Functional Servicing Study
Proposed Furniture Workshop
1272 County Road 8

Prepared for:

Two Degrees North Inc
201 - 500 Keele Street
Toronto, ON M6N 3C9

Submitted By:

The Greer Galloway Group Inc.
1620 Wallbridge Loyalist Road
Belleville, ON K8N 4Z5

August 2021

GREER GALLOWAY
CONSULTING ENGINEERS

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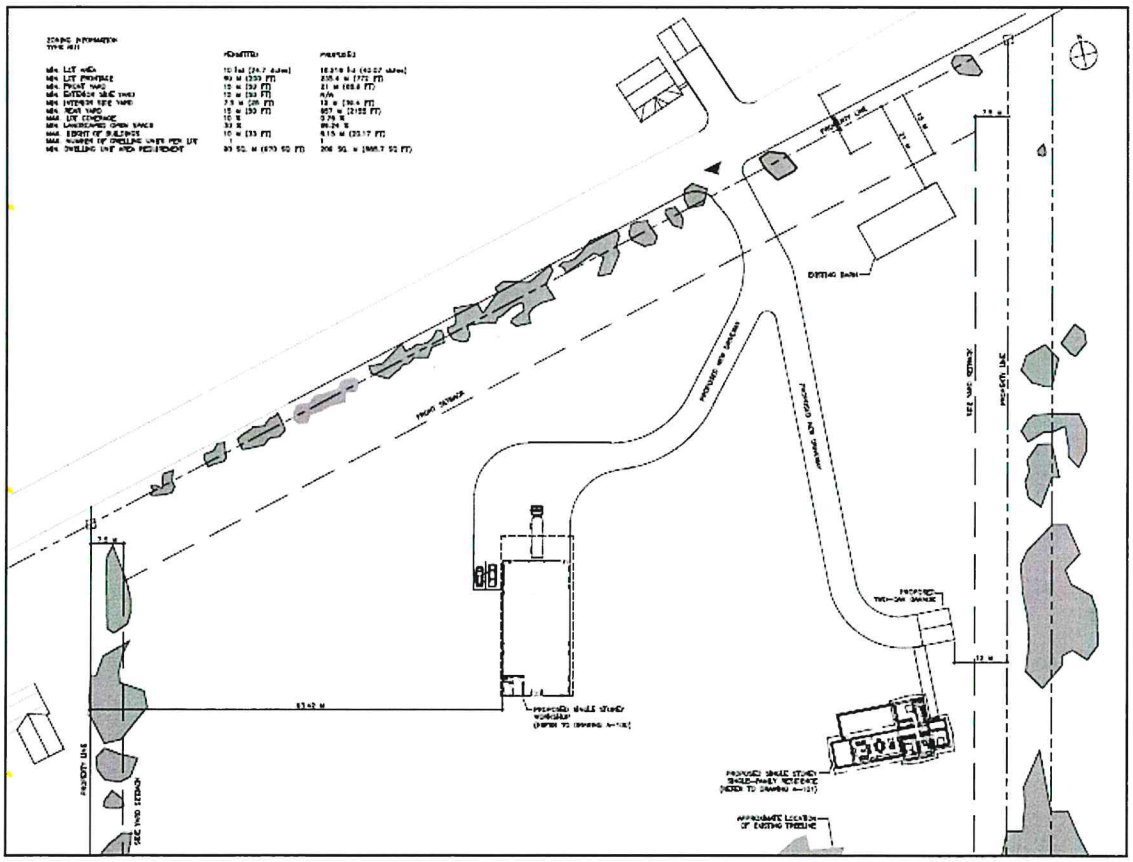
Appendix

1 Introduction

A 5000 square foot building is planned for a furniture manufacturing workshop and will require a rezoning application supported by a functional servicing study and engineering drawings illustrating various aspects of the development.

A functional servicing report will be prepared to cover water supply and distribution, sewage treatment and disposal, and stormwater management. A detailed topographic site survey will be completed of the area around the proposed works but it is typical and assumed that sufficient existing contour mapping will be available from OBM, PEC or available GIS to confirm the drainage characteristics of the surrounding lands.

This circulation describes how the servicing plan satisfies the objectives for the site, confirms spatial relationships of the plan within the confines of the site, and provides recommendations to be implemented in the detailed design. Where necessary, reasonable assumptions based on normal industry practices have been used and are described as such.



2 Water Servicing

2.1 Overview

There are two objectives regarding water servicing: providing domestic water supply as per Provincial, and County requirements, and ensuring that an adequate fire-fighting water supply is available as per Ontario Building Code and other Regional (i.e., FUS) requirements.

Confirmation of an adequate water supply is not as simple as the question of wastewater servicing. This is because such assessments normally follow guidance published in the Ministry of Environment Conservation and Parks Procedure D-5-5 which involves a 6-hour minimum duration test pumping at a rate suitable for residential water supply along with monitoring neighbouring wells for interference and assessing water quality against residential requirements. These guidelines are not suitable for the assessment of the proposed development because:

The required water quantities are too small for off-property effects to be seen in a 6-hour test at relevant pumping rates.

Effects from pumping at higher rates (currently unlimited as an agricultural use) cannot be extrapolated to low water takings of the volumes required from the proposed development.

In the absence of an established guidance for supply assessments for the proposed development we looked at the water volumes required, the ability of such volumes to be obtained at the site, and whether the water quality is suitable for the proposed operations or could be made suitable through commercially available treatment processes. Our analysis is summarized below:

2.2 Water Use Requirements

We understand that the proposed workshop will be a dry operation except for a single washroom containing a sink and toilet. If we consider the woodworking shop to be a factory then OBC Table 8.2.1.3.B gives a daily design sewage flow of 75 litres per employee or 150 L/day assuming that two persons work full time in the shop. Alternatively, a sink and toilet are 5.5 fixture units under OBC Table 8.2.1.3.B equivalent to 275 L/day. These flows are quite low and correspond to a constant flow rate of between 0.1 and 0.2 L/min.

2.3 Water Requirements for Fire Suppression

Requirements for an onsite water supply for firefighting at 1272 county road 8 were analyzed. The building to be constructed is a 5000sqft single story building used for woodworking. Woodworking is considered a medium hazard (group F-division 2) industrial operation.

According to article 1.1.2.4 of the Ontario Building Code 2012 revised (OBC), this building is classified as a part 9 group F building as it is less than 3 stories, less than 6458 square feet, and used for medium hazard (F-2) industrial operations.

Section 9.10 of the OBC which regulates fire protection in part 9 buildings does not contain any articles relating to the requirement for an on-site water supply for firefighting.

Section 6.0 of the Ontario Fire Marshal (OFM) guideline (OFM-TG_03-1999) regulates the requirements for onsite water supply. Section 6.0 of the OFM guideline states that part 9 buildings are not regulated under this guideline. Section 9.8 of the OFM guidelines states that the OBC does not require part 9 buildings to have an adequate on-site water supply for firefighting.

Based on this information, it can be concluded that 1272 County Road 8 will not require any onsite water supply for firefighting purposes.

2.4 Water Availability

Groundwater supply is available from a dug well (A223581) taken to 4.9 m depth in limestone bedrock. The driller tested this well at the time of the construction with pumping for one hour at a rate of approximately 400 L/min. Approximately 1 m of drawdown was observed, and the driller estimated the yield to be approximately 40 L/min. The recorded well yield is significantly greater than the water demand estimated for the wood shop whose daily water requirements can be met through less than 4 min of well production. The amount of water required for the planned washroom in the woodshop is low enough that it may be more cost effective to meet this requirement through the collection of roof runoff in a cistern than to excavate a trench in bedrock. The wood shop roof area (approximately 470 m^2, is large enough to generate about 1,000 L/day on an annualized basis. Collecting roof runoff in a 5,000 L cistern would provide more than a month's reserve supply based on OBC flows of 150 L/day. We therefore conclude that water supply for the proposed woodshop will not be a problem. The amount of the water taking is too small for well interference with neighbouring wells to be an issue (and too small for such interference to be assessed through pumping test methods).

2.5 Water Quality Requirements

While the water in the woodshop washroom is to be used primarily for non-potable purposes, we recommend treatment to potable standards. A water sample was obtained from the on-site well on June 15, 2021, following a short duration (20 min) pumping at a rate of 7 L/min using a Proactive Mini-Monsoon 12 Volt submersible purge pump. The static water level was measured at 1.88 m below the top of the well casing at the time of the sampling.

The well water sample was placed in variety of laboratory-prepared sample containers that were sealed, placed into a cooler with ice packs to maintain a temperature of approximately 4 °C and transported to Caduceon Laboratories in Kingston, Ontario. Analytical parameters included E. coli and total coliform bacteria, pH, total hardness, total alkalinity; calcium, magnesium, sodium; potassium; iron, manganese; chloride; sulphate; nitrate (NO3-N); nitrite (NO2-N), ammonia/ ammonium NH3-N; conductivity; dissolved organic carbon, suspended solids; and a variety of additional parameters (refer to the Laboratory Certificate of Analysis in Appendix X).

The water quality from the well is generally good with no exceedances of health-related water quality standards. However, shallow dug wells are intrinsically susceptible to bacterial contamination and for this reason a suitable treatment system such as ultraviolet disinfection or reverse osmosis is recommended. Should roof runoff be used for the water supply, provision should be made for chlorine injection to prevent bacteria from growing in the storage cistern.

3 Sewage Treatment/Disposal

The site conditions are considered suitable for the construction of private septic systems although the shallow bedrock will require the use of raised systems. Such systems must be constructed in accordance with Section 8 of the Ontario Building Code and must meet the following setback distances:

Table: Minimum Clearances for Distribution Piping

Object	Minimum Setback (m)
Structure	5

Object	Minimum Setback (m)
Well with a watertight casing to a depth of 6 m	15
Any other well	30
Pond	15
Stream	15
Property Line	3

Representative total daily design sanitary sewage flows were estimated using the Ontario Building Code (OBC) Table 8.2.1.3.B. Based on a daily design flow of 150 L/day, an appropriately sized filter bed and mantle would cover an area of about 100 m^2 with a septic tank of 3,600 L capacity (the minimum capacity permitted under the OBC).

Environmental impacts to groundwater from private sewage works are typically assessed under the MECP's Guideline entitled "Technical Guideline for Individual On-site Sewage Systems: Water Quality Impact Risk Assessment", dated August 1996 (Guideline D-5-4). In the case of nitrate[1], the Ontario Drinking Water Standard of 10 mg/L of nitrate-nitrogen is used as an indicator of groundwater impact potential.

The total nitrate loading to groundwater resulting from sewage disposal may be estimated by dividing the total nitrate input from a septic system by the volume of groundwater recharge over the property, and the volume of sewage effluent. Sewage effluent nitrate of 40 mg/L is assumed yielding a total nitrate (as N) load of 40 g/day of nitrate from sewage in accordance with MECP Procedure D-5-4. Total dilution is equal to the dilution generated by sewage flows and the total groundwater recharge over the property. At 40 mg/L and 150 L/day, the nitrate concentration will be much less than 10 mg/L in groundwater leaving the property under any realistic recharge rate.

[1] Nitrate is the principal contaminant of concern for "domestic" type sewage since other chemical constituents of sewage degrade quickly and are relatively immobile in the subsurface. Nitrate is formed by oxidation of the ammonia contained in human wastes and is the stable form of nitrogen in an oxidizing environment.

4 Stormwater Management

4.1 Existing / Proposed Conditions - General

The property located at 1272 County Road 8 in Prince Edward County is a rural lot, roughly 16 hectare (160,000m^2) in size has the following approximate lot dimensions:

- Back 210m
- Front 233m
- Side (West) 727m
- Side (East) 822m

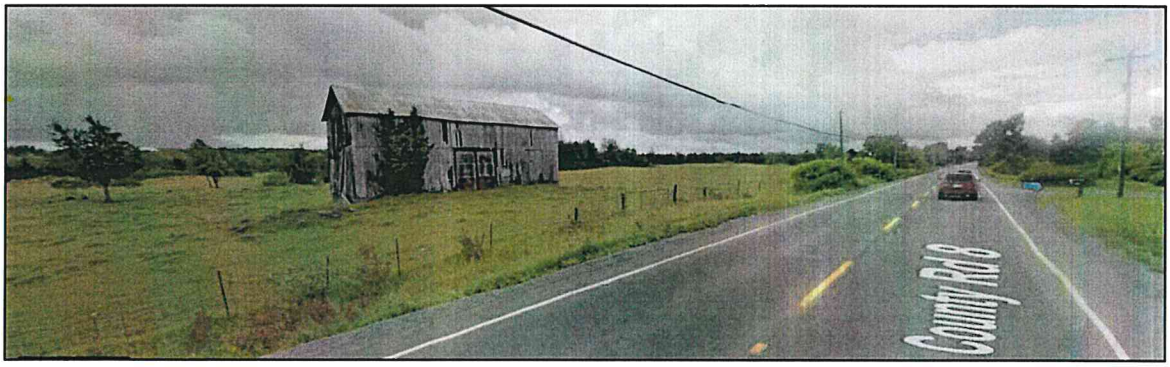
There is an existing wood barn in the northeast corner and no other structures.

The northern portion of the lot is largely open grass with the remainder being wooded.

There is a drainage course running across the middle of the property and various small ponds and areas of water retention created by the existing undulating surfaces.

County Road 8 is a 2-lane municipal rural road with shallow or no roadside ditch along the property frontage (note the existing entrance to the old barn does not have an entrance culvert).

The northern portion of the property is shown in the digital imaging below (June 2015).



The proposed development includes a 5,000 ft^2 building as noted earlier. It also includes a residence and gravel laneway / parking surfaces.

All new elements will be placed generally in keeping with the existing grades so no extensive lot grading modifications are planned beyond those required to ensure local drainage around the new elements is away from buildings and gravel surfaces.

The property is rural with overland sheet flow drainage, and it will remain that with the proposed works.

4.2 Existing / Proposed Conditions - Calculations

To illustrate the impact of the proposed development on stormwater runoff through the introduction of impervious surfaces, the following illustrations and calculations are provided.

(Note: The parcel is large. Site modifications will be limited to area north of the treeline, roughly 3 ha of the total 16 ha.)

Drainage Area 1 includes lands north of the watercourse. These lands drain from the municipal right of way south to the watercourse. Grades are irregular but trend towards the watercourse with various pockets of trapped water. It is this area where the proposed development is located.

Drainage Area 2 includes lands south of the watercourse are flat and poorly drained but based on Ontario Flow Assessment Tool Mapping appears to have wetlands and a slight grade to the south. There will be no change to these lands.

Drainage Area 3 includes a small pocket of land between two tributaries of the watercourse. There will be no change to these lands.

Ontario Soil Mapping / Soil Survey of Prince Edward County (1948) suggests the property includes:

Northern Portion

- Soil Material - Natural Drainage – Good
- Ameliasburg Loam (Al)
- Topography – Undulating to Rolling
- Stony Surface
- 1-3 feet over bedrock.

Southern Portion

- Natural Drainage – Good
- Farmington Loam (Fl)
- Topography – Level to Undulating
- Stony Surface
- Less than 1 foot of soil over bedrock.

While the natural drainage for these soil conditions is good, the flat grade and shallow bedrock will result in localized ponding and poor infiltration.

4.3 Analysis

Level of Detail Required

Being a rural site where the development is small relative to the property (and vegetated / permeable surfaces) and there are unlikely to be any measurable impact on adjacent lands, we believe a lower level of detail is appropriate for the analysis.

There is no risk of damage to up or downstream property of riparian land owners; the public road system is not impacted; and there is no threat to safety which may warrant a more detailed analysis.

Peak Flow Rate Calculation

The most common methods used to assess peak flow rates are those based on modelling of the precipitation-runoff process. Some of these methods are empirical. These methods use statistical representations of the precipitation record, from a rainfall gauging station (e.g. Intensity-Duration-Frequency IDF curve), combined with physical parameters representing the catchment (e.g. area, length, slope, and runoff coefficient), to calculate the peak flow rate at a particular location in a catchment area. One of these methods is the Rational Method which is most suitable for small land development sites.

Rational Method

The Rational Method calculates the peak flow rate at a particular location in a catchment due to the runoff contributed from the entire upstream catchment area. The Rational Method is represented by then following equation:

$Q = 0.0028CiA$, where

C = Runoff Coefficient; i = Rainfall Intensity (mm/h); A = Area of Catchment (m^2)

The Rational Method can provide acceptable estimates of peak flow rates in small non-retentive rural watersheds. It is mostly applied to an urban catchment as a design tool to size storm sewers.

The use of the rational method of peak flow calculation can be applied to the following watersheds (per MTO practices):

- Rural watershed drainage areas less than 100 ha.
- Urban watershed drainage areas less than 50 ha.

Being a small rural catchment with a low level of detail required, the Rational Method will be used to estimate peak flows.

Time of Concentration:

The time of concentration is a measure of the total time that it takes a drop of rain to travel the longest flow path in a catchment area.

When the time of concentration is reached, the entire catchment is contributing to the flow at the catchment confluence point.

A minimum time of concentration of 15 minutes will be used.

Time of concentration is calculated using one of the following formulas:

Bransby William Formula – Used if Rational Method runoff coefficient is greater than 0.40.

$T_c = 0.057L / S_w^{0.2}A^{0.1}$

Airport Equation – Used if Rational Method runoff coefficient is less than 0.40.

$T_c = 3.26(1.1-C)L^{0.5} / S_w^{0.33}$ where,

Tc = time of concentration, minutes
C = Rational method runoff coefficient
L = catchment or watershed length, m
S_w = catchment or watershed slope, %
A = catchment or watershed area, ha

Intensity-Duration-Frequency:

An IDF curve is a statistical relationship of rainfall intensity corresponding to a specified storm duration and frequency for a given location.

IDF curves are used where precipitation field measurements on a drainage system are not available, and precipitation must be estimated from secondary sources. Besides being quick and easy to use, this data are readily available. IDF curves are one of the most widely used forms of rainfall data.

IDF rainfall data is used to estimate flows for the design of minor drainage systems with the Rational method. With IDF curves, it is possible to determine the average rainfall intensity likely to be attained or exceeded in a specific location and for a specific frequency at a given location.

IDF information is obtained through the MTO IDF Curve Lookup website.

4.3.1 Existing

As the proposed development will only impact the northern portion of the property identified as Drainage Area #1 (DA1), accordingly it is the only one being considered.

Drainage areas #2 and #3 will continue to function as they do today. We are not aware of any drainage issues associated with these adjacent areas.

DA1 is a mixture of grass; trees; and roof (old barn) areas. It drains from County Road #1 south via sheet flow.

Calculations are provided in the appendix detailing runoff coefficients, IDF curve details and resulting peak flow of 0.535 m^3/s for the 100 year event.

4.3.2 Proposed

The proposed development will see the addition of a workshop building, residence, gravel laneway and associated elements.

These features will increase the amount of impervious surface on the site and result in an increase in runoff.

Based on the information available, we estimate the development will cause the composite runoff coefficient to increase from 0.34 to 0.35 (0.01 or 5%) and the 100 year peak flow rate to increase from 0.535 m^3/s l/s to 0.570 m^3/s (0.035 m^3/s or 6.5%).

To provide some context to the increase in runoff (for the 100 year event), 0.035 m^3/s is roughly equivalent to a 300mm pipe set at a 1.0% slope flowing at 2% full.

This increase in runoff is minor and unlikely to result in any measurable impact on the surrounding lands and/or watercourses based on the rural nature of the area and the small scale of the development relative to the property as a whole.

However, as part of the safe conveyance of water around the new laneway and buildings a shallow ditch is proposed along side of the laneways to prevent unnecessary ponding or damage to the gravel surfaces.

This shallow grassed ditching along the laneways and downstream natural sheet flow is felt adequate to address any development stormwater quality and quantity concerns.

(While not felt necessary at this time, there will be the option of including a series of stone check dams along the length of the ditch and prior to its outlet to slow, retain and infiltrate runoff as part of a simple stormwater retention system should any issues or concerns arise.)

5 Summary

Based on the information presented in this functional servicing study, we can provide the following:

1. The proposed woodshop will not require any onsite water supply for firefighting purposes.
2. The water quality from the well is generally good with no exceedances of health-related water quality standards.
3. Shallow dug wells are intrinsically susceptible to bacterial contamination and for this reason a suitable treatment system such as ultraviolet disinfection or reverse osmosis is recommended.
4. Should roof runoff be used for the water supply, provision should be made for chlorine injection to prevent bacteria from growing in the storage cistern.
5. Based on a daily design flow of 150 L/day, an appropriately sized filter bed and mantle would cover an area of about 100 m^2 with a septic tank of 3,600 L capacity (the minimum capacity permitted under the OBC).
6. Based on calculated flows, the resulting nitrate concentration will be much less than 10 mg/L in groundwater leaving the property.
7. Stormwater runoff will increase slightly due to an increase in impervious surfaces but the increase is minor and not likely to affect adjacent lands or watercourses. Natural conveyance of stormwater runoff through grassed ditches and sheet flow is sufficient for the proposed works.

Respectfully Submitted,

THE GREER GALLOWAY GROUP INC.
CONSULTING ENGINEERS

LICENSED PROFESSIONAL ENGINEER
M.D. McIntosh
100056710
August 5'2021
PROVINCE OF ONTARIO

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Peter Zandbergen, P.Eng.
Mechanical Engineer

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PRACTISING MEMBER
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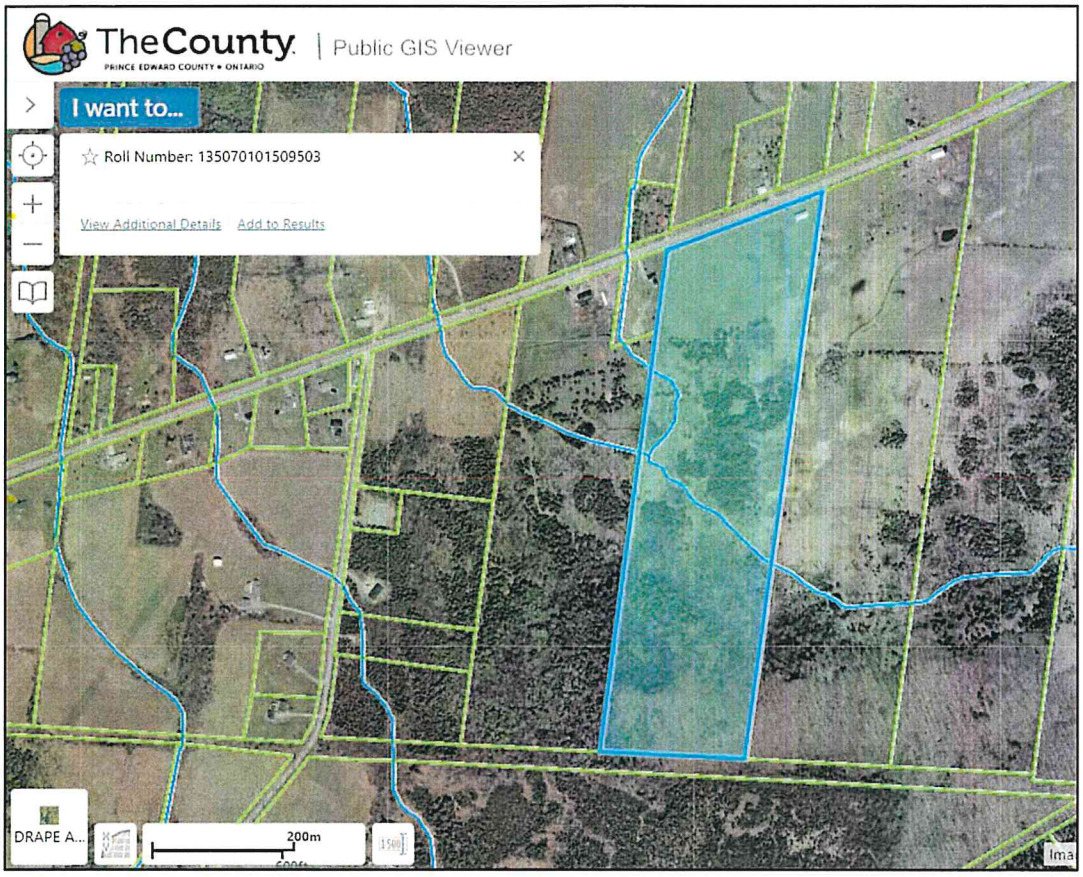
Charles Mitz, Ph.D., P.Geo.
Project Manager

Appendix A
Site Images & Drawings

Image 1/2: Prince Edward County GIS: Showing property boundary and aerial imaging.



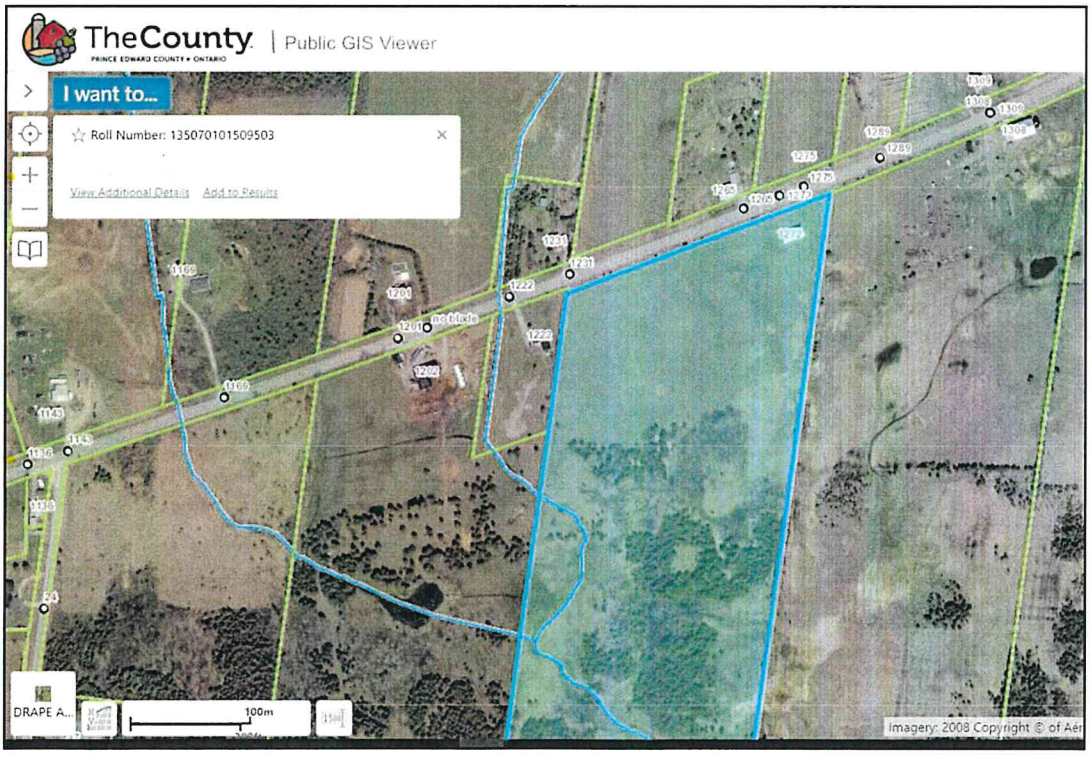
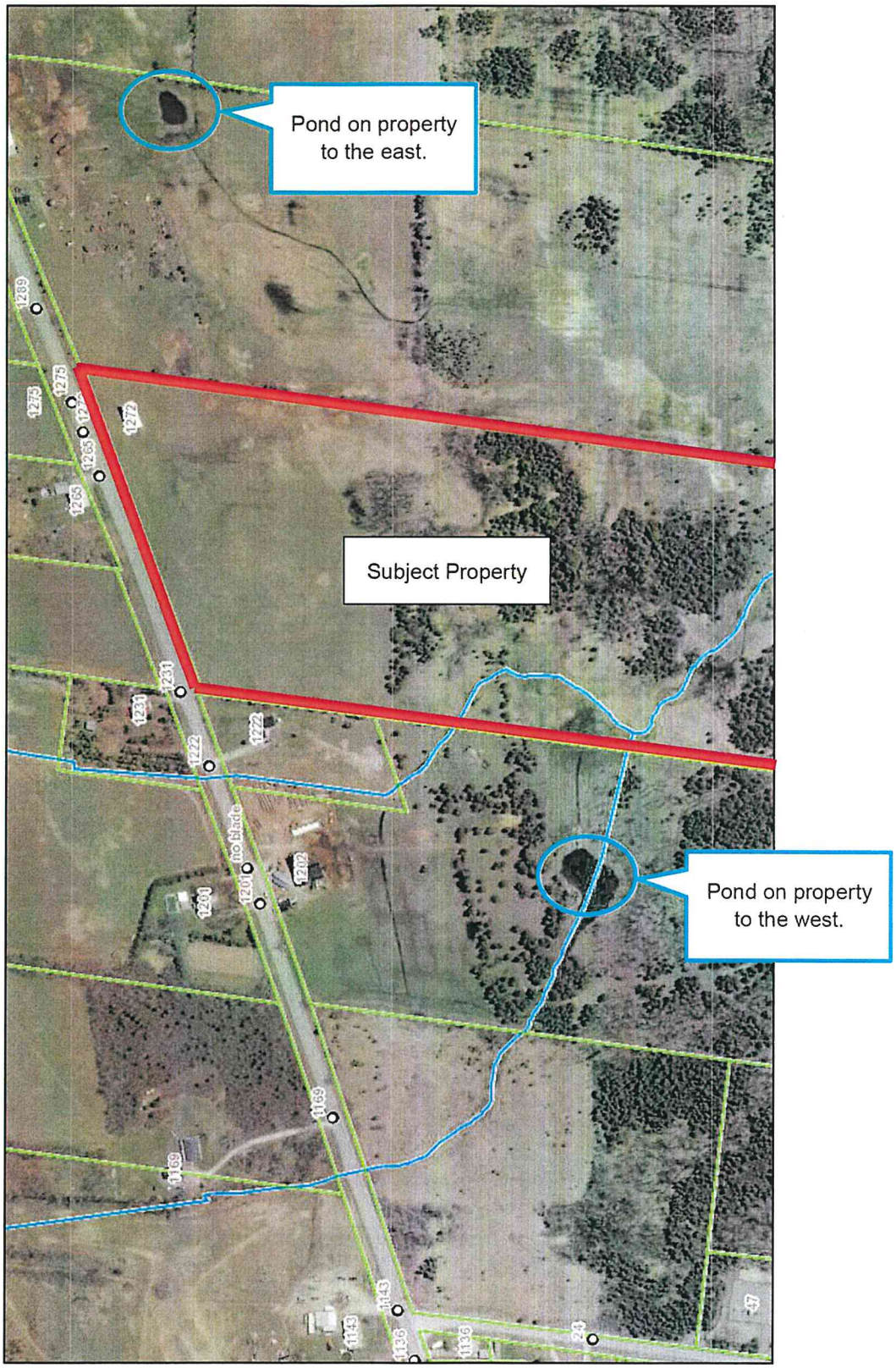
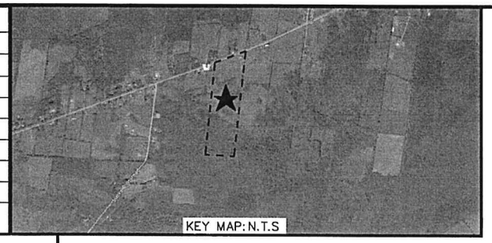


Image 3: Surrounding Watercourses and Ponds



ZONING INFORMATION- TYPE RU1		
	PERMITTED	PROPOSED
MINIMUM LOT AREA	10 ha.	16.2 ha
MINIMUM LOT FRONTAGE	60 m	239.4 m
MINIMUM FRONT YARD	15 m	16.1 m
MINIMUM EXTERIOR SIDE YARD	7.5 m	N/A
MINIMUM INTERIOR SIDE YARD	15 m	12.0 m
MINIMUM REAR YARD	15 m	660.5 m
MAXIMUM LOT COVERAGE	10%	0.60%
MINIMUM LANDSCAPED OPEN SPACE	30%	98.20%



GENERAL NOTES:

1) PROPERTY INFORMATION PER WATSON LAND SURVEYORS DRAWING: 2130869 AUGUST 26, 2020.
2) ENTRANCE TO BE CONSISTENT WITH MTO CSAS-31 ENTRANCE TO SMALL BUSINESS: 8m WIDE; 15m RADIUS; 90° TO ROAD; NO TAPER: RURAL.
3) FIRE/ EMERGENCY ACCESS PER ONTARIO BUILDING CODE:
   a) HAVE A CLEAR WIDTH NOT LESS THAN 6m.
   b) HAVE A CENTERLINE RADIUS NOT LESS THAN 12m.
   c) HAVE AN OVERHEAD CLEARANCE NOT LESS THAN 5m.
   d) HAVE A CHANGE IN GRADIENT NOT MORE THAN 1 IN 12.5 (8%)
   e) BE DESIGNED TO SUPPORT THE EXPECTED LOADS IMPOSED BY FIREFIGHTING EQUIPMENT AND BE SURFACED WITH CONCRETE, ASPHALT OR OTHER MATERIAL DESIGNED TO PERMIT ACCESSIBILITY UNDER ALL CLIMATIC CONDITIONS.
   f) HAVE TURNAROUND FACILITIES FOR AND DEAD-END PORTION OF THE ACCESS ROUTE MORE THAN 90m LONG.
   g) BE CONNECTED TO A PUBLIC THOROUGHFARE.
4) BUILDING DETAILS PER SONDERWORK INC. PLANS
5) FINISHED GRADES TO BE CONFIRMED IN THE FIELD.

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FAX: 613-966-3087

NOTES:
1. ALL WORK SHALL BE IN ACCORDANCE WITH RELEVANT CODES AND GUIDELINES.
2. ALL DRAWINGS AND ADDENDA ARE TO BE READ AS, AND IN CONJUNCTION WITH THE SPECIFICATIONS.
3. ALL EQUIPMENT SHALL BE INSTALLED AS SPECIFIED OR APPROVED EQUIVALENT.
4. CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS BEFORE PROCEEDING WITH WORK AND BE RESPONSIBLE FOR SAME.
5. CONTRACTOR MUST REPORT ANY DISCREPANCIES TO ENGINEER FOR RESOLUTION BEFORE COMMENCING THE WORK.
6. ANY CHANGES MUST BE APPROVED BY THE ENGINEER.

A DETAIL NO.
B DRAWING NO. – WHERE DETAILED

EXISTING	DESCRIPTION	PROPOSED
	ASPHALT	
	SHOULDER	
	DRIVEWAY	
	ACCESS ROUTE	
	EDGE OF PAVEMENT	
	CENTERLINE	
	WATERCOURSE	
	PROPERTY LINE	
	SETBACK LIMITS	
	FENCE	
	BOTTOM OF SWALE / DITCH	
	TOP OF SWALE / DITCH	
	BELL OVERHEAD LINES	N/A
	HYDRO OVERHEAD LINES	N/A
XXX.XX	EXISTING ELEVATION	
	PROPOSED ELEVATION	XXX.XX
	PROP. SWALE ELEVATION	XXX.XX
	SLOPE DIRECTION	
	SLOPE INDICATOR	
	CULVERT	
HP	HYDROPOLE	
BP	BELL POLE	
	TREE	
	TREELINE	
SSB	IRON BAR	
	WELL	

BENCHMARK- IRON BAR
N: 4874670.086
E: 334757.525
ELEV: 134.20

REVISION	DESCRIPTION	YY/MM/DD
01	ORIGINAL SUBMISSION	21/08/09

NORTH

STAMP: LICENSED PROFESSIONAL ENGINEER, M.D. McIntosh, 100056710, August 9'2021, PROVINCE OF ONTARIO

PROJECT
1272 COUNTY ROAD 8
FURNITURE WORKSHOP

PRINCE EDWARD COUNTY, ONTARIO

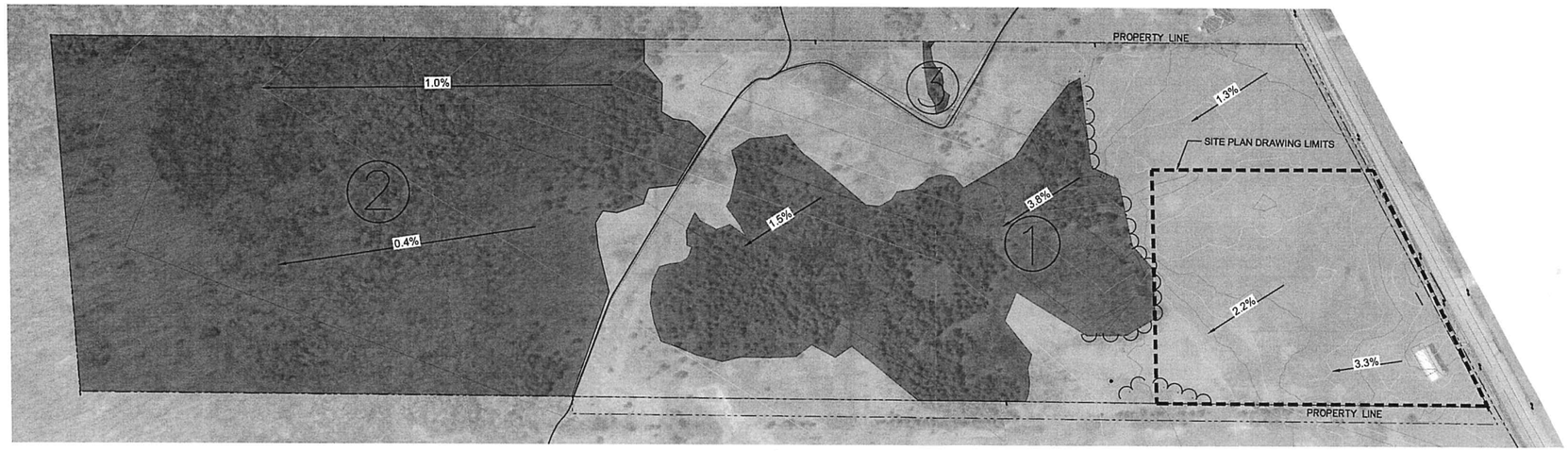
TWO DEGREES NORTH INC.

DRAWING TITLE
SITE PLAN

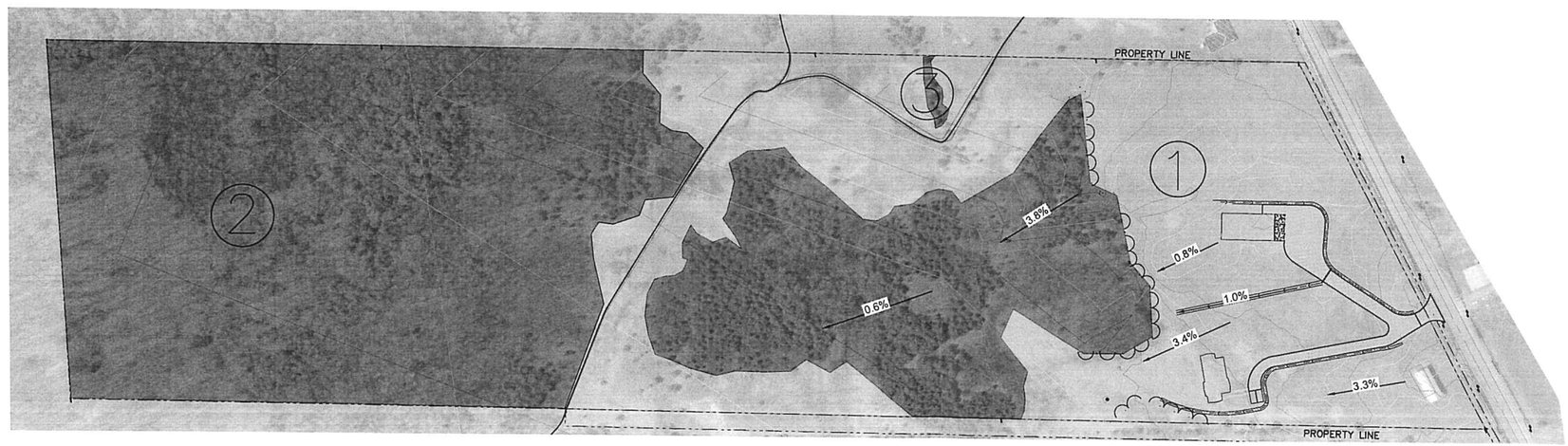
DESIGNED BY: M. MCINTOSH/ N. WHITMAN
DRAWN BY: N. WHITMAN
REVIEWED BY: M. MCINTOSH
APPROVED BY: M.MCINTOSH
PROJECT DATE: 2021/05/31 (YYYY/MM/DD)
PROJECT #: 21-3-8442
DRAWING #: SP1
DRAWING SCALE (ISO A1): HOR: 1:500, VER: N/A

CAD PLOTTER: Nicole Whitman
FILE PATH: P:\Belleville Project\60000\21368442 – 1272 Cty Rd 8 Site Plan And Servicing\Drawings\Working\21-3-8442- CAD- WORKING.dwg
PLOT SCALE: 1:1
DATE PLOTTED: 2021 / 08 / 09 @ 03:21 PM
BORDER SIZE: ISO A1 (841mm x 594mm)

(METRIC SCALE – ALL DIMS IN METERS U.N.O.)



POST-DEVELOPMENT				
	AREA 1- NORTH OF CREEK	AREA 2- SOUTH OF CREEK	AREA 3- WEST OF CREEK	TOTAL AREA
TREED AREA	30,654 m²	68,590 m²	313 m²	99,557 m²
IMPERVIOUS AREA	1,114 m²	N/A	N/A	1,114 m²
GRAVEL AREA	2,262 m²	N/A	N/A	2,262 m²
GRASSED AREA	51,668 m²	4,594 m²	3,013 m²	59,275 m²
TOTAL AREA	85,698 m²	73,184 m²	3,326 m²	162,208 m²



PRE-DEVELOPMENT				
	AREA 1- NORTH OF CREEK	AREA 2- SOUTH OF CREEK	AREA 3- WEST OF CREEK	TOTAL AREA
TREED AREA	30,654 m²	68,590 m²	313 m²	99,557 m²
IMPERVIOUS AREA	140 m²	N/A	N/A	140 m²
GRAVEL AREA	N/A	N/A	N/A	N/A
GRASSED AREA	54,904 m²	4,594 m²	3,013 m²	62,511 m²
TOTAL AREA	85,698 m²	73,184 m²	3,326 m²	162,208 m²

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A/B A DETAIL NO. B DRAWING NO. – WHERE DETAILED

TREELINE
TREED AREA
WATERCOURSE

REVISION	DESCRIPTION	YY/MM/DD
01	ORIGINAL SUBMISSION	21/08/09

NORTH

STAMP: LICENSED PROFESSIONAL ENGINEER — M.D. McIntosh — 100056710 — August 9'2021 — PROVINCE OF ONTARIO

PROJECT
1272 COUNTY ROAD 8
FURNITURE WORKSHOP

PRINCE EDWARD COUNTY, ONTARIO

TWO DEGREES NORTH INC.

DRAWING TITLE
STORMWATER
DEVELOPMENT PLAN

DESIGNED BY: M. MCINTOSH/ N.WHITMAN
DRAWN BY: N. WHITMAN
REVIEWED BY: M. MCINTOSH
APPROVED BY: M.MCINTOSH
PROJECT DATE: 2021/05/31 (YYYY/MM/DD)
PROJECT #: 21-3-8442
DRAWING #: SWM
DRAWING SCALE (ISO A1): HOR: 1:1500 VER: N/A

Appendix B
Laboratory Certificate of Analysis

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: DW113354

REPORT No. B21-18453

Report To:

The Greer Galloway Group
1620 Wallbridge-Loyalist Road, RR #5,
Belleville Ontario K8N 4Z5 Canada
Attention: Charles Mitz

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 15-Jun-21
DATE REPORTED: 21-Jun-21
SAMPLE MATRIX: Drinking Water

JOB/PROJECT NO.: -
P.O. NUMBER: 2138443
WATERWORKS NO.

			Client I.D.:		S1		ODWS	
			Sample I.D.:		B21-18453-1		Objective	Type of Objective
			Date Collected:		15-Jun-21			
Parameter	Units	R.L.	Reference Method	Date/Site Analyzed				
Total Coliform	cfu/100mL	1	MOE E3407	16-Jun-21/K	0		0	MAC
E coli	cfu/100mL	1	MOE E3407	16-Jun-21/K	0		0	MAC
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	16-Jun-21/O	294		30-500	OG
pH @25°C	pH Units		SM 4500H	16-Jun-21/O	8.10		6.5-8.5	OG
Conductivity @25°C	µmho/cm	1	SM 2510B	16-Jun-21/O	815			
Fluoride	mg/L	0.1	SM4110C	17-Jun-21/O	< 0.1		1.5	MAC
Chloride	mg/L	0.5	SM4110C	17-Jun-21/O	75.5		250	AO
Nitrite (N)	mg/L	0.1	SM4110C	17-Jun-21/O	< 0.1		1	MAC
Nitrate (N)	mg/L	0.1	SM4110C	17-Jun-21/O	0.9		10	MAC
Nitrate + Nitrite (N)	mg/L	0.1	SM4110C	17-Jun-21/O	0.9			
Sulphate	mg/L	1	SM4110C	17-Jun-21/O	24		500	AO
Total Suspended Solids	mg/L	3	SM2540D	16-Jun-21/K	< 3			
TDS (Calc. from Cond.)	mg/L	1	Calc.	17-Jun-21	429		500	AO
Dissolved Organic Carbon	mg/L	0.2	EPA 415.2	17-Jun-21/O	5.3		5	AO
Hardness (as CaCO3)	mg/L	1	SM 3120	16-Jun-21/O	263		500,80-100	ODWO,OG
Sodium	mg/L	0.2	SM 3120	16-Jun-21/O	72.6		200,20	AO,WL

ODWS - Ontario Drinking Water Standards
AO - Aesthetic Objectives
IMAC - Interim Maximum Acceptable Concentration
MAC - Maximum Acceptable Concentration
ODWO - D-5-5 Objective
OG - Operational Guidelines
WL - Warning Level - Sodium Restricted Diets
R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

M. Dubien

Michelle Dubien
Lab Manager

Appendix C
Stormwater Calculations

Project Name: Prince Edward County, 1272 County Road 8
Project No.: 2138442

Existing Peak Flow Calculations - 100 Year Event (Major Event Design Flow)

Drainage Area #1 - Between County Road 1 and the watercourse.

Runoff Coefficients:

10 Year

Pasture (Open Space) =	0.28	(MTO Design Chart 1.07, Rural, 0-5%, Average Soil Drainage)
Woodland or Cutover =	0.25	(MTO Design Chart 1.07, Rural, 0-5%, Average Soil Drainage)
Gravel Surface =	0.60	(MTO Design Chart 1.07, Max Value)
Impervious Surfaces =	0.95	(MTO Design Chart 1.07, Max Value)

100 Year (+25%)

Pasture (Open Space) =	0.35	(MTO Design Chart 1.07, Rural, 0-5%, Average Soil Drainage)
Woodland or Cutover =	0.31	(MTO Design Chart 1.07, Rural, 0-5%, Average Soil Drainage)
Gravel Surface =	0.75	(MTO Design Chart 1.07, Max Value)
Impervious Surfaces =	0.95	(MTO Design Chart 1.07, Max Value)

Contributing Areas:

Pasture (Open Space) =	5.490	ha
Woodland or Cutover =	3.065	ha
Gravel Surface =	0.000	ha
Impervious Surfaces =	0.014	ha
Total Area =	8.570	ha
Composite Runoff Coefficient:	0.34	
Drainage Length:	300	meters
Elevation (Upper):	-	meters
Elevation (Lower):	-	meters
Drainage Slope (85-10):	1.3	%
Kirpich	Tc:	8.4
Airport (C<0.4)	Tc:	39.5
Bransby-Williams (C>0.4)	Tc:	5.2
Time of Concentration:	39	minutes
Intensity:	67	mm/h
Peak Flow:	**0.535**	**m^3/s**
Peak Flow:	**535.3**	**l/s**

IDF Curve Values - East of Picton

$i = A / (t_d+B)^c$

A = 46.7 c = -0.699

Belleville IDF Curve Data - 100 Year Event

Storm Event (min.)		Intensity (mm/h)	
5	-	265	-
10	-	163	-
15	-	123	-
-	0.0	-	0.0
30	-	76	-
-	39.5	-	66.6
60	-	47	-
-	0.0	-	0.0
120	-	29	-
-	0.0	-	0.0
360	-	13	-
-	0.0	-	0.0
720	-	8	-
-	0.0	-	0.0
1440	-	5	-

Project Name: Prince Edward County, 1272 County Road 8
Project No.: 2138442

Post Development Peak Flow Calculations - 100 Year Event (Major Event Design Flow)

Drainage Area #1 - Between County Road 1 and the watercourse.

Runoff Coefficients:

10 Year

Pasture (Open Space) =	0.28	(MTO Design Chart 1.07, Rural, 0-5%, Average Soil Drainage)
Woodland or Cutover =	0.25	(MTO Design Chart 1.07, Rural, 0-5%, Average Soil Drainage)
Gravel Surface =	0.60	(MTO Design Chart 1.07, Max Value)
Impervious Surfaces =	0.95	(MTO Design Chart 1.07, Max Value)

100 Year (+25%)

Pasture (Open Space) =	0.35	(MTO Design Chart 1.07, Rural, 0-5%, Average Soil Drainage)
Woodland or Cutover =	0.31	(MTO Design Chart 1.07, Rural, 0-5%, Average Soil Drainage)
Gravel Surface =	0.75	(MTO Design Chart 1.07, Max Value)
Impervious Surfaces =	0.95	(MTO Design Chart 1.07, Max Value)

Contributing Areas:

Pasture (Open Space) =	5.167	ha
Woodland or Cutover =	3.065	ha
Gravel Surface =	0.226	ha
Impervious Surfaces =	0.1114	ha
Total Area =	8.570	ha
Composite Runoff Coefficient:	0.35	
Drainage Length:	300	meters
Elevation (Upper):	-	meters
Elevation (Lower):	-	meters
Drainage Slope (85-10):	1.3	%
Kirpich	Tc:	8.4
Airport (C<0.4)	Tc:	38.6
Bransby-Williams (C>0.4)	Tc:	5.2
Time of Concentration:	39	minutes
Intensity:	67	mm/h
Peak Flow:	**0.570**	**m^3/s**
Peak Flow:	**570.2**	**l/s**

IDF Curve Values - East of Picton

$i = A / (t_d+B)^c$

A = 46.7 c = -0.699

Belleville IDF Curve Data - 100 Year Event

Storm Event (min.)		Intensity (mm/h)	
5	-	265	-
10	-	163	-
15	-	123	-
-	0.0	-	0.0
30	-	76	-
-	38.6	-	67.5
60	-	47	-
-	0.0	-	0.0
120	-	29	-
-	0.0	-	0.0
360	-	13	-
-	0.0	-	0.0
720	-	8	-
-	0.0	-	0.0
1440	-	5	-