# FUNCTIONAL SERVICING & PRELIMINARY STORMWATER MANAGEMENT REPORT

**6939 KING STREET**

**TOWN OF CALEDON**
**REGION OF PEEL**

**PREPARED FOR:**

**SWAMINARAYAN MANDIR VASNA SANSTHA (SMVS)**

**PREPARED BY:**

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

**JUNE 2022**

**CFCA FILE NO. 1990-5787**



CROZIER
CONSULTING ENGINEERS

| Revision Number | Date | Comments |
|---|---|---|
| Rev.0 | December 2020 | Issued for First Submission |
| Rev.1 | June 2022 | Issued for Second Submission |

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# 1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Swaminarayan Mandir Vasna Sanstha (SMVS) c/o Weston Consulting to prepare a Functional Servicing and Preliminary Stormwater Management Report to support the Official Plan Amendment (OPA) and Zoning By-Law Amendment (ZBA) for the proposed place of worship development located at 6939 King Street, in the Town of Caledon (the Site).

This report will demonstrate that the proposed site can be developed in accordance with the Town of Caledon and Region of Peel guidelines from a functional servicing and preliminary stormwater management perspective.

The reports and design standards referenced during the preparation of this report include:

- Ontario Building Code (2012)
- The Town of Caledon Development Standards Manual (2019)
- Toronto and Region Conservation Authorities (TRCA) Stormwater Management Criteria Version 1.0 (August 2012)

# 2.0 Site Description

The subject property covers approximately 6.06 ha and currently contains a single-family dwelling located on the north-west corner of the Site with the remaining land comprised of an agricultural field. The Site is in a rural residential and agricultural neighbourhood and is bounded by King Street to the north, Centreville Creek Road to the east, agricultural lands to the south, and a residential lot to the west.

The southwest corner of the Site is located within an area regulated by the Toronto and Region Conservation Area (TRCA).

The elements envisioned for this development include demolishing the existing dwelling to construct a place of worship, complete with worship areas, dining hall, gym/activity hall as well as several offices and kitchens. The proposed building will be accompanied with an above ground parking lot with a landscaped area in the front. The proposed building will be privately serviced with an onsite sewage system, well and stormwater management feature.

The pertinent background information for the Site has been reviewed, including:

- Site Plan (Battaglia Architect Inc, May 6, 2022)
- Topographic Survey (P & C Surveying Inc, December 6, 2019)
- Geotechnical Investigation [Terraprobe Inc., (Terraprobe) December 21, 2021]
- Hydrogeological Assessment Report (Terraprobe, June 9, 2022)
- Ministry of Environment, Conservation and Parks (MECP) Well Record (December 11, 1985)

# 3.0 Sanitary Servicing

## 3.1 Existing Sanitary Servicing

The subject property is in a rural area and does not have municipal sanitary services available. Currently, the Region of Peel does not have plans to provide sanitary servicing in this area.

The existing dwelling on the Site is assumed to be serviced by an on-site sewage system. The house is to be demolished and the existing sewage system is to be decommissioned by a licenced contractor.

## 3.2 Soil Conditions

Terraprobe was retained by the Client to complete a geotechnical investigation & hydrogeological assessment for the proposed development at 6939 King Street. The Geotechnical Investigation Report was utilized to establish a percolation rate for the onsite sewage system design. Seventeen (17) boreholes were advanced across the property as part of the geotechnical investigation. The borehole log relevant to this design (Borehole BH104) along with a borehole location plan can be found in Appendix A to this report. The soil encountered in the vicinity of the proposed leaching bed (BH104) consisted of a 1.20 m thick layer of surficial fill overlying an extensive deposit of silt and clay, that extended beyond the termination depth of 6.6 meters below ground surface (mbgs). Groundwater was observed at an elevation of 5.69 mbgs at BH104 (December 13, 2021).

As presented in Appendix A of the Geotechnical Investigation Report, the percolation time of the predominant native silt and clay deposit encountered by Terraprobe throughout the property and in the vicinity of proposed leaching bed is generally classified as 'ML-CL' under the Unified Soil Classification System (USCS) with a percolation rate of T = 20 to 50 min/cm. Terraprobe completed T-time testing on one (1) soil sample collected from 0.76 mbgs at BH104, and estimated that the percolation rate of the soil sample was T = 45 min/cm. A conservative percolation rate of T = 50 min/cm was selected for the purposes of this assessment.

## 3.3 Design Sewage Flow

The total daily design sanitary sewage flow for the subject property was calculated in accordance with Part 8 of the Ontario Building Code (OBC). A review of the architectural plans indicate that the proposed building will have multiple uses, resulting in different occupancy rates used when determining the peak sewage flow. Table 1 summarizes the expected maximum day sewage flow for the proposed building based on assumed occupancies. Detailed calculations are provided in Appendix A.

**Table 1: Peak Sewage Design Flow**

| **Use** | **Design Parameter** | **Design Flow per OBC** | **Peak Flow**(L/day) |
|---|---|---|---|
| Place of Worship | 970 seats | 8 L/day per seat; with kitchen facilities | 7,760 |
| Office Area | 85 $m^2$ of floor area | 75 L/day per 9.3 $m^3$ of floor area | 683 |
| Cafeteria | 168 seats | 12 L/day per meal; assume 2 meals per seat | 8,064 |
| Activity Hall with Kitchen | 300 seats | 36 L/day per seat | 10,800 |
| Mandir (Activity Hall) | 100 seats | 8 L/day per seat; no kitchen facilities | 800 |
| | | **Total** | **28,107** |

The total maximum day sewage flow for the proposed building is estimated at 28,107 L/day. A conservative flow of 30,000 L/day will be used for design purposes. Note as this flow exceeds 10,000 L/day the property is subject to the Ontario Water Resources Act and will require an Environmental Compliance Approval (ECA) issued by the Ministry of Environment, Conservation and Parks (MECP).

### 3.4 Proposed Sanitary Servicing

Municipal sanitary sewage services are not available at the subject property. Therefore, the building will be serviced with a privately owned onsite sewage treatment system with subsurface disposal. The proposed treatment system includes a grease interceptor for kitchen wastewater, anaerobic digester tanks, a Waterloo Biofilter treatment unit, a Water NOx-LS treatment unit, and a polishing basket biofilter tank with discharge to a Type A dispersal bed. Refer to Appendix B for a preliminary schematic of the proposed treatment system.

Terraprobe completed a groundwater impact assessment for the proposed sewage system in accordance with Chapter 22 of the MECP Sewage Works Design Manual 2008, as presented in Terraprobe's Hydrogeological Assessment Report. According to the impact assessment, a nitrate-nitrogen concentration of 3.26 mg/L for the proposed Type A dispersal bed is required to meet a concentration of 2.5 mg/L at the property boundary, consistent with "reasonable use" per the MECP. The proposed treatment system from Waterloo Biofilter has been designed to meet an effluent nitrate-nitrogen concentration of 3.26 mg/L.

The treated effluent will be discharged to a Type A dispersal bed with a 600 $m^2$ area of clear stone overlying a 3,750 $m^2$ area of imported sand. The proposed leaching bed is located on the southeast corner of the property, oriented parallel to groundwater flow to maximize the attenuation zone. The detailed onsite sewage system calculations are presented in Appendix C. The Site Servicing Plan (DWG C102) and the Site Grading Plan (DWG C103) illustrate the location of the proposed onsite system to service the development. The internal sanitary plumbing within the building will be designed by the mechanical engineer in accordance with the OBC.

The proposed sewage system described in this report and on the accompanying drawings is a functional level design. As noted above an ECA will be required from the MECP. Therefore, the detailed design of the sewage system will be completed in the future to apply for the ECA.

## 4.0 Water Servicing

### 4.1 Existing Water Servicing

There is no watermain infrastructure available to service the Site. An on-site well located in the front yard of the existing dwelling is currently being used to service the Site.

### 4.2 Design Water Demand

The water demand for the proposed development was calculated, referencing the maximum daily sewage flows as noted above and the appropriate Region of Peel peaking factors. Table 2 summarizes the anticipated water demand and Appendix D contains the detailed water demand calculations.

**Table 2: Estimated Design Water Demand**

| **Average Day Demand** (L/min) | **Maximum Day Demand** (L/min) | **Peak Hour Demand** (L/min) |
|---|---|---|
| 29.76 L/min | 41.67 | 89.29 L/min |

The design daily sewage flow for the proposed building is 30,000 L/day and using peaking factors of 1.4 and 3.0 for the maximum day and peak hour, respectively were used. The maximum day and peak hour demand of the proposed building is calculated to be 41.67 L/min and 89.29 L/min respectively.

### 4.3 Fire Flow Demand

The Office of the Fire Marshal Fire Protection Water Supply Guideline for Part 3 in the Ontario Building Code was used to calculate the fire flow. In consultation with the architect, it is understood that the proposed building is classified as a Group A, Division 3 with combustible construction. Referencing the OBC, the spatial coefficients and approximation of the building volumes in cubic meters, it was determined that a storage volume of 314,175 L is required for fire flow services. Table 3 summarizes the estimated fire flow demand and duration to meet fire protection for the proposed building. Appendix C contains the fire flow demand calculations.

**Table 3: Estimated Fire Flow**

| Method | Fire Flow Volume | Fire Flow Demand | Duration |
|---|---|---|---|
| (Part 3 of the OBC) | 314,175 L | 150 L/s | 2.00 hr |

Please note that the fire flow value is a conservative estimate for comparison purposes only. The architect and mechanical engineer will confirm the fire requirements at the detailed design stage.

### 4.4 Proposed Water Servicing

It is recommended that the Site be serviced by a new drilled well. The well must be constructed in accordance with Ontario Regulation (O. Reg.)903 and have a watertight casing to a minimum depth of 6.0 m and located a minimum distance of 15 m to any of the sewage system components. The proposed supply well will need to be tested to determine if it can meet the anticipated water demand for the Site. If the proposed well cannot meet the anticipated water demand, then a domestic drinking water cistern will be required to provide sufficient water during peak times. The sizing and design of the water cistern will take place at the detailed design stage. A preliminary location of the proposed well is shown on the Preliminary Servicing Plan (DWG C102). After the new well has been constructed, the existing well should be decommissioned by a licenced well contractor.

Water quality samples will also need to be collected from the proposed supply well to determine if water treatment is required. Water quality samples collected from the proposed supply well will be compared to the Ontario Drinking Water Standards (ODWS) and appropriate treatment technologies, e.g., filtration, UV treatment will be proposed should exceedances of the ODWS be identified. Details of the water treatment system, if needed, will be provided at the detailed design stage.

Fire protection cisterns are proposed to provide the fire protection volume calculated for the property. Three fire protection cisterns will be required to meet the required volume and they will be connected in series. A dry hydrant will be located on the fire route of the building to provide coverage for the proposed building. The fire protection cisterns and the dry hydrant are in front of the proposed building on the east side. Refer to the Preliminary Site Servicing Plan for details.

# 5.0 Drainage Conditions

## 5.1 Existing Drainage

Most of the Site is comprised of agricultural field with the exception of the northwest quadrant that comprises of a dwelling and driveway that are to be removed. A review of topographic survey indicates that surface runoff on the property drains via sheet flow to the southwest corner of the Site and outlets into a tributary of the Humber River.

For the purpose of analyzing the runoff from the Site it is assumed that the Site currently consists of Two (2) catchments (Catchment C101 and C102). C101 comprises of the north portion of the Site and drains to Catchment C102 which ultimately leads to the tributary at the southwest corner of the property. Please refer to Figure 1 enclosed with this report illustrating the pre-development drainage patterns.

## 5.2 Proposed Drainage

The proposed development consists of a place of worship accompanied with a parking lot, drive aisles, and landscaped area.

The proposed development will be situated in the north half of the property leaving the southern portion pervious. Stormwater runoff generated from the building and surrounding impervious area is to be collected by a series of catch basins into the on-site storm sewer network and directed to a SWM Facility at the southwest corner of the property. The SWM facility ultimately outlets to a tributary of the Humber River at the southwest corner of the Site. This tributary is regulated by the TRCA.

The Preliminary Site Servicing and Site Grading Plans illustrate the proposed drainage patterns of the Site, the location and design of the storm sewer, SWM Facility, and all connections.

In the Post Development scenario, catchments C201 to C218 will comprise of the proposed development while Catchment UC1 will remain as undeveloped, and catchment UC2 will drain to the municipal R.O.W. Please refer to Figure 2 which illustrates the post-development impervious areas and drainage patterns for the Site. The composite runoff coefficient was calculated by using a runoff coefficient of 0.25 for pervious areas and 0.90 for impervious areas. Table 4 provides a comparison of the pre- and post-development land use areas and composite runoff coefficients.

**Table 4: Land Area Comparison**

| **Conditions** | **Catchment ID** (Ha) | **Total Area** (Ha) | **Impervious Area** (Ha) | **Runoff Coefficient** |
|---|---|---|---|---|
| **Pre-Development** | C101 | 3.09 | 0.00 | 0.25 |
| | C102 | 2.97 | 0.00 | 0.25 |
| **Post-Development** | C201-C218 | 2.78 | 2.39 | 0.81 |
| | UC1 | 3.13 | 0.00 | 0.25 |
| | UC2 | 0.15 | 0.00 | 0.25 |

Under the proposed development plan, the existing major and minor drainage patterns will be generally preserved, and the Site will continue to drain in a general north to south and east to west direction towards the Humber River tributary, as shown on the Site Grading Plan (Drawing C103). Refer to Figures 1 and 2 which highlight the pre- and post-development drainage catchments.

## 6.0 Stormwater Management

Stormwater management design criteria must comply with the policies and standards of:

- Town of Caledon
- Toronto and Region Conservation Authority (TRCA)
- Ministry of Environment, Conservation and Parks (MECP)

A summary of the stormwater management criteria controls is as follows:

- Quantity Control

The Site is located within the watershed for the Humber River and outlets to a tributary to the Humber River. Therefore, the stormwater flow control is dictated by the Humber River Unit Flow Rates as defined within the TRCA Stormwater Management criteria.

- Quality Control

Enhanced Level 80% TSS removal.

- Water Balance

Retain the first 5 mm of runoff from the Site.

- Erosion Mitigation

Retain the first 5mm of infiltration from the site.

### 6.1 Stormwater Quantity Control

The Site is located within the Humber River Watershed Sub-basin 36 and is required to control peak flows to the TRCA unit flow rates as summarized in Table 5 below.

**Table 5: Humber River Watershed Unit Flow for Equation F Sub-Basin 36**

| Storm | Unit Flow Equation<br>Q = Unit Flow (L/s/ha)<br>A = Area (ha) | Area (ha) | Target Release Rate (L/s) |
|---|---|---|---|
| 2-year | Q = 9.506 - 0.719 x ln(A) | 2.78 | 25 |
| 5-year | Q = 14.652 - 1.136 x ln(A) | | 37 |
| 10-year | Q = 17.957 - 1.373 x ln(A) | | 45 |
| 25-year | Q = 22.639 - 1.741 x ln(A) | | 57 |
| 50-year | Q = 26.566 - 2.082 x ln(A) | | 67 |
| 100-year | Q = 29.912 - 2.316 x ln(A) | | 76 |

Using the Town of Caledon's intensity-duration-frequency (IDF) data, the Rational Method was used to determine the pre-development and post-development uncontrolled peak flow rates for site stormwater runoff. The IDF parameters and associated intensities are included within Appendix D.

Since the post-development uncontrolled peak runoff rates exceed the Humber River Sub-basin 36 target flows, quantity controls are required on site.

The proposed stormwater quantity controls consist of a SWM Facility with a controlled outlet, located at the southwest corner of the Site. Stormwater runoff will enter the SWM Facility via an enhanced grassed swale and flows from the SWM facility will be restricted by two orifice controls to meet the target flows. Based on preliminary sizing calculations, two 125 mm in diameter orifice controls are proposed to be installed at two different elevations, to provide control for smaller and larger storm events, respectively. Modified Rational Method calculations were prepared and determined the maximum required storage volumes to be 1,628 $m^3$ during the 100-year storm event. Preliminary grading for the SWM facility provides a total 3,119 $m^3$ storage volume at a maximum 1.50 m depth. A summary of site flows and required storage volumes has been provided in Table 6 below**.** Refer to Appendix D for preliminary stormwater calculations. The Preliminary Servicing and Grading Plan illustrates the location of the SWM Facility and enhanced swale.

**Table 6: Pre- and Post-Development Flow Rates and Required Storage Volumes**

| Storm | Target Flow Rate (L/s) | Pre-Development Uncontrolled Flow Rate (L/s) | Post-Development Uncontrolled Flow Rate (L/s) | Post-Development Controlled Flow Rate (L/s) | Storage Volume Required ($m^3$) | Storage Volume Provided ($m^3$) |
|---|---|---|---|---|---|---|
| **2-year** | 25 | 167 | 540 | 24.0 | 605 | 3,119 |
| **5-year** | 38 | 213 | 691 | 30.4 | 899 | |
| **10-year** | 46 | 261 | 845 | 34.5 | 1,079 | |
| **25-year** | 58 | 304 | 985 | 49.5 | 1,285 | |
| **50-year** | 68 | 343 | 1,109 | 56.5 | 1,446 | |
| **100-year** | 77 | 382 | 1,237 | 62.5 | 1,628 | |

### 6.2 Stormwater Quality Control

Stormwater quality control for the Site will be provided by a treatment train which includes:

- An OGS at the site outlet as pre-treatment for runoff from the site.
- An enhanced grassed swale with an underlying sand filter or bioswale.

The enhanced swale is approximately 125 m long, with a 1.0 m bottom width and will provide the quality treatment prior to entering the SWM Facility. The sand filter details will be determined at detailed design stage.

### 6.3 Water Balance

As the site has both high groundwater and low permeability soils it may be challenging to mitigate the decrease in infiltration shown in the water balance calculations. The proposed bioswale will be used to reduce runoff volumes for the site. It is recommended that options for additional LIDs be explored further during detailed design.

### 6.4 Erosion Mitigation

Based on the 2.48 ha impervious development area, a 125 $m^3$ volume is required to meet the water minimum erosion mitigation criteria (2.48 ha x 0.005 m = 125 $m^3$). A storage volume of 142 $m^3$ will be provided below the pond in a 0.15 m layer of clear stone which will infiltrate. This storage volume must be retained on-site to comply with the criteria of retaining the first 5 mm of runoff on site. As the site has both high groundwater and low permeability soils it is unlikely that this criterion will be achievable through infiltration practices. As such a bioswale is proposed downstream of the site, with vegetation specifically selected to utilize the first 5 mm of runoff from the site.

### 6.5 Site outlet

To provide flow dispersion and final polishing to runoff from the site prior to leaving the site the pond outlet will incorporate of a small wetland feature. This feature will include a small area of pooled water, stone reinforcing integrated into the soil and wetland plantings selected to withstand the fluctuations in runoff from the site.

## 7.0 Erosion and Sediment Controls During Construction

Erosion and sediment controls will be installed prior to the beginning of any construction activities. They will be maintained until the Site is stabilized or as directed by the site engineer and/or Town of Caledon. The Erosion & Sediment Control locations and details will be provided at detailed design stage. However, a preliminary Erosion and Sediment Control plan has been attached which illustrates erosion and sediment control measures that will be installed prior to construction.

<u>Heavy Duty Silt Fencing</u>

Heavy Duty Silt fencing will be installed on the perimeter of the Site and along the 10.0 m wetland buffer to intercept sheet flow. The silt fence aims to mitigate erosion and will deter any grading works to be completed outside of the fencing limit. Additional silt fence may be added based on field decisions by the site engineer and Owner, prior to, during and following construction.

<u>Rock Mud Mat</u>

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

## 8.0 Conclusions and Recommendations

Based on the information offered in this report, we offer the following conclusions:

- The Site will be serviced with a proposed septic system including a treatment system and dispersal bed. The septic system design flow is 30,000 L/day and will require an ECA from the MECP.
- The Site will be serviced with a new drilled well to provide the domestic water supply. The new drilled well will need to be tested by a hydrogeologist to confirm the pumping rate. A domestic water supply cistern can be designed in the event that the well cannot provide the anticipated water demands. Water treatment equipment, if required, will be provided at the detailed design stage.

- The Site will be serviced with fire water cisterns to provide fire protection per the OBC Part 3.
- Stormwater quantity control objectives will be achieved by a landscaped SWM facility that will outlet to the Humber River tributary located at the southwest corner of the Site.
- Stormwater quality control objectives will be achieved via an enhanced grass swale with an underlying sand filter on the Site.
- Water balance is provided with a layer of clear stone below the pond to provide the 5 mm water balance requirement.

Based on the above conclusions, we recommend the approval of the Official Plan Amendment and Zoning By-Law Amendment from the perspective of functional servicing and preliminary stormwater management.

Respectfully submitted,

**C.F. CROZIER & ASSOCIATES INC.**


Rebecca Archer, P.Eng.
Senior Project Engineer

**C.F. CROZIER & ASSOCIATES INC.**


Katherine Rentsch, P.Eng.
Senior Project Manager

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# APPENDIX A

## Sewage System Calculations

# ONSITE SEWAGE SYSTEM NON-RESIDENTIAL CALCULATION SHEET

CROZIER & ASSOCIATES Consulting Engineers

**Project Name:** 6939 KING STREET
**Project Number:** 1990-5787
**Date:** 2020-12-04
**Designed By:** AS/MC
**Checked By:** KR

**PRELIMINARY FLOW ESTIMATES**

References/Notes

| | Description | Area ($ft^2$) | Area ($m^2$) | Unit | Unit Flow | Number of Units | Total Flow (L/day) | References/Notes |
|---|---|---|---|---|---|---|---|---|
| **Proposed Place of Worship** | | | | | | | | |
| | Sabha Hall | 6160 | 572 | per seat | 8 | 970 | 7,760 | Assumed 970 seats per the architectural plans. |
| | Offices | 912 | 85 | per 9.3 m2 | 75 | 9 | 683 | Office per floor area, or per employee. Employees unknown. |
| | Cafeteria | 3795 | 353 | per meal | 12 | 336 | 8,064 | Assumed 2 meals per day and based on number of seats |
| | Activity Hall with kitchen facility | 5940 | 552 | per seat | 36 | 300 | 10,800 | Assumed 300 seats with assembly hall use. |
| | Mandir | 559 | 52 | per seat | 8 | 100 | 800 | |
| | | | | | | **SUBTOTAL AREA** | **28,107** | |
| | | | | | | **Total Maximum Day Sewage Flow:** | **28,107** | |
| | | | | | | **Design Sewage Flow:** | 30,000 | |

**Pre-Treatment Options**

Required septic tank size = 90000 L minimum

Propose Level IV Treatment (Y/N): Y

Native Percolation time, T = 50 min/cm

Imported Percolation time = 10 min/cm

**Type A Dispersal Bed**

Stone area required = 600 $m^2$

Sand area required = 3750 $m^2$ 0.375 ha

# Terraprobe

*Consulting Geotechnical & Environmental Engineering*
*Construction Materials Inspection & Testing*

**GEOTECHNICAL INVESTIGATION**
**PROPOSED SMVS TEMPLE**
**6939 KING STREET**
**CALEDON, ONTARIO**

**Prepared for:** Swaminarayan Mandir Vasna Sanstha Canada (SMVS)
114 Toryork Drive
Toronto, Ontario
M9L 1X6

**Attention:** Mr. Rasik Patel



File No. 1-20-0222-01
Issued: October 20, 2020

**Distribution**

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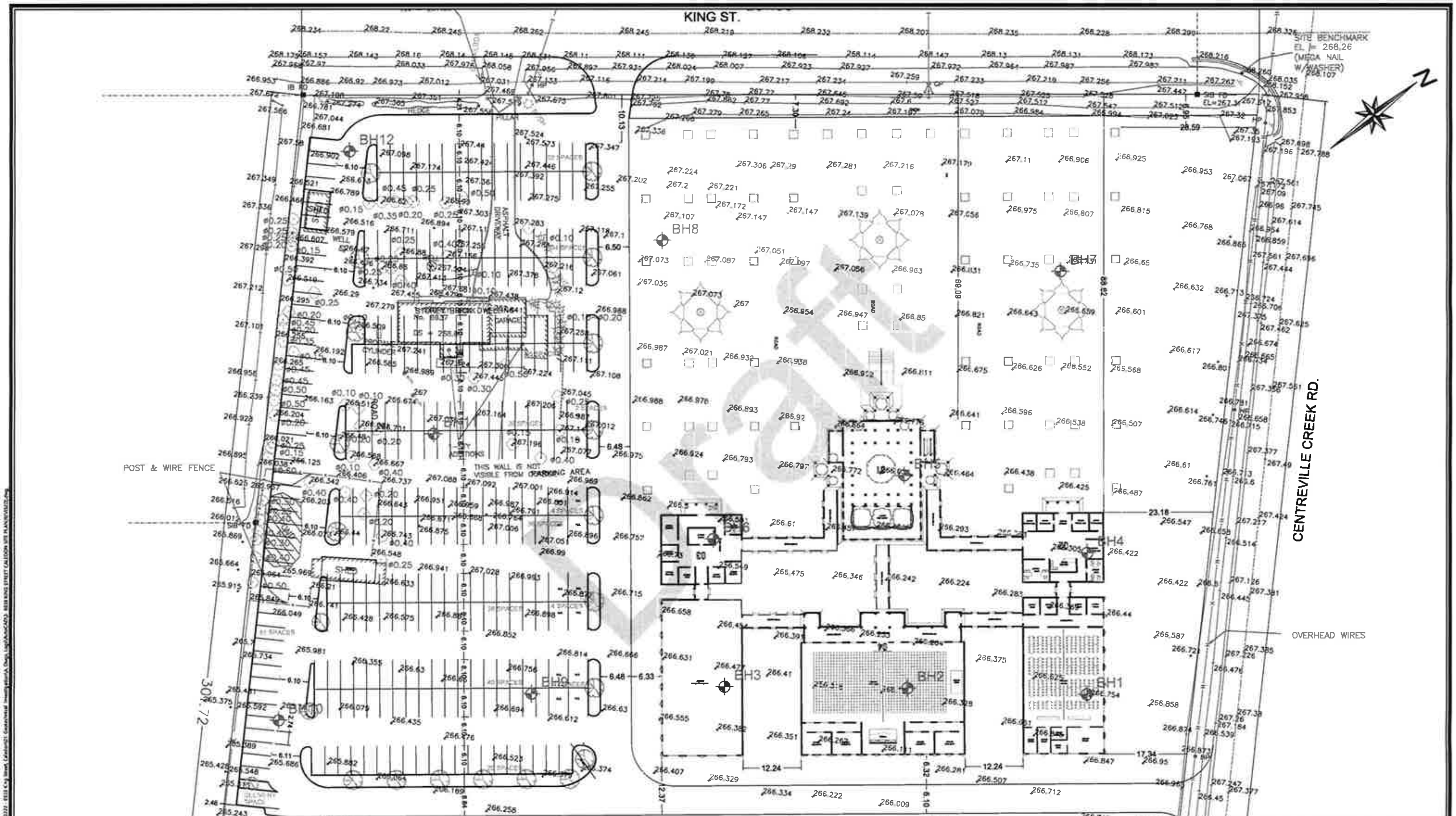



REFERENCE
Project: 6939 King Street, Kleinberg Ontario
Title: Site Plan, Dwg. No.: A1, Date: Aug. 06, 2020
By: Battaglia Architect Inc.

LEGEND
⯐ Approximate Borehole Location

0 10 20 30 Metres
SCALE

**Terraprobe**
11 Indell Lane, Brampton, Ontario, L6T 3Y3
Tel: (905) 796-2650 Fax: (905) 796-2250

| Title: | FIGURE: |
|---|---|
| **BOREHOLE LOCATION PLAN** | 2 |
| File No. 1-20-0222-01 | |

Terraprobe

# LOG OF BOREHOLE 1

| | | |
|---|---|---|
| Project No. : 1-20-0222-01 | Client : Swaminarayan Mandir Vasna Sansthan Canada | Originated by : Saif |
| Date started : July 14, 2020 | Project : 6939 King Street | Compiled by : CM |
| Sheet No. : 1 of 1 | Location : Caledon, Ontario | Checked by : SZ |

| | |
|---|---|
| Position : E: 597212, N: 4855726 (UTM 17T) | Elevation Datum : Geodetic |
| Rig type : Deidric 60, track-mounted | Drilling Method : Solid stem augers |

**SOIL PROFILE**

| Elev / Depth (m) | Description |
|---|---|
| 266.8 | GROUND SURFACE |
| 265.6 / 1.2 | **FILL**, clayey silt, trace sand, trace gravel, trace wood chips, very stiff, brown, moist |
| 258.7 / 8.1 | **SILT AND CLAY to CLAYEY SILT**, trace to some sand, trace gravel, stiff to very stiff, brown, moist (GLACIAL TILL) ...grey below ...rock fragments |

**SAMPLES**

| Number | Type | SPT 'N' Value |
|---|---|---|
| 1 | SS | 17 |
| 2 | SS | 21 |
| 3 | SS | 17 |
| 4 | SS | 23 |
| 5 | SS | 23 |
| 6 | SS | 14 |
| 7 | SS | 21 |
| 8 | SS | 24 |

Depth Scale (m): 0, 1, 2, 3, 4, 5, 6, 7, 8

Elevation Scale (m): 266, 265, 264, 263, 262, 261, 260, 259

Penetration Test Values (Blows / 0.3m) — X Dynamic Cone — 10, 20, 30, 40

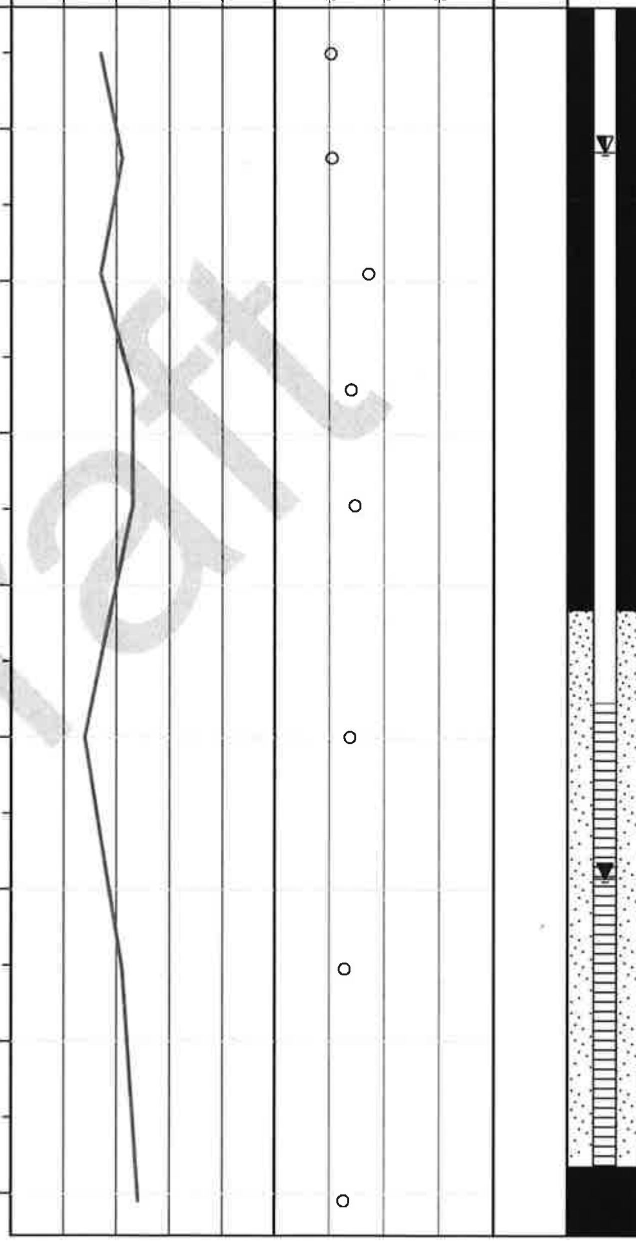
Undrained Shear Strength (kPa) — O Unconfined, + Field Vane, ● Pocket Penetrometer, ■ Lab Vane — 40, 80, 120, 160

Moisture / Plasticity — Plastic Limit (PL), Natural Water Content (MC), Liquid Limit (LL) — 10, 20, 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level



**Lab Data and Comments** — GRAIN SIZE DISTRIBUTION (%) (MIT)

| GR | SA | SI | CL |
|---|---|---|---|
| 2 | 14 | 48 | 36 |

**END OF BOREHOLE**

Borehole was dry and caved to 5.8 m below ground surface upon completion of drilling.

50 mm dia. monitoring well installed.

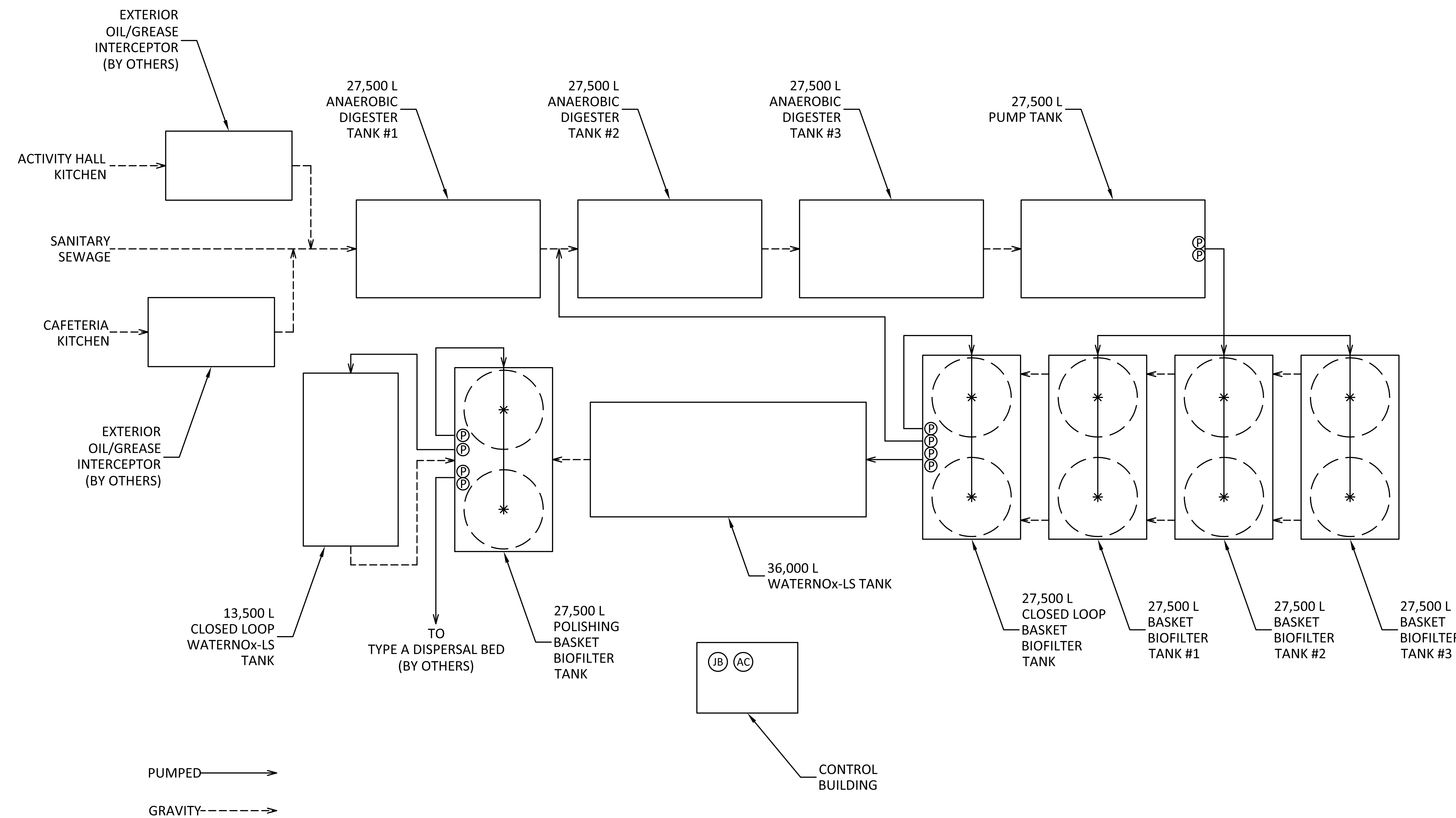
WATER LEVEL READINGS

| Date | Water Depth (m) | Elevation (m) |
|---|---|---|
| Oct 5, 2020 | 1.0 | 265.9 |
| Oct 13, 2020 | 5.7 | 261.1 |

# APPENDIX B

## Preliminary Schematic for Onsite Sewage Treatment System

# PRELIMINARY SCHEMATIC ONLY




NOTES:

1. THIS IS A PRELIMINARY SCHEMATIC FOR A WATERLOO BIOFILTER SEWAGE TREATMENT SYSTEM. THIS IS FOR PLANNING PURPOSES ONLY AND IS NOT AN ENGINEERED DESIGN.

2. THE PEAK DESIGN SANITARY SEWAGE FLOW FOR THIS PLACE OF WORSHIP IS 30,000 L/day. PEAK FLOWS ARE EXPECTED TO OCCUR INFREQUENTLY WITH AVERAGE FLOWS BEING AROUND HALF OF THE PEAK.

3. THE SANITARY SEWAGE IS ESTIMATED TO HAVE THE FOLLOWING CONCENTRATIONS:

BOD = 300 mg/L
TSS = 300 mg/L
TKN = 80 mg/L

SEWAGE CONCENTRATIONS TO BE CONFIRMED BY DESIGNER.

4. WASTEWATER FROM THE FACILITY'S KITCHENS FLOW BY GRAVITY TO AN EXTERIOR OIL/GREASE INTERCEPTOR(S) (BY OTHERS). THE INTERCEPTOR IS TO BE VENTED AS PER MANUFACTURER'S RECOMMENDATIONS.

5. EFFLUENT FROM THE EXTERIOR OIL/GREASE INTERCEPTOR(S) AND SANITARY SEWAGE FROM THE REST OF THE FACILITY FLOW BY GRAVITY INTO THE FIRST OF THREE (3) 27,500 L ANAEROBIC DIGESTER TANKS ARRANGED IN SERIES. THE INLET OF EACH TANK IS EQUIPPED WITH AN INNERTUBE. THE OUTLET OF TANK #1 IS EQUIPPED WITH AN EFFLUENT FILTER. THE OUTLET OF TANK #2 IS EQUIPPED WITH A BAFFLE. THE OUTLET OF TANK #3 IS EQUIPPED WITH TWO (2) EFFLUENT FILTERS.

6. EFFLUENT FROM ANAEROBIC DIGESTER TANK #3 FLOWS BY GRAVITY INTO A 27,500 L PUMP TANK. THE PUMP TANK IS EQUIPPED WITH TWO (2) SUBMERSIBLE EFFLUENT PUMPS (P) OPERATING ON AN ALTERNATING TIMER.

7. THE PUMPS IN THE PUMP TANK DOSE THE EFFLUENT TO THREE (3) 27,500 L BASKET BIOFILTER TANKS, EACH HOUSING TWO (2) BASKETS EACH FILLED WITH 10.8 $m^3$ OF BIOFILTER MEDIUM. THE PUMP TANK EFFLUENT IS EVENLY DISTRIBUTED OVER THE SURFACE OF THE MEDIUM AND TREATED AS IT TRICKLES THROUGH THE INTERIOR OF THE MEDIUM. SMALL, LOW VOLTAGE AIR FANS AND PASSIVELY VENTED LIDS PROMOTE AEROBIC CONDITIONS. THE TANKS ARE CONNECTED BY BOTTOM DRAINS WITH THE EFFLUENT COLLECTING ON THE FLOOR OF THE TANKS.

8. BASKET BIOFILTER TANK #1 IS CONNECTED BY BOTTOM DRAINS WITH A 27,500 L CLOSED LOOP BASKET BIOFILTER TANK. THE CLOSED LOOP BASKET BIOFILTER TANK IS EQUIPPED WITH TWO (2) SUBMERSIBLE EFFLUENT PUMPS (P) OPERATING ON SEPARATE TIMERS AND TWO (2) SUBMERSIBLE EFFLUENT PUMPS (P) OPERATING ON AN ALTERNATING TIMER.

9. THE FIRST SIMPLEX PUMP IN THE CLOSED LOOP BASKET BIOFILTER TANK PUMPS A MAXIMUM OF 15,000 L/day TO TWO (2) BASKETS EACH FILLED WITH 10.8 $m^3$ BIOFILTER MEDIUM LOCATED WITHIN THE CLOSED LOOP BASKET BIOFILTER TANK. THE EFFLUENT IS EVENLY DISTRIBUTED OVER THE SURFACE OF THE MEDIUM AND TREATED AS IT TRICKLES THROUGH THE INTERIOR OF THE MEDIUM. A SMALL LOW VOLTAGE AIR FAN AND PASSIVELY VENTED LIDS PROMOTE AEROBIC CONDITIONS. THE EFFLUENT COLLECTS ON THE FLOOR OF THE TANK AND MIXES WITH THE EFFLUENT FROM THE THREE (3) BASKET BIOFILTER TANKS.

10. THE SECOND SIMPLEX PUMP IN THE CLOSED LOOP BASKET BIOFILTER TANK RECIRCULATES A PORTION OF THE EFFLUENT TO THE INLET OF ANAEROBIC DIGESTER TANK #2.

11. THE DUPLEX PUMPS IN THE CLOSED LOOP BASKET BIOFILTER TANK PUMP THE EFFLUENT TO A 36,000 L WATERNOx-LS TANK FILLED WITH DENITRIFYING MEDIUM.

12. THE WATERNOx-LS TANK EFFLUENT FLOWS BY GRAVITY INTO INTO A 27,500 L POLISHING BASKET BIOFILTER TANK. THE POLISHING BASKET BIOFILTER TANK IS EQUIPPED WITH TWO (2) SUBMERSIBLE EFFLUENT PUMPS (P) OPERATING ON SEPARATE SEPARATE TIMERS AND TWO (2) SUBMERSIBLE EFFLUENT PUMPS OPERATING ON ALTERNATING DEMAND.

13. THE FIRST SIMPLEX PUMP IN THE POLISHING BASKET BIOFILTER TANK DOSES A MAXIMUM OF 15,000 L/DAY TO A 13,500 L CLOSED LOOP WATERNOx-LS TANK FILLED WITH DENITRIFYING MEDIUM. THE EFFLUENT FROM THE CLOSED LOOP WATERNOx-LS TANK FLOWS BY GRAVITY BACK INTO THE POLISHING BASKET BIOFILTER TANK.

14. THE SECOND SIMPLEX PUMP IN THE POLISHING BASKET BIOFILTER TANK DOSES A MAXIMUM OF 15,000 L/day TO TWO (2) BASKETS EACH FILLED WITH 10.8 $m^3$ OF BIOFILTER MEDIUM ALSO LOCATED WITHIN THE POLISHING BASKET BIOFILTER TANK. THE EFFLUENT IS EVENLY DISTRIBUTED OVER THE SURFACE OF THE MEDIUM AND TREATED AS IT TRICKLES THROUGH THE INTERIOR OF THE MEDIUM. A SMALL, LOW VOLTAGE AIR FAN AND PASSIVELY VENTED LIDS PROMOTE AEROBIC CONDITIONS. THE EFFLUENT COLLECTS ON THE FLOOR OF THE TANK.

15. THE DUPLEX PUMPS IN THE POLISHING BASKET BIOFILTER TANK PUMP THE FINAL EFFLUENT TO A TYPE A DISPERSAL BED (BY OTHERS).

16. A CONTROL BUILDING HOUSES TWO (2) METERING PUMPS. THE FIRST METERING PUMP DOSES AN ALKALINITY CHEMICAL (AC) TO THE INLET OF ANAEROBIC DIGESTER TANK #3. THE SECOND METERING PUMP DOSES JUMPSTART BACTERIA (JB) TO THE INLET OF THE PUMP TANK. DOSING LINES ARE NOT SHOWN ON THE SCHEMATIC.

17. ALL PUMPS ARE RUN BY A WATERLOO SMART PANEL(S). THE WATERLOO SMART PANEL PROVIDES REMOTE MONITORING, CONTROL, AND DATA LOGGING OVER A STABLE WIRELESS CELLULAR NETWORK. THIS FUNCTIONALITY ALLOWS FOR REAL TIME OPERATIONAL ADJUSTMENTS TO OPTIMIZE SYSTEM PERFORMANCE. THE WATERLOO SMART PANEL ALSO IMMEDIATELY NOTIFIES THE SERVICE PROVIDER OF A PUMP FAILURE OR HIGH LEVEL ALARM, PROVIDING THEM WITH VITAL INFORMATION TO LIMIT SITE VISITS WHILE KEEPING THE SYSTEM OPERATING PROPERLY.

18. ADHERENCE TO BEST MANAGEMENT PRACTICES (PROVIDING THE APPROPRIATE STRENGTH SEWAGE, PERFORMING ROUTINE MAINTENANCE, LIMITING TOXINS ENTERING THE SYSTEM, ETC.) IS NECESSARY FOR OPTIMAL PERFORMANCE OF THE WATERLOO BIOFILTER TREATMENT SYSTEM OUTLINED IN THIS SCHEMATIC, WHICH IS DESIGNED FOR THE FOLLOWING EFFLUENT OBJECTIVES (LIMITS):

cBOD = 10 mg/L (20 mg/L)
TSS = 10 mg/L (20 mg/L)
NITRATE-NITROGEN = 3 mg/L (limit)
pH = 6.5 - 8.5

Waterloo BIOFILTER


65 MASSEY ROAD SUITE C, GUELPH ON N1H 7M6
TEL: 519-856-0757 FAX: 519-856-0759
EMAIL: INFO@WATERLOO-BIOFILTER.COM


TITLE: PROCESS SCHEMATIC

PROJECT: PLACE OF WORSHIP, 6939 KING STREET - CALEDON

FOR: CROZIER CONSULTING ENGINEERS

| PROJECT NUMBER: | PEAK SEWAGE FLOW: | CONFIGURATION: | DATE: |
|---|---|---|---|
| ON-C-2022-0090 | 30,000 L/day | BASKETS w/ LS | MAY 18, 2022 |
| DRAWN BY: | PERCOLATION RATE: | DISCHARGE: | 1 OF 1 |
| K. WETHERALL | N/A | TYPE A DISPERSAL BED | |

# APPENDIX C

## Water Demand Calculations

# Domestic Water Demand - Ontario Building Code

| | | | Notes & References |
|---|---|---|---|
| **Peak Sewage Flow** | 30,000 | L/day | Ontario Building Code - Table |
| Avg. Daily Demand = | 21429 | L/day | Using peaking factor |
| | **29.762** | **L/min** | Over a 12 hour period |
| **Peaking Factors** | | | |
| Max Day = | 1.40 | | Peel Region Public Works Watermain Design Criteria |
| Peak Hour = | 3.00 | | |
| Average Day = | 29.76 | L/min | |
| Max Day = | **41.67** | L/min | Max Day = (Average Day Demand) * (Max Day Factor) |
| Peak Hour = | **89.29** | L/min | Peak Hour = (Average Day Demand) * (Peak Hour Factor) |

| Criteria | Average Daily Water Demand (L/min) | Max Day Demand (L/min) | Peak Hourly Demand (L/min) |
|---|---|---|---|
| OBC Sewage & Peel Region | 29.76 | 41.67 | 89.29 |

## SMVS - Proposed 1 Storey Place of Worship
## Fire Protection Volume Calculation
## CFC File: 1990-5787



**Fire Protection Water Supply Guideline**
**Part 3 of the Ontario Building Code (2006)**

$$Q = KVS_{TOT}$$

Q = minimum supply of water in litres (L)
K = water supply coefficient
V = total building volume in cubic metres
$S_{TOT}$ = total of spatial coefficient values from property line exposures on all sides

| | | |
|---|---|---|
| K = | 25.0 | Group A, Division 3 building with combustible construction conforming to OBC 3.2.2 (Table 1) [ confirmed by architect] |
| V = | 12567 | Volume per total floor area and average height of 4m |
| $S_{TOT}$ = | 1 | $S_{TOT}$ As calculated |

**Q = 314175 L OR 314.175 $m^3$**

Based on ranges listed in Table 2, the required minimum water supply flow rate is **9000 L/min**

**150 L/s**

# APPENDIX D

## Stormwater Management Calculations

# Modified Rational Calculations - Input Parameters

**Storm Data:** Caledon

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

| Return Period | A | B | C | I (mm/hr) |
|---|---|---|---|---|
| **2 yr** | 1070 | 7.85 | 0.8759 | 85.72 |
| **5 yr** | 1593 | 11.00 | 0.8789 | 109.68 |
| **10 yr** | 2221 | 12.00 | 0.9080 | 134.16 |
| **25 yr** | 3158 | 15.00 | 0.9335 | 156.47 |
| **50 yr** | 3886 | 16.00 | 0.9495 | 176.19 |
| **100 yr** | 4688 | 17.00 | 0.9624 | 196.54 |

| **Pre - Development Conditions** | | | | | |
|---|---|---|---|---|---|
| **Catchment** | **Land Use** | **Area** (ha) | **Area** ($m^2$) | **C** | **Weighted Average C** |
| *101* | *Pervious* | 3.09 | 30,900 | **0.25** | **0.13** |
| | *Impervious* | 0.00 | 0 | **0.9** | **0.00** |
| *102* | *Pervious* | 2.97 | 29,724 | **0.25** | **0.12** |
| | *Impervious* | 0.00 | 0 | **0.9** | **0.00** |
| **Total Site** | | **6.06** | **60,624** | **-** | **0.25** |

| **Post - Development Conditions (Controlled)** | | | | | |
|---|---|---|---|---|---|
| **Catchment** | **Land Use** | **Area** (ha) | **Area** ($m^2$) | **C** | **Weighted Average C** |
| **Controlled** | | | | | |
| *201-218* | *Pervious* | 0.39 | 3,900 | **0.25** | **0.04** |
| | *Impervious* | 2.39 | 23,900 | **0.90** | **0.77** |
| **Total Controlled** | | **2.78** | **27,800** | **-** | **0.81** |
| **Uncontrolled** | | | | | |
| *UC1* | *Pervious* | 3.13 | 31,300 | **0.25** | **0.24** |
| | *Impervious* | 0.00 | - | **0.9** | **0.00** |
| *UC2* | *Pervious* | 0.15 | 1,500 | **0.25** | **0.01** |
| | *Impervious* | 0.00 | - | **0.9** | **0.00** |
| **Total Uncontrolled** | | **3.28** | **32,800** | **-** | **0.25** |
| **Total Site** | | **6.06** | **60,600** | **-** | **0.51** |

**Equations:**

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

Intensity
$$i(T_d) = A / (T + B)^C$$

CROZIER
CONSULTING ENGINEERS

**Project:** 6939 King Street
**Project No.:** 1990-5787
**Created By:** JA
**Checked By:** JL
**Date:** 11/17/2020
**Updated:** 6/17/2022

## Modified Rational Calculations - Peak Flows Summary

| Humber River Unit Flow Rates (TRCA 2012) | | | | | |
|---|---|---|---|---|---|
| Return Period | Site Area (Ha) | A | B | Unit Flow Rate (L/s/ha) | Target Peak Flow (L/s) |
| 2 | 2.78 | 9.506 | -0.719 | 8.7 | 24 |
| 5 | | 14.652 | -1.136 | 13.3 | 37 |
| 10 | | 17.957 | -1.373 | 16.4 | 45 |
| 25 | | 22.639 | -1.741 | 20.6 | 57 |
| 50 | | 26.566 | -2.082 | 24.1 | 67 |
| 100 | | 29.912 | -2.316 | 27.2 | 76 |

| Pre/Post-Development Uncontrolled Peak Flows (L/s) | | |
|---|---|---|
| Return Period | $Q_{pre}$ | $Q_{post}$ |
| **2 yr** | 167 | 540 |
| **5 yr** | 213 | 691 |
| **10 yr** | 261 | 845 |
| **25 yr** | 304 | 985 |
| **50 yr** | 343 | 1,109 |
| **100 yr** | 382 | 1,237 |

*Note Target based on Unit Flow Rates for Humber River Sub-Basin 36, Equation F (TRCA Stromwater Management Criteria August 2012 Version 1.0)

**Equations:**

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

Quantity Control Release Rates
$$Q_{target} = [A + B \times \ln(Area)](Area)$$

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# Modified Rational Calculations - Summary

| Storm Event (yr) | Peak Flow Rate | | | Required Storage ($m^3$) |
|---|---|---|---|---|
| | $Q_{Target}$(L/s) | Post-Development (L/s) | | |
| | | Uncontrolled | Controlled | |
| 2 | 24.1 | 540 | 24.0 | 605 |
| 5 | 37.1 | 691 | 30.4 | 899 |
| 10 | 45.5 | 845 | 34.5 | 1079 |
| 25 | 57.3 | 985 | 49.5 | 1285 |
| 50 | 67.1 | 1,109 | 56.5 | 1446 |
| 100 | 75.7 | 1,237 | 62.5 | 1628 |

1. Contorlled flows using 75mm diameter orifice

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# Dry Pond Outlet Orifice Design - 2 x 125 mm

| | |
|---|---|
| Depth Increment (m) = | 0.05 |
| Inlet Elevation (m) = | 263.95 |

| Orifice: $Q=CA(2gH)^{0.5}$ | Orifice 1 | Orifice 2 |
|---|---|---|
| Discharge Coef., Cd= | 0.80 | 0.80 |
| Orifice Diameter (mm) = | 125 | 125 |
| Area of Orifice ($m^2$) = | 0.0123 | 0.0123 |
| Orifice (Side/Bottom) = | Side | Side |
| Invert (m) = | 263.95 | 264.50 |

**Storage Rating Curve**

| | Water Elev. (m) | Depth (m) | Active Length (m) | Active Width (m) | Volume (m3) | Orifice1 Q (Side) L/s | Orifice2 Q (Side) L/s | Total Q |
|---|---|---|---|---|---|---|---|---|
| **Bottom of Pond** | 263.95 | 0.00 | 28.50 | 58.50 | 0 | 0.00 | 0.00 | 0.00 |
| | 264.00 | 0.05 | 28.80 | 58.80 | 84 | 0.00 | 0.00 | 0.00 |
| | 264.05 | 0.10 | 29.10 | 59.10 | 169 | 8.42 | 0.00 | 8.42 |
| | 264.10 | 0.15 | 29.40 | 59.40 | 256 | 12.86 | 0.00 | 12.86 |
| | 264.15 | 0.20 | 29.70 | 59.70 | 344 | 16.13 | 0.00 | 16.13 |
| | 264.20 | 0.25 | 30.00 | 60.00 | 433 | 18.83 | 0.00 | 18.83 |
| | 264.25 | 0.30 | 30.30 | 60.30 | 524 | 21.19 | 0.00 | 21.19 |
| | 264.30 | 0.35 | 30.60 | 60.60 | 616 | 23.32 | 0.00 | 23.32 |
| | 264.35 | 0.40 | 30.90 | 60.90 | 709 | 25.26 | 0.00 | 25.26 |
| | 264.40 | 0.45 | 31.20 | 61.20 | 804 | 27.07 | 0.00 | 27.07 |
| | 264.45 | 0.50 | 31.50 | 61.50 | 900 | 28.76 | 0.00 | 28.76 |
| | 264.50 | 0.55 | 31.80 | 61.80 | 997 | 30.36 | 0.00 | 30.36 |
| | 264.55 | 0.60 | 32.10 | 62.10 | 1096 | 31.88 | 0.00 | 31.88 |
| | 264.60 | 0.65 | 32.40 | 62.40 | 1196 | 33.33 | 8.42 | 41.75 |
| | 264.65 | 0.70 | 32.70 | 62.70 | 1298 | 34.72 | 12.86 | 47.58 |
| | 264.70 | 0.75 | 33.00 | 63.00 | 1401 | 36.06 | 16.13 | 52.18 |
| | 264.75 | 0.80 | 33.30 | 63.30 | 1505 | 37.34 | 18.83 | 56.17 |
| **Top of Active Storage (264.84)** | **264.80** | **0.85** | **33.60** | **63.60** | **1611** | **38.59** | **21.19** | **59.78** |
| | 264.85 | 0.90 | 33.90 | 63.90 | 1718 | 39.80 | 23.32 | 63.11 |
| | 264.90 | 0.95 | 34.20 | 64.20 | 1827 | 40.97 | 25.26 | 66.23 |
| | 264.95 | 1.00 | 34.50 | 64.50 | 1937 | 42.11 | 27.07 | 69.17 |
| | 265.00 | 1.05 | 34.80 | 64.80 | 2049 | 43.21 | 28.76 | 71.98 |
| | 265.05 | 1.10 | 35.10 | 65.10 | 2162 | 44.29 | 30.36 | 74.66 |
| | 265.10 | 1.15 | 35.40 | 65.40 | 2276 | 45.35 | 31.88 | 77.23 |
| | 265.15 | 1.20 | 35.70 | 65.70 | 2392 | 46.38 | 33.33 | 79.71 |
| | 265.20 | 1.25 | 36.00 | 66.00 | 2509 | 47.39 | 34.72 | 82.11 |
| | 265.25 | 1.30 | 36.30 | 66.30 | 2628 | 48.38 | 36.06 | 84.43 |
| | 265.30 | 1.35 | 36.60 | 66.60 | 2749 | 49.34 | 37.34 | 86.69 |
| | 265.35 | 1.40 | 36.90 | 66.90 | 2870 | 50.29 | 38.59 | 88.88 |
| | 265.40 | 1.45 | 37.20 | 67.20 | 2994 | 51.22 | 39.80 | 91.02 |
| **Top of Pond** | 265.45 | 1.50 | 37.50 | 67.50 | 3119 | 52.14 | 40.97 | 93.10 |

**Project:** 6939 King Street
**Project No.:** 1990-5787
**Created By:** JA
**Checked By:** JL
**Date:** 11/17/2020
**Updated:** 6/17/2022

# Modified Rational Calculations - 100-Year Storm Event

**Control Criteria**

100 yr: Control Post-Development Peak Flows to Unit Flow Rate

100 yr: Uncontrolled Post-Development Flow:

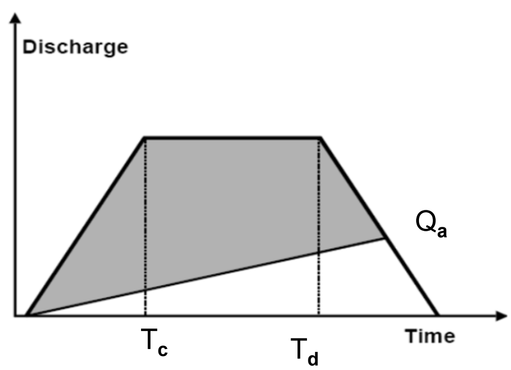
$Q_{post}$ = 1,237.4 L/s

100 yr: Target Flow Rate:

$Q_{target}$ = 75.7 L/s

$Q_{actual}$ = 62.5 L/s

| Storage Volume Determination | | | | |
|---|---|---|---|---|
| $T_d$ (min) | i (mm/hr) | $T_d$ (sec) | $Q_{Uncont}$ ($m^3/s$) | $S_d$ ($m^3$) |
| 10 | 196.54 | 600 | 1.237 | 704.9 |
| 20 | 145.13 | 1200 | 0.914 | 1040.2 |
| 30 | 115.28 | 1800 | 0.726 | 1231.4 |
| 40 | 95.75 | 2400 | 0.603 | 1353.0 |
| 50 | 81.95 | 3000 | 0.516 | 1435.4 |
| 75 | 60.40 | 4500 | 0.380 | 1551.8 |
| 100 | 47.93 | 6000 | 0.302 | 1604.1 |
| 125 | 39.78 | 7500 | 0.250 | 1625.1 |
| **150** | **34.03** | **9000** | **0.214** | **1628.1** |
| 175 | 29.75 | 10500 | 0.187 | 1620.0 |
| 200 | 26.45 | 12000 | 0.167 | 1604.3 |
| 225 | 23.81 | 13500 | 0.150 | 1583.3 |
| 250 | 21.66 | 15000 | 0.136 | 1558.3 |
| 275 | 19.87 | 16500 | 0.125 | 1530.2 |
| 300 | 18.36 | 18000 | 0.116 | 1499.8 |
| 325 | 17.07 | 19500 | 0.107 | 1467.6 |
| 335 | 16.60 | 20100 | 0.105 | 1454.2 |
| **Required Storage Volume:** | | | | **1628.1** |




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

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

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**Project:** 6939 King Street
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**Updated:** 6/17/2022

# Modified Rational Calculations - 50-Year Storm Event

**Control Criteria**

50 yr: Control Post-Development Peak Flows to Unit Flow Rate

50 yr: Uncontrolled Post-Development Flow:

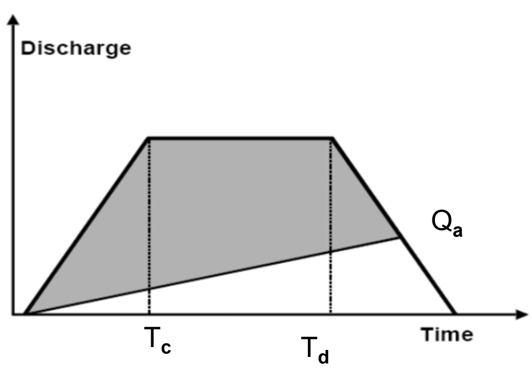
$Q_{post}$ = 1,109 L/s

50 yr: Target Flow Rate:

$Q_{target}$ = 67 L/s

$Q_{actual}$ = 57 L/s

| Storage Volume Determination | | | | |
|---|---|---|---|---|
| $T_d$ (min) | i (mm/hr) | $T_d$ (sec) | $Q_{Uncont}$ ($m^3$/s) | $S_d$ ($m^3$) |
| 10 | 176.19 | 600 | 1.109 | 631.7 |
| 20 | 129.36 | 1200 | 0.814 | 926.4 |
| 30 | 102.50 | 1800 | 0.645 | 1093.7 |
| 40 | 85.04 | 2400 | 0.535 | 1200.1 |
| 50 | 72.75 | 3000 | 0.458 | 1272.4 |
| 75 | 53.63 | 4500 | 0.338 | 1375.3 |
| 100 | 42.59 | 6000 | 0.268 | 1422.4 |
| 125 | 35.39 | 7500 | 0.223 | 1442.0 |
| **150** | **30.30** | **9000** | **0.191** | **1445.9** |
| 175 | 26.53 | 10500 | 0.167 | 1439.9 |
| 200 | 23.60 | 12000 | 0.149 | 1427.1 |
| 225 | 21.27 | 13500 | 0.134 | 1409.5 |
| 250 | 19.37 | 15000 | 0.122 | 1388.3 |
| 275 | 17.78 | 16500 | 0.112 | 1364.4 |
| 300 | 16.45 | 18000 | 0.104 | 1338.2 |
| 325 | 15.30 | 19500 | 0.096 | 1310.4 |
| 335 | 14.88 | 20100 | 0.094 | 1298.8 |
| **Required Storage Volume:** | | | | **1445.9** |




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

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

**Project:** 6939 King Street
**Project No.:** 1990-5787
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**Date:** 11/17/2020
**Updated:** 6/17/2022

# Modified Rational Calculations - 25-Year Storm Event

**Control Criteria**

25 yr: Control Post-Development Peak Flows to Unit Flow Rate

25 yr: Uncontrolled Post-Development Flow:

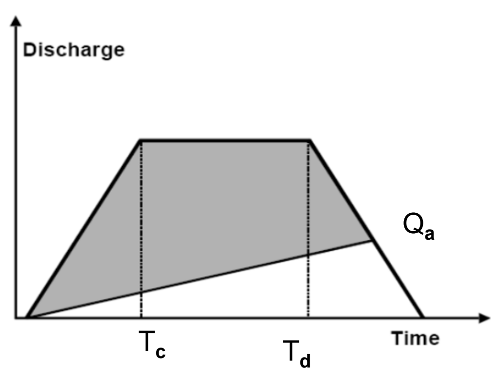
$Q_{post}$= 985 L/s

25 yr: Target Flow Rate:

$Q_{target}$ = 57 L/s

$Q_{actual}$ = 50 L/s

| Storage Volume Determination | | | | |
|---|---|---|---|---|
| $T_d$ (min) | i (mm/hr) | $T_d$ (sec) | $Q_{Uncont}$ ($m^3$/s) | $S_d$ ($m^3$) |
| 10 | 156.47 | 600 | 0.985 | 561.4 |
| 20 | 114.29 | 1200 | 0.720 | 818.9 |
| 30 | 90.39 | 1800 | 0.569 | 965.0 |
| 40 | 74.95 | 2400 | 0.472 | 1058.3 |
| 50 | 64.13 | 3000 | 0.404 | 1122.1 |
| 75 | 47.33 | 4500 | 0.298 | 1214.7 |
| 100 | 37.65 | 6000 | 0.237 | 1258.8 |
| 125 | 31.33 | 7500 | 0.197 | 1279.0 |
| **150** | **26.88** | **9000** | **0.169** | **1285.3** |
| 175 | 23.56 | 10500 | 0.148 | 1282.8 |
| 200 | 20.99 | 12000 | 0.132 | 1274.2 |
| 225 | 18.94 | 13500 | 0.119 | 1261.2 |
| 250 | 17.27 | 15000 | 0.109 | 1244.9 |
| 275 | 15.88 | 16500 | 0.100 | 1226.1 |
| 300 | 14.70 | 18000 | 0.093 | 1205.2 |
| 325 | 13.69 | 19500 | 0.086 | 1182.7 |
| **Required Storage Volume:** | | | | **1285.3** |




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

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

# Modified Rational Calculations - 10-Year Storm Event

**Control Criteria**

10 yr: Control Post-Development Peak Flows to Unit Flow Rate

10 yr: Uncontrolled Post-Development Flow:

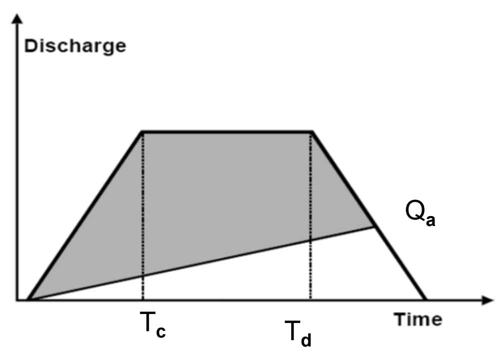
$Q_{post}$ = 845 L/s

10 yr: Target Flow Rate:

$Q_{target}$ = 45 L/s

$Q_{actual}$ = 35 L/s

| Storage Volume Determination | | | | |
|---|---|---|---|---|
| $T_d$ (min) | i (mm/hr) | $T_d$ (sec) | $Q_{Uncont}$ ($m^3/s$) | $S_d$ ($m^3$) |
| 10 | 134.16 | 600 | 0.845 | 486.1 |
| 20 | 95.47 | 1200 | 0.601 | 690.2 |
| 30 | 74.58 | 1800 | 0.470 | 803.8 |
| 40 | 61.44 | 2400 | 0.387 | 876.5 |
| 50 | 52.37 | 3000 | 0.330 | 927.0 |
| 75 | 38.50 | 4500 | 0.242 | 1002.8 |
| 100 | 30.61 | 6000 | 0.193 | 1042.4 |
| 125 | 25.49 | 7500 | 0.160 | 1064.0 |
| 150 | 21.89 | 9000 | 0.138 | 1074.9 |
| **175** | **19.22** | **10500** | **0.121** | **1079.0** |
| 200 | 17.15 | 12000 | 0.108 | 1078.2 |
| 225 | 15.50 | 13500 | 0.098 | 1074.0 |
| 250 | 14.15 | 15000 | 0.089 | 1067.1 |
| 275 | 13.03 | 16500 | 0.082 | 1058.1 |
| 300 | 12.07 | 18000 | 0.076 | 1047.4 |
| 325 | 11.26 | 19500 | 0.071 | 1035.4 |
| **Required Storage Volume:** | | | | **1079.0** |




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

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

**Project:** 6939 King Street
**Project No.:** 1990-5787
**Created By:** JA
**Checked By:** JL
**Date:** 11/17/2020
**Updated:** 6/17/2022

# Modified Rational Calculations - 5-Year Storm Event

**Control Criteria**

5 yr: Control Post-Development Peak Flows to Unit Flow Rate

5 yr: Uncontrolled Post-Development Flow:

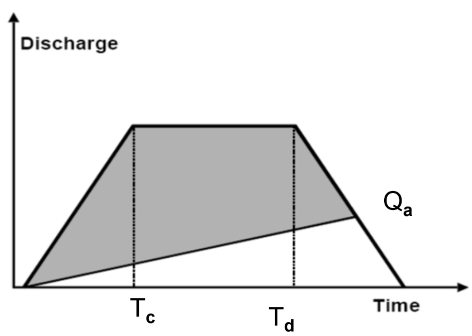
$Q_{post}$ = 691 L/s

5 yr: Target Flow Rate:

$Q_{target}$ = 37 L/s

$Q_{actual}$ = 30 L/s

| Storage Volume Determination | | | | |
|---|---|---|---|---|
| $T_d$ (min) | i (mm/hr) | $T_d$ (sec) | $Q_{Uncont}$ ($m^3$/s) | $S_d$ ($m^3$) |
| 10 | 109.68 | 600 | 0.691 | 396.1 |
| 20 | 77.89 | 1200 | 0.490 | 561.1 |
| 30 | 60.92 | 1800 | 0.384 | 653.9 |
| 40 | 50.28 | 2400 | 0.317 | 714.2 |
| 50 | 42.96 | 3000 | 0.270 | 756.7 |
| 75 | 31.77 | 4500 | 0.200 | 822.5 |
| 100 | 25.39 | 6000 | 0.160 | 858.6 |
| 125 | 21.23 | 7500 | 0.134 | 879.6 |
| 150 | 18.31 | 9000 | 0.115 | 891.4 |
| 175 | 16.13 | 10500 | 0.102 | 897.3 |
| **200** | **14.43** | **12000** | **0.091** | **899.0** |
| 225 | 13.08 | 13500 | 0.082 | 897.5 |
| 250 | 11.97 | 15000 | 0.075 | 893.6 |
| 275 | 11.05 | 16500 | 0.070 | 887.8 |
| 300 | 10.26 | 18000 | 0.065 | 880.5 |
| 325 | 9.59 | 19500 | 0.060 | 871.8 |
| **Required Storage Volume:** | | | | **899.0** |




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

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

**CROZIER**
CONSULTING ENGINEERS

**Project:** 6939 King Street
**Project No.:** 1990-5787
**Created By:** JA
**Checked By:** JL
**Date:** 11/17/2020
**Updated:** 6/17/2022

# Modified Rational Calculations - 2-Year Storm Event

**Control Criteria**

2 yr: Control Post-Development Peak Flows to Unit Flow Rate

2 yr: Uncontrolled Post-Development Flow:

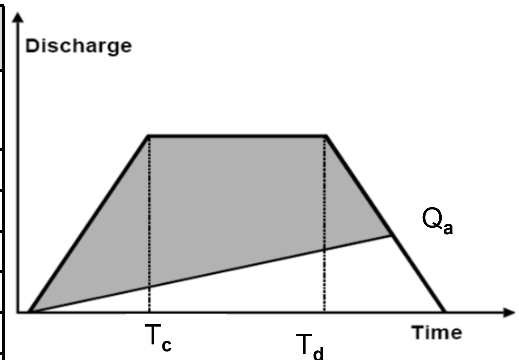
$Q_{post}$= 540 L/s

2 yr: Target Flow Rate:

$Q_{target}$ = 24 L/s

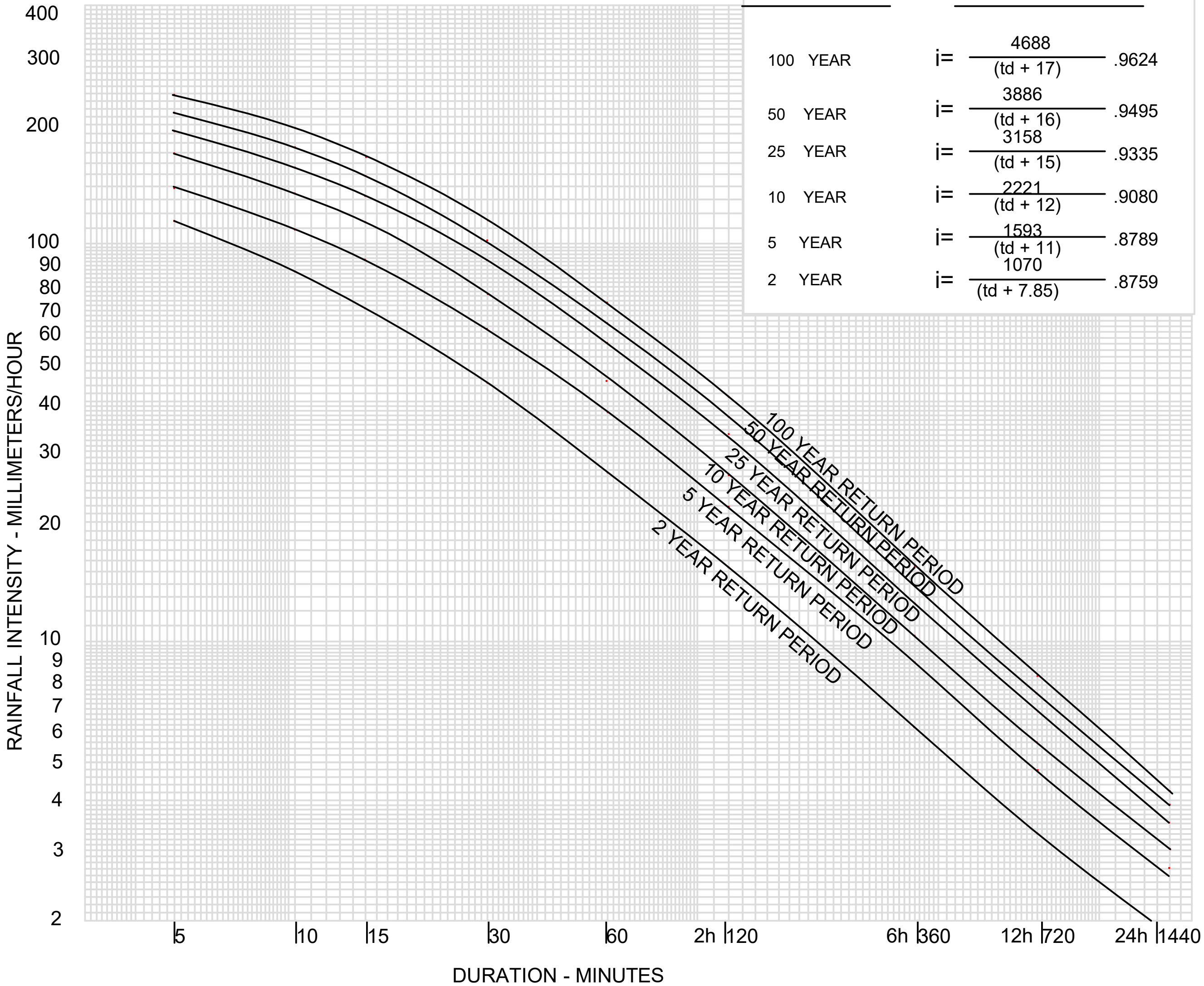
$Q_{actual}$ = 24 L/s

| Storage Volume Determination | | | | |
|---|---|---|---|---|
| $T_d$ (min) | i (mm/hr) | $T_d$ (sec) | $Q_{Uncont}$ ($m^3$/s) | $S_d$ ($m^3$) |
| 10 | 85.72 | 600 | 0.540 | 309.4 |
| 20 | 58.06 | 1200 | 0.366 | 417.0 |
| 30 | 44.38 | 1800 | 0.279 | 474.1 |
| 40 | 36.14 | 2400 | 0.228 | 510.1 |
| 50 | 30.60 | 3000 | 0.193 | 534.8 |
| 75 | 22.34 | 4500 | 0.141 | 571.8 |
| 100 | 17.74 | 6000 | 0.112 | 590.7 |
| 125 | 14.78 | 7500 | 0.093 | 600.5 |
| **150** | **12.70** | **9000** | **0.080** | **604.6** |
| 175 | 11.17 | 10500 | 0.070 | 605.1 |
| 200 | 9.98 | 12000 | 0.063 | 603.0 |
| 225 | 9.04 | 13500 | 0.057 | 599.0 |
| 250 | 8.27 | 15000 | 0.052 | 593.4 |
| 275 | 7.62 | 16500 | 0.048 | 586.6 |
| 300 | 7.08 | 18000 | 0.045 | 578.8 |
| 325 | 6.61 | 19500 | 0.042 | 570.2 |
| **Required Storage Volume:** | | | | **605.1** |




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

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




| RETURN PERIOD | EQUATION OF CURVE |
|---|---|
| 100 YEAR | $i = \frac{4688}{(td + 17)^{.9624}}$ |
| 50 YEAR | $i = \frac{3886}{(td + 16)^{.9495}}$ |
| 25 YEAR | $i = \frac{3158}{(td + 15)^{.9335}}$ |
| 10 YEAR | $i = \frac{2221}{(td + 12)^{.9080}}$ |
| 5 YEAR | $i = \frac{1593}{(td + 11)^{.8789}}$ |
| 2 YEAR | $i = \frac{1070}{(td + 7.85)^{.8759}}$ |

INLET TIMES

| | |
|---|---|
| SUBURBAN RESIDENTIAL | |
| (ROOF DRAINS UNCONNECTED) | 15 min |
| (ROOF DRAINS CONNECTED) | 10 min |
| SUBURBAN, COMMERCIAL, INDUSTRIAL MULTIPLE FAMILY | 10 min |
| DOWNTOWN COMMERCIAL, HIGH DENSITY APARTMENTS, EXPRESSWAYS | 5 min |

RUNOFF COEFFICIENT

| | |
|---|---|
| COMMERCIAL | |
| - DOWNTOWN & SUBURBAN SHOPPING | 0.90 |
| INDUSTRIAL | |
| - DOWNTOWN | 0.90 |
| - SUBURBAN INDUSTRIAL PARKS | 0.75 |
| RESIDENTIAL | |
| - APARTMENTS | 0.75 |
| - ROW DWELLINGS | 0.70 |
| - DUPLEX DWELLINGS | 0.70 |
| - SEMIDETACHED - DOWNTOWN | 0.60 |
| - SINGLE FAMILY - DOWNTOWN | 0.60 |
| - SEMIDETACHED - SUBURBAN | 0.50 |
| - SINGLE FAMILY - SUBURBAN | 0.40 |
| SCHOOLS, CHURCHES, HOSPITALS | 0.75 |
| PARKS, CEMETERIES, RAIL YARDS | |
| (OVER 4 Ha) | 0.20 |
| (UNDER 4 Ha) | 0.25 |
| PARKING LOTS | |
| ASPHALT & GRAVEL | 0.90 |

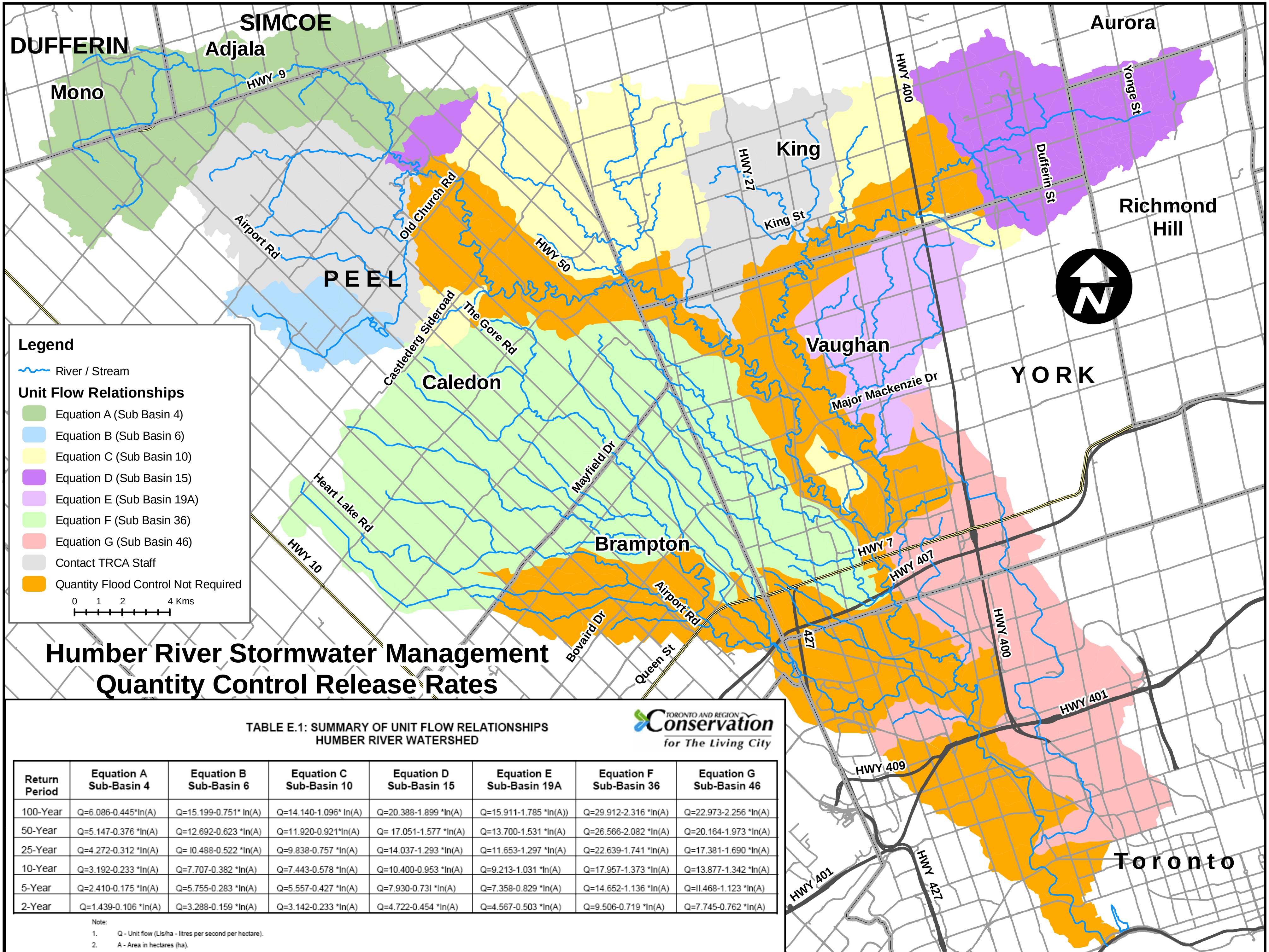
TOWN OF CALEDON

# RAINFALL INTENSITY CURVES

| NO. | REVISION | APR'D | DATE |
|---|---|---|---|
| 3 | ADDITION OF TEXT | | APR 19 |
| 2 | STANDARD 104 NOW 103 | | JAN 08 |
| 1 | STANDARD 112.01 NOW 104 | | JUNE 08 |

| | | | |
|---|---|---|---|
| APR'D: | C.C. | DATE: | FEB 2000 |
| DRAWN: | BJM | SCALE: | N.T.S. |

STANDARD No. 103




# Humber River Stormwater Management Quantity Control Release Rates

TORONTO AND REGION Conservation for The Living City

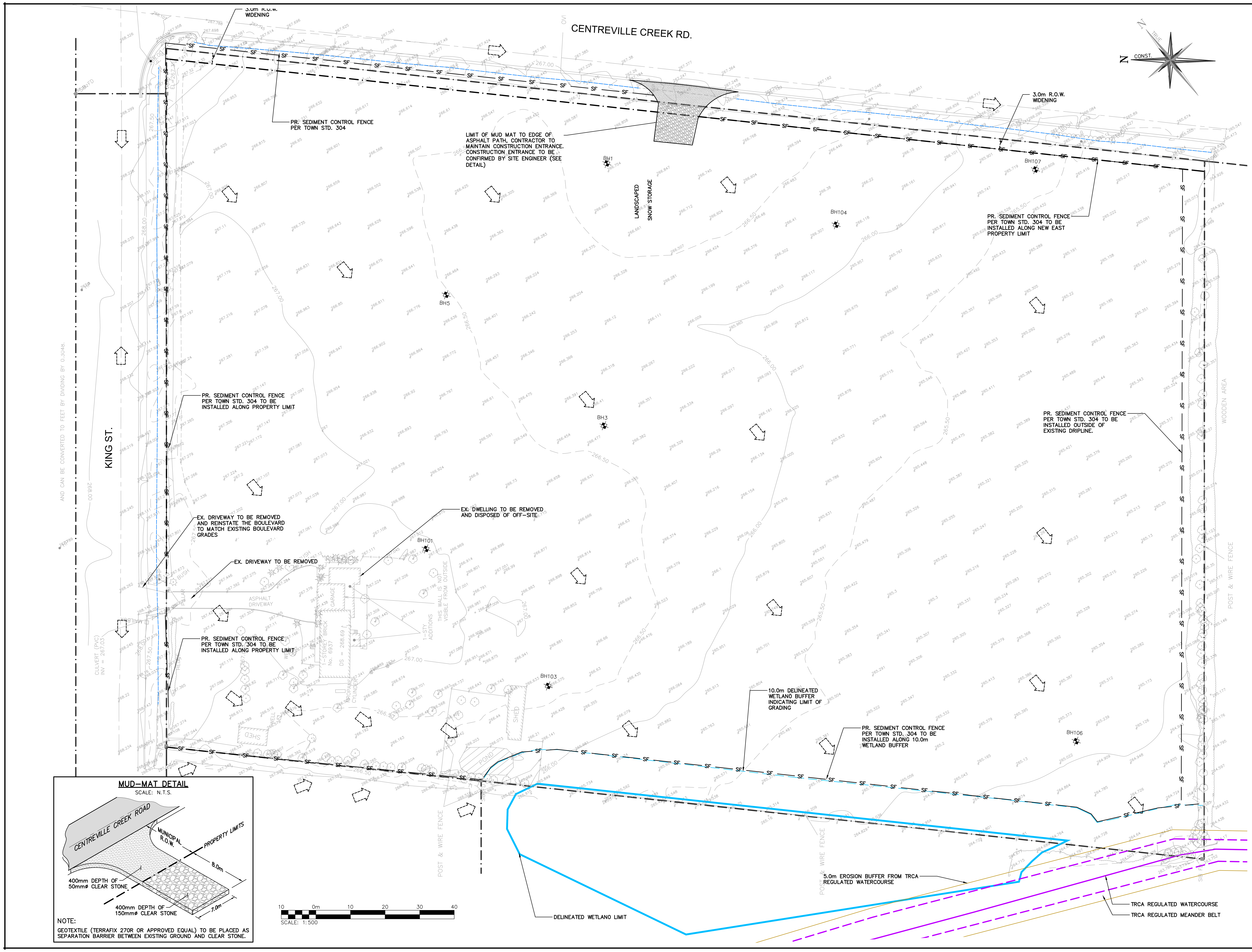
**TABLE E.1: SUMMARY OF UNIT FLOW RELATIONSHIPS**
**HUMBER RIVER WATERSHED**

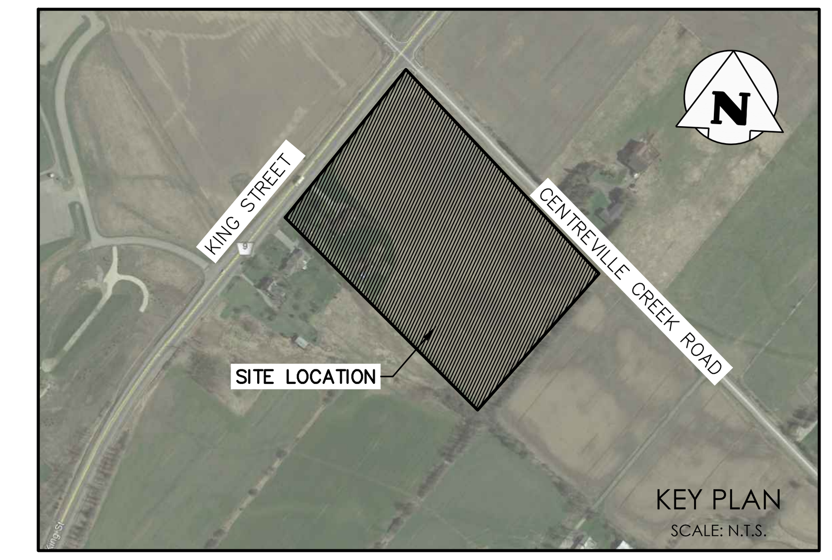
| Return Period | Equation A Sub-Basin 4 | Equation B Sub-Basin 6 | Equation C Sub-Basin 10 | Equation D Sub-Basin 15 | Equation E Sub-Basin 19A | Equation F Sub-Basin 36 | Equation G Sub-Basin 46 |
|---|---|---|---|---|---|---|---|
| 100-Year | Q=6.086-0.445*In(A) | Q=15.199-0.751* In(A) | Q=14.140-1.096* In(A) | Q=20.388-1.899 *In(A) | Q=15.911-1.785 *In(A)) | Q=29.912-2.316 *In(A) | Q=22.973-2.256 *In(A) |
| 50-Year | Q=5.147-0.376 *In(A) | Q=12.692-0.623 *In(A) | Q=11.920-0.921*In(A) | Q= 17.051-1.577 *In(A) | Q=13.700-1.531 *In(A) | Q=26.566-2.082 *In(A) | Q=20.164-1.973 *In(A) |
| 25-Year | Q=4.272-0.312 *In(A) | Q= I0.488-0.522 *In(A) | Q=9.838-0.757 *In(A) | Q=14.037-1.293 *In(A) | Q=11.653-1.297 *In(A) | Q=22.639-1.741 *In(A) | Q=17.381-1.690 *In(A) |
| 10-Year | Q=3.192-0.233 *In(A) | Q=7.707-0.382 *In(A) | Q=7.443-0.578 *In(A) | Q=10.400-0.953 *In(A) | Q=9.213-1.031 *In(A) | Q=17.957-1.373 *In(A) | Q=13.877-1.342 *In(A) |
| 5-Year | Q=2.410-0.175 *In(A) | Q=5.755-0.283 *In(A) | Q=5.557-0.427 *In(A) | Q=7.930-0.73I *In(A) | Q=7.358-0.829 *In(A) | Q=14.652-1.136 *In(A) | Q=II.468-1.123 *In(A) |
| 2-Year | Q=1.439-0.106 *In(A) | Q=3.288-0.159 *In(A) | Q=3.142-0.233 *In(A) | Q=4.722-0.454 *In(A) | Q=4.567-0.503 *In(A) | Q=9.506-0.719 *In(A) | Q=7.745-0.762 *In(A) |

Note:

1. Q - Unit flow (Lls/ha - litres per second per hectare).
2. A - Area in hectares (ha).

# FIGURES




## LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING GRADE
- EXISTING DITCH
- EXISTING TREE
- TRCA REGULATED WATERCOURSE
- TRCA REGULATED MEANDER BELT
- DELINEATED WETLAND LIMIT (BY PINCHIN)
- 10.0m WETLAND BUFFER
- EXISTING TREE DRIP LINE
- EXISTING OVERLAND FLOW DIRECTION
- MUD-MAT; SEE DETAIL
- SILT FENCE; SEE DETAIL

NOT FOR CONSTRUCTION

LICENSED PROFESSIONAL ENGINEER
R.S. ARCHER
100120701
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
K. RENTSCH
100105133
2022-JUN-17
PROVINCE OF ONTARIO

| No. | ISSUE / REVISION | YYYY/MMM/DD |
|---|---|---|
| 1 | ISSUED FOR SECOND SUBMISSION | 2022/JUN/17 |
| 0 | ISSUED FOR FIRST SUBMISSION | 2020/DEC/23 |

**ELEVATION NOTE:**

ELEVATIONS SHOWN ON THIS PLAN ARE DERIVED FROM A COSINE BENCHMARK No. 00819758057

ELEVATION = 251.929m

**SURVEY NOTES:**

SURVEY COMPLETED BY P&C SURVEYING INC. (2019/DEC/06) REFERENCE No.: 2019-1206

BEARINGS ARE UTM GRID, DERIVED FROM RTN OBSERVATIONS UTM ZONE 17, NAD83 (GSRS) (2010.0)

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.9996781

**SITE PLAN NOTES:**

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

Project

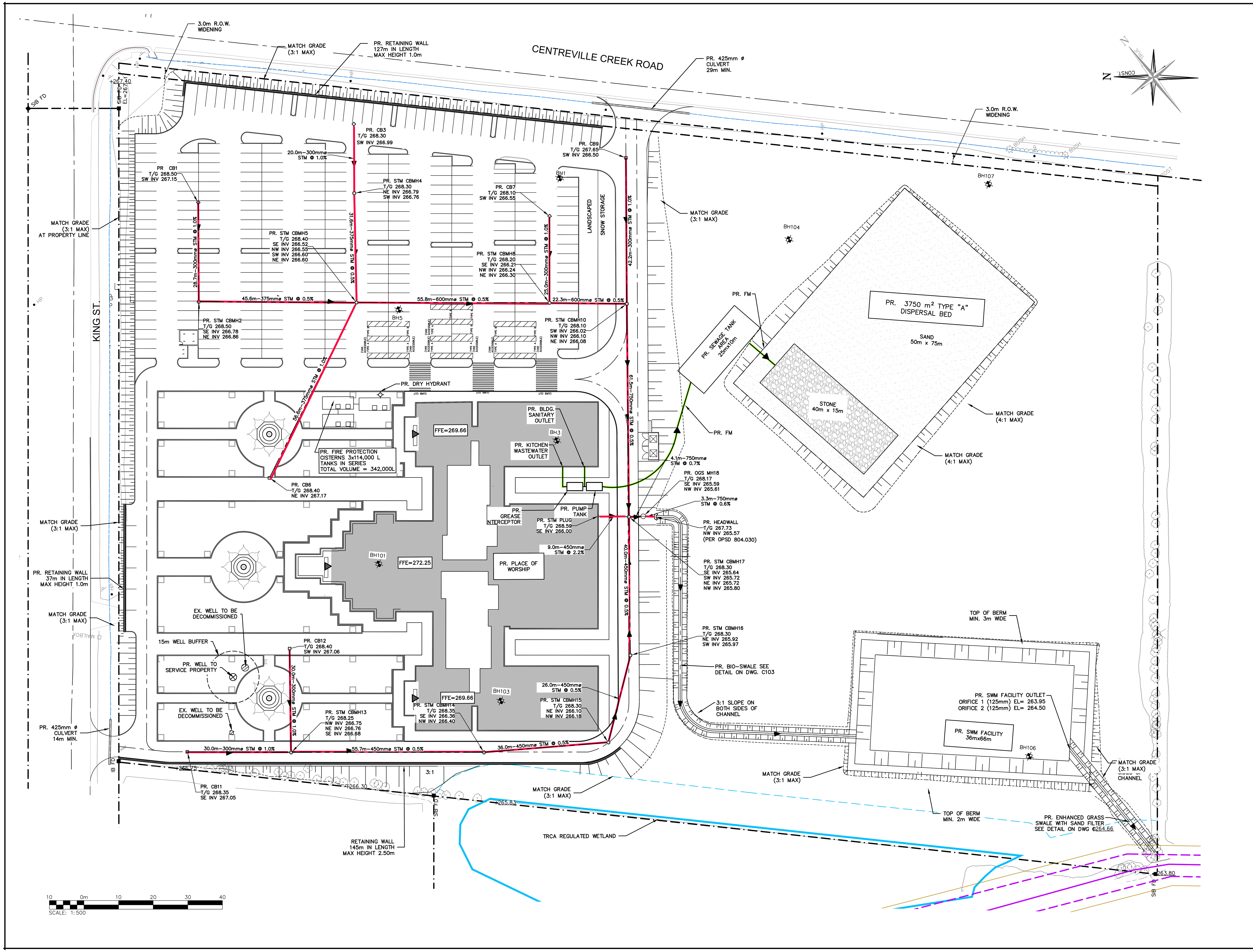
# 6939 KING STREET TOWN OF CALEDON REGION OF PEEL

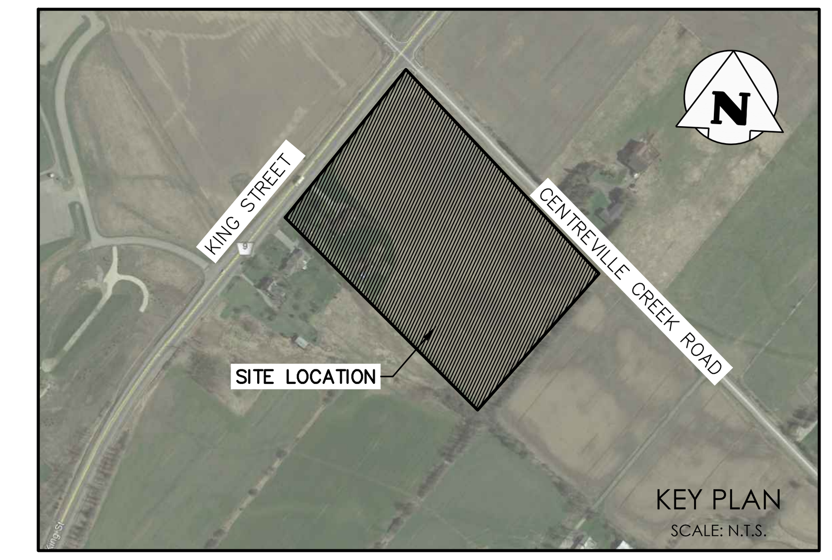
Drawing

## EROSION & SEDIMENT CONTROL PLAN

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 | A.S. | Design | A.S. | Project No. | 1990–5787 |
|---|---|---|---|---|---|
| Check | K.R./R.A. | Check | K.R./R.A. | Scale 1:500 | Dwg. C101 |




LEGEND

- PROPERTY LINE
- EXISTING DITCH
- EXISTING FENCE
- EXISTING TREE DRIP LINE
- EXISTING TREE
- TRCA REGULATED WETLAND
- 10.0m TRCA REGULATED WETLAND BUFFER
- BH1 BOREHOLES (BY OTHERS)
- PROPOSED RETAINING WALL
- PROPOSED SLOPE
- PROPOSED WELL
- PROPOSED SANITARY FORCEMAIN
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- PROPOSED DRY HYDRANT

NOT FOR CONSTRUCTION

LICENSED PROFESSIONAL ENGINEER
June 17, 2022
R.S. ARCHER
100120701
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
K. RENTSCH
100105133
2022–JUN–17
PROVINCE OF ONTARIO

| No. | ISSUE / REVISION | YYYY/MMM/DD |
|---|---|---|
| 1 | ISSUED FOR SECOND SUBMISSION | 2022/JUN/17 |
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**ELEVATION NOTE:**

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DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.9996781

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Project

6939 KING STREET
TOWN OF CALEDON
REGION OF PEEL

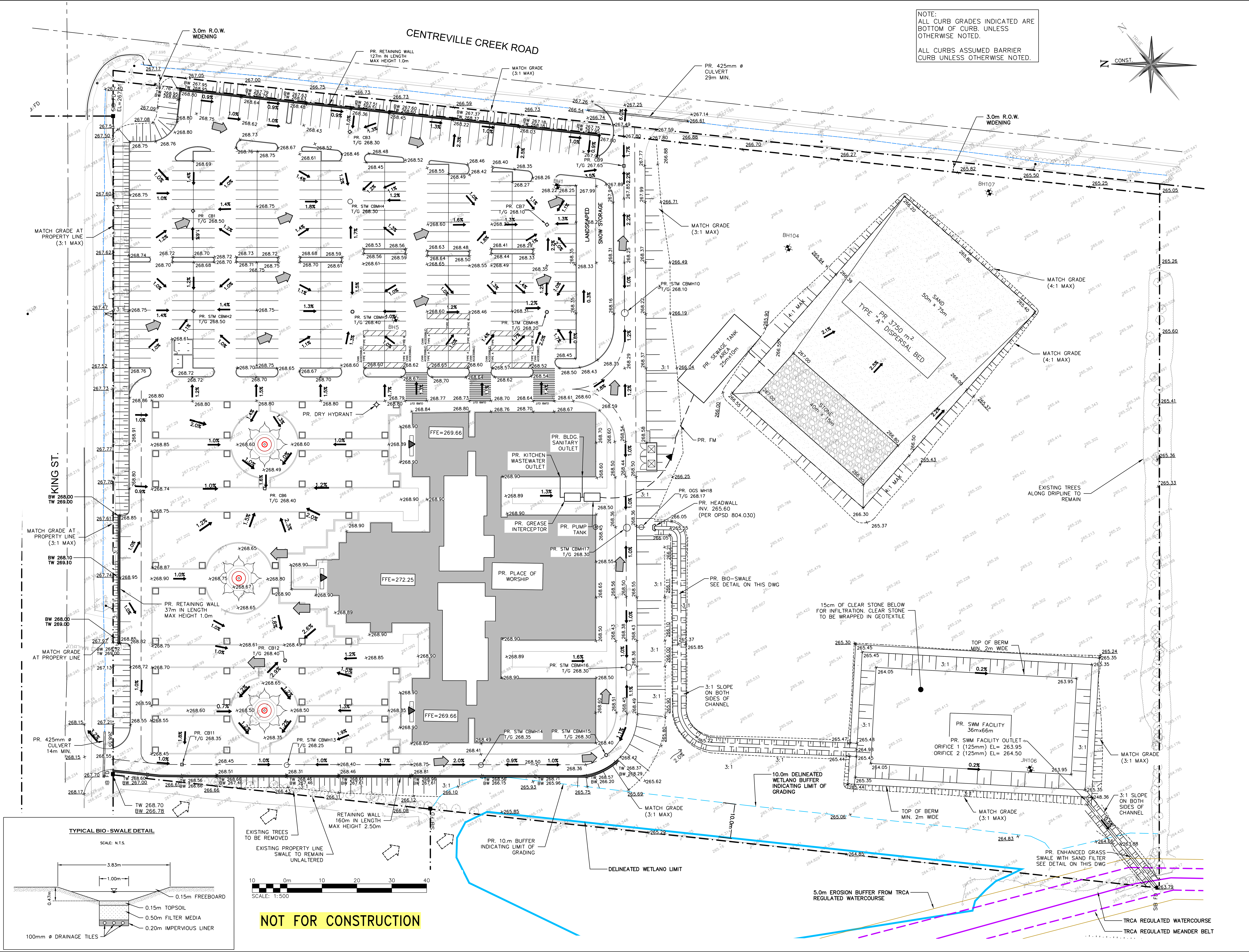
Drawing

PRELIMINARY SERVICING PLAN

CROZIER CONSULTING ENGINEERS

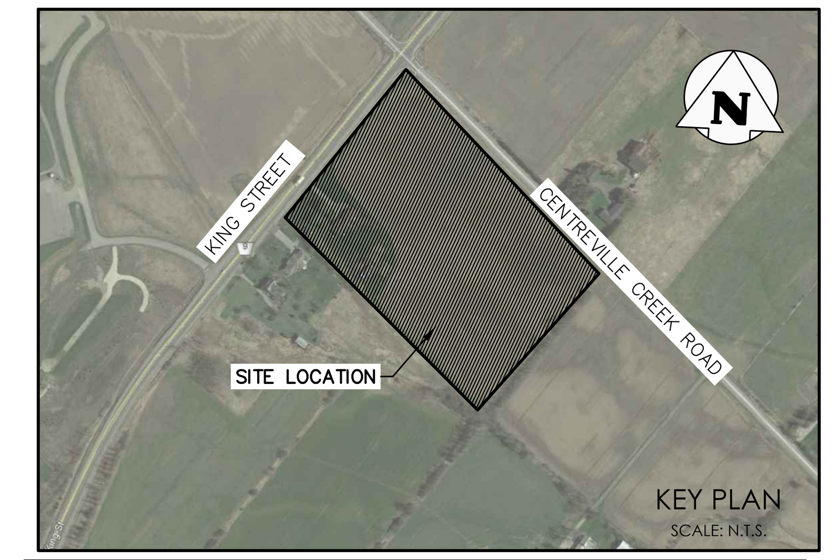
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

| Drawn | A.S. | Design | A.S. | Project No. | 1990–5787 |
|---|---|---|---|---|---|
| Check | K.R./R.A. | Check | K.R./R.A. | Scale 1:500 | Dwg. C102 |




NOTE:
ALL CURB GRADES INDICATED ARE BOTTOM OF CURB, UNLESS OTHERWISE NOTED.

ALL CURBS ASSUMED BARRIER CURB UNLESS OTHERWISE NOTED.




## LEGEND

- PROPERTY LINE
- EXISTING DITCH
- TRCA REGULATED WATERCOURSE
- TRCA REGULATED MEANDER BELT
- DELINEATED WETLAND LIMIT (BY PINCHIN)
- 10.0m WETLAND BUFFER
- EXISTING TREE DRIP LINE
- EXISTING TREE
- EXISTING GRADE
- PROPOSED GRADE
- PROPOSED GRADE (TO MATCH EXISTING)
- PROPOSED MINOR FLOW DIRECTION
- PROPOSED RETAINING WALL
- PROPOSED SLOPE
- BUILDING ENTRANCE (PERSONNEL DOOR)
- BOREHOLES (BY OTHERS)
- PROPOSED STORM CATCHBASIN MANHOLE
- PROPOSED STORM MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED DRY HYDRANT
- PROPOSED OVERLAND FLOW DIRECTION

LICENSED PROFESSIONAL ENGINEER R.S. ARCHER 100120701 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER K. RENTSCH 100105133 2022-JUN-17 PROVINCE OF ONTARIO

| No. | ISSUE / REVISION | YYYY/MMM/DD |
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ELEVATION = 251.929m

**SURVEY NOTES:**

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REFERENCE No.: 2019-1206

BEARINGS ARE UTM GRID, DERIVED FROM RTN OBSERVATIONS
UTM ZONE 17, NAD83 (GSRS) (2010.0)

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.9996781

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DRAWING No.: A1, REV 2 (2022/MAY/31)

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

Project

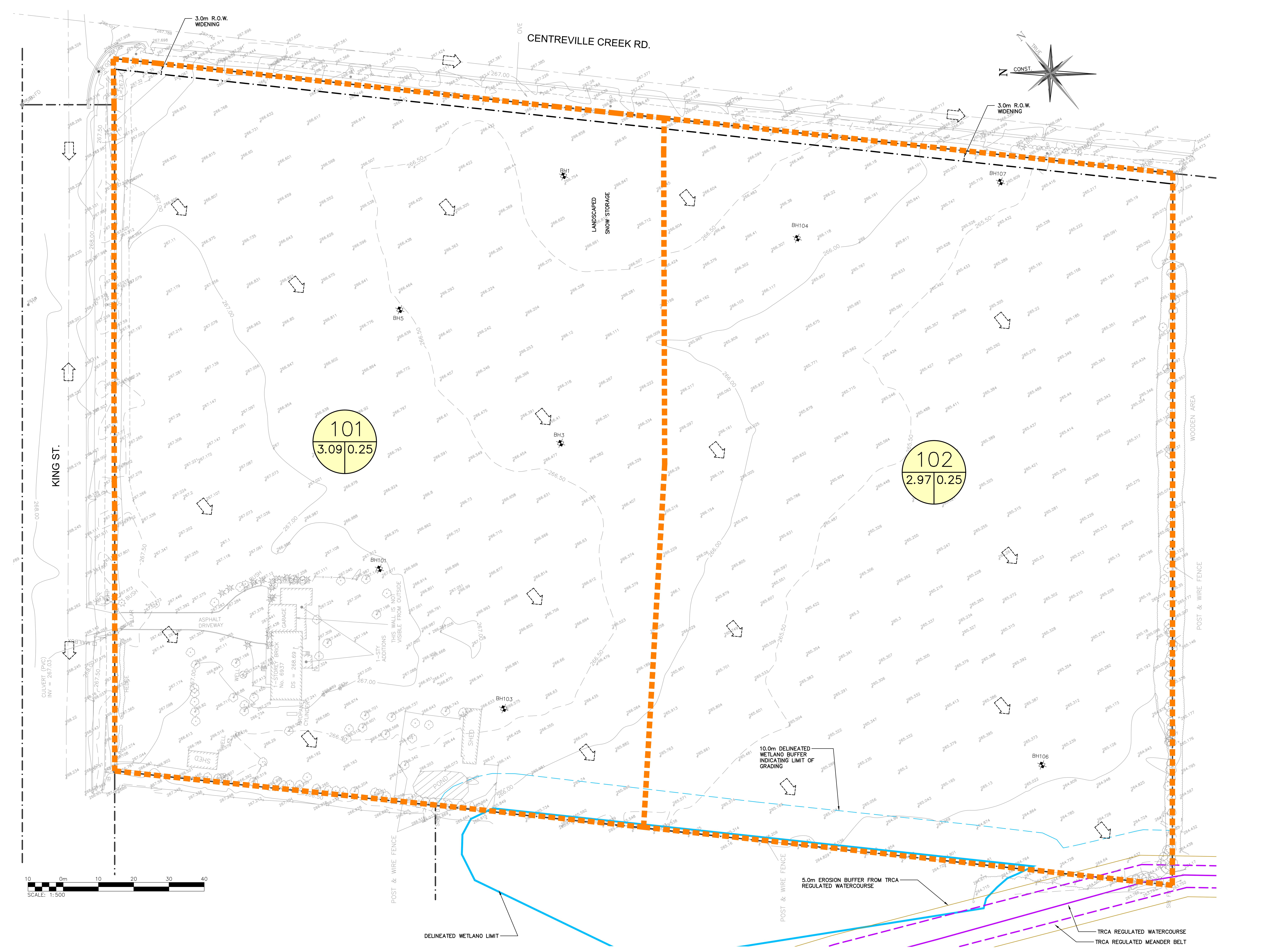
6939 KING STREET
TOWN OF CALEDON
REGION OF PEEL

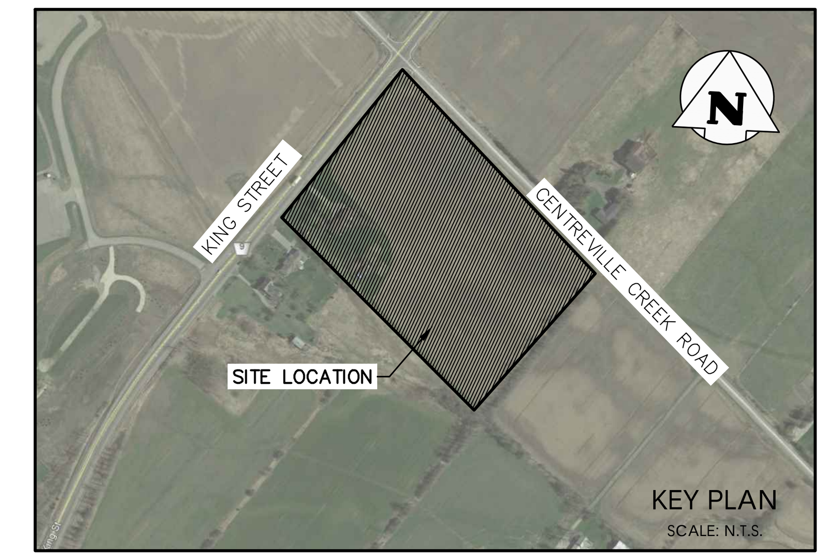
Drawing

PRELIMINARY GRADING PLAN


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. | |
|---|---|---|---|
| A.S. | A.S. | 1990-5787 | |
| Check K.R./R.A. | Check K.R./R.A. | Scale 1:500 | Dwg. C103 |




LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING GRADE (× 215.00)
- EXISTING FENCE
- TRCA REGULATED WATERCOURSE
- TRCA REGULATED MEANDER BELT
- DELINEATED WETLAND LIMIT (BY PINCHIN)
- 10.0m WETLAND BUFFER
- EXISTING DITCH
- EXISTING TREE
- EXISTING OVERLAND FLOW DIRECTION
- STORM DRAINAGE CATCHMENT
- ID: CATCHMENT I.D.
- A | RC: AREA (ha) | RUNOFF COEFFICIENT

**NOT FOR CONSTRUCTION**

Stamp

LICENSED PROFESSIONAL ENGINEER
June 17, 2022
R.S. ARCHER
100120701
PROVINCE OF ONTARIO

Stamp

LICENSED PROFESSIONAL ENGINEER
K. RENTSCH
100105133
2022-JUN-17
PROVINCE OF ONTARIO

| No. | ISSUE / REVISION | YYYY/MMM/DD |
|---|---|---|
| 1 | ISSUED FOR SECOND SUBMISSION | 2022/JUN/17 |
| 0 | ISSUED FOR FIRST SUBMISSION | 2020/DEC/23 |

**ELEVATION NOTE:**

ELEVATIONS SHOWN ON THIS PLAN ARE DERIVED FROM A COSINE BENCHMARK No. 00819758057

ELEVATION = 251.929m

**SURVEY NOTES:**

SURVEY COMPLETED BY P&C SURVEYING INC. (2019/DEC/06)
REFERENCE No.: 2019-1206

BEARINGS ARE UTM GRID, DERIVED FROM RTN OBSERVATIONS
UTM ZONE 17, NAD83 (GSRS) (2010.0)

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.9996781

**SITE PLAN NOTES:**

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY BATTAGLIA ARCHITECT INC.
DRAWING No.: A1, REV 2 (2022/MAY/31)

**DRAWING NOTES:**

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

Project

6939 KING STREET
TOWN OF CALEDON
REGION OF PEEL

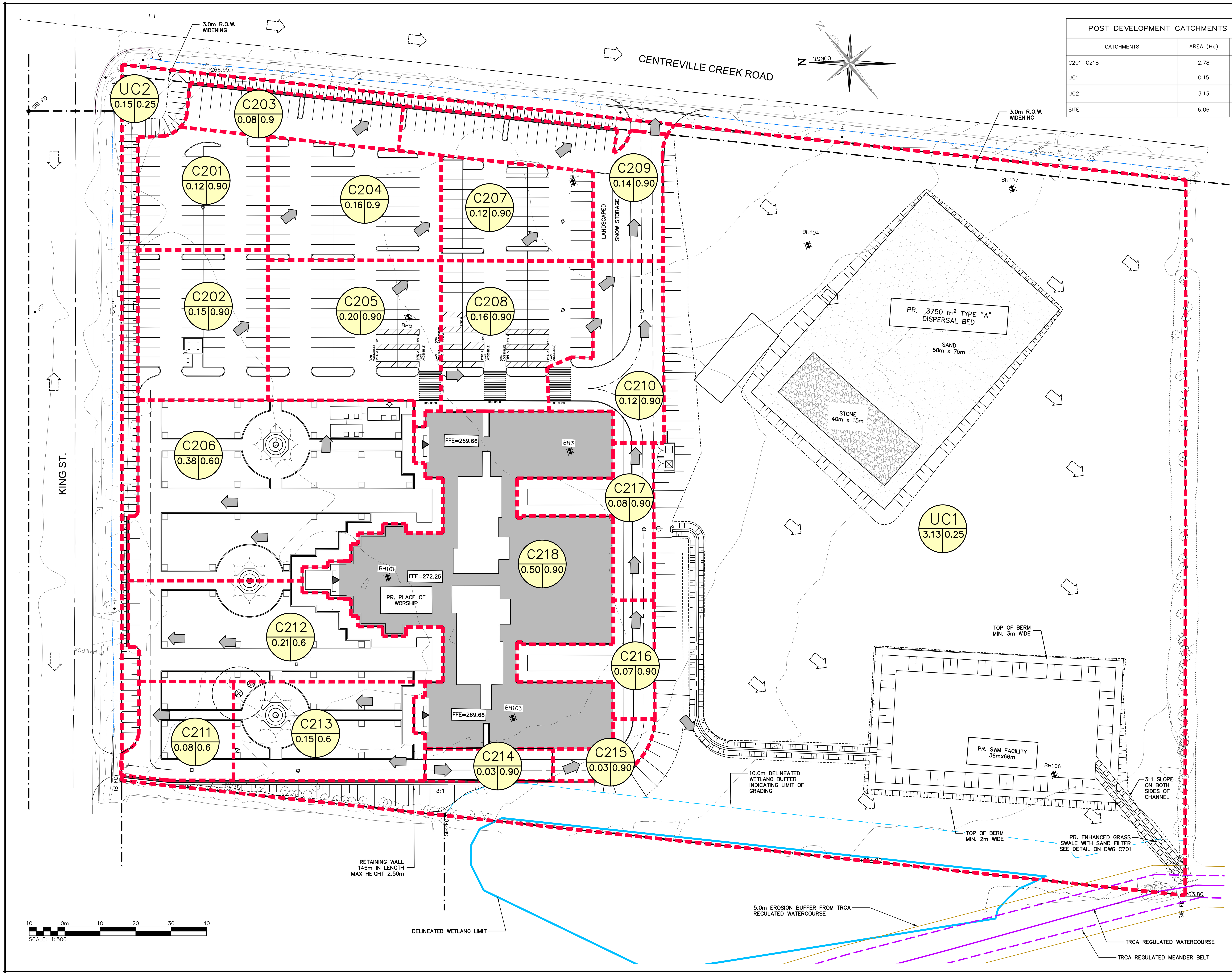
Drawing

PRE-DEVELOPMENT DRAINAGE PLAN


CROZIER
CONSULTING ENGINEERS

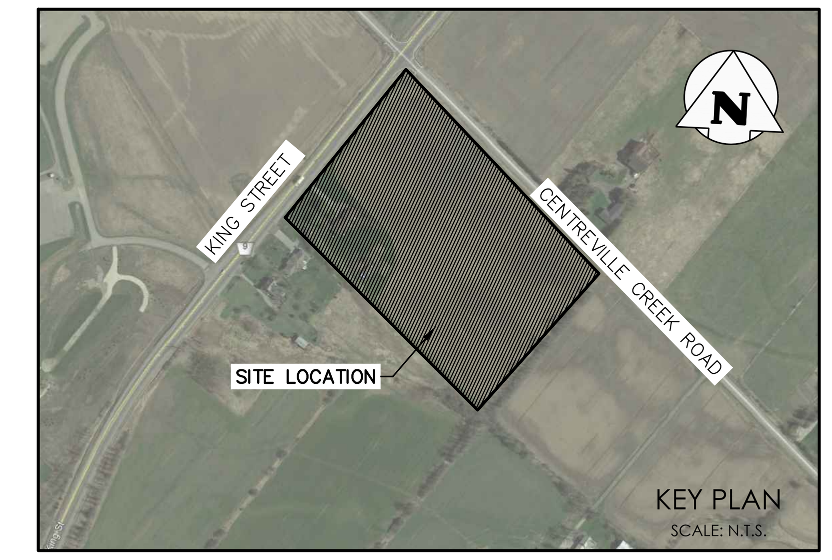
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca


| Drawn | Design | Project No. | |
|---|---|---|---|
| A.S. | A.S. | 1990-5787 | |
| Check: K.R./R.A. | Check: K.R./R.A. | Scale: 1:500 | Dwg.: FIG. 1 |




## POST DEVELOPMENT CATCHMENTS TABLE

| CATCHMENTS | AREA (Ha) | RUNOFF COEFFICIENT |
|---|---|---|
| C201–C218 | 2.78 | 0.81 |
| UC1 | 0.15 | 0.25 |
| UC2 | 3.13 | 0.25 |
| SITE | 6.06 | 0.51 |




## LEGEND

- PROPERTY LINE
- EXISTING DITCH
- EXISTING TREE DRIP LINE
- EXISTING TREE
- TRCA REGULATED WATERCOURSE
- TRCA REGULATED MEANDER BELT
- DELINEATED WETLAND LIMIT (BY PINCHIN)
- 10.0m WETLAND BUFFER
- BH1 BOREHOLES (BY OTHERS)
- PROPOSED RETAINING WALL
- PROPOSED SLOPE
- EXISTING OVERLAND FLOW DIRECTION
- PROPOSED OVERLAND FLOW DIRECTION
- STORM DRAINAGE CATCHMENT
- ID / A | RC — CATCHMENT I.D. / AREA (ha) | RUNOFF COEFFICIENT

**NOT FOR CONSTRUCTION**

Stamp: LICENSED PROFESSIONAL ENGINEER — R.S. ARCHER 100120701 — PROVINCE OF ONTARIO — June 17, 2022

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# 6939 KING STREET TOWN OF CALEDON REGION OF PEEL

Drawing

# POST–DEVELOPMENT DRAINAGE PLAN

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 | A.S. | Design | A.S. | Project No. | 1990–5787 |
|---|---|---|---|---|---|
| Check | K.R./R.A. | Check | K.R./R.A. | Scale 1:500 | Dwg. FIG 2 |