FUNCTIONAL SERVICING
&
STORMWATER MANAGEMENT REPORT
13290 NUNNVILLE ROAD

TOWN OF CALEDON

PREPARED FOR:

BOLTON SUMMIT DEVELOPMENTS INC.

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
2800 HIGH POINT DRIVE, SUITE 100
MILTON, ON L9T 6P4

APRIL 2022

CFCA FILE NO. 649-6278

CROZIER
CONSULTING ENGINEERS

Revision Number	Date	Comments
Rev 0	April 13, 2022	Issued for 1st Submission

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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Bolton Summit Developments Inc. (BSDI) to prepare a Functional Servicing and Stormwater Management Report in support of the Zoning By- Law Amendment and Official Plan Amendment for the proposed development located at 13290 Nunnville Road in the Town of Caledon.

This report demonstrates how the proposed development's functional servicing and stormwater management will integrate with the area's existing water, sanitary and stormwater infrastructure.

2.0 Site Description

The proposed development is part of an established residential area in Bolton. The property is located at 13290 Nunnville Road. The site currently consists of one existing residential building surrounded by a forested area. The proposed development covers an area of approximately 0.85 ha. The developable area is proposed to include 15 multi-unit townhouses comprised of 3 (three)separate blocks, a private road, and associated landscaped areas. The remainder of the site is environmentally sensitive and is regulated by the Toronto and Region Conservation Authority (TRCA).

The subject property is bounded by:

- A TRCA Regulated Environmental Protection Area (EPA) to the north and west.
- Nunnville Road to the east and south.
- An Existing residential property to the south.

3.0 Water Servicing

The Region of Peel is responsible for the operation and maintenance of the public water supply and treatment system in the Town of Caledon. Any local water supply system will connect to the existing or proposed Region's municipal water network.

3.1 Existing Water Servicing

According to Berkshire Homes Development as-constructed drawing 36209-D (A.M. Candaras Associates, May 2006), there is an existing 150 mm diameter PVC watermain along Nunnville Road with a plug and blowoff valve located at the northwest corner of Bateman Lane and Nunnville Road. An existing fire hydrant is also located at the northwest corner of Bateman Lane and Nunnville Road.

3.2 Design Water Demand

The population density, provided by the Region of Peel, was used to determine an equivalent population estimate for the proposed residential development. The results are provided in Table 1 and detailed calculations along with email correspondences regarding the population density are provided in Appendix A.

Table 1: Equivalent Population Estimate

Number of Units	Persons/Unit	Total Persons
15	3.4	51

The Region of Peel Watermain Design Criteria (June 2010) was used to determine the maximum domestic water demand generated by the proposed development based on the equivalent population estimate for the site. Table 2 summarizes the estimated design water demand. Appendix A contains detailed calculations for the required water demand.

Table 2: Estimated Design Water Demand

Standard	Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Peak Hourly Demand (L/s)
Region of Peel Watermain Design Criteria (June 2010)	0.17	0.33	0.50

The domestic water service will be designed to convey a peak domestic design water demand of 0.50 L/s.

3.3 Fire Flow Demand

The Fire Underwriters Survey method (1999) was used to estimate the fire flow demand for the proposed development. Based on dwelling gross floor area and exposure distance (WSP, March 2022), the preliminary fire demand using this method is 150 L/s for a minimum duration of 2 hours. Detailed calculations are provided in Appendix A. The calculation is based on the assumptions that the proposed building will be made from ordinary construction material, potential to contain rapid burning fire hazards, and will not have an automatic sprinkler system.

Hydrant flow testing was carried out on April 18, 2019, by Aquazition on the existing 150 mm diameter municipal watermain on Nunnville Road. Based on the hydrant test results, at 276 kPa (40 psi) residual pressure, a minimum of 171 L/s (2,708 US GPM) projected flow is available within the 150 mm diameter municipal watermain on Nunnville Road. Detailed results of the hydrant flow test and projected fire flows are provided in Appendix A.

3.4 Proposed Water Servicing

The proposed development will be serviced by the existing 150 mm diameter PVC watermain located on Nunnville Road. The existing watermain will be extended from the plug located at the northwest corner of Nunnville Road and Bateman Lane to the proposed development. The proposed development will be serviced with a 150 mm diameter PVC watermain within the private site. The units will be serviced by a 25 mm diameter domestic water services which will connect to the proposed watermain within the private road. Two (2) fire hydrants are also proposed to provide the required fire suppression coverage for the proposed development.

4.0 Sanitary Servicing

The Region of Peel is responsible for the operation and maintenance of the public sewage collection and treatment system in the Town of Caledon. Any local sewage system will connect to the Region's municipal sanitary sewage network.

4.1 Existing Sanitary Servicing

According to Southridge Estates Phase 7 as-constructed drawing 25231-D (Falby Burnside & Associates, May 1997) there is an existing 250 mm diameter sanitary sewer flowing south on Nunnville Road. Additionally, according Nunnville Road issued for construction drawings 69958-D (Region of Peel, July 2018) there is a proposed 900 mm diameter trunk sanitary sewer flowing south on Nunnville Road which will connect to the existing trunk sanitary sewer on Albion-Vaughan Road. According to the issued for construction drawings, a 250 mm diameter sanitary sewer is proposed to provide sanitary service from the site to the trunk sewer.

4.2 Design Sanitary Flow

The Region of Peel Sanitary Design Criteria (March 2017) and the equivalent population estimate from Section 3.2, were used to determine the estimated design sanitary flow for the proposed development. Estimated design sanitary calculations are provided in Table 3, and detailed calculations are provided in Appendix B.

Table 3: Estimated Design Sanitary Demand

Standard	Average Day (L/s)	Peaking Factor	Infiltration Flow (L/s)	Total Flow (L/s)
Region of Peel Sanitary Design Criteria (March 2017)	0.18	4.00	0.08	0.80

The proposed sanitary service must convey a total design sanitary demand of 0.80 L/s determined according to the Region of Peel Sanitary Design Criteria (March 2017).

4.3 Proposed Sanitary Servicing

The proposed development will be serviced by a 200 mm diameter sanitary sewer at a minimum slope of 1% which will connect to the future 250 mm diameter sanitary sewer (completed by others) within Nunnville Road.

5.0 Drainage Conditions

5.1 Existing Drainage Conditions

According to the topographic survey (R-PE Surveying Ltd., February 2022) the site slopes from south to north and existing stormwater flows are conveyed overland to the TRCA Environmental Protection Area (EPA) Regulated Lands and towards adjacent properties on Old King Road and Deer Hollow Court, ultimately to the Humber River.

- Catchment 101 (A = 0.77 ha; RC = 0.30) demonstrates drainage from the south of the site discharging uncontrolled to the TRCA EPA regulated land that surrounds the site.

- Catchment 102 (A = 0.08 ha; RC = 0.25) demonstrates drainage form the southeast corner of the site discharging uncontrolled minor flows towards a catch basin located on the southeast portion of the property. Flows are discharges to a headwall adjacent to the Nunnville Road pedestrian walkway towards Old King Road within the TRCA EPA regulated land. Major flows also drain to the TRCA EPA regulated land that surrounds the site.

Figure 1 illustrates the delineation of the drainage areas and existing drainage conditions. The existing residential building is connected to the municipal stormwater infrastructure.

5.2 Proposed Drainage Conditions

The developable area is proposed to include 15 multi-unit townhouses comprised of 3 (three) separate blocks, a private road, and associated landscaped areas. Stormwater flows within the total property area will be considered for this analysis. Lands outside the development limit will maintain their existing drainage patterns.

The proposed development has been divided into three post-development stormwater catchment areas as shown on Figure 2 Post-Development Drainage Plan**.** The grading of the proposed development results in the following post-development drainage catchments:

- Catchment UC1 (A = 0.51 ha; RC = 0.25) discharges uncontrolled to the TRCA EPA regulated lands and adjacent properties on Old King Road and Deer Hollow Court, ultimately to the Humber River following existing drainage patterns. Post-development uncontrolled peak flows will be equal to or less than pre-development peak flows.

- Catchment 201 (A = 0.32 ha; RC = 0.77) minor flows will be controlled using an orifice tube and a superpipe for stormwater storage. Minor flows will be conveyed to the existing storm sewer system on Nunnville Road which discharge via a headwall to the existing concrete channel adjacent to the Nunnville Road walkway within the TRCA EPA regulated land, ultimately draining to Old King Road and then the Humber River. Emergency flows will be conveyed to the ditch on Nunnville Road within the TRCA EPA regulated land, ultimately draining to Old King Road and then the Humber River.

- Catchment 202 (A = 0.02 ha; RC = 0.53) minor flows will be conveyed to the relocated catch basin located in the southeast corner of the site (previously conveyed Catchment 102 minor flows) and major flows will be directed to a ditch on Nunnville Road within the TRCA EPA regulated land, ultimately draining to Old King Road and then the Humber River.

In accordance with Town of Caledon standards, stormwater flows will be attenuated so the post-development peak flows for all storm events match or are less than the pre-development peak flows for all storm events. The controlled catchment 201 will be controlled by a 150 mm diameter orifice tube downstream of a proposed 1200 mm diameter storm sewer superpipe which will be used to attenuate excess flows.

Emergency flows will be directed to the TRCA EPA regulated lands that surround the site. The overland flow route for an emergency flow scenario is outlined in Figure 2.

6.0 Stormwater Management

The proposed stormwater management design must comply with the Town of Caledon Development Standards Manual (V5, 2019). Table 4 provides a summary of the stormwater management criteria based on the stormwater management design guidelines.

Table 4: Summary of Stormwater Management Criteria

Control Parameter	Catchment 202
Quantity Control	Post-development peak stormwater flows must be equal to or less than pre-development peak stormwater flows.
Quality Control	Achieve Ontario Ministry of the Environment, Conservation and Parks (MECP.) Enhanced Level of protection (80% total suspended solids (TSS) removal).
Water Balance	Retain 5 mm rainfall event on-site.
Erosion and Sediment Controls	Provided during construction and until the site is stabilized.

6.1 Stormwater Quantity Control

The Modified Rational Method was used to determine the pre-development and post-development flow rates for the site using the Town's IDF rainfall data according to Town Standard Drawing No. 103. The peak flow rates were then used to determine if any stormwater quantity control was required for the proposed development. Detailed Modified Rational Method calculations are included in Appendix C.

The following section will consider one outlet, which is the TRCA EPA regulated lands. The outlet to the regulated lands includes pre-development Catchment 101 and 102, and post-development Catchments UC1, 201, and 202. Table 5 summarizes the pre-and post-development peak flows to the TRCA EPA regulated lands.

Table 5: Summary of Peak Flow Rates

Storm Event (yr)	Flow Rates (L/s)						
	Pre-Development			Post-Development			
	Uncontrolled			Uncontrolled		Controlled	
	Q_{101}	Q_{102}	Q_{total}	Q_{UC1}	Q_{202}	$Q_{201 – 150\ mm\ orifice}$	Q_{total}
2-yr	55	5	**60**	31	3	27	**60**
5-yr	71	6	**77**	39	3	34	**77**
10-yr	87	8	**94**	48	4	41	**93**
25-yr	101	9	**110**	56	5	47	**107**
50-yr	114	10	**124**	63	5	51	**120**
100-yr	127	11	**138**	70	6	56	**132**

As presented in Table 5, the post-development peak flows to the regulated lands are equal to or less than the pre-development peak flows. Therefore, the stormwater quantity control criterion to this outlet is satisfied.

Controlled stormwater from Catchment 201 will be conveyed to the existing 375 mm diameter storm sewer located on Nunnville Road. A 150 mm diameter orifice tube downstream of a 97 m long 1200 mm diameter storm sewer superpipe network which will restrict peak flow to achieve the quantity control criterion. The superpipe will retain the attenuated peak flows from the 2-year to 100-year storm events.

A summary of the target peak flows and subsequent required storage volumes is presented in Table 6.

Table 6: Summary of Target Peak Flow Rates and Storage Volumes

Storm Event (yr)	**Catchment 201 (150mm Orifice Tube)**			
	Target Flow Rate (L/s) $Q_{201} = Q_{101} + Q_{102} - Q_{UC1} - Q_{202}$	**Flowrate** (L/s)	**Required Storage** (m^3)	**Provided Storage** (m^3)
2-yr	27	27	24	**110**
5-yr	35	34	35	
10-yr	42	41	44	
25-yr	49	47	56	
50-yr	56	51	66	
100-yr	62	56	77	

As shown in Table 6, a 150 mm diameter orifice tube is required for Catchment 201 to control post-development peak flows to pre-development peak flows and meet the quantity control criteria. A 97 m long 1200 mm diameter storm sewer superpipe network, upstream of the 150 mm diameter orifice tube, will provide storage for the attenuated flows up to the 100-year storm event. The 100-year high-water level will be contained within the pipe. The system will be designed to detain 110h m^3 therefore satisfying the storage requirement outlined in Table 6.

6.2 Stormwater Quality Control

Stormwater quality controls for the site must incorporate measures to provide an Enhanced Level of Protection (Level 1) according to the MECP (March 2003) guidelines. Enhanced water quality protection involves the removal of at least 80% of total suspended solids (TSS) from 90% of the annual runoff volume. An area breakdown and associated TSS removal rate is provided in Table 7.

Table 7: Area Breakdown and Associated TSS Removal

Catchment		Area (ha)	% of Total Development Area	TSS Removal Efficiency	Total TSS Removal
Catchment UC1	Landscape	0.51	60%	80%	48%
Catchment 201	Jellyfish Filter	0.32	38%	89%	34%
Catchment 202	Partial Landscape	0.02	2%	40%	1%
	Total Site	**0.85**	**100.0%**	**-**	**83%**

Catchment UC1, which discharges uncontrolled to the TRCA EPA regulated lands, are landscaped areas that naturally achieve 80% TSS removal efficiency. Catchment 202, discharges to the existing storm sewer network on Nunnville Road partially treated as the portion of landscaped area will naturally achieve 80% TSS removal efficiency and the remaining road area will discharge untreated. A Jellyfish Filter will be used to treat the controlled discharge from Catchment 201 and will apply 89% TSS Removal Efficiency. The resulting combined TSS removal efficiency for the site is 83%, therefore the quality control criterion is achieved.

6.3 Water Balance

The minimum volume requirement to promote water balance is the retention of a 5 mm rainfall event. The water balance retention volume was calculated considering initial abstraction of runoff based on various surface types.

Water balance for the proposed development will be achieved through attenuation of stormwater runoff over the natural landscaped area with a 150 mm enhanced topsoil layer. Water balance for the impervious areas of the site (Catchment 201) will be achieved by providing a total topsoil depth of 300 mm over the landscaped areas per the Town of Caledon Development Standards Manual (V5, 2019). A storage volume of approximately 12.5 m^3 is required to achieve the water balance criteria (5mm x 0.25 ha of impervious area in Catchment 201).

The total water balance volume will be stored in the topsoil of the landscaped area in Catchment 201 (0.06 ha). Using typical topsoil parameters (soil porosity = 0.47; soil field capacity = 0.32), the first 150 mm of topsoil is available for initial abstraction and has approximately 13.50 m^3 of capacity for rainfall storage. Since the capacity of storage in the topsoil and the physical volume of rainfall exceed the required storage volume, we conclude that a total topsoil depth of 300 mm will successfully retain 12.5 m^3 of rainfall volume. Detailed calculations for the topsoil retention are included in Appendix C.

7.0 Erosion and Sediment Controls During Construction

Erosion and sediment controls (ESC) will be installed prior to the start of any construction activities and will be maintained until the site is stabilized or as directed by the Site Engineer or the Town of Caledon. The contractor will inspect the ESC after each significant rainfall event to ensure they are maintained in proper working condition.

Sediment Control Fencing

Sediment control fencing in accordance with Town standard drawing 304 will be installed on the perimeter of the site to intercept sheet flow. Adjacent to the sensitive EPA lands, double silt fence with straw bales will be installed for additional protection. Based on field decisions, the Site Engineer and the Owner may add additional sediment control fencing prior to, during, and following construction.

Rock Mud Mat

A rock mud mat will be installed at the entrance to the construction zone to prevent mud tracking from the site onto the surrounding lands and perimeter roadway network. All construction traffic will be restricted to this access only.

Sediment Control for Catchbasins

Sediment control device will be installed in the existing nearby storm sewer catch basins. The sediment control device will provide sediment control to prevent silt and sediment from entering the stormwater system.

8.0 Conclusions & Recommendations

The proposed development can be serviced for water, sanitary, and stormwater in accordance with the Town of Caledon requirements and standards. Our conclusions and recommendations include:

1. Water demand for the proposed development will be provided using individual 25 mm domestic water services connected to the proposed 150 mm diameter PVC watermain within the private road. The proposed watermain will connect to an extension of the existing 150 mm diameter watermain on Nunnville Road.

2. Two (2) fire hydrants are proposed to provide fire suppression coverage for the development.

3. Sanitary servicing for the proposed development will be provided using a 200 mm diameter sanitary sewer, which connects to the future 250mm diameter sanitary sewer located on Nunnville Road.

4. Stormwater runoff from Catchment UC1 and 202 will flow uncontrolled to the TRCA EPA regulated lands outlet. Stormwater runoff from Catchment 201 will flow controlled to the existing storm sewer system located on Nunnville Road.

5. Stormwater quantity control has been provided using a 200 mm diameter orifice tube and a 97 m long 1200 mm diameter storm sewer superpipe which is sized to contain the attenuated post-development peak flows up to the 100-year storm event.

6. A combination of landscaped areas and a Jellyfish filter will provide an enhanced level of protection (83% TSS removal for total site) for stormwater quality control for Catchment 201.

7. Water balance for the proposed development will be achieved using enhanced topsoil over the landscaped area in Catchment 201, providing 13.5 m^3 of storage.

8. Erosion and Sediment Controls will be implemented on-site during construction and will be maintained until the site is stabilized.

Based on the above conclusions we support the proposed development application from the perspective of water supply, sanitary servicing, and stormwater management.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

Jayesh Boily, E.I.T.
Land Development

C.F. CROZIER & ASSOCIATES INC.

Peter Smuczak, P.Eng.
Project Engineer

OS/cj

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APPENDIX A

Water Demand Calculations

Connection Demand Table

WATER CONNECTION

Connection point [3]				
Existing 150mm diameter watermain on Nunnville Road ID: WND6569890-WND6569891				
Pressure zone of connection point		6		
Total equivalent population to be serviced [1]		51 persons		
Total lands to be serviced		0.41 ha		
Hydrant flow test				
	Hydrant flow test location	Nunnville Road		
		Pressure (kPa)	Flow (in l/s)	Time
Minimum water pressure		379	92	
Maximum water pressure		448	55	

No.	Water Demand		
	Demand type	**Demand**	**Units**
1	Average day flow	0.17	l/s
2	Maximum day flow	0.33	l/s
3	Peak hour flow	0.50	l/s
4	Fire flow [2]	150.00	l/s
Analysis			
5	Maximum day plus fire flow	150.50	l/s

WASTEWATER CONNECTION

Phase 1

Connection point [4]		
Future 250mm diameter PVC sanitary sewer on Nunnville Road Wastewater Line ID: SMH6579831-SMH6579832		
Total equivalent population to be serviced		51 persons
Total lands to be serviced		0.41 ha
6	Wastewater sewer effluent (l/s)	0.80

[1] Please refer to design criteria for population equivalencies
[2] Please reference the Fire Underwriters Survey Document
[3] Please specify the connection point ID
[4] Please specify the connection point (wastewater line or manhole ID)
Also, the "total equivalent population to be serviced" and the "total lands to be serviced" should reference the connection point. (the FSR should contain one copy of Site Servicing Plan)

Please include the graphs associated with the hydrant flow test information table
Please provide Professional Engineer's signature and stamp on the demand table
All required calculations must be submitted with the demand table submission.

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Project: 13290 Nunnville Rd
Project No.: 649-6278
Prepared By: OS
Checked By: JB/PS
Date: 2022.03.30
Updated: 2022.04.22

WATER DEMAND CALCULATIONS

13290 Nunnville Road, Town of Caledon

Note: Based on Concept Plan provided by WSP Global Inc. dated April 5, 2022.

			References
Population Density	3.4	persons/unit	Population density as per email corespondence with Iwona Frandsen from the Region of Peel.
Number of Units	15		
Total Population	51	persons	
Average Daily Demand	280	L/cap/day	Region of Peel Public Works Design, Specifications & Procedures Manual, Linear Infrastructure, Watermain Design Criteria, Table 1, Section 2.3 (Revised June 2010)
	14,280.00	L/day	
	0.17	**L/s**	
Maximum Daily Demand Peaking Factor	2.0		Region of Peel Public Works Design, Specifications & Procedures Manual, Linear Infrastructure, Watermain Design Criteria, Table 1, Section 2.3 (Revised June 2010)
Maximum Hourly Demand Peaking Factor	3.0		
Maximum Daily Flow	28,560.00	L/day	
	0.33	**L/s**	
Peak Hour Flow	42,840.00	L/day	
	0.50	**L/s**	

CROZIER CONSULTING ENGINEERS

13290 Nunnville Road, Town of Caledon
Fire Flow Calculation, North Block (6 Units)

Date: 2022.03.07
Designed By: OS
Checked By: JB/PS
Updated: 2022.04.13

Water Supply for Public Fire Protection
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

1. An estimate of fire flow required for a given area may be determined by the formula:

$$F = 220 * C * \sqrt{A}$$

where

F = the required fire flow in litres per minute

C = coefficient related to the type of construction:

=	1.5	for wood frame construction (structure essentially all combustible)
=	1.0	for ordinary construction (brick or other masonry walls, combustible floor and interior)
=	0.8	for non-combustible construction (unprotected metal structural components)
=	0.6	for fire-resistive construction (fully protected frame, floors, roof)

A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings

Area of North Block (6 Units): 567.3 **sq.m**

Based on Concept Plan provided by WSP Global Inc. dated March 23, 2022.

A = 567 sq.m.
C = 1.0 ordinary construction

Therefore F = 5,240 L/min

Fire flow determined above shall not exceed:
30,000 L/min for wood frame construction
30,000 L/min for ordinary construction
25,000 L/min for non-combustible construction
25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Burning	25%
Combustible	0% (No Change)		

Rapid Burning 25%

1,310 L/min reduction
6,550 L/min

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above maybe reduced by up to 50% for complete automatic sprinkler protection. The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards. 10% may be granted if the water supply is standard for both the system and fire departement hose lines required. Additional credit of up to 10% may be given for a fully supervised system.

Building will not have automatic sprinklers per NFPA 13 (typical 30% reduction)

0 L/min reduction

13290 Nunnville Road, Town of Caledon
Fire Flow Calculation, North Block (6 Units)

Water Supply for Public Fire Protection
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

Separation	Charge	Separation	Charge
0 to 3 m	25%	20.1 to 30 m	10%
3.1 to 10 m	20%	30.1 to 45 m	5%
10.1 to 20 m	15%	> 45 m	0%

Exposed buildings

Name	Description	Distance		
North	Forest	> 45 m	0%	0.00
East	East Block	15 m	15%	589.50
South	South Block	19 m	15%	589.50
West	Forest	> 45 m	0%	0.00

1,179 L/min Surcharge

Determine Required Fire Flow

No.1	5,240	
No. 2	1,310 reduction	
No. 3	0 reduction	
No. 4	1,179 surcharge	
Required Flow:	**7,729 L/min**	
Rounded to nearest 1000 L/min:	**8,000 L/min** or	133.3 L/s
		2,113 USGPM

Required Flow (L/s):	134
Duration (hr):	2.00

Required Duration of Fire Flow	
Flow Required L/min	Duration (hours)
2,000 or less	1.0
3,000	1.25
4,000	1.5
5,000	1.75
6,000	2.0
8,000	2.0
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20,000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32,000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

CROZIER CONSULTING ENGINEERS

13290 Nunnville Road, Town of Caledon
Fire Flow Calculation, East Block (3 Units)

Date: 2022.03.07
Designed By: OS
Checked By: JB/PS
Updated: 2022.03.25

Water Supply for Public Fire Protection
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

1. An estimate of fire flow required for a given area may be determined by the formula:

$$F = 220 * C * \sqrt{A}$$

where

F = the required fire flow in litres per minute

C = coefficient related to the type of construction:

=	1.5	for wood frame construction (structure essentially all combustible)
=	1.0	for ordinary construction (brick or other masonry walls, combustible floor and interior)
=	0.8	for non-combustible construction (unprotected metal structural components)
=	0.6	for fire-resistive construction (fully protected frame, floors, roof)

A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings

Area of East Block (3 Units): 283.65 sq.m

Based on Concept Plan provided by WSP Global Inc. dated March 23, 2022.

A = 284 sq.m.
C = 1.0 ordinary construction

Therefore F = 3,705 L/min

Fire flow determined above shall not exceed:
30,000 L/min for wood frame construction
30,000 L/min for ordinary construction
25,000 L/min for non-combustible construction
25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Burning	25%
Combustible	0% (No Change)		

Rapid Burning 25%

926 L/min reduction
4,632 L/min

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above maybe reduced by up to 50% for complete automatic sprinkler protection. The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards. 10% may be granted if the water supply is standard for both the system and fire departement hose lines required. Additional credit of up to 10% may be given for a fully supervised system.

Building will not have automatic sprinklers per NFPA 13 (typical 30% reduction)

0 L/min reduction

13290 Nunnville Road, Town of Caledon
Fire Flow Calculation, East Block (3 Units)

Water Supply for Public Fire Protection
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

Separation	Charge	Separation	Charge
0 to 3 m	25%	20.1 to 30 m	10%
3.1 to 10 m	20%	30.1 to 45 m	5%
10.1 to 20 m	15%	> 45 m	0%

Exposed buildings

Name	Description	Distance		
North	Nunnville Road	> 45 m	0%	0.00
East	Residential Building	8 m	20%	555.78
South	South Block	26 m	10%	277.89
West	North Block	15 m	15%	416.84

1,251 L/min Surcharge

Determine Required Fire Flow

No.1	3,705	
No. 2	926 reduction	
No. 3	0 reduction	
No. 4	1,251 surcharge	
Required Flow:	**5,882 L/min**	
Rounded to nearest 1000 L/min:	**6,000 L/min** or	100.0 L/s 1,585 USGPM

Required Flow (L/s):	100
Duration (hr):	2.00

Required Duration of Fire Flow	
Flow Required L/min	Duration (hours)
2,000 or less	1.0
3,000	1.25
4,000	1.5
5,000	1.75
6,000	2.0
8,000	2.0
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20,000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32,000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

CROZIER CONSULTING ENGINEERS

13290 Nunnville Road, Town of Caledon
Fire Flow Calculation, South Block (6 Units)

Date: 2022.03.07
Designed By: OS
Checked By: JB/PS
Updated: 2022.03.25

Water Supply for Public Fire Protection
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

1. An estimate of fire flow required for a given area may be determined by the formula:

$$F = 220 * C * \sqrt{A}$$

where

F = the required fire flow in litres per minute

C = coefficient related to the type of construction:

=	1.5	for wood frame construction (structure essentially all combustible)
=	1.0	for ordinary construction (brick or other masonry walls, combustible floor and interior)
=	0.8	for non-combustible construction (unprotected metal structural components)
=	0.6	for fire-resistive construction (fully protected frame, floors, roof)

A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings

Area of South Block (6 Units): 567.3 sq.m

Based on Concept Plan provided by WSP Global Inc. dated March 23, 2022.

A = 567 sq.m.
C = 1.0 ordinary construction

Therefore F = 5,240 L/min

Fire flow determined above shall not exceed:
30,000 L/min for wood frame construction
30,000 L/min for ordinary construction
25,000 L/min for non-combustible construction
25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Burning	25%
Combustible	0% (No Change)		

Rapid Burning 25%

1,310 L/min reduction
6,550 L/min

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above maybe reduced by up to 50% for complete automatic sprinkler protection. The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards. 10% may be granted if the water supply is standard for both the system and fire departement hose lines required. Additional credit of up to 10% may be given for a fully supervised system.

Building will not have automatic sprinklers per NFPA 13 (typical 30% reduction)

0 L/min reduction

13290 Nunnville Road, Town of Caledon
Fire Flow Calculation, South Block (6 Units)

Water Supply for Public Fire Protection
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

Separation	Charge	Separation	Charge
0 to 3 m	25%	20.1 to 30 m	10%
3.1 to 10 m	20%	30.1 to 45 m	5%
10.1 to 20 m	15%	> 45 m	0%

Exposed buildings

Name	Description	Distance		
North	North Block	19 m	15%	589.50
East	East Block	26 m	10%	393.00
South	Residential Building	8 m	20%	786.00
West	Forest	> 45 m	0%	0.00

1,768 L/min Surcharge

Determine Required Fire Flow

No.1	5,240	
No. 2	1,310 reduction	
No. 3	0 reduction	
No. 4	1,768 surcharge	
Required Flow:	**8,318 L/min**	
Rounded to nearest 1000 L/min:	**9,000 L/min** or	150.0 L/s
		2,378 USGPM

Required Flow (L/s):	150
Duration (hr):	2.00

Required Duration of Fire Flow

Flow Required L/min	Duration (hours)
2,000 or less	1.0
3,000	1.25
4,000	1.5
5,000	1.75
6,000	2.0
8,000	2.0
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20,000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32,000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

CROZIER
CONSULTING ENGINEERS

13290 Nunnville Road, Town of Caledon
Fire Flow Calculation, Summary

Date: 2022.03.07
Designed By: OS
Checked By: JB/PS
Updated: 2022.03.25

Fire Underwriters Survey Summary		
Block	**Required Fire Flow** (L/s)	**Duration** (hr)
North	134	2.00
East	100	2.00
South	150	2.00

5-200 Connie Cres. Concord ON L4K 1M1 Phone 416-883-9777 Fax 905-303-6977

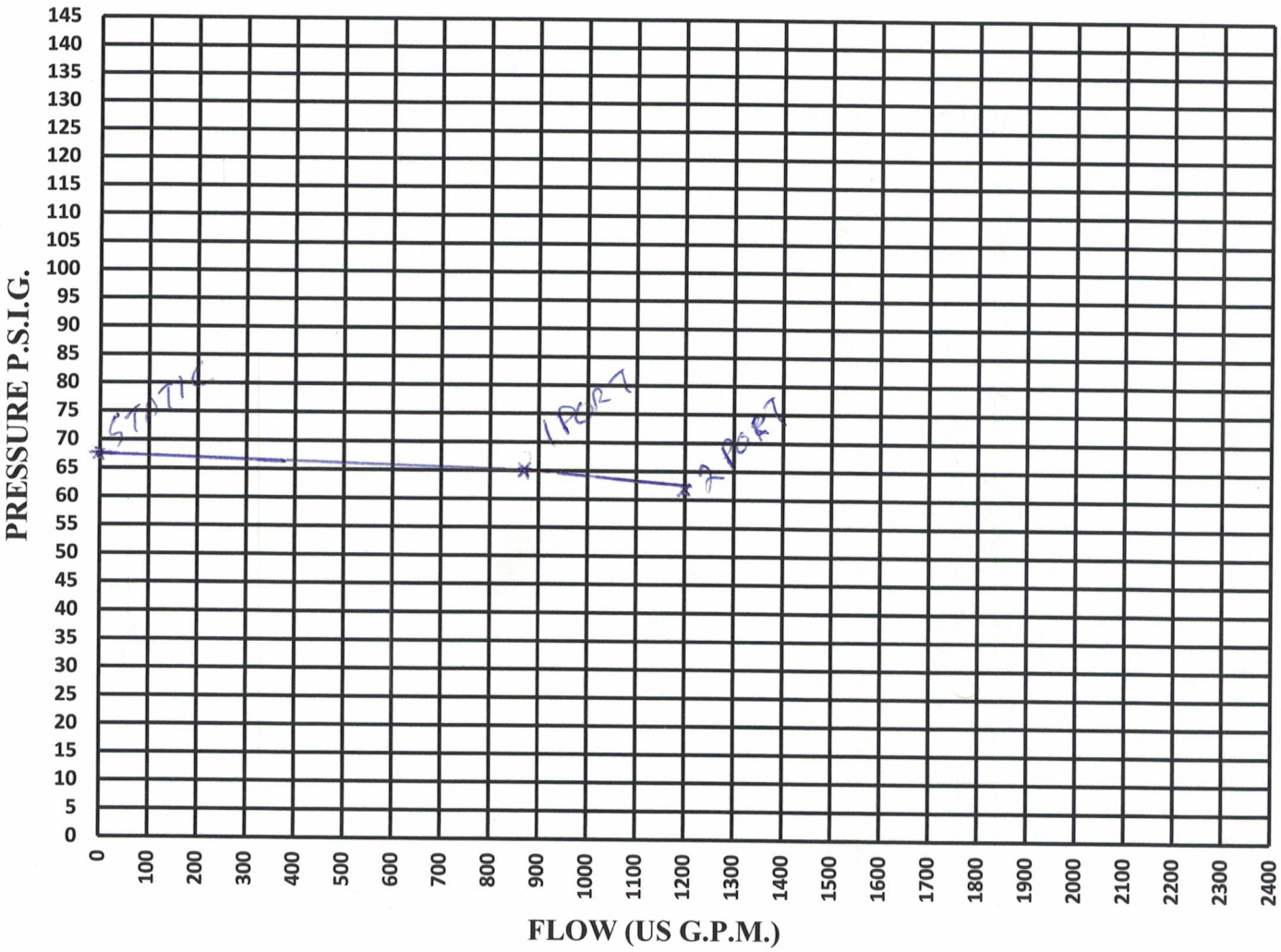
FLOW TEST REPORT

LOCATION OF RESIDUAL HYDRANT 13160 Nunnville Road

LOCATION OF FLOW HYDRANT 13259 Nunnville Road

TIME OF TEST 12:00 WATERMAIN SIZE 150mm STATIC PRESSURE 67

NUMBER OF OUTLETS	PITOT PRESSURE	FLOW (US G.P.M.)	RESIDUAL PRESSURE
One 2 ½" hydrant port	27	870	65
Two 2 ½" hydrant port	13	1207	62



PROJECT LOCATION Nunnville Road, Bolton DATE 04/18/19

COMPANY NAME SALV Inc. (PRINT NAME) AQUAZITION EMPLOYEE JASON WALING (PRINT NAME)

5-200 Connie Cres. Concord ON L4K 1M1 Phone 416-883-9777 Fax 905-303-6977

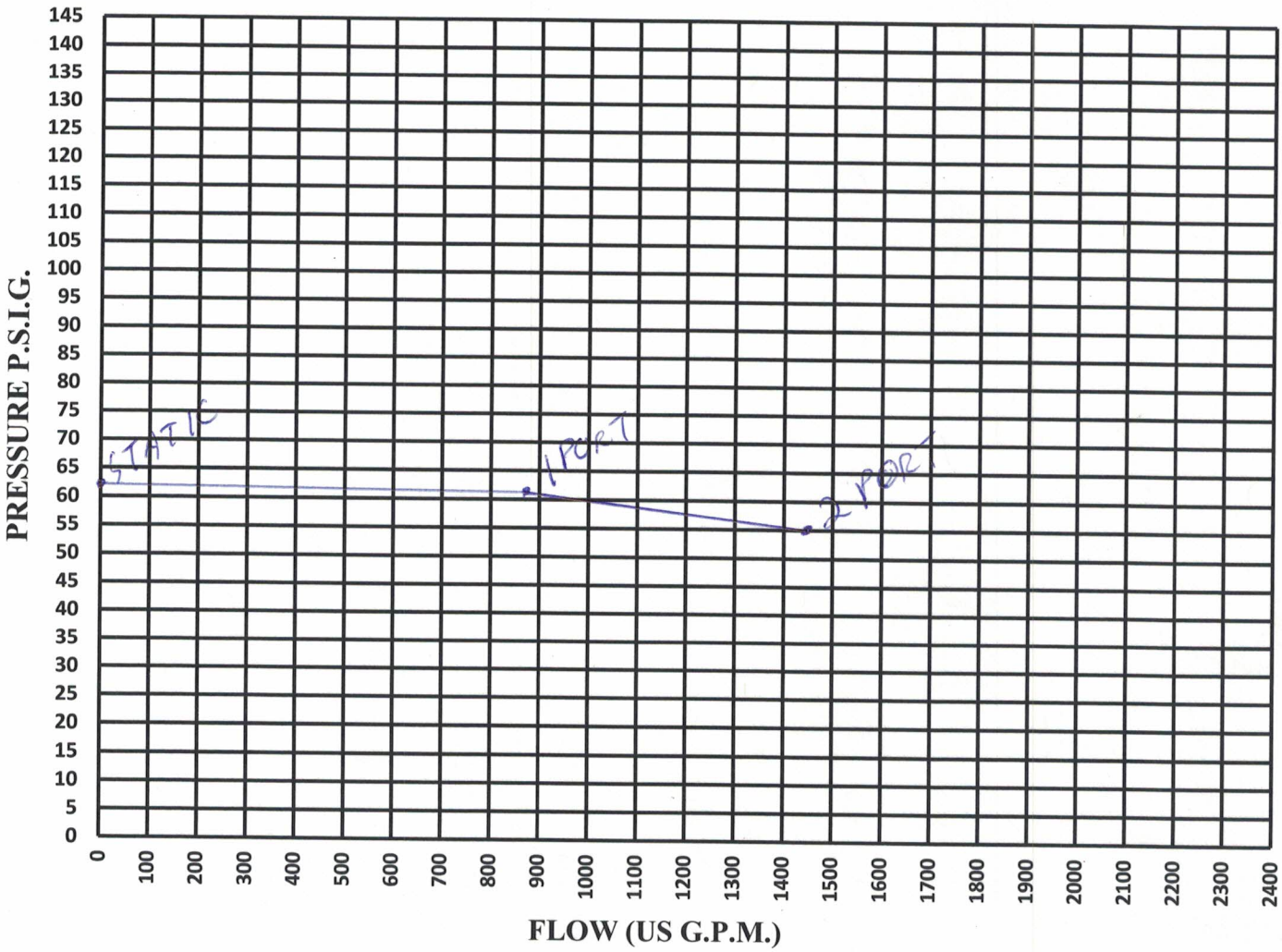
FLOW TEST REPORT

LOCATION OF RESIDUAL HYDRANT 13259 NUNNVILLE RD

LOCATION OF FLOW HYDRANT 13160 NUNNVILLE RD

TIME OF TEST 12:15 WATERMAIN SIZE 150 mm STATIC PRESSURE 62

NUMBER OF OUTLETS	PITOT PRESSURE	FLOW (US G.P.M.)	RESIDUAL PRESSURE
One 2 ½" hydrant port	27	870	61
Two 2 ½" hydrant port	19	1459	55



PROJECT LOCATION NUNNVILLE RD BOLTON DATE 04/18/19

COMPANY NAME SALV INC AQUAZITION EMPLOYEE J. MORGBIN

(PRINT NAME) (PRINT NAME)

CROZIER
CONSULTING ENGINEERS

PROJECT: Nunnville Road
PROJECT No.: 649-6278
DATE: 2019.04.23
UPDATE: 2022.04.13
DESIGN: JB
CHECK: PS

Projected Fire Flow Calculations - 1

Test	Hydrant Location / ID	Static Pressure	Residual Pressure during Test	Flow from Hydrant Test	Desired Residual Pressure*	Projected Fire Flow Available at 20 psi	
		Ps	Pt	Qt	Pr	Qr	
		(psi)	(psi)	(USGPM)	(psi)	(USGPM)	L/s
1	Nunnville Road	67	65	870	40	3,547	224
2			62	1207		3,001	189

$Q_r = Q_t \times ((P_s - P_r)/(P_s - P_t))^{0.54}$ Formula to determine available flow as per AWWA M17 (1989)

NOTE: Projected fire flows are calculated on the basis of hydrant tests carried out by Aqualization on April 18, 2019 at 12:15 pm.

Note Region of peel operation pressures 40-100 psi

CROZIER CONSULTING ENGINEERS

PROJECT: Nunnville Road
PROJECT No.: 649-6278
DATE: 2019.04.23
UPDATE: 2022.04.13
DESIGN: JB
CHECK: PS

Projected Fire Flow Calculations - 2

Test	Hydrant Location / ID	Static Pressure	Residual Pressure during Test	Flow from Hydrant Test	Desired Residual Pressure*	Projected Fire Flow Available at 20 psi	
		Ps	Pt	Qt	Pr	Qr	
		(psi)	(psi)	(USGPM)	(psi)	USGPM	L/s
1	Nunnville Road	62	61	870	40	4,618	291
2			55	1459		2,708	171

$Q_r = Q_t \times ((P_s - P_r)/(P_s - P_t))^{0.54}$ Formula to determine available flow as per AWWA M17 (1989)

NOTE: Projected fire flows are calculated on the basis of hydrant tests carried out by Aqualization on April 18, 2019 at 12:15 pm.

Note Region of peel operation pressures 40-100 psi

APPENDIX B

Sanitary Demand Calculations

CROZIER
CONSULTING ENGINEERS

Project: 13290 Nunnville Road
Project No.: 649-6278
Prepared By: OS
Checked By: JB
Date: 2022.03.30
Updated: 2022.04.22

SANITARY FLOW CALCULATIONS
13290 Nunnville Road, Town of Caledon

Note: Based on Concept Plan provided by WSP Global Inc. dated April 5, 2022.

				References
	Total Site Area	0.41	ha	
	Population Density	3.4	persons/unit	Population density as per email corespondence with Iwona Frandsen from the Region of Peel.
	Number of Units	15		
	Total Population	51	persons	
Average daily demand		302.8	L/person/day	Region of Peel 2013 Water and Wastewater Master Plan for the Lake-Based System, Volume IV - Wastewater master Plan, Table 4.1, Section 2.1.1. (March 31, 2014)
Harmon Peaking Factor (M) M = 1+(14/(4+p^0.5))		4.00	(Max Harmon Peaking Factor of 4.00)	Region of Peel Public Works Design, Specifications & Procedures Manual, Linear Infrastructure, Sanitary Sewer Design Criteria, Sectin 2.2 (Modified March 2017).
Average Daily Flow		15,442.80	L/day	
		0.18	**L/s**	
Peak Flow		61,771.20	L/day	
		0.71	**L/s**	
Infiltration		0.20	L/s/ha	Region of Peel 2013 Water and Wastewater Master Plan for the Lake-Based System, Volume IV - Wastewater master Plan, Section 2.1.3. (March 31, 2014)
		0.08	**L/s**	
Total Sanitary Flow		**0.80**	**L/s**	

APPENDIX C

Stormwater Design Calculations

Project: 13290 Nunnville Road
Project No.: 649-6278
Created By: OS
Reviewed By: JB/PS
Date: 2022.03.09
Updated: 2022.04.13

Modified Rational Calculations - Input Parameters
13290 Nunnville Road, Town of Caledon

Storm Data: Caledon

Time of Concentration: T_c = **10** **min** (per Town of Caledon standards)

Return Period	A	B	C	I (mm/hr)
2 yr	1070	8	0.8759	85.72
5 yr	1593	11	0.8789	109.68
10 yr	2221	12	0.9080	134.16
25 yr	3158	15	0.9335	156.47
50 yr	3886	16	0.9495	176.19
100 yr	4688	17	0.9624	196.54

Pre - Development Conditions			
Catchment ID	**Area** (ha)	**Area** (m^2)	**Weighted Average C**
101	0.77	7,700	0.30
102	0.08	800	0.25
Total Site	**0.85**	8,500	**0.30**

Post- Development Conditions			
Catchment ID	**Area** (ha)	**Area** (m^2)	**Weighted Average C**
UC1	0.51	5,100	0.25
201	0.32	3,200	0.77
202	0.02	200	0.53
Total Site	**0.85**	8,500	**0.45**

Equations:

Peak Flow
$Q_{post} = 0.0028 \bullet C_{post} \bullet i(T_d) \bullet A$

Intensity
$i(T_d) = A / (T + B)^{\wedge}C$

CROZIER CONSULTING ENGINEERS

Project: 13290 Nunnville Road
Project No.: 649-6278
Created By: OS
Reviewed By: JB/PS
Date: 2022.03.09
Updated: 2022.04.13

2022.03.29

Target Flow Rates Summary

Storm Event (yr)	Flow Rates (L/s)							
	Pre-Development Flows			Post-Development Flows				
				Uncontrolled Flows		Target Control Flow	Control Flow	Total Outlet Flow
	Q_{101}	Q_{102}	$Q_{pre\text{-}total}$	Q_{UC1}	Q_{202}	$Q_{201} = Q_{pre} - Q_{UC1} - Q_{202}$	$Q_{201\text{ - }150\text{ mm orifice}}$	$Q_{post\text{-}total}$
2	55	5	**60**	31	3	27	27	**60**
5	71	6	**77**	39	3	35	34	**77**
10	87	8	**94**	48	4	42	41	**93**
25	101	9	**110**	56	5	49	47	**107**
50	114	10	**124**	63	5	56	51	**120**
100	127	11	**138**	70	6	62	56	**132**

Storm Event (yr)	Catchment 201 (150mm Orifice Tube)			
	Target Flow Rate $Q_{201} = Q_{pre} - Q_{UC1} - Q_{202}$	Flowrate L/s	Required Storage m^3	Provided Storage m^3
2	27	27	24	**110**
5	35	34	35	
10	42	41	44	
25	49	47	56	
50	56	51	66	
100	62	56	77	

CROZIER CONSULTING ENGINEERS

Project: 13290 Nunnville Road
Project No.: 649-6278
Created By: OS
Reviewed By: JB/PS
Date: 2022.03.09
Updated: 2022.04.13

2022.03.29

Modified Rational Calculations - 2 -Year Storm Event

Control Criteria

2 yr: Uncontrolled Post-Development Flow:

Q_{UC1} = 31 L/s

Q_{202} = 3 L/s

2 yr: Target Flow Rate:

Q_{101} = 55 L/s

Q_{102} = 5

$Q_{target\ 201}$ = 27 L/s

$Q_{orifice\ 202}$= 27 L/s **(150 mm orifice)**

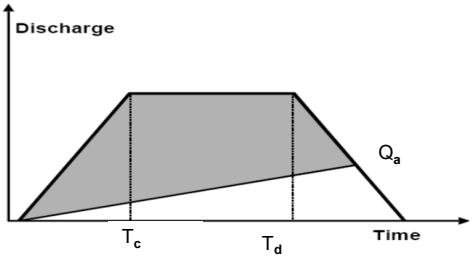
Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Post} (m^3/s)	S_d (m^3)
10	85.72	600	0.059	19.4
20	58.06	1200	0.040	23.9
30	44.38	1800	0.031	22.9
40	36.14	2400	0.025	19.6
50	30.60	3000	0.021	15.0
60	26.62	3600	0.018	9.7
70	23.60	4200	0.016	3.9
80	21.23	4800	0.015	-2.2
90	19.31	5400	0.013	-8.6
100	17.74	6000	0.012	-15.2
110	16.41	6600	0.011	-21.9
120	15.28	7200	0.011	-28.8
130	14.30	7800	0.010	-35.8
140	13.45	8400	0.009	-42.9
150	12.70	9000	0.009	-50.0
160	12.04	9600	0.008	-57.2
Required Storage Volume:				**23.9**

Peak Flow

$$Q_{post} = 0.0028 \cdot C_{post} \cdot i(T_d) \cdot$$

Storage

$$S_d = Q_{post} \cdot T_d - Q_{target} (T_d + T_c) / 2$$



Project: 13290 Nunnville Road
Project No.: 649-6278
Created By: OS
Reviewed By: JB/PS
Date: 2022.03.09
Updated: 2022.04.13

2022.03.29

Modified Rational Calculations - 5 -Year Storm Event

Control Criteria

5 yr: Uncontrolled Post-Development Flow:

Q_{UC1} = 39 L/s

Q_{202} = 3 L/s

5 yr: Target Flow Rate:

Q_{101} = 71 L/s

Q_{102} = 6 L/s

$Q_{target\ 202}$ = 35 L/s

$Q_{orifice\ 202}$ = 34 L/s **(150 mm orifice)**

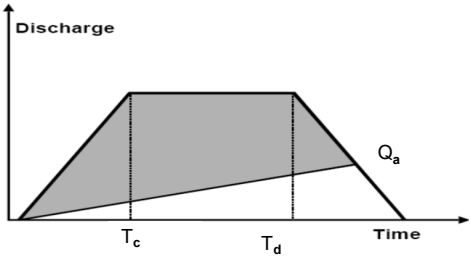
Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Post} (m^3/s)	S_d (m^3)
10	109.68	600	0.076	24.8
20	77.89	1200	0.054	33.6
30	60.92	1800	0.042	34.5
40	50.28	2400	0.035	31.9
50	42.96	3000	0.030	27.2
60	37.60	3600	0.026	21.4
70	33.48	4200	0.023	14.8
80	30.23	4800	0.021	7.6
90	27.58	5400	0.019	0.0
100	25.39	6000	0.018	-8.0
110	23.53	6600	0.016	-16.2
120	21.95	7200	0.015	-24.6
130	20.57	7800	0.014	-33.2
140	19.37	8400	0.013	-41.9
150	18.31	9000	0.013	-50.8
160	17.36	9600	0.012	-59.8
Required Storage Volume:				**34.5**

Peak Flow

$$Q_{post} = 0.0028 \cdot C_{post} \cdot i(T_d) \cdot$$

Storage

$$S_d = Q_{post} \cdot T_d - Q_{target} (T_d + T_c) / 2$$



Project: 13290 Nunnville Road
Project No.: 649-6278
Created By: OS
Reviewed By: JB/PS
Date: 2022.03.08
Updated: 2022.04.13

2022.03.29

Modified Rational Calculations - 10 -Year Storm Event

Control Criteria

10 yr: Uncontrolled Post-Development Flow:

Q_{UC1} = 48 L/s

Q_{202} = 4 L/s

10 yr: Target Flow Rate:

Q_{101} = 87 L/s

Q_{102} = 8 L/s

$Q_{target\ 202}$ = 42 L/s

$Q_{orifice\ 202}$ = 41 L/s **(150 mm orifice)**

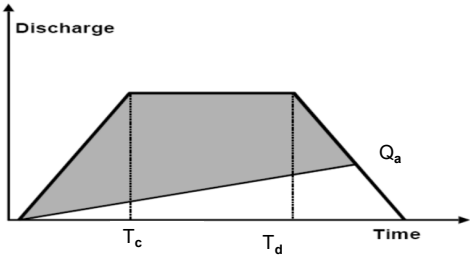
Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Post} (m^3/s)	S_d (m^3)
10	134.16	600	0.093	31.1
20	95.47	1200	0.066	42.4
30	74.58	1800	0.051	43.7
40	61.44	2400	0.042	40.6
50	52.37	3000	0.036	35.0
60	45.72	3600	0.032	28.0
70	40.63	4200	0.028	19.9
80	36.60	4800	0.025	11.2
90	33.32	5400	0.023	1.9
100	30.61	6000	0.021	-7.8
110	28.32	6600	0.020	-17.8
120	26.37	7200	0.018	-28.0
130	24.68	7800	0.017	-38.4
140	23.20	8400	0.016	-49.0
150	21.89	9000	0.015	-59.7
160	20.73	9600	0.014	-70.5
Required Storage Volume:				**43.7**

Peak Flow

$$Q_{post} = 0.0028 \cdot C_{post} \cdot i(T_d) \cdot$$

Storage

$$S_d = Q_{post} \cdot T_d - Q_{target} (T_d + T_c) / 2$$



Project: 13290 Nunnville Road
Project No.: 649-6278
Created By: OS
Reviewed By: JB/PS
Date: 2022.03.09
Updated: 2022.04.13

2022.03.29

Modified Rational Calculations - 25 -Year Storm Event

Control Criteria

25 yr: Uncontrolled Post-Development Flow:

Q_{UC1} = 56 L/s

Q_{202} = 5 L/s

25 yr: Target Flow Rate:

Q_{101} = 101 L/s

Q_{102} = 9 L/s

$Q_{target\ 202}$ = 49 L/s

$Q_{orifice\ 202}$ = 47 L/s **(150 mm orifice)**

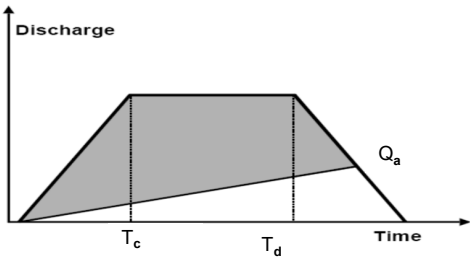
Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Post} (m^3/s)	S_d (m^3)
10	156.47	600	0.108	36.6
20	114.29	1200	0.079	52.3
30	90.39	1800	0.062	55.9
40	74.95	2400	0.052	53.6
50	64.13	3000	0.044	48.1
60	56.11	3600	0.039	40.7
70	49.92	4200	0.034	31.9
80	45.00	4800	0.031	22.1
90	40.99	5400	0.028	11.7
100	37.65	6000	0.026	0.8
110	34.83	6600	0.024	-10.6
120	32.41	7200	0.022	-22.3
130	30.32	7800	0.021	-34.2
140	28.49	8400	0.020	-46.3
150	26.88	9000	0.019	-58.7
160	25.44	9600	0.018	-71.2
Required Storage Volume:				**55.9**

Peak Flow

$$Q_{post} = 0.0028 \cdot C_{post} \cdot i(T_d) \cdot$$

Storage

$$S_d = Q_{post} \cdot T_d - Q_{target} (T_d + T_c) / 2$$



Project: 13290 Nunnville Road
Project No.: 649-6278
Created By: OS
Reviewed By: JB/PS
Date: 2022.03.09
Updated: 2022.04.13

2022.03.29

Modified Rational Calculations - 50 -Year Storm Event

Control Criteria

50 yr: Uncontrolled Post-Development Flow:

Q_{UC1} = 63 L/s

Q_{202} = 5 L/s

50 yr: Target Flow Rate:

Q_{101} = 114 L/s

Q_{102} = 10 L/s

$Q_{target\ 202}$ = 56 L/s

$Q_{orifice\ 202}$ = 51 L/s **(150 mm orifice)**

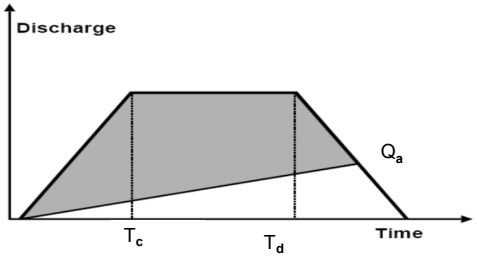
Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Post} (m^3/s)	S_d (m^3)
10	176.19	600	0.122	42.1
20	129.36	1200	0.089	60.8
30	102.50	1800	0.071	65.6
40	85.04	2400	0.059	63.7
50	72.75	3000	0.050	58.0
60	63.63	3600	0.044	50.1
70	56.58	4200	0.039	40.6
80	50.97	4800	0.035	30.0
90	46.40	5400	0.032	18.6
100	42.59	6000	0.029	6.6
110	39.37	6600	0.027	-5.8
120	36.62	7200	0.025	-18.6
130	34.23	7800	0.024	-31.7
140	32.15	8400	0.022	-45.1
150	30.30	9000	0.021	-58.6
160	28.67	9600	0.020	-72.3
Required Storage Volume:				**65.6**

Peak Flow

$$Q_{post} = 0.0028 \cdot C_{post} \cdot i(T_d) \cdot$$

Storage

$$S_d = Q_{post} \cdot T_d - Q_{target} (T_d + T_c) / 2$$



Project: 13290 Nunnville Road
Project No.: 649-6278
Created By: OS
Reviewed By: JB/PS
Date: 2022.03.09
Updated: 2022.04.13

2022.03.29

Modified Rational Calculations - 100 -Year Storm Event

Control Criteria

100 yr: Uncontrolled Post-Development Flow:

Q_{UC1} = 70 L/s

Q_{202} = 6 L/s

100 yr: Target Flow Rate:

Q_{101} = 127 L/s

Q_{102} = 11 L/s

$Q_{target\ 202}$ = 62 L/s

$Q_{orifice\ 202}$ = 56 L/s **(150 mm orifice)**

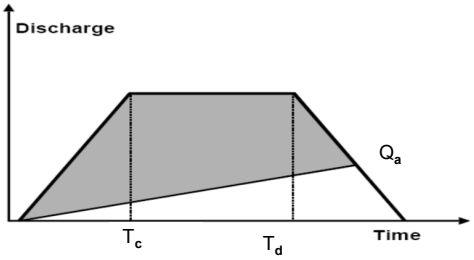
Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Post} (m^3/s)	S_d (m^3)
10	196.54	600	0.136	47.8
20	145.13	1200	0.100	69.9
30	115.28	1800	0.080	76.1
40	95.75	2400	0.066	74.8
50	81.95	3000	0.057	69.1
60	71.69	3600	0.049	60.8
70	63.74	4200	0.044	50.6
80	57.40	4800	0.040	39.3
90	52.23	5400	0.036	27.0
100	47.93	6000	0.033	14.1
110	44.29	6600	0.031	0.6
120	41.17	7200	0.028	-13.3
130	38.47	7800	0.027	-27.5
140	36.11	8400	0.025	-42.0
150	34.03	9000	0.023	-56.8
160	32.18	9600	0.022	-71.7
Required Storage Volume:				**76.1**

Peak Flow

$$Q_{post} = 0.0028 \cdot C_{post} \cdot i(T_d) \cdot$$

Storage

$$S_d = Q_{post} \cdot T_d - Q_{target} (T_d + T_c) / 2$$



CROZIER & ASSOCIATES
Consulting Engineers

Project: 13290 Nunnville Road
Project No.: 649-6278
Created By: OS
Reviewed By: JB/PS
Date: 2022.03.09
2022.03.29 2022.04.13

Orifice Design Summary - 2 Year Storm Event

Orifice Type	=	Tube	
Invert Elevation	=	241.08	m
Diameter of Orifice	=	150	mm
Area of Orifice (A)	=	0.0177	sq.m
Orifice Coefficient (Cd)	=	0.820	

Calculation of Head

Centroid Elevation	=	241.16	m
Water Elevation	=	241.33	m
Upstream Head*, (h)	=	0.18	m

Qa	=	**(Cd)(A)(2gh)^0.5**	
Actual Controlled Discharge, Qa	=	0.02685	cms
Qa	=	**26.85**	**L/s**

*Head is based upon orifice area @ orifice face not Vena Contracta

CROZIER & ASSOCIATES
Consulting Engineers

Project: 13290 Nunnville Road
Project No.: 649-6278
Created By: OS
Reviewed By: JB/PS
Date: 2022.03.09
2022.03.29 2022.04.13

Orifice Design Summary - 5 Year Storm Event

Orifice Type	=	Tube	
Invert Elevation	=	241.08	m
Diameter of Orifice	=	150	mm
Area of Orifice (A)	=	0.0177	sq.m
Orifice Coefficient (Cd)	=	0.820	

Calculation of Head

Centroid Elevation	=	241.16	m
Water Elevation	=	241.44	m
Upstream Head*, (h)	=	0.28	m

Qa	**=**	**(Cd)(A)(2gh)^0.5**	
Actual Controlled Discharge, Qa	**=**	0.03427	cms
Qa	**=**	**34.27**	**L/s**

*Head is based upon orifice area @ orifice face not Vena Contracta

CROZIER & ASSOCIATES
Consulting Engineers

Project: 13290 Nunnville Road
Project No.: 649-6278
Created By: OS
Reviewed By: JB/PS
Date: 2022.03.09
2022.03.29 2022.04.13

Orifice Design Summary - 10 Year Storm Event

Orifice Type =	Tube	
Invert Elevation =	241.08	m
Diameter of Orifice =	150	mm
Area of Orifice (A) =	0.0177	sq.m
Orifice Coefficient (Cd) =	0.820	

Calculation of Head

Centroid Elevation =	241.16	m
Water Elevation =	241.56	m
Upstream Head*, (h) =	0.40	m

Qa = **(Cd)(A)(2gh)^0.5**

Actual Controlled Discharge, Qa =	0.04076	cms
Qa =	**40.76**	**L/s**

*Head is based upon orifice area @ orifice face not Vena Contracta

CROZIER & ASSOCIATES
Consulting Engineers

Project: 13290 Nunnville Road
Project No.: 649-6278
Created By: OS
Reviewed By: JB/PS
Date: 2022.03.09
2022.03.29 2022.04.13

Orifice Design Summary - 25 Year Storm Event

Orifice Type	=	Tube	
Invert Elevation	=	241.08	m
Diameter of Orifice	=	150	mm
Area of Orifice (A)	=	0.0177	sq.m
Orifice Coefficient (Cd)	=	0.820	

Calculation of Head

Centroid Elevation	=	241.16	m
Water Elevation	=	241.69	m
Upstream Head*, (h)	=	0.54	m

Qa	**=**	**(Cd)(A)(2gh)^0.5**	
Actual Controlled Discharge, Qa	**=**	0.04699	cms
Qa	**=**	**46.99**	**L/s**

*Head is based upon orifice area @ orifice face not Vena Contracta

CROZIER & ASSOCIATES
Consulting Engineers

Project: 13290 Nunnville Road
Project No.: 649-6278
Created By: OS
Reviewed By: JB/PS
Date: 2022.03.09
2022.03.29 2022.04.13

Orifice Design Summary - 50 Year Storm Event

Orifice Type =	Tube	
Invert Elevation =	241.08	m
Diameter of Orifice =	150	mm
Area of Orifice (A) =	0.0177	sq.m
Orifice Coefficient (Cd) =	0.820	

Calculation of Head

Centroid Elevation =	241.16	m
Water Elevation =	241.80	m
Upstream Head*, (h) =	0.64	m

Qa = **(Cd)(A)(2gh)^0.5**

Actual Controlled Discharge, Qa =	0.05141	cms
Qa =	**51.41**	**L/s**

*Head is based upon orifice area @ orifice face not Vena Contracta

Project: 13290 Nunnville Road
Project No.: 649-6278
Created By: OS
Reviewed By: JB/PS
Date: 2022.03.09
2022.03.29 2022.04.13

Orifice Design Summary - 100 Year Storm Event

Orifice Type	=	Tube	
Invert Elevation	=	241.08	m
Diameter of Orifice	=	150	mm
Area of Orifice (A)	=	0.0177	sq.m
Orifice Coefficient (Cd)	=	0.820	

Calculation of Head

Centroid Elevation	=	241.16	m
Water Elevation	=	241.91	m
Upstream Head*, (h)	=	0.76	m

Qa	**=**	**(Cd)(A)(2gh)^0.5**	
Actual Controlled Discharge, Qa	**=**	0.05585	cms
Qa	**=**	**55.85**	**L/s**

*Head is based upon orifice area @ orifice face not Vena Contracta

CROZIER & ASSOCIATES
Consulting Engineers

Project: 13290 Nunnville Road
Project No.: 649-6278
Created By: OS
Reviewed By: JB/PS
Date: 2022.03.09
Update: 2022.04.13

Provided Storage			
Diameter of Pipe (mm)	**Length of Pipe** (m)	**Cross Sectional Area of Pipe** (m^2)	**Provided Storage** (m^3)
1200	97	1.13	109.7

Super Pipe Summary				
Storm Event (yr)	**Storage Required (m3)**	**Storage Provided (m3)**	**Percent Full**	**HWL (m)**
2	23.90	109.70	22%	241.33
5	34.53	109.70	31%	241.44
10	43.71	109.70	40%	241.56
25	55.86	109.70	51%	241.69
50	65.59	109.70	60%	241.80
100	76.14	109.70	69%	241.91

Project: 13290 Nunnville Road
Project No.: 0649-6278

Date: 2022.03.28
Designed By: OS
Checked By: JB/PS
Updated: 2022.04.13

Enhanced Topsoil Design

Storage Required	Total Area of Additional Topsoil	Extra Topsoil Depth[1]	Soil Volume	Soil Porosity	Soil Field Capacity	Avalable Storage Volume[2]
m3	ha	mm	m3			m3
12.50	0.06	150.00	90.00	0.47	0.32	13.50

1. Topsoil depth in addition to the 150mm minimum covering the site, total topsoil depth = 300mm (150mm + 150mm = 300mm topsoil)
2. Water volume that can be stored for a given soil = (soil volume) x (soil porosity – soil field capacity)

Total Contributing Area 0.25 ha

Allowable Infiltration Rainfall Depth: 5 mm

Available Runoff Volume to be infiltrated: 12.50 m3

DRAWINGS AND FIGURES

10 0m 10 20

SCALE: 1:300

KEY PLAN

SCALE: N.T.S.

LEGEND

- PROPERTY LINE
- x 215.00 — EXISTING GRADE
- MUD-MAT; SEE DETAIL
- SF — SILT FENCE
- x — x — EXISTING FENCE
- LONG TERM STABLE TOP OF SLOPE (SOIL ENGINEERS DATED MARCH 25 2022)
- TREE PRESERVATION LINE & FENCE (KUNTZ FORESTRY, 2022)
- INTERNAL DEVELOPMENT LIMIT
- EXTERNAL ENTRANCE CIVIL WORKS LIMIT

SITE REMOVAL NOTE:

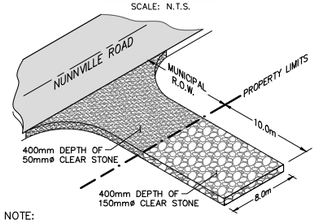
1. REMOVE ALL EXISTING SURFACE MATERIALS AS REQUIRED TO COMPLETE THE SITE WORKS AND DISPOSE OF OFF SITE
2. STRIP AND REMOVE ALL TOPSOIL
3. REMOVE ALL SURFACE INFRASTRUCTURE ON TOWN PROPERTY AS REQUIRED TO ACCOMODATE NEW CONSTRUCTION

EROSION & SEDIMENT CONTROL NOTES:

1. EROSION & SEDIMENT CONTROL MEASURES MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS.
2. EROSION & SEDIMENT CONTROLS MUST BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY RAIN FALL EVENT, AND MUST BE MAINTAINED AND REPAIRED IN A TIMELY MANNER TO PREVENT SEDIMENT FROM LEAVING THE SITE.
3. EXISTING AND PROPOSED CATCHBASINS ARE TO BE PROTECTED WITH FILTER CLOTH AND 150mm DEPTH OF 50mm DIA. STONE COVER DURING CONSTRUCTION.
4. IT IS REQUIRED TO STABILIZE ALL AREAS THAT WILL REMAIN DISTURBED FOR MORE THAN 30 DAYS.
5. MUD MAT, SILT FENCE, AND CATCHBASIN PROTECTION ARE NOT TO BE REMOVED UNTIL COMPLETION OF CONSTRUCTION.
6. ALL SILT FENCES SHOWN ARE OFFSET FROM PROPERTY LINE FOR CLARITY ONLY. INSTALL SILT FENCE IN SUITABLE LOCATION FOR THE DURATION OF THE PROJECT.
7. SEDIMENT AND EROSION CONTROL MEASURES WILL BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING THE CONSTRUCTION PHASES, TO PREVENT ENTRY OF SEDIMENT INTO THE WATER.
8. THE EROSION AND SEDIMENT CONTROL STRATEGIES OUTLINED ON THE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO PREVENT SEDIMENT RELEASES TO THE NATURAL ENVIRONMENT. THE TRCA ENFORCEMENT OFFICER SHOULD BE IMMEDIATELY CONTACTED SHOULD THE EROSION AND SEDIMENT CONTROL PLANS CHANGE FROM THE APPROVED PLANS.
9. ALL EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE INSPECTED WEEKLY, AFTER EVERY RAINFALL AND SIGNIFICANT SNOW MELT EVENT, AND DAILY DURING PERIODS OF EXTENDED RAIN OR SNOW MELT.
10. ALL DAMAGED EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE REPAIRED AND/OR REPLACED WITHIN 48 HOURS OF THE INSPECTION.
11. ALL DISTURBED AREAS WILL BE STABILIZED AND RESTORED WITH NATIVE/NON-INVASIVE SPECIES UPON COMPLETION OF THE WORK.
12. A REHABILITATION PLAN IS TO BE IMPLEMENTED TO RESTORE THE CONSTRUCTION SITE BACK TO ITS PRE-CONSTRUCTION STATE, OR BETTER.
13. THE CONTRACTOR SHALL MONITOR THE WEATHER SEVERAL DAYS IN ADVANCE OF THE ONSET OF THE PROJECT TO ENSURE THAT THE WORKS WILL BE CONDUCTED DURING FAVOURABLE WEATHER CONDITIONS.

MUD MAT DETAIL

SCALE: N.T.S.

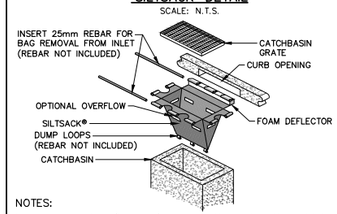


NOTE:

GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUAL) TO BE PLACED AS SEPARATION BARRIER BETWEEN EXISTING GROUND AND CLEAR STONE.

'SILTSACK' DETAIL

SCALE: N.T.S.



NOTES:

1. INSTALL TERRAFIX 'SILTSACK' IN ALL CATCHBASINS & CATCHBASIN MANHOLES AFFECTED BY CONSTRUCTION.
2. INSTALL TERRAFIX 'SILTSACK' IN ALL NEW CATCHBASINS & CATCHBASIN MANHOLES.

No.	ISSUE / REVISION	YYYY/MMM/DD
0	ISSUED FOR FIRST SUBMISSION	2022/APR/13

ELEVATION NOTE:

ELEVATIONS ARE GEODETIC IN ORIGIN AND ARE REFERRED TO FIRST ORDER BENCHMARK No.00819758057 HAVING AN ORTHOMETRIC ELEVATION OF 251.929 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928:1978)

SURVEY NOTES:

SKETCH FOR ENGINEER'S USE COMPLETED BY R-PE SURVEYING LTD. ON THE 23RD DAY OF FEBRUARY, 2022.
JOB No. 21-434

SITE PLAN NOTES:

DESIGN ELEMENTS SHOWN ARE BASED ON CONCEPT PLAN PREPARED BY WSP PROJECT No.: 211-09988-01 (2022/APR/05)

DRAWING NOTES:

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ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project

13290 NUNNVILLE RD TOWN OF CALEDON

Drawing

REMOVALS, EROSION & SEDIMENT CONTROL PLAN

NOT FOR CONSTRUCTION

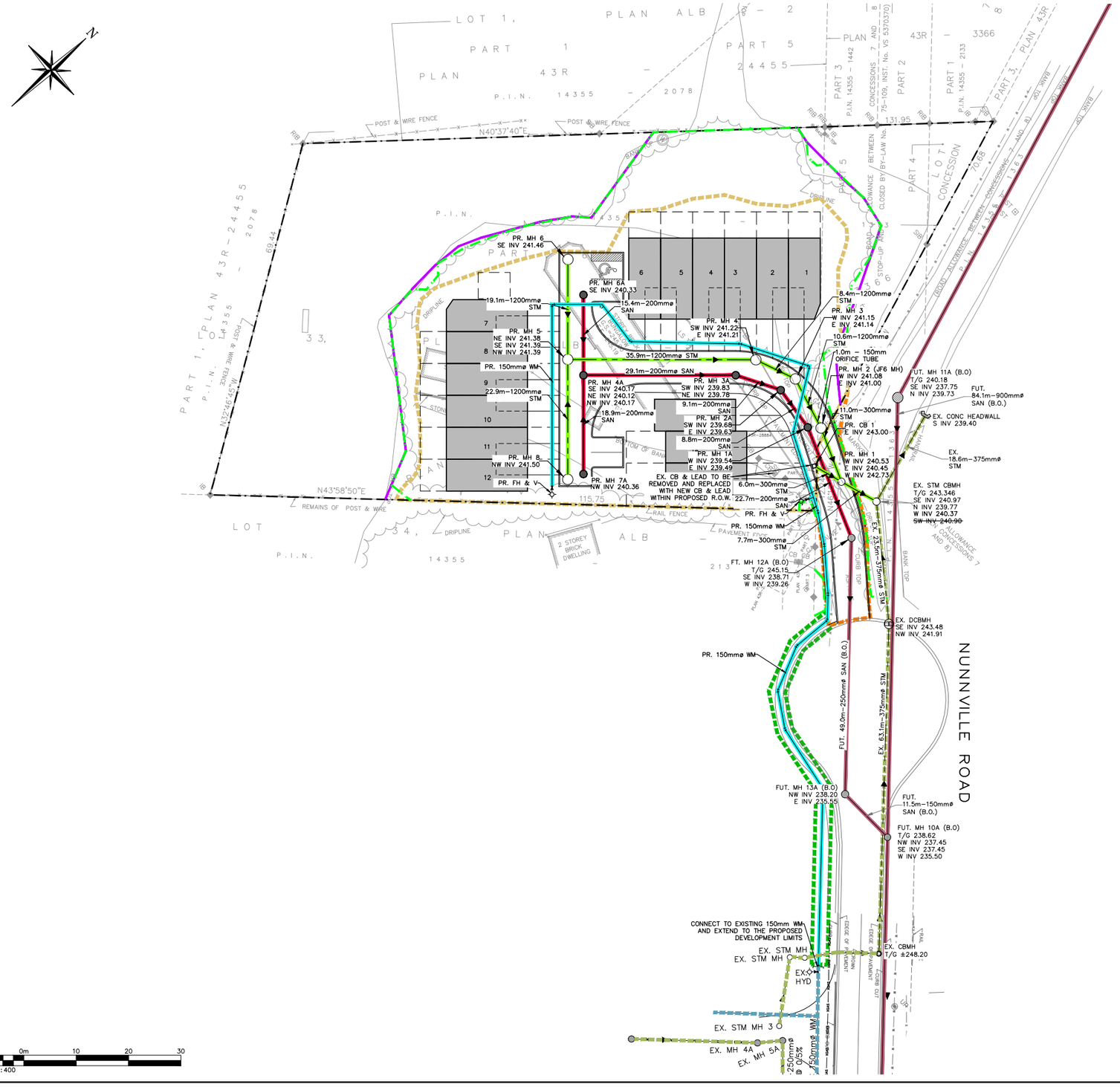
Engineer	Engineer

FOR REVIEW

NOT TO BE USED FOR CONSTRUCTION

CROZIER CONSULTING ENGINEERS
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905-875-0026 T
905-875-4915 F
www.CFCrozier.ca

Drawn	Design	Project No.	
P.S./J.B.	P.S./J.B.		649-6278
Check	Check	Scale	Dwg.
P.S.	P.S./N.C.	1:300	C101



KEY PLAN
SCALE: N.T.S.

LEGEND

- PROPERTY LINE
- EXISTING WATERMAIN & GATE VALVE
- EXISTING STORM SEWER & MANHOLE
- EXISTING SINGLE CATCHBASIN
- EXISTING SANITARY SEWER & MANHOLE
- PROPOSED WATERMAIN & GATE VALVE
- PROPOSED FIRE HYDRANT & GATE VALVE
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE CATCHBASIN
- PROPOSED SANITARY SEWER & MANHOLE
- FUTURE SANITARY SEWER & MANHOLE
- INTERNAL DEVELOPMENT LIMIT
- EXTERNAL ENTRANCE CIVIL WORKS LIMIT
- EXTERNAL WATERMAIN WORKS LIMIT
- LONG TERM STABLE TOP OF SLOPE (SOIL ENGINEERS DATED MARCH 25 2022)
- TREE PRESERVATION LINE & FENCE (KUNTZ FORESTRY, 2022)

No.	ISSUE / REVISION	YYYY/MMM/DD
0	ISSUED FOR FIRST SUBMISSION	2022/APR/13

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SURVEY NOTES:

SKETCH FOR ENGINEER'S USE COMPLETED BY R-PE SURVEYING LTD. ON THE 23RD DAY OF FEBRUARY, 2022.
JOB No. 21-434

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ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project

13290 NUNNVILLE RD
TOWN OF CALEDON

Drawing

PRELIMINARY
SITE SERVICING PLAN

NOT FOR CONSTRUCTION

Engineer | Engineer

FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

CROZIER CONSULTING ENGINEERS
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca

Drawn	Design	Project No.	
P.S./J.B.	P.S./J.B.	649-6278	
Check	Check	Scale	Dwg.
P.S.	P.S./N.C.	1:400	C102

KEY PLAN
SCALE: N.T.S.

LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING FENCE
- EXISTING STORM SEWER & MANHOLE
- EXISTING SANITARY SEWER & MANHOLE
- 215.00 EXISTING GRADE
- 215.00 PROPOSED GRADE
- 215.00 PROPOSED GRADE (TO MATCH EXISTING)
- 2.0% PROPOSED MINOR FLOW DIRECTION
- 2.0% PROPOSED GRASSED SWALE
- PROPOSED SLOPE (3:1 MAX.)
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- EXISTING MAJOR OVERLAND FLOW DIRECTION
- PROPOSED FIRE HYDRANT & GATE VALVE
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- DEVELOPMENT LIMIT
- EXTERNAL ENTRANCE CIVIL WORKS LIMIT
- LONG TERM STABLE TOP OF SLOPE (SOIL ENGINEERS DATED MARCH 25 2022)
- TREE PRESERVATION LINE & FENCE (KUNTZ FORESTRY, 2022)

No.	ISSUE / REVISION	YYYY/MMM/DD
0	ISSUED FOR FIRST SUBMISSION	2022/APR/13

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SURVEY NOTES:

SKETCH FOR ENGINEER'S USE COMPLETED BY R-PE SURVEYING LTD. ON THE 23RD DAY OF FEBRUARY, 2022.
JOB No. 21-434

SITE PLAN NOTES:

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Project

13290 NUNNVILLE RD
TOWN OF CALEDON

Drawing

PRELIMINARY
SITE GRADING PLAN

NOT FOR CONSTRUCTION

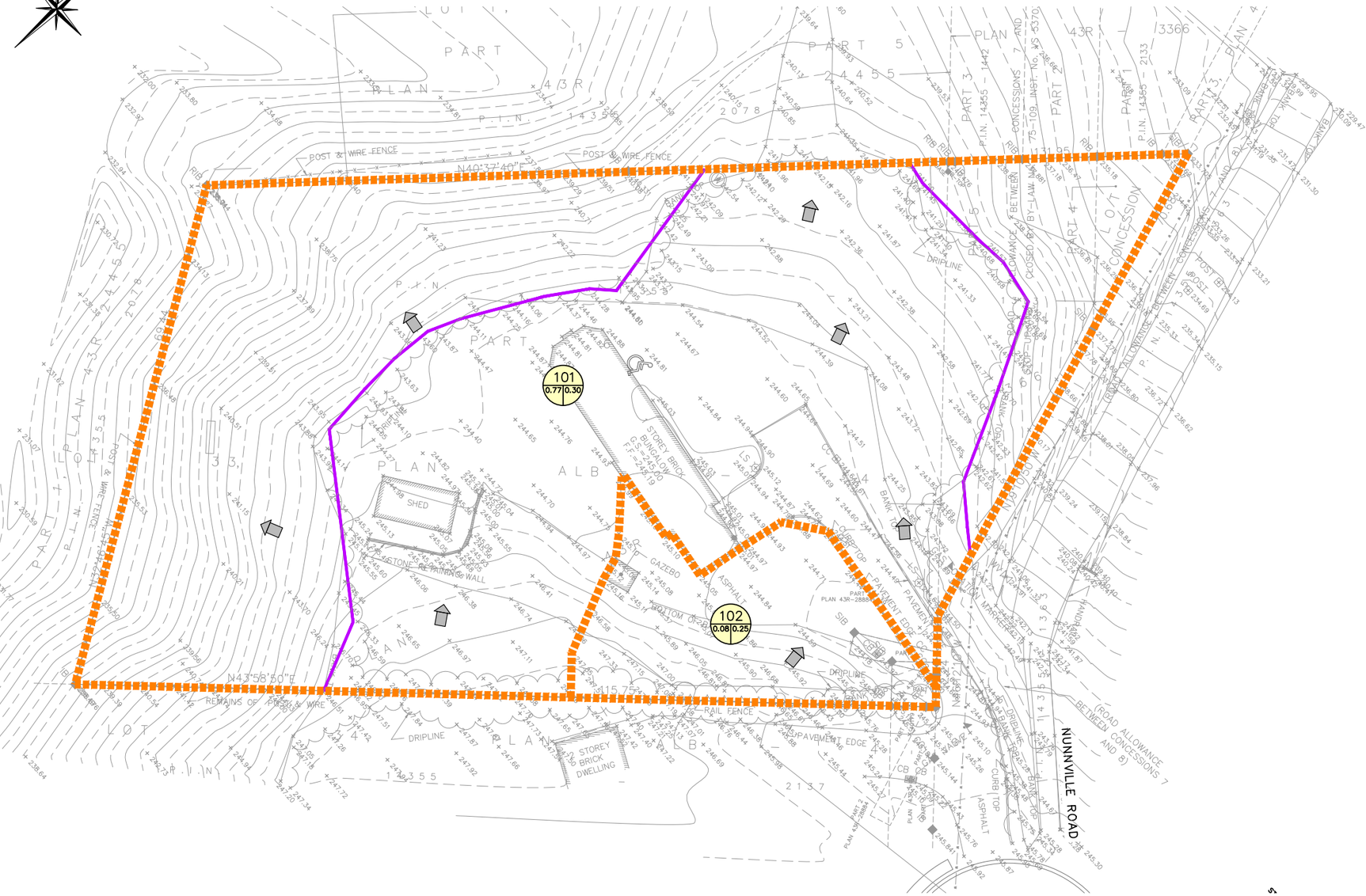
Engineer | Engineer

FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn	Design	Project No.	
P.S./J.B.	P.S./J.B.		649-6278
Check	Check	Scale	Dwg.
P.S.	P.S./N.C.	1:300	C103

10 0m 10 20
SCALE: 1:300



10 0m 10 20
SCALE: 1:300

KEY PLAN
SCALE: N.T.S.

LEGEND

- PROPERTY LINE
- STORM DRAINAGE CATCHMENT
- EXISTING OVERLAND FLOW DIRECTION
- ID / A | RC — CATCHMENT I.D. / AREA (ha) | RUNOFF COEFFICIENT
- LONG TERM STABLE TOP OF SLOPE (SOIL ENGINEERS DATED MARCH 25 2022)

No.	ISSUE / REVISION	YYYY/MMM/DD
0	ISSUED FOR FIRST SUBMISSION	2022/APR/13

ELEVATION NOTE:

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SURVEY NOTES:

SKETCH FOR ENGINEER'S USE COMPLETED BY R-PE SURVEYING LTD. ON THE 23RD DAY OF FEBRUARY, 2022.
JOB No. 21-434

SITE PLAN NOTES:

DESIGN ELEMENTS SHOWN ARE BASED ON CONCEPT PLAN PREPARED BY WSP PROJECT No.: 211-09988-01 (2022/APR/05)

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Project

13290 NUNNVILLE RD
TOWN OF CALEDON

Drawing

PRE-DEVELOPMENT DRAINAGE PLAN

NOT FOR CONSTRUCTION

Engineer | Engineer

FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905 875 0026 T
905 875 4915 F
WWW.CFCROZIER.CA

Drawn	Design	Project No.
P.S./J.B.	P.S./J.B.	649-6278
Check	Check	Scale
P.S.	P.S./N.C.	1:300

Dwg. FIG1

KEY PLAN
SCALE: N.T.S.

LEGEND

- PROPERTY LINE
- STORM DRAINAGE CATCHMENT
- EXISTING OVERLAND FLOW DIRECTION
- PROPOSED OVERLAND FLOW DIRECTION
- ID — CATCHMENT I.D.
- A | RC — AREA (ha) | RUNOFF COEFFICIENT
- LONG TERM STABLE TOP OF SLOPE (SOIL ENGINEERS DATED MARCH 25 2022)
- DEVELOPMENT LIMIT
- INTERNAL DEVELOPMENT LIMIT

No.	ISSUE / REVISION	YYYY/MMM/DD
0	ISSUED FOR FIRST SUBMISSION	2022/APR/13

ELEVATION NOTE:

ELEVATIONS ARE GEODETIC IN ORIGIN AND ARE REFERRED TO FIRST ORDER BENCHMARK No.00819758057 HAVING AN ORTHOMETRIC ELEVATION OF 251.929 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928:1978)

SURVEY NOTES:

SKETCH FOR ENGINEER'S USE COMPLETED BY R-PE SURVEYING LTD. ON THE 23RD DAY OF FEBRUARY, 2022.
JOB No. 21-434

SITE PLAN NOTES:

DESIGN ELEMENTS SHOWN ARE BASED ON CONCEPT PLAN PREPARED BY WSP PROJECT No.: 211-09988-01 (2022/APR/05)

DRAWING NOTES:

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ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project

13290 NUNNVILLE RD
TOWN OF CALEDON

Drawing

POST-DEVELOPMENT DRAINAGE PLAN

NOT FOR CONSTRUCTION

Engineer | Engineer

FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

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Drawn	Design	Project No.
P.S./J.B.	P.S./J.B.	649-6278
Check	Check	Scale / Dwg.
P.S.	P.S./N.C.	1:300 / FIG2