STORMWATER MANAGEMENT BRIEF

4011 Vaughan Side Road, Carp, ON

Prepared For:

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Prepared By:

Intelligent, Intuitive, Inspired
iN ENGINEERING + PLANNING
PLANNING
LAND DEVELOPMENT
ENGINEERING
BUILDING DESIGN

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Job No. 12486
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1.0 Introduction

IN Engineering + Planning ("IN Engineering") has been retained by Hidden Pond Winery to prepare this Stormwater Management (SWM) Brief in support of a Site Plan Control application to the City of Ottawa for a proposed change of use at 4011 Vaughan Side Road in Carp, Ontario.

The subject property is approximately 16.39 hectares in area and currently contains an existing single-storey residential dwelling, an existing single-storey winery building, and vineyard lands extending across the central and northern portions of the site. According to the owner, the winery building was previously constructed under a separate permit. The owner is now proposing a change of use to permit grape processing, wine production, and a farmgate tasting area open to the public as an On-Farm Diversified Use.

To support this application, minor site modifications are proposed, including widening of the existing gravel driveway and expansion of a gravel parking area to accommodate the proposed use. This SWM Brief has been prepared to demonstrate that the proposed changes will not negatively impact stormwater quantity or quality and that the site will remain compliant with applicable municipal stormwater management criteria.

Refer to **Figure 1** below for the site location.

Figure 1: Aerial View of Site

1.1 Scope of Work and Objectives

The objectives of this SWM Brief are to:

- Evaluate existing site drainage conditions
- Assess the impact of the proposed development on stormwater runoff
- Demonstrate compliance with municipal SWM criteria
- Identify any required stormwater management controls

The following design criteria have been applied:

- Post-development peak flows (up to the 100-year event) are to be controlled to pre-development levels
- Stormwater quality control is to achieve 80% Total Suspended Solids (TSS) removal
- Grading and drainage design is to be consistent with the proposed Site Plan

2.0 References

The design and analysis presented in this brief are based on the following guidelines and reference materials:

[1] Ministry of the Environment, *Stormwater Management Planning and Design Manual*, Ontario, Canada, Mar. 2003.

[2] Ministry of Transportation Ontario, *Hydrotechnical Design Charts*, Jan. 2023.

[3] Ontario Ministry of Transportation, “IDF Curves Map Acquisition,” *IDF Curves*, n.d. [Online]. Available: https://idfcurves.mto.gov.on.ca/map_acquisition.shtml.

[4] City of Ottawa, *Ottawa Sewer Design Guidelines*, ch. 8, “Stormwater Management,” Ottawa, ON, Canada, Oct. 2012.

3.0 Development Description & Study Area

The proposed development consists of the conversion of the existing winery building to support wine production and a tasting area, together with minor modifications to the site access and parking areas. The existing gravel driveway will be widened and the parking area expanded to accommodate visitors to the farmgate winery.

For the purposes of the stormwater management analysis, a scoped study area of approximately 1.37 hectares has been defined. This study area includes the winery building, the proposed driveway and parking area, and the existing residential dwelling. The remainder of the

property, consisting primarily of vineyards and pasture lands, will remain unchanged and is not expected to experience any alteration in drainage characteristics. As such, these areas have not been included in the detailed stormwater quantity control analysis.

The proposed grading and drainage design for the development is illustrated on the **Grading and Drainage Plan** prepared by IN Engineering (Drawing C-2), included in **Appendix A**.

4.0 Existing Drainage Conditions

Under existing conditions, the site generally drains from south to north via overland flow following the natural topography of the property. Runoff for the analyzed area mostly flows away from Vaughan Side Road, with roadside ditches along Vaughan Side Road conveying flows eastward. The majority of the site is permeable and consists of vineyard lands and pasture areas, which promote infiltration and limit runoff. Based on AgMaps soil classification information provided in **Appendix D**, the native soils in the study area are classified as a Hydrologic Soil Group B (well drained). In the absence of a site-specific geotechnical investigation, a moderate infiltration rate of approximately **15 mm/hr** has been assumed for design and discussion purposes.

There is no formal storm sewer system servicing the site. Existing drainage occurs via natural overland flow and roadside ditch conveyance, which will remain the case under post-development conditions.

5.0 Proposed Drainage & SWM Strategy

The proposed stormwater management approach is based on maintaining existing drainage patterns while incorporating localized infiltration measures to manage runoff generated by the expanded gravel driveway, parking area, and winery roof.

Runoff from the winery roof and gravel surfaces will be conveyed via overland flow toward a V-shaped grass swale located along the east side of the driveway and parking area. The swale will direct runoff northward to a gravel soakaway pit located near the north end of the parking area. In order to match existing grading, portions of the swale are graded as steep as 5% (noting that most grass swales can typically accommodate slopes up to approximately 6% when appropriately vegetated and stabilized). Signs of erosion (e.g., rilling, sediment deposition, or bare areas) should be monitored and repaired as required, particularly after periods of high

rainfall. The soakaway pit has been designed to temporarily store and infiltrate runoff generated by the proposed development.

Any overflow from the soakaway pit will be directed northward via existing overland flow routes, consistent with current site drainage patterns, ensuring that there are no adverse impacts to adjacent lands or downstream drainage systems.

6.0 Stormwater Management Analysis

6.1 Hydrologic Methodology

Stormwater runoff from the study area was evaluated using the Rational Method. Runoff coefficients were assigned based on surface types including roof area, gravel surfaces, and landscaped areas, as suggested in *MTO Design Chart 1.07*. See **Table 1** for pre- vs post-development areas and runoff coefficients. A time of concentration of 10 minutes was assumed for the study area based on site characteristics and overland flow conditions.

Table 1: Pre- and Post-Development Runoff Coefficients

Surface Type	**Area (ha)**	**Runoff Coefficient (C)**
Pre-Development		
Grass/Landscaped	1.22	0.25
Gravel	0.12	0.4
Building/Roof	0.03	0.9
Concrete	0.005	0.9
TOTAL / Weighted	1.37	**0.28**
Post-Development		
Grass/Landscaped	1.16	0.25
Gravel	0.17	0.4
Building/Roof	0.03	0.9
Concrete	0.006	0.9
TOTAL / Weighted	1.37	**0.29**

Rainfall intensities for return periods ranging from the 2-year to 100-year storm events were obtained from the Ministry of Transportation (MTO) *IDF Curve Lookup* **[3]** for the specific site

location. The calculated pre-development and post-development peak flows are summarized in **Table 2**. Refer to **Appendix C** for detailed calculations.

The analysis confirms that the proposed stormwater management measures effectively limit post-development peak flows to pre-development levels.

6.2 Stormwater Quantity Control

The City of Ottawa requires that post-development peak flows for all storm events up to the 100-year storm be controlled to pre-development rates. The increased stormwater flows for the 2- to 100-year storm events are shown in **Table 2**.

Table 2: 2- to 100-Year Storm Flows

Storm Event	Post-Development Flow (m^3/s)	Pre-Development Flow (m^3/s)	Flow Increase (m^3/s)
2-Year	0.077	0.075	0.002
5-Year	0.102	0.100	0.003
10-Year	0.119	0.116	0.003
25-Year	0.154	0.150	0.004
50-Year	0.187	0.182	0.005
100-Year	0.214	0.208	**0.005↑**

Based on the Rational Method analysis for the 1.37 hectare study area, the allowable 100-year release rate for the site is **0.208 m³/s (208 L/s)**.

To satisfy the quantity control requirement, on-site storage is provided through a gravel soakaway pit located at the north end of the swale system. The required storage volume for the 100-year storm event has been calculated as approximately **3.25 m³**. The proposed soakaway pit, with dimensions of 3.0 m by 3.0 m and a depth of 1.0 m, provides approximately **3.6 m³** of effective storage based on an assumed void ratio of 0.40 for clean gravel. This available storage exceeds the required volume and is therefore sufficient to meet the City's quantity control criteria.

Soakaway pit **operation and maintenance**: The soakaway pit (gravel storage/infiltration layer) is covered with approximately 0.15 m of uncompacted soil and grass. The pit should be inspected at least twice annually (spring and fall) and after major rainfall events. Maintain a

healthy grass cover and repair any bare or eroded areas promptly; avoid soil compaction over the pit (e.g., no vehicle traffic) to preserve infiltration capacity. Accumulated sediment and debris on the grassed surface should be removed to prevent clogging and to maintain positive grading to the pit. If reduced infiltration performance is observed (e.g., prolonged ponding), the soil/sod layer should be carefully stripped and stockpiled, the upper clogged portion of the underlying aggregate should be removed and replaced with clean clear stone to restore void space, and the 0.15 m soil layer and grass cover reinstated. Any geotextile should be checked for blinding and replaced as needed. Stabilize disturbed areas within the contributing drainage area to minimize sediment inputs.

6.3 Stormwater Quality Control

Stormwater quality control requirements for the site consist of achieving a minimum of 80% total suspended solids (TSS) removal, in accordance with City of Ottawa criteria. This requirement is achieved through the use of infiltration-based stormwater management practices.

Runoff from the developed area is directed to the gravel soakaway pit, where it undergoes filtration through the granular medium and infiltration into the native soils. This process provides effective removal of suspended solids and is consistent with low impact development best practices suitable for rural and agricultural settings. As noted in *Section 4.0*, the soils are classified as **Hydrologic Soil Group B** based on AgMaps mapping, and a moderate infiltration rate (15 mm/hr) has been assumed in the absence of a geotechnical investigation. Given the limited scale of development and the absence of direct discharge to a receiving watercourse, the proposed approach is considered appropriate and effective.

7.0 Conclusion

The proposed change of use for the Hidden Pond Winery represents a minor modification to an existing developed rural property and results in only a small increase in impervious area associated with the gravel driveway and parking expansion.

The stormwater management strategy for the site maintains existing drainage patterns and incorporates a swale and soakaway pit system to manage runoff from the developed area. Hydrologic analysis demonstrates that post-development peak flows are controlled to pre-development levels for storm events up to and including the 100-year storm, and that sufficient on-site storage is provided to meet City of Ottawa requirements.

Stormwater quality objectives are achieved through infiltration and filtration within the soakaway pit, providing effective removal of suspended solids. The proposed design does not introduce any adverse impacts to adjacent properties or downstream drainage systems.

Based on the analysis presented in this report, the proposed development satisfies the stormwater management requirements of the City of Ottawa Site Plan Control process.

IN Engineering should be promptly notified if site or soil conditions vary from those assumed in this Stormwater Management Brief.

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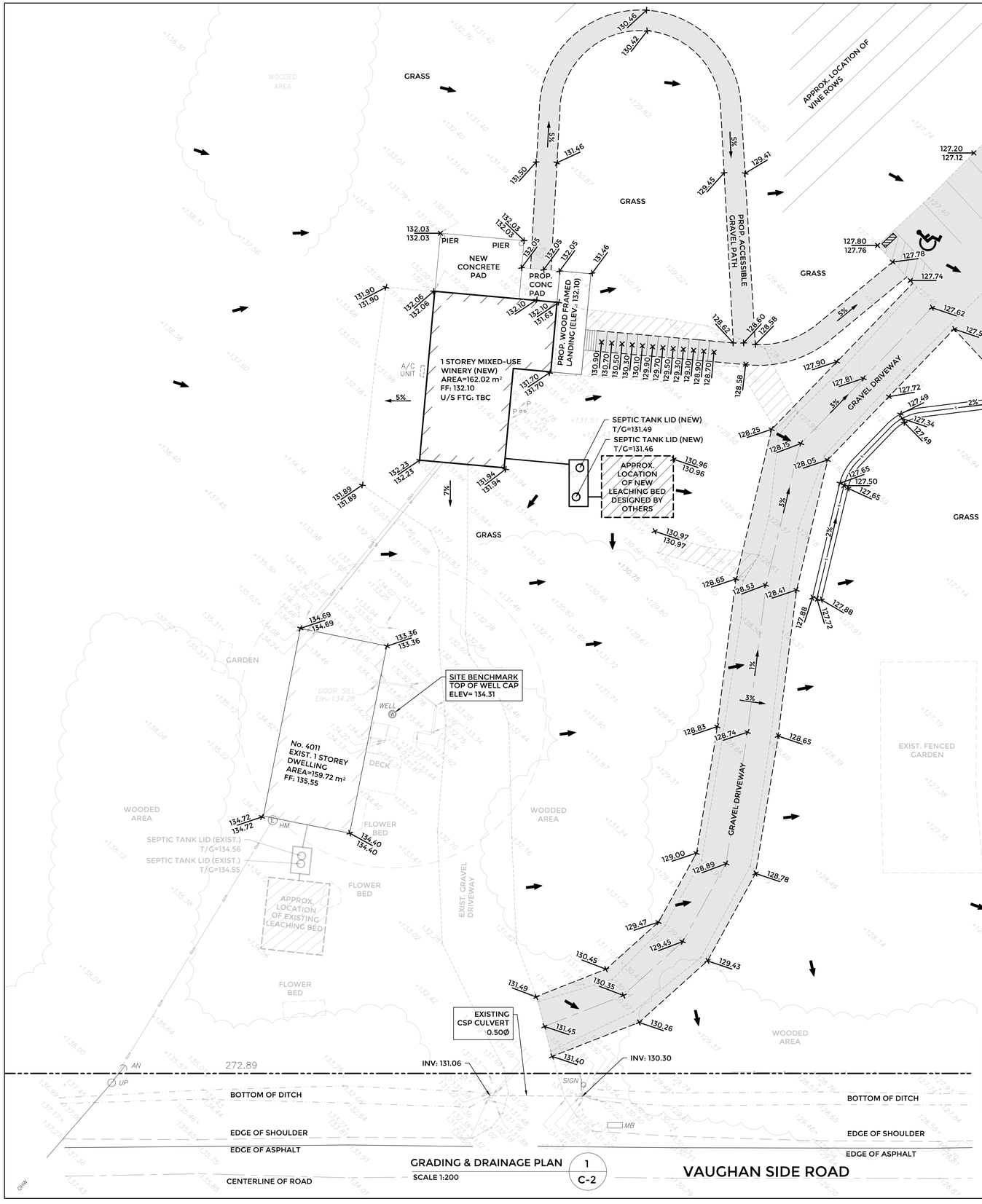
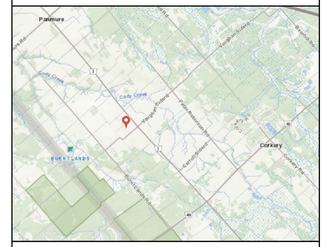
Appendix A

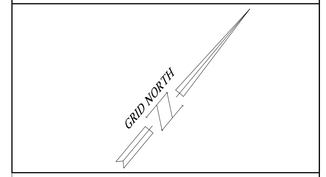
Grading & Drainage Plan



KEY PLAN
NTS



ORIENTATION



SITE SYMBOL LEGEND

- EXISTING WELL
- EXISTING HYDRO METER
- EXISTING ELEVATION
- MAJOR FLOW DIRECTION
- SLOPE (X%)
- PROPOSED ELEVATION CHANGE (PROP. / EXIST.)
- EXISTING FENCE
- PROPERTY LINE
- BOTTOM OF DITCH
- C/L OF ROAD
- EXISTING EDGE OF GRAVEL
- PROPOSED C/L SWALE
- PROPOSED SOAKAWAY PIT
- NEW BUILDING
- EXISTING BUILDING
- PROPOSED GRAVEL

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm

STORMWATER MANAGEMENT STATISTICS

DESCRIPTION	PRE-DEVELOPMENT (TOTAL LOT AREA)	PRE-DEVELOPMENT (SCOPED AREA)	POST-DEVELOPMENT (SCOPED AREA)
TOTAL AREA	163,818.9 m²	13,701.5 m²	13,701.5 m²
GRASS/LANDSCAPED AREA	162,236.2 m²	12,118.8 m²	11,590.3 m²
GRAVEL AREA	1,244.9 m²	1,244.9 m²	1,731.8 m²
CONCRETE AREA	46.03 m²	46.03 m²	57.6 m²
BUILDING AREA	291.8 m²	291.8 m²	321.8 m²
RUNOFF COEFFICIENT (2, 5, 10-YEAR)	0.25	0.28	0.29

NO.	BY:	DATE:	REVISION:
1	JH	MAR. 12, 2026	ISSUED FOR SITE PLAN CONTROL

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Planning
Land Development
Building Design
Engineering

REVIEWER	DESIGNER	DRAFTER	FILE NO.
AFM	JH	JH	12486

HIDDEN POND WINERY
4011 VAUGHAN SIDE RD.
CARP, ONTARIO
K0A 1L0

CIVIL

GRADING & DRAINAGE PLAN — C-2

Appendix B

IDF Data (MTO)

Ontario IDF CURVE LOOKUP

Active coordinate

45° 17' 15" N, 76° 9' 15" W (45.287500,-76.154167)

Retrieved: Mon, 02 Mar 2026 14:38:44 GMT

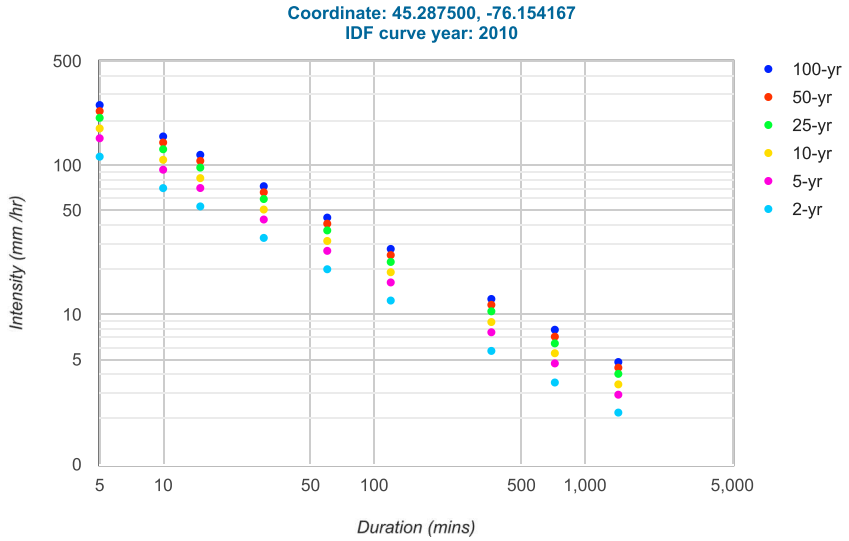
Location summary

These are the locations in the selection.

IDF Curve: 45° 17' 15" N, 76° 9' 15" W (45.287500,-76.154167)

Results

An IDF curve was found.



Coefficient summary

IDF Curve: 45° 17' 15" N, 76° 9' 15" W (45.287500,-76.154167)

Retrieved: Mon, 02 Mar 2026 14:38:44 GMT

Data year: 2010
IDF curve year: 2010

Return period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
A	20.1	26.7	31.1	36.6	40.6	44.6
B	-0.699	-0.699	-0.699	-0.699	-0.699	-0.699

Statistics

Rainfall intensity (mm hr^{-1})

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	114.2	70.3	53.0	32.6	20.1	12.4	5.7	3.5	2.2
5-yr	151.7	93.4	70.4	43.3	26.7	16.4	7.6	4.7	2.9
10-yr	176.6	108.8	82.0	50.5	31.1	19.2	8.9	5.5	3.4
25-yr	207.9	128.1	96.5	59.4	36.6	22.5	10.5	6.4	4.0
50-yr	230.6	142.1	107.0	65.9	40.6	25.0	11.6	7.1	4.4
100-yr	253.3	156.0	117.5	72.4	44.6	27.5	12.7	7.9	4.8

Rainfall depth (mm)

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	9.5	11.7	13.2	16.3	20.1	24.8	34.5	42.5	52.3
5-yr	12.6	15.6	17.6	21.7	26.7	32.9	45.8	56.4	69.5
10-yr	14.7	18.1	20.5	25.2	31.1	38.3	53.3	65.7	80.9
25-yr	17.3	21.3	24.1	29.7	36.6	45.1	62.8	77.3	95.3
50-yr	19.2	23.7	26.7	33.0	40.6	50.0	69.6	85.8	105.7
100-yr	21.1	26.0	29.4	36.2	44.6	54.9	76.5	94.2	116.1

Terms of Use

Appendix C

Hydrologic Calculations

Rainfall Intensities

Time of Concentration (Tc)

Site area consists of small sub-catchments, Therefore
The Time of Concentration is assumed as 10 minutes

Rainfall Intensities Based on MTO Online IDF Curve Look-up (See Appendix B)

Return Period	Intensity, I mm/hr
2 year	70.30
5 year	93.40
10 year	108.80
25 year	128.10
50 year	142.10
100 year	156.00

Pre-Development Condition

Predevelopment Flows are Computed by utilizing Rational Formula

Q (m^3/s)= C I A/360

Where

C = Runoff Coefficient

I = Rainfall Intensity in mm/hr

A = Drainage Area in ha

Total Area	16.38 ha
Study Area	1.37 ha

Total Lot Area

Catchment ID	Area (m^2)	Area (ha)	C
Grass/Landscaped	162236.2	16.2236	0.25
Gravel	1244.9	0.1245	0.4
Building/Roof	291.8	0.0292	0.9
Concrete	46.03	0.0046	0.9
Total / Weighted	**163818.93**	**16.38**	**0.25**

Scoped Study Area

Catchment ID	Area (m^2)	Area (ha)	C
Grass/Landscaped	12118.8	1.2119	0.25
Gravel	1244.9	0.1245	0.4
Building/Roof	291.8	0.0292	0.9
Concrete	46.03	0.0046	0.9
Total / Weighted	**13701.5**	**1.37**	**0.28**

Total Lot Area

Storm Event	Adjusted C	Intensity, I mm/hr	Flow m^3/s
2 year	0.25	70.30	0.808
5 year	0.25	93.40	1.073
10 year	0.25	108.80	1.250
25 year	0.28	128.10	1.619
50 year	0.30	142.10	1.959
100 year	0.32	156.00	2.240

Scoped Study Area

Storm Event	Adjusted C	Intensity, I mm/hr	Flow m^3/s
2 year	0.28	70.30	0.075
5 year	0.28	93.40	0.099
10 year	0.28	108.80	0.116
25 year	0.31	128.10	0.150
50 year	0.34	142.10	0.181
100 year	0.35	156.00	**0.208**

Post-Development Condition

Post Development Flows are Computed by utilizing Rational Formula

Q (m^3/s)= C I A/360

Where

C = Runoff Coefficient

I = Rainfall Intensity in mm/hr

A = Drainage Area in ha

Total Area	16.38	ha
Study Area	1.37	ha

Total Lot Area

Catchment ID	Area (m^2)	Area (ha)	C
Grass/Landscaped	161707.72	16.1708	0.25
Gravel	1731.8	0.1732	0.4
Building/Roof	321.8	0.0322	0.9
Concrete	57.61	0.006	0.9
Total / Weighted	**163818.93**	**16.38**	**0.25**

Scoped Study Area

Catchment ID	Area (m^2)	Area (ha)	C
Grass/Landscaped	11590.3	1.1590	0.25
Gravel	1731.8	0.1732	0.4
Building/Roof	321.8	0.0322	0.9
Concrete	57.61	0.006	0.9
Total / Weighted	**13701.5**	**1.37**	**0.29**

Total Lot Area

Storm Event	Adjusted C	Intensity, I mm/hr	Flow (Q) m^3/s
2 year	0.25	70.30	0.810
5 year	0.25	93.40	1.076
10 year	0.25	108.80	1.253
25 year	0.28	128.10	1.623
50 year	0.30	142.10	1.964
100 year	0.32	156.00	2.246

Scoped Study Area

Storm Event	Adjusted C	Intensity, I mm/hr	Flow (Q) m^3/s
2 year	0.29	70.30	0.077
5 year	0.29	93.40	0.102
10 year	0.29	108.80	0.119
25 year	0.32	128.10	0.154
50 year	0.34	142.10	0.186
100 year	0.36	156.00	**0.213**

Total Lot Area

Storm Event	Post Dev Flow (m^3/s)	Pre Dev Flow (m^3/s)	Flow (Q) Increase (m^3/s)
2 year	0.810	0.808	0.002
5 year	1.076	1.073	0.003
10 year	1.253	1.250	0.003
25 year	1.623	1.619	0.004
50 year	1.964	1.959	0.005
100 year	2.246	2.240	0.005

Scoped Study Area

Storm Event	Post Dev Flow (m^3/s)	Pre Dev Flow (m^3/s)	Flow (Q) Increase (m^3/s)
2 year	0.077	0.075	0.002
5 year	0.102	0.099	0.003
10 year	0.119	0.116	0.003
25 year	0.154	0.150	0.004
50 year	0.186	0.181	0.005
100 year	0.213	0.208	0.005

Tc= 10 min

StorageVolume Req'd= Flow Increase x Tc x 60

3.25 m3

Soakaway Pit Sizing

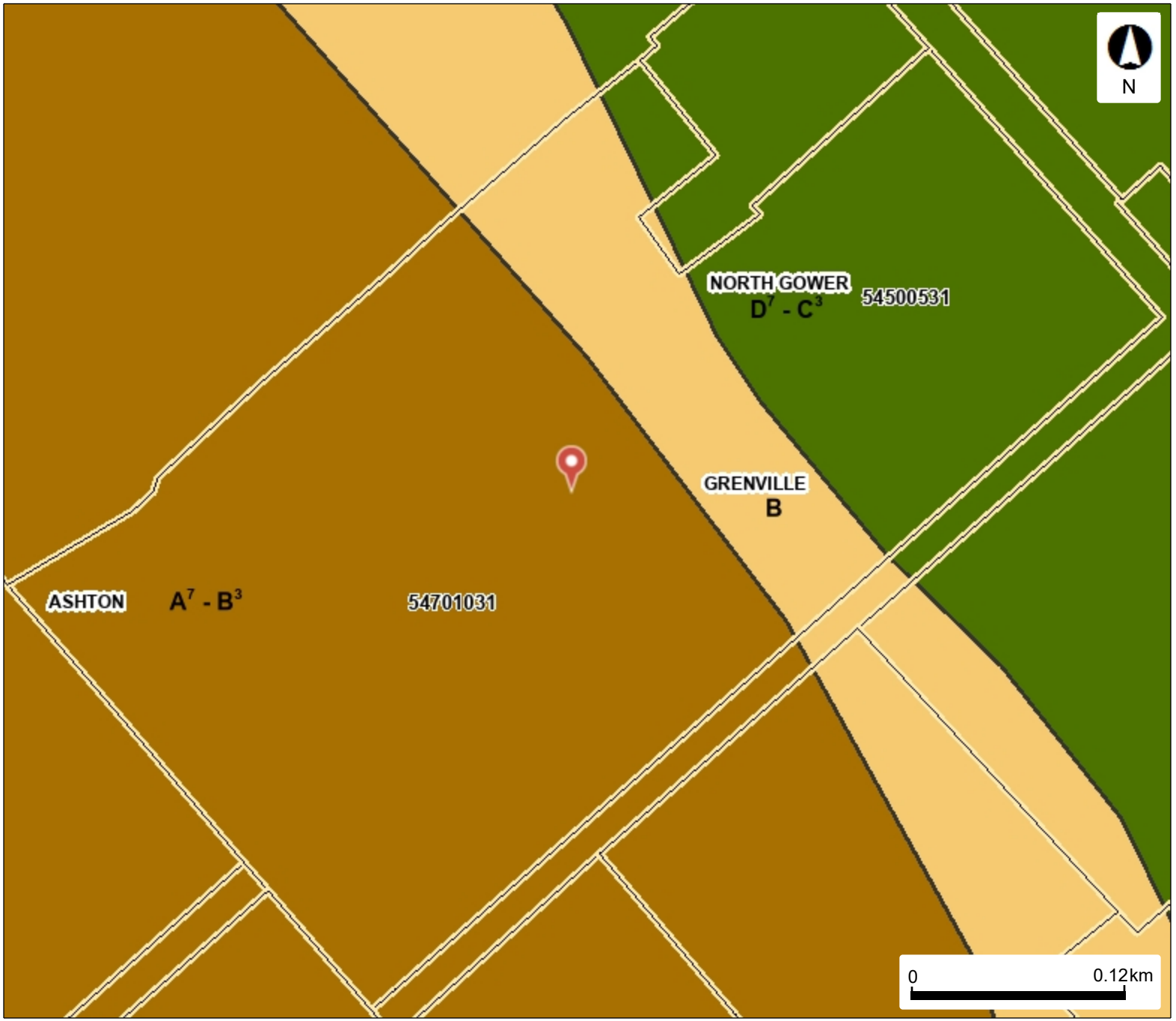
Length	3.0	m
Width	3.0	m
Depth	1.0	m
Vol.	9.0	m^3
Gravel Void Ratio	0.4	
Total Storage Cap.	**3.6**	**m^3**

Capacity (%)	1.11	> 1 OK

Appendix D

Soil Classification Map (AgMaps)

Soil Classification Map



Legend

- Assessment Parcel
- Soil Name Label
- Hydrologic Soil Group
  - A - High
  - B - Moderate
  - C - Slow
  - D - Very Slow
- Soil Landscapes - Soil Order

This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Agriculture, Food and Agribusiness (OMAFA) shall not be liable in any way for the use or any information on this map. of, or reliance upon, this map.

Map Created: 3/12/2026
Map Center: 45.28718 N, -76.15758 W