



**Re: 3131 Victoria Road, Ameliasburgh, Prince Edward County**

**Subject: Stormwater Brief – 3131 Victoria Road**

**Project Number: 23-3-6610**

## 1.0 INTRODUCTION

The Greer Galloway Group has been retained to provide engineering services to support the development application process for the property at 3131 Victoria Road, Ameliasburgh, Prince Edward County.

### 1.1 Scope of Report

This stormwater management brief provides comment on the potential effects the proposed development may have on surface water runoff quality and quantity and describes proposed measures to mitigate post development impacts using various control systems and/or best management practices, should they be warranted.

### 1.2 Standards and Guidelines

The following standards and guidelines were consulted:

- Stormwater Management Planning and Design Manual - Ministry of the Environment
- MTO Drainage Management Manual – Ministry of Transportation
- Low Impact Development Stormwater Management Planning and Design Guide by CVC and TRCA
- Quinte Conservation Authority Stormwater Management Technical Resources

## 2.0 EXISTING CONDITIONS

The development site is at 3131 Victoria Road. The property has a total area of approximately 48.1 ha. The extent of the property parcel is outlined in the appendix as Figure 1.

Most of the property is cultivated except for a wetland stretching east/west across the southern portion of the property.

This document will be focused on the section of property that was surveyed as we understand the development impact will be limited to this area.

The property was previously agricultural with the following features:

- Barn
- Outbuildings
- Single Family Home
- Gravel Laneway and Parking Areas

### 2.1 Topographic Survey

The topographic survey conducted by Greer Galloway Group shows the property has a highpoint slightly south of the existing barn structure. The high point acts as the division between the drainage area to wetland and the drainage area to Victoria Road.

The drainage area to Victoria Road has an area of 6.92 ha and consists of part of the surveyed property north of the highpoint division line. The drainage area to Victoria Road will drain stormwater runoff north to the existing roadside ditch along Victoria Road.

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The drainage area to the wetland has an area of 11.18 ha and contains part of the surveyed property south of the highpoint division line. The drainage area to the wetland will drain the stormwater runoff south to the existing wetland.

A visual representation of stormwater runoff areas and topographic elevations is appended as Figure 2.

Offsite runoff does not appear to drain onto the property in any significant manner as surrounding properties are at similar elevations and drain to the north / south generally parallel to the side property line. Therefore, the proposed development is responsible for on-site drainage only.

## 2.2 Geotechnical Investigation

A geotechnical investigation of the Victoria Road 3131 property was conducted on June 7, 2024 by Terraspec Engineering incorporation. Test pit soil samples were collected and analyzed. The soil within the property was classified as sand with silty fines using ASTM soil classification. The geotechnical reference information is appended to this document as Figure 3.

## 3.0 PROPOSED DEVELOPMENT

The proposed property redevelopment will provide wedding and event spaces with the following proposed features:

- Wedding Event Space
- Complementary Buildings
- Small Concrete Parking Lot (7 spaces)
- Large Gravel Parking Lot (70 spaces)
- Gravel Laneway

The development plan drawing is appended, see Figure 4.

The proposed redevelopment will impact a small portion of the property with the most significant stormwater impact being the change in surface from grass to granular for the parking area.

It is anticipated that the proposed redevelopment will have minimal impact on property stormwater runoff given it's a large rural property and while the changes will tend to increase runoff, surface water flows will travel generous distances via sheet flow over grassed areas before reaching the property line or any area of concern as it relates to runoff.

## 4.0 ANALYSIS BACKGROUND

### 4.1 Level of Detail Required

Being a rural site where the development is small relative to the property (which is and will remain largely vegetated with permeable surfaces) and where there are unlikely to be any measurable impact on adjacent lands, we believe a highly detailed stormwater report is not necessary. Accordingly, the following is intended to show, with reasonable certainty, what is any impact the proposed development will have on surrounding lands.

If concerns are identified a more detailed stormwater investigation may be considered.

### 4.2 Peak Flow Rate Calculation

The most common methods used to assess peak flow rates are those based on modelling

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of the precipitation-runoff process. These methods use statistical representations of the precipitation record, from a rainfall gauging station (e.g. rainfall 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 suitable for small land development sites.

#### 4.3 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 the following equation:

$$Q = 0.0028CiA, \text{ where}$$

C = Runoff Coefficient; I = Rainfall Intensity (mm/h); A = Area of Catchment (m<sup>2</sup>)

The Ministry of Environment (now ministry of Environment, Conservation and Parks) Drainage Management Manual states applications where it is appropriate to use the Rational Method to estimate peak flows include:

- Small drainage areas including watersheds less than 100 hectares in size.
- Determinations of peak flows to size channels, sewers, ditches and culverts.
- Preliminary design estimation for drainage systems.
- Flow estimation to design erosion and sediment control devices.

As this subject site is a small rural catchment with a low level of detail required, the rational Method will be used to estimate peak flows.

#### 4.4 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 the catchment area.

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

A minimum time of concentration of 15 minutes is used.

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

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

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

Airport Equation – Used if the runoff coefficient is less than 0.40. Runoff coefficients of less than 0.40 are more common in rural areas where there are more vegetated / permeable surfaces.

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

T<sub>c</sub> = time of concentration, minutes  
C = Rational Method runoff coefficient  
L = catchment or watershed length, m  
S<sub>w</sub> = catchment or watershed slope, %  
A = catchment or watershed area, ha

#### 4.5 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.

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IDF curves are used where precipitation field measurements for a specific drainage system are not available, and precipitation must be estimated from secondary sources.

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 and the information for the development property is appended as Figure 5.

#### 4.6 Drainage Area

Peak flow rate calculations included a contributing area estimate. Depending on the location being considered it can be a small part of or an entire catchment area.

In this instance the peak flow calculations are being used to compare the potential impact of a proposed development so the contributing area will be limited to the subject property.

(Note: If the area is expanded to include a larger catchment area, the relative impact of the proposed development will be further decreased as an even greater area will remain unchanged relative to the proposed development changes.)

The property is divided into two different drainage areas, one draining north to Victoria Road and the other draining south to the wetland. A figure depicting the drainage areas and topographic elevations is appended as Figure 2.

#### 5.0 PRE DEVELOPMENT PEAK FLOW

Following the Rational Method principals previously noted, the following is provided to represent predevelopment peak flows for both drainage areas.

Topographic elevations and stormwater drainage areas are outlined in the appendix as figure 2.

#### 5.1 Pre Development Drainage Area to Victoria Road

The pre development drainage area to Victoria Road includes the northern portion of the surveyed property adjacent to Victoria Road. The stormwater runoff will be collected in the roadside ditch. The drainage area is 6.92 ha and the ASTM soil classification is sand with silty fines.

MTO Design Chart 1.07: Runoff Coefficients

Land Use	Area (Ha)	Runoff Coefficient (10 Year)	Runoff Coefficient (100 Year) (10 year + 25%)	C x A (10 Year)	C x A (100 Year)
Gravel	0.11	0.45	0.56	0.05	0.06
Roofs	0.14	0.8	1	0.11	0.14
Cultivated	5.96	0.22	0.28	1.31	1.67
Lawn	0.71	0.07	0.09	0.05	0.06
<b>Total</b>	<b>6.92</b>			<b>1.52</b>	<b>1.93</b>

Drainage Area: 6.92 ha

Composite Runoff Coefficient (10 Year): 0.22

Composite Runoff Coefficient (100 Year): 0.27

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Existing Peak Flow Calculations - 100 Year Event (Major Event Design Flow)			
<b>Pre Development Drainage Area to Victoria Road</b>			
100 Year (Base values +25%)			
Pasture (Open Space) =	0.00	(MTO Design Chart 1.07, Rural, 0-5%, Average Soil Drainage)	
Cultivated =	0.28	(MTO Design Chart 1.07, Rural, 0-5%, Average Soil Drainage)	
Grass =	0.09	(MTO Design Chart 1.07, Urban, Average Slope / Soil Drainage)	
Woodland or Cutover =	0.00	(MTO Design Chart 1.07, Rural, 0-5%, Average Soil Drainage)	
Gravel Surface =	0.56	(MTO Design Chart 1.07)	
Impervious Surfaces =	1.00	(MTO Design Chart 1.07)	
Contributing Areas (Excluding Severed Lots):			
Cultivated =	5.960	ha	$i = A * (t_c)^B$ A = 46.4      B = -0.699 IDF Curve Data - 100 Year Event
Grass =	0.710	ha	
Woodland or Cutover =	0.000	ha	
Gravel Surface =	0.110	ha	
Impervious Surfaces =	0.140	ha	
Total Area =	6.920	ha	
Composite Runoff Coefficient:	0.27		
Drainage Length:	218	m	
Upper Elevation (at 85% of Length) =	93	m	
Lower Elevation (at 10% of Length) =	90	m	
Drainage Slope (85-10):	1.40	%	
Airport (C<0.4)	Tc:	35.8	
Bransby-Williams (C>0.4)	Tc:	3.8	
Time of Concentration:	35.8	minutes	
Intensity:	69.8	mm/h	
<b>Peak Flow:</b>	<b>0.362</b>	<b>m<sup>3</sup>/s</b>	

The calculations above reflect anticipated runoff from a major (100-year) event resulting in a peak flow of 0.362 m<sup>3</sup>/s.

### 5.2 Pre Development Drainage Area to Wetland

The pre development drainage area to Wetland includes the southern portion of the surveyed property through to the end of the laneway. It has an area of 11.18 ha and the ASTM soil classification is sand with silty fines.

Stormwater runoff will be collected in the existing wetland to the south. As the gradient is shallow, water movement will be slow. Should some runoff spill onto neighboring properties it will continue south along the property to collect in another section of the wetland. Neighboring properties have no infrastructure in the southern portion of their property, eliminating any risk to neighboring properties.

MTO Design Chart 1.07: Runoff Coefficients

Land Use	Area (Ha)	Runoff Coefficient (10 Year)	Runoff Coefficient (100 Year) (10 year + 25%)	C x A (10 Year)	C x A (100 Year)
Gravel	0.18	0.45	0.56	0.08	0.10
Roofs	0.00	0.8	1	0.00	0
Cultivated	11.00	0.22	0.28	2.42	3.08
<b>Total</b>	<b>11.18</b>			<b>2.5</b>	<b>3.18</b>

Drainage Area: 11.18 ha  
 Composite Runoff Coefficient (10 Year): 0.22  
 Composite Runoff Coefficient (100 Year): 0.28

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<b>Existing Peak Flow Calculations - 100 Year Event (Major Event Design Flow)</b>			
<b>Pre Development Drainage Area to Wetland</b>			
100 Year (Base values +25%)			
Cultivated =	0.28	(MTO Design Chart 1.07, Rural, 0-5%, Average Soil Drainage)	
Gravel Surface =	0.56	(MTO Design Chart 1.07)	
<b>Contributing Areas (Excluding Severed Lots):</b>			
Cultivated =	11.000	ha	$i = A * (t_0)^B$ A = 46.4      B = -0.699 <b>IDF Curve Data - 100 Year Event</b>
Grass =	0.000	ha	
Woodland or Cutover =	0.000	ha	
Gravel Surface =	0.180	ha	
Impervious Surfaces =	0.000	ha	
<b>Total Area =</b>	<b>11.180</b>	<b>ha</b>	
<b>Composite Runoff Coefficient:</b>	<b>0.28</b>		
Drainage Length:	375	m	
Upper Elevation (at 85% of Length) =	93	m	
Lower Elevation (at 10% of Length) =	90	m	
Drainage Slope (85-10):	0.80	%	
Airport (C<0.4)	Tc:	55.7	
Bransby-Williams (C>0.4)	Tc:	7.0	
<b>Time of Concentration:</b>	<b>55.7</b>	<b>minutes</b>	
Intensity:	50.5	mm/h	
<b>Peak Flow:</b>	<b>0.439</b>	<b>m<sup>3</sup>/s</b>	

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The calculations above reflect anticipated runoff from a major (100-year) event resulting in a peak flow of 0.439 m<sup>3</sup>/s.

## 6.0 POST DEVELOPMENT PEAK FLOW

Following the Rational Method principals previously noted, the following is provided to represent post development peak flows for both development drainage areas.

Topographic elevations and stormwater drainage areas are outlined in the appendix as figure 2.

### 6.1 Post Development Drainage Area to Victoria Road

MTO Design Chart 1.07: Runoff Coefficients

Land Use	Area (Ha)	Runoff Coefficient (10 Year)	Runoff Coefficient (100 Year) (10 year + 25%)	C x A (10 Year)	C x A (100 Year)
Gravel	0.08	0.45	0.56	0.04	0.05
Roofs	0.14	0.8	1	0.11	0.14
Cultivated	5.96	0.22	0.28	1.31	1.67
Lawn	0.71	0.07	0.09	0.05	0.06
Concrete	0.03	0.85	1.06	0.03	0.03
<b>Total</b>	<b>6.92</b>			<b>1.54</b>	<b>1.95</b>

Drainage Area: 6.92 ha

Composite Runoff Coefficient (10 Year): 0.22

Composite Runoff Coefficient (100 Year): 0.28





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Post Development Peak Flow Calculations - 100 Year Event (Major Event Design Flow)			
<b>Post Development Drainage Area to Victoria Road</b>			
Runoff Coefficients:			
<b>100 Year (Base values +25%)</b>			
Cultivated =	0.28	(MTO Design Chart 1.07, Rural, 0-5%, Average Soil Drainage)	
Grass =	0.09	(MTO Design Chart 1.07, Urban, Average Slope / Soil Drainage)	
Gravel Surface =	0.56	(MTO Design Chart 1.07)	
Impervious Surfaces =	1.00	(MTO Design Chart 1.07)	
Concrete =	1.06	(MTO Design Chart 1.07)	
Contributing Areas:			
Cultivated =	5.960	ha	IDF Curve Values - CR12/Winns Drive $i = A * (t_c)^B$ A = 46      B = -0.699 IDF Curve Data - 100 Year Event
Lawn =	0.710	ha	
Concrete =	0.030	ha	
Gravel Surface =	0.080	ha	
Impervious Surfaces =	0.140	ha	
Total Area =	6.920	ha	
Composite Runoff Coefficient:	0.28		
Drainage Length:	218	m	
Elevation (Upper):	93	m	
Elevation (Lower):	90	m	
Drainage Slope (85-10):	1.40	%	
Airport (C<0.4)	Tc:	35.3	
Bransby-Williams (C>0.4)	Tc:	3.8	
Time of Concentration:	35.3	minutes	
Intensity:	70.2	mm/h	
Peak Flow (Post):	0.378	m <sup>3</sup> /s	
Peak Flow (Pre):	0.362	m <sup>3</sup> /s	
Peak Flow (Increase):	0.016	m <sup>3</sup> /s	
Peak Flow (Increase):	4.3%		

The calculations above reflect anticipated runoff from a major (100-year) event resulting in a peak flow of 0.378 m<sup>3</sup>/s, an increase of 4.3% from the pre-development estimate.

## 6.2 Post Development Drainage Area to Wetland

MTO Design Chart 1.07: Runoff Coefficients

Land Use	Area (Ha)	Runoff Coefficient (10 Year)	Runoff Coefficient (100 Year) (10 year + 25%)	C x A (10 Year)	C x A (100 Year)
Gravel	0.48	0.45	0.56	0.22	0.27
Roofs	0	0.8	1	0	0
Cultivated	10.70	0.22	0.28	2.35	3.00
<b>Total</b>	<b>11.18</b>			<b>2.57</b>	<b>3.27</b>

Drainage Area: 11.18 ha  
Composite Runoff Coefficient (10 Year): 0.23  
Composite Runoff Coefficient (100 Year): 0.29





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Post Development Peak Flow Calculations - 100 Year Event (Major Event Design Flow)			
Post Development Drainage Area to Wetland			
Runoff Coefficients:			
100 Year (Base values +25%)			
Cultivated =	0.28	(MTO Design Chart 1.07, Rural, 0-5%, Average Soil Drainage)	
Gravel Surface =	0.56	(MTO Design Chart 1.07)	
Impervious Surfaces =	1.00	(MTO Design Chart 1.07)	
Contributing Areas:			
Cultivated =	10.700	ha	IDF Curve Values - CR12/Winns Drive $i = A * (t_d)^B$ A = 46      B = -0.699 IDF Curve Data - 100 Year Event
Lawn =	0.000	ha	
Concrete =	0.000	ha	
Gravel Surface =	0.480	ha	
Impervious Surfaces =	0.000	ha	
Total Area =	11.180	ha	
Composite Runoff Coefficient:	0.29		
Drainage Length:	375	m	
Elevation (Upper):	93	m	
Elevation (Lower):	90	m	
Drainage Slope (85-10):	0.80	%	
Airport (C<0.4)	Tc:	55.0	
Bransby-Williams (C>0.4)	Tc:	7.0	
Time of Concentration:	55.0	minutes	
Intensity:	51.2	mm/h	
Peak Flow (Post):	0.461	m <sup>3</sup> /s	
Peak Flow (Pre):	0.439	m <sup>3</sup> /s	
Peak Flow (Increase):	0.022	m <sup>3</sup> /s	
Peak Flow (Increase):	5.1%		

The calculations above reflect anticipated runoff from a major (100-year) event results in a peak flow of 0.461 m<sup>3</sup>/s, an increase of 5.1% from the pre-development estimate.

## 7.0 PEAK FLOW INCREASE

The peak flow within the drainage area to Victoria Road has increased by 0.016 m<sup>3</sup>/s, which is a 4.3% increase.

The peak flow within drainage area to the wetland increased by 0.022 m<sup>3</sup>/s, which is a 5.1% increase.

To put the increase in flow in context, we note a standard 450mm smooth walled HDPE entrance culvert set at a modest 1.0% slope when flowing full has a capacity of 0.27 m<sup>3</sup>/s.

## 8.0 POTENTIAL STORMWATER CONCERNS

Stormwater concerns are categorized as quantity, quality or conveyance.

### 8.1 Water Quantity

Water quantity is typically impacted by a development through an increase in impervious area and a resulting increase in runoff. Increases in runoff is a concern when conveyance restrictions exist; lands are sensitive to increased flows; or adjacent structures are put at risk by additional flows.

Increases in water quantity are not a concern when the receiving system or body of water is significant in size and not likely to be impacted by additional flow. This is the case with this property as the wetland is a substantial size stretching across multiple properties and the municipal ditch will be able to convey minor flow increases with ease.



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Considering the information above, drainage will be largely conveyed via sheet flow maximizing opportunity for infiltration, initial abstraction and slowing of flows.

No stormwater quantity peak flow attenuation provisions are required or recommended.

## 8.2 Water Quality

Water quality is typically impacted by a development through an increase in vehicle traffic and supporting surfaces like roads, driveways and parking lots where debris from vehicles, salt and otherwise become more likely to accumulate.

Clean water from rooftops and grassed surfaces are not typically a source of stormwater quality concerns.

Stormwater quality treatment processes are focused on the removal of suspended solids and/or floatable debris and oils.

The site has an existing gravel laneway extending from the road through a small gravel parking lot and ending at the back of the surveyed property. The small parking lot will be converted into concrete, the large gravel parking lot will be constructed, and the gravel laneway will not be changed.

The conversion of gravel to concrete will increase surface runoff generated from the small parking lot. However, due to its small surface area, the additional runoff generated will have minimal effects on the property.

The combination of maintaining similar proposed elements to existing, minimal impermeable parking surfaces, overland flow over large permeable grassed surfaces into an existing wetland or grassed municipal ditch is felt to be adequate to address water quality concerns associated with the proposed redevelopment.

No additional water quality treatment measures are required or recommended.

## 8.3 Conveyance

Existing drainage is overland via sheet flow. Overland conveyance will continue to be overland via sheet flow.

No on-site conveyance concerns are anticipated.

It is unlikely there will be any noticeable increase to flows in the municipal ditch. While there is a theoretical increase noted, we do not believe there to be any risk or concern as it relates to conveyance in the existing municipal infrastructure.

## 9.0 CONCLUSIONS

Based on the information presented in this stormwater brief, we provide the following:

1. The proposed development will not significantly impact stormwater runoff conditions of the property.
2. Existing conditions including lengthy sheet flow over vegetated surfaces will continue to be adequate to address any stormwater concerns that may result from the proposed redevelopment.
3. There is no risk of damage to downstream property; the public road system is not at risk; and there is no threat to safety or the natural environment that warrants a more detailed analysis.

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4. There are no stormwater quantity, quality or conveyance measures necessary or recommended for the proposed development.

Yours truly,

**GREER GALLOWAY  
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Figure 1: Google Maps screenshot of 3131 Victoria Road property boundaries

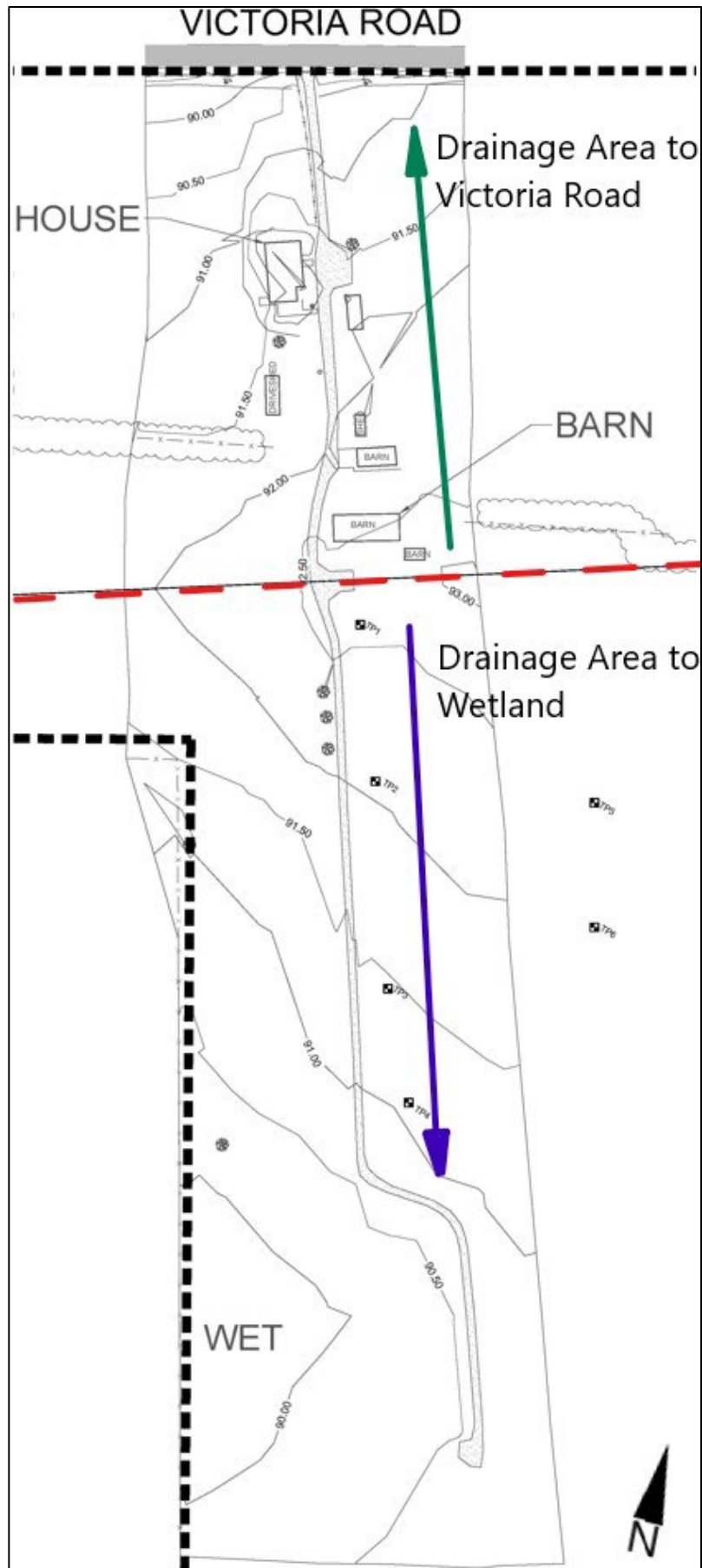


Figure 2: Stormwater Runoff Distribution and Topographic Elevation

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**SITE REPORT**

**To:** The Greer Galloway Group Inc.

1 Page

**From:** Shane Galloway

**Re:** Grain Size Analysis  
 24-3-8633

**Date:** June 25, 2024

Test pit soil samples from June 7, 2024, Victoria Road.

<u>Sieve</u>	<u>TP1</u> <u>% Passing</u>	<u>TP3</u>	<u>TP5</u>		
26.5mm	100	100	100	grain size	
19.0mm	96.4	97.4	100		
13.2mm	96.4	84.7	100		
9.50mm	95.2	74.2	91.0		
4.75mm	91.4	55.3	81.4		
2.36mm	88.4	47.5	70.5		
1.18mm	84.9	41.4	61.7		
600um	79.8	36.8	54.4		
300um	72.0	33.9	46.0		
150um	61.1	28.1	37.0		
75um	48.1	22.2	29.5		
ASTM	SM	SM	SM		classification description estimated T time
description	si sa tr gr	si sa & gr	si sa w gr		
min/cm	24	12	16		

Figure 3: Onsite Geotechnical Report of 3131 Victoria Road Property



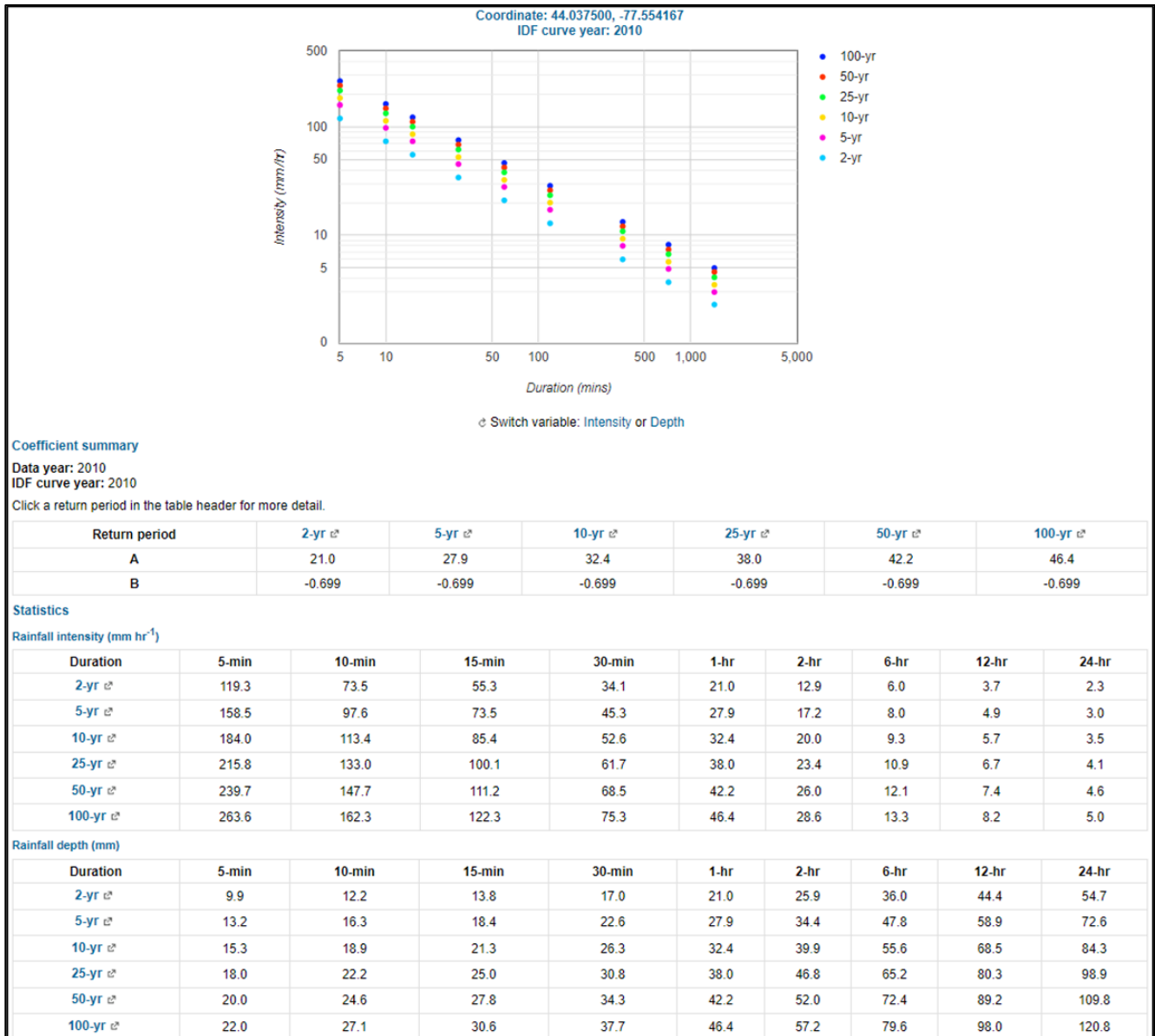


Figure 5: IDF Curve of 3131 Victoria Road Property