surface.

Integrated Stormwater Management

The proposed 40 m swale provides approximately 87 m³ of stormwater detention storage, with 25 m incorporating bioretention measures and the remaining 15 m functioning as a vegetated drainage swale.
Although the entire asphalt area does not drain directly into the proposed bioretention section, runoff is conveyed to both the existing and proposed swales. A compensatory treatment approach is proposed, subject to City acceptance and verification of 80% long-term TSS removal, including untreated and bypassed runoff.

7. Conclusion

The proposed stormwater management strategy maintains the existing drainage patterns and incorporates improvements to the existing swale system to satisfy the City of Ottawa's stormwater management requirements.

The allowable release rate is calculated as 66.1 L/s, based on the 5-year pre-development condition. The required 100-year stormwater storage volume is approximately 120 m³, of which 33 m³ is provided by the existing swale and the remaining 87 m³ by the proposed swale extension. A 240 mm diameter control orifice is proposed to regulate discharge to the existing roadside ditch.

For stormwater quality control, a 25 m long engineered bioretention section is proposed within the 40 m swale extension, providing approximately 7.31 m³ of preliminary water-quality surface storage against the calculated reference volume of 7.2 m³. The proposed compensatory treatment approach is intended to address the City's 80% TSS removal requirement, subject to the City of Ottawa acceptance.

Overall, the proposed stormwater management system is designed to provide quantity and quality control while maintaining the existing drainage patterns and minimizing impacts on adjacent properties.



Naresh Ochani, P.Eng., M.Eng.
Senior Project Manager