TOWN OF CALEDON
PLANNING
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FUNCTIONAL SERVICING REPORT

TRENDKENNEDY DEVELOPMENT RESIDENTIAL SUBDIVISION

12909 KENNEDY ROAD

PART OF LOT 22, CONCESSION 2

TOWN OF CALEDON

1ST SUBMISSION September 2024

S. D. LANG
SEPT 23, 2024

PROJECT NO. W22068

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1. INTRODUCTION

This Study has been prepared as a technical document in support of the Draft Plan application for the subject subdivision and addresses sanitary, storm and water servicing and stormwater management.

The proposed subdivision is located at the southeast corner of Kennedy Road and Old School Road, in the town of Caledon, as shown on figure 1. It is bounded by Kilmanagh creek to the east and existing residential lands and Bonnieglen Farm Boulevard to the south.

The subdivision, as illustrated on the Draft Plan of Subdivision by Candevcon Group Inc. (copy attached) comprises an area of 36.87 ha and includes:

- 230 single detached units;
- 56 semi-detached units;
- 99 townhomes; Blocks 1, 1A, 1B, 1C & 1D
- 3 medium density Condominium Blocks 2, 2A & 2B
- Mixed use Block 3;
- Residential (Special) Block 3A;
- Heritage house Block 4;
- Park Block 5;
- Stormwater management pond Block 6;
- Vista Block 7;
- Walkway Block 8;
- NHS (Natural Heritage System) and NHS Buffer, Block 9 & Block 10, 10A;
- Right-of-ways including Streets ‘A’ through ‘K’;
- Road widening Blocks 11, 11A & 11B;
- Other lands Block 12

This report describes the existing site conditions, and the proposed sanitary, storm and water systems, as well as the stormwater management infrastructure. This report includes preliminary grading information and outlines the required Erosion and Sediment Control Measures.

TRENT KENNEDY DEVELOPMENT
RESIDENTIAL SUBDIVISION
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL
LOCATION PLAN

2.

FILE No. XXXX

OZS-XXXXX

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DATE	APRIL 5th, 2024	JOB No	W22068
DRAWN	E.A.M	SKETCH No.	1.0
SCALE	N.T.S		

FIGURE 1

BACKGROUND AND SITE SPECIFIC TECHNICAL STUDIES

2.1 Background Studies

The following Technical Studies are relevant to the stormwater management criteria for the subject lands:

- Humber River Hydrology Study Scenario Modelling and Analysis Report conducted by TRCA in 2008

2.2 Site Specific Studies

The following Studies were completed in support of the subject application:

- Preliminary Geotechnical Investigation and Slope Stability Assessment prepared by DS Consultants Ltd., dated January 11, 2023, Reference No. 22-371-100-R.

- Preliminary Hydrogeological Investigation prepared by DS Consultants Ltd., dated January 17, 2023, Reference No. 22-371-100.

- Comprehensive Environmental Impact Study and Management Plan, Mayfield West Phase 1 – Stage 2 Expansion Area, prepared by Beacon Environmental Ltd. et al., dated August 30, 2021, Reference 219527.1.

3. EXISTING CONDITIONS

3.1 Land Use

The subject subdivision property currently comprises Agricultural lands and associated farm buildings. There is an existing heritage building on the subject lands which will be incorporated into the proposed subdivision.

3.2 Topography, Drainage and Natural Features

The site is relatively flat with approximately 21.50ha of the land draining east to Kilmanagh Creek at approx. 0.5% slope. Two areas at the northwest and west of the site (2.80ha and 1.83ha) drain directly to the Kennedy Road ditch. The remaining 10.74ha and 0.95ha (externally from the Dixon Cemetery) drain south to an existing ditch inlet catch basin (DICB) at the Arcadia Road located at the south and west corner of the site. The DICB captures stormwater runoff for the 2-year through 100-year storm events and conveys flows to an existing 1050mm diameter municipal storm sewer beneath the Arcadia Road.

Existing elevations in the developable area range from approx. 269.0m to 274.8m. The Kilmanagh Creek which runs through the east portion of the site was classified as a natural heritage system (NHS) by the Toronto and Region Conservation Authority (TRCA). This NHS area is regulated by the TRCA and 6.68ha of land and 2.14ha of buffering land will be dedicated as natural heritage lands.

For details of the existing drainage patterns refer to drawing PRE-STMDR - Pre-development Drainage Area Plan. A summary of the pre-development catchment areas is provided in the table below.

TABLE 1.1 PRE-DEVELOPMENT DRAINAGE AREAS

Catchment ID	**Outlet Location**	**Area**
Drainage Area No. 1	Kilmanagh Creek	21.50ha
Drainage Area No. 2	Arcadia Road DICB	10.74ha
Drainage Area No. 3	Kennedy Road Ditch	2.80ha
Drainage Area No. 4	Kennedy Road Ditch	1.83ha
Drainage Area No. 5	Arcadia Road DICB	0.95ha
	Total	37.82ha

3.3 Physiography and Geotechnical Conditions

The preliminary Geotechnical Investigation (copy of report included in Appendix “D”) indicated that the surficial soils beneath the topsoil layer is comprised of clayey silt to silty clay till deposits (to a depth of 1.7m to 7.8m) overlying sandy silt till.

The preliminary Geotechnical investigation indicated groundwater test holes were dry to 1.91m. Depth to the groundwater ranges from 1.91m to 6.10 below ground surface.

Four Single Well Response Tests were conducted to determine soil conductivity K values of the soils. Based on the testing K values were calculated to be 0.03 to 0.0004cm/hr. A copy of the hydrogeological report is included in Appendix E.

4. SANITARY AND WATER SERVICING

4.1 Sanitary

4.1.1 Existing Sanitary Sewers

There is an existing 250mm sanitary sewer on Bonnieglen Farm Boulevard to serve as an outlet for a portion of the subject lands. There is no existing sanitary sewer beneath the Kennedy Road.

4.1.2 Proposed Sanitary Sewer System

The proposed sanitary sewer system is shown on Drawing SA-1, and consists of a 250mm sanitary sewer that will connect to the existing 250mm sanitary sewer on Bonnieglen Farm Boulevard to service a portion of the lands at the south west. This section will include 24 single detached lots and 24 townhomes. This section of the development can proceed in advance of the full build out. The remainder and majority of the development will be serviced internally by a 250mm sanitary sewer which will convey flows westerly beneath street ‘A’ through the adjacent development lands and ultimately to a proposed sanitary pumping station to be located at the west. The Medium density Block 2B will require a separate sanitary service connection and off-site sewer connection. Approximately 200m of 250mm diameter municipal sewer will be required to developed this block. Details of the sanitary servicing layout can be found on drawings SA-1 and PS-1.

The sewer system is designed in accordance with the Region of Peel New Linear Wastewater Standard, 2023.

The peak sanitary flows were calculated based on the following;
Population densities in persons per hectare provided in Table 4.1;
A sanitary flow based on 290 Lpcd (Litres per capita per day);
A Harmon Peaking Factor calculated based upon the Harmon Peaking Formula ($M = 1+14/(4+P^{0.5})$, where M = ratio of peak flow to average flow and P = the tributary population in thousands; and,
An infiltration allowance of 0.26 L/s/ha.

The sanitary drainage areas for the subdivision are shown on Drawing SA-1 and a preliminary Sanitary Sewer Design Sheet is included in Appendix A.

The peak sanitary flow to the existing Bonnieglen Farm Boulevard sanitary sewer is calculated to be **3.0 L/s**. The peak sanitary flow to the proposed pumping station is calculated to be **30.3 L/s**.

Manning's equation was used to determine the capacity of the proposed sanitary sewers. The capacity of a 250mm diameter sewer at 0.5% slope is **42.1 L/s** which is greater than the peak sanitary flow for the proposed subdivision.
Sanitary flows shown in Appendix A are based on the values shown in table 4.1.

TABLE 4.1 SANITARY DESIGN POPULATIONS PER HECTARE

Density	**Pop. /Hectare**
Single family (greater than 10m frontage)	117 persons/hectare*
Semi detached	197 persons/hectare*
Townhouses	183 persons/hectare*
Medium Density (Condominium)	175 persons/hectare
Mixed-Use Midrise	175 persons/hectare

*Based on unit per hectare densities on Draft Plan of Subdivision x population per unit type in Table 4.2

The anticipated sanitary flows from the development based on actual unit types and count are as shown in table 4.3, populations per unit type are shown in table 4.2 and are based on the Region of Peel standards.

TABLE 4.2 SANITARY DESIGN POPULATIONS PER UNIT TYPE

Unit type	Population
Single detached	4.2
Semi detached	4.2
Townhouse	3.4
Condo	3.1
Apartment	3.1

The following is a breakdown of anticipated sanitary flows for the subject lands. Table 4.3 and Table 4.4 provide a summary of the anticipated sanitary flows to the existing sanitary and proposed pumping station, respectively.

TABLE 4.3 SANITARY FLOWS BASED ON UNIT TYPE
To Existing Sanitary Sewer – Arcadia Road

Developable area(ha)	2.05		
unit type	Units	pop/unit	population
Single detached	24	4.2	101
Semi-detached	0	4.2	0
Medium density (towns)	24	3.4	82
Medium density (condo)	0	175	0
Commercial Mixed Use (ha)	0	50	0
	Total population		183
Average day (l/s)	0.6		
peak factor	4.0		
Infiltration	0.5		
total peak sanitary flow (l/s)	3.0		

TABLE 4.4 SANITARY FLOWS BASED ON UNIT TYPE AREA
To Proposed Pumping Station – Kennedy Road

Developable area(ha)	20.01		
unit type	ha	pop/ha	population
Single detached	206	4.2	865
Semi-detached	56	4.2	235
Medium density (towns)	75	3.4	255
Medium density (condo)	4.22	175	739
Commercial Mixed Use (ha)	0	50	0
	Total population		2094
Average day (l/s)	7.0		
peak factor	3.6		
infiltration	5.2		
total peak sanitary flow (l/s)	30.3		

4.2 Water

4.2.1 Existing Watermains

The proposed plan is located within Region of Peel water Zone 7. The existing watermain system in the vicinity of the subject subdivision is shown on Drawing PS-1 and consists of the following;

- 600mm diameter watermain on Kennedy Road;
- 400mm diameter watermain on Kennedy Road;
- 300mm diameter watermain on Bonnieglen Farm Boulevard;
- 300mm diameter watermain on Old School Road

4.2.2 Proposed Watermain System

The proposed water distribution system is shown on Drawings WM-1 and consists of a 150mm watermain to be constructed on the internal streets that will connect to the surrounding existing 300mm watermain on Old School Road to the north, 400mm watermain on Kennedy Road to the west and the 300mm watermain on Bonnieglen Farm Boulevard to the south.

The estimated water demand for the proposed subdivision is summarized in the following table:

TABLE 4.5
WATER DEMAND BASED ON UNIT TYPE AREA

Unit Type	# of Units Area (ha)	Persons/Unit Persons/ha	Population
Single Detached (units)	230	4.2	966
Semi-detached (units)	56	4.2	236
Medium density Towns (units)	99	3.1	337
Medium density Condo (ha)	3.82	175	669
Commercial Mixed Use (ha)	0	50	0
Special Residential (ha)	0.4	175	70
	Total population		**2277**
Water Demand (L/s)			
Average day (L/s) [A]	7.4		
Max day (L/s) [B]	14.8		
Peak Hour Consumption (L/s) [C]	22.1		
Max Day plus fire (L/s)	114.8		

[A] Based on 280 L/cap/day average consumption rate
[B] Based on Max Day Factor of 2.0
[C] Based on Peak Hour Factor of 3.0

5. STORM DRAINAGE AND STORMWATER MANAGEMENT

5.1 General

The subject site is located within the West Humber River Watershed, as illustrated in the 2012 TRCA Stormwater Management Criteria. The site includes a portion of Kilmanagh Creek, which has been identified as part of the Greenbelt Plan Area. Furthermore, the Regional Official Plan designates the creek and valley corridor of the West Humber River tributary as a Core Area. In the absence of a specific subwatershed study for the site that establishes the required SWM controls, the SWM design will adhere to the criteria set forth for the West Humber River Watershed.

The following documents have been consulted to provide additional information for the stormwater management plan for the subject lands:

- Humber River Watershed Scenario Modelling and Analysis Report, 2008.
- Town of Caledon Development Standards Manual, 2019, Version 5.0.
- Comprehensive Environmental Impact Study and Management Plan Mayfield West Phase 1 – Stage 2 Expansion Area Beacon Environmental Limited, David Schaeffer Engineering Ltd., Glen Schnarr & Associates Inc. and DS Consultants Ltd., June 2023.
- Stormwater Management Planning and Design Manual, Ontario, Ministry of Environment, March 2003 (SWMP Manual).
- TRCA Stormwater Management Criteria, August 2012.
- TRCA & CVC Low Impact Development Stormwater Management Planning and Design Guide, 2010, Version 1.0.
- Guidance for Development Activities in Redside Dace Protected Habitat (MNRF, March 2016)
- Hydrogeological Report prepared by DS Consultants Ltd, dated January 2023.

5.2 Storm Drainage Design and Requirements

The Stormwater management criteria for the proposed development has been designed in accordance with the standards and requirements of the Town of Caledon, TRCA and the MOECP and are summarized below:

- Storm sewer systems shall be designed to accommodate a 10-year storm where foundation drains are to be connected. For systems that do not allow for foundation drains, a 5-year design will be allowed.
- Storm sewers shall be located a minimum of one (1) meter below basement floor elevations to allow for the installation of foundation connections. In areas of no storm sewer connection, the sewers shall have a minimum frost cover of 1.5m.
- The major system should be designed to accommodate runoff exceeding the capacity of the minor system for flows up to and including the 100-year storm or regional storm event, whichever is greater. The major system should be contained within the ROW and designated easements.
- Roof leaders must not be connected directly to the storm sewer system, and the following conditions must be complied with:
    - Roof leaders must discharge onto concrete splash pads which direct the water into side yard swales, these swales must discharge to the front of the lot, no roof leaders shall drain to the rear of the lot. Roof leaders are not permitted to discharge onto driveways or walkways. For walkouts, a note is to be added to the drawings that all roof drainage is to be directed to the front of the lot, unless otherwise approved by the Town.
    - Houses located on corner lots have roof leaders located at the corner(s) of the house, closest to the street lines.
    - Roof leader down spout locations is to be indicated on site grading plans.
- Inverts of service connections at the property line shall be surcharge free and be above the 100-year hydraulic grade line of the municipal storm sewer system.
- Foundation Drain Collector (FDC) sewers are permitted to connect by gravity to the storm sewer system provided that the elevation of the basement floor is at least 1.0 metres above the elevation of the storm sewer obvert at that point. Where provisions for gravity connection of foundation drains cannot be met, a sump pump

system must be installed in the building and discharge to a location, which is satisfactory to the Town’s Director of Public Works and Engineering.

Water quality, erosion, and quantity control for the subject lands will be addressed by the proposed SWM pond located at the southeast corner of the property. The SWM Pond will drain to the **Kilmanagh Creek** (Tributary to West Humber River).

The general design criteria for the SWM facility are summarized as follows:

- The stormwater management facility is designed as an off-line wet pond with permanent storage for water quality control in accordance with the “enhanced” protection level (80% TSS Removal) for the receiving watercourse as defined in the March 2003 MOE guidelines.
- As mentioned in the EIS report, the portion of Kilmanagh Creek flowing through the Russell parcel within the study area is considered occupied habitat for the endangered Redside Dace. The Redside Dace is listed as endangered both federally and provincially, and it is regulated by the DFO under the Species at Risk Act and by the MECP under the Endangered Species Act. Consequently, thermal mitigation measures are required.
- Erosion control criteria is based on the 48-hour detention of runoff from a 25mm, 4-hour Chicago storm.
- The SWM facility is designed to provide water quantity control for the 2 to100-Year and Regional Storm events.
- Water Quantity Control release targets are established as per the Humber River Unit Flow Rates for Sub-Basin 36 (Equation F) for 2, 5, 10, 25, 50 and 100-year return period rainfall events.
- Regional storm event (285mm depth, 48-hour Hurricane Hazel).
- The grading and configuration of the SWM pond is designed as per Town of Caledon Standards:
    - 4:1 (H: V) from the bottom of the permanent pool to up to 0.5m below the normal water level (NWL).
    - 7:1 above the 4:1 sloping zone up to the berm/maintenance access road.
    - 4:1 where the slope backs on to the rear yard lot line, adjacent road system or valley.
    - 5.0m wide maintenance access route from a municipal road.

5.3 Storm Sewer (Minor) System

A. Sewers to Proposed SWM Pond

The proposed storm sewer system is shown on Drawing ST-1. The sewer system will be designed in accordance with the Town of Caledon Standards to accommodate a 10-year storm event and will outlet to the proposed stormwater management pond.

The sewer system and pipe sizing will be designed so that the hydraulic grade line in the sewers will be one (1) metre below the basement floor elevations. The storm drainage areas are shown on Drawing ST-1 and the related Storm Sewer Design Sheets are included in Appendix B. Overland flow will be conveyed within the road right of way (maximum ponding depth of 0.3m) to the proposed stormwater management pond. Rear yards will generally drain via swales directed to rear lot catch basins. Single detached homes backing onto the NHS buffer will drain via sheet flow directly overland to the creek.

Storm Sewer Design Sheets is included in **Appendix D**.

B. Sewers to Arcadia Road

A portion of the storm sewer system will be designed to accommodate the 100-year storm event and will outlet to the existing 1050mm diameter storm sewer on Arcadia Road.

As previously discussed in section 3.2, In pre-development condition, approximately 10.74 ha of subject site drains to DICB located near the southwest boundary. The DICB is designed to capture surface runoff from subject site and drains to the existing storm sewer located on Arcadia Road. The pre-development peak flow for this area was determined using Hydrologic Modelling (Visual Otthymo). The pre-development peak flow rate for the 100-year storm event, determined using the hydrologic modeling program Visual OTTHYMO (VO), is **1.16 m³/s**.

As a result of grading constraints in the post-development condition, a portion of the stormwater drainage area (2.35 Ha) will discharge into the existing 1050mm diameter storm sewer on Arcadia Road. The post-development peak flows will be managed to match the pre-development peak levels. Using the rational method, the 100-year peak flow rate was calculated to be **0.63 m³/s**, which is lower than the pre-development 100-year peak flow.

Storm sewer design sheet is included in **Appendix D** and VO Results are included in **Appendix B**.

5.4 Stormwater Management Pond Design

5.4.1 Water Quality Control

Proposed SWM Wet Pond #4 shall provide an Enhanced Level of Protection for runoff from total drainage area of 23.65ha at an imperviousness of 65%.

Based on the Table 3.2 (Water Quality Storage Requirements based on receiving waters) in the 2003 MOE Stormwater Management Planning and Design Manual and an overall imperviousness of 65%, a wet pond will require 213 m^3 /ha of storage volume to provide a "Enhanced Level of Protection" or 80% TSS removal. For a total drainage area of 23.65 hectares, this translates to a required volume of 5,045 m^3, with 4091 m^3 assigned to the permanent pool and 946 m^3 allocated for extended detention storage. With a 2.0m deep permanent pool, the total permanent pool volume provided in the pond is 7,239 m^3.

5.4.2 Erosion Control

At a minimum, TRCA requires on-site retention of the first 5 mm of runoff generated from the total impervious area. This requirement applies in situations where the sensitivity of the receiving watercourses does not warrant a more comprehensive analysis of the erosion potential associated with urban development. For properties with stormwater management facilities, extended detention of the 25 mm design storm event for a period of 48-hours are required.

Drainage Area (Ha) = 23.65 Ha
25mm Chicago Storm Runoff Volume (mm) = 14.97 mm
Volume Required = 3,540 m^3
Volume Provided = 3,548 m^3
Drawdown Time = 48 Hr
Orifice Plate Size = 155 mm
Elevation in Pond = 268.55

Refer to **Appendix C** for Stormwater Management Pond Design Calculations.

5.4.3 Thermal Mitigation

The presence of the endangered species Redside Dace in Kilmanagh Creek necessitates the incorporation of specific thermal mitigation measures in the design of the SWM Pond. These measures are crucial to protect the habitat of the Redside Dace, which is sensitive to temperature fluctuations.

The proposed SWM pond will be designed with deeper permanent pools near the outlet and bottom draw outlets. These deeper pools enable cooler water to settle near the bottom, where it will be collected and conveyed through the bottom draw outlets, maintaining lower temperatures. Additional mitigation measures will be considered during detailed design stage:

- **Bottom-draw pipe**: Positioned within the deepest portion of the permanent pool to collect cooler water from the bottom and convey it through the outlet.
- **Berms**: Incorporated into the pond to increase its length-to-width ratio and enhance the resident time, promoting natural cooling.
- **Cooling trenches**: Implemented between the SWM pond and the outlet if a deeper permanent pool is not feasible.
- **LID techniques**: Utilizing infiltration and evapotranspiration where appropriate within the development.
- **Plunge Pool**: At the outfall, deep plunge pool with native plantings to provide additional benefits such as erosion control, energy dissipation, and flow dispersion.

Adhering to the above measures will enable the discharge of relatively cool effluent to the receiving watercourse in accordance with the mitigation measures proposed by the MECP (2003) manual.

5.4.4 Water Quantity Control

5.4.4.1 SWM Pond Outflow Rates

As mentioned in section 5.2, the SWM Pond will provide quantity control of post-development peak flows to allowable target release rates for 2 to 100-year storm and regional design storm event.

The required flow release rates were calculated using the unit flow equations for the West Humber River (Sub-Basin 36). These equations were applied to the total drainage area to SWM Pond. Table I below shows the corresponding Target Release Rates.

TABLE I

TARGET RELEASE RATES (L/s)

Drainage Area (Ha)*	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
23.65	171	262	322	405	473	534

**Total Development Drainage Area Breakdown for 23.65 Ha.*
Low Density Subdivision Area = 12.91 Ha
Medium Density Subdivision Area = 6.430 Ha
Park and Open Spaces = 1.93 Ha
Roads = 0.29 Ha
SWM Pond Area = 2.12 Ha

5.4.4.2 SWM Pond Volume Design

Based on the drainage area and release rates identified in Table I, an iterative process was used to calculate the pond's effective stage-storage-discharge relationship, thereby determining the control structure sizing. The ponds have been adequately sized to accommodate all storm events up to and including the Regional event. The Visual Otthymo (VO) model was used to determine storm flow calculations and required stormwater quantity control volumes based on the required release rates. Table II below provides an overview of the modeling results for the pond operation during 2 to 100-year storm events (AES 6 and 12 hour) as well as the Regional Storm. Detailed design information for the pond can be found on Drawing SWM-1. A copy of the related VO outputs is included in **Appendix C.**

TABLE II
STORMWATER MANAGEMENT POND - SUMMARY OF VO RESULTS
(DESIGN STORAGE VOLUME REQUIRED/PROVIDED)

Description	Design Storm						
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	Regional
Unit Flow Targets (m^3/s)	0.171	0.262	0.322	0.405	0.473	0.534	---
VO Peak Flows (m^3/s)	0.844	2.074	2.540	3.132	3.588	4.025	3.287
Outflow (m^3/s)	0.073	0.192	0.304	0.374	0.419	0.461	0.314
Pond W.L (m)	268.75	268.97	269.07	269.25	269.40	269.50	269.73
Storage Required (m^3)	4,925	6,479	7,626	9,155	10,469	11,763	14,904
Storage Provided (m^3)	5,058	6,944	7,719	9,711	11,371	12,478	15,022

An orifice plate will be used for erosion control outflow, and a rectangular weir are proposed to control the peak outflows for the 2-year up to the Regional storm events. The control structure stage-storage-discharge curve is provided in Table III below.

TABLE III
STORMWATER MANAGEMENT POND
CONTROL STRUCTURE RATING CURVE

Storm Event	Stage (m)	Storage (m^3)	Outflow (m^3/s)
25mm	268.55	3,548	0.036
2-Year	268.75	5,058	0.075
5-Year	268.97	6,944	0.231
10-Year	269.07	7,719	0.314
25-Year	269.25	9,711	0.394
50-Year	269.40	11,371	0.450
100-Year	269.50	12,478	0.483
Regional	269.73	15,022	3.32

The following summarizes the outlet controls:

- 25mm Erosion Control: 155mm diameter orifice plate.
- 2 to 100 Year and Regional Storm Release: combination of 155mm diameter
- orifice plate and 0.60m wide x 0.30m high weir.
- A 12.0m wide emergency spillway is sized to safely convey the 100-Year uncontrolled peak flow (4.03m^3/s). The crest elevation of the emergency spillway is set at an elevation of 269.50m.

The event storage conditions of the wet pond, supporting stage storage and discharge calculations are included in **Appendix C.**

5.4.5 Sediment Loading and Drying Area

The estimated annual sediment loading, based on 65% catchment imperviousness, is 2.50 m^3/ha. With the SWM pond drainage area covering 23.65 hectares, the annual sediment generation amounts to 59.13 m^3. Over a ten-year interval, assuming the sediment is removed from the SWM pond, the total sediment generated will be 592.0 m^3.

To prevent sediment dispersion to the surrounding area, it is proposed that the sediment storage area be enclosed with interlocking plastic barriers (New Jersey barrier style) lined with Terrafix 270R Geotextile, which will allow the water to drain from the sediment. Based on a 1.2m storage height, a minimum footprint area of 493 m^2 is required.

Typically, sediment is allowed to dry in the pond before removal, avoiding double handling and additional costs. However, to comply with the new Excess Soil Regulations, it is essential that the sediment from the forebay is dry and remains dry until it is hauled off-site. Therefore, we have provided a sediment drying area, as described above, to meet these specific regulatory requirements and ensure the responsible management of sediment in accordance with the Town’s guidelines.

5.4.6 Water Balance

The Province of Ontario (MOECP) and the Town of Caledon have established a Consolidated Linear Infrastructure Environmental Compliance Approval (CLI-ECA) agreement. The CLI-ECA requirements include maintaining the post- to pre-development infiltration rate or retaining the 90th Percentile Storm event on the property in the absence of a water balance study. One key constraint of the CLIECA is that it mandates water balance measures on public property. Consequently, the LID (Low Impact Development) strategy for this property focuses on public LID options rather than private ones. Typically, for residential developments like this property, traditional water balance design involves directing roof drainage to rear yard infiltration trenches on private lots to meet infiltration deficit volumes. However, this approach cannot be proposed due to CLI-ECA requirements. The list below combines Low Impact Development (LID) measures that are applicable on both private and public properties.

- Increased topsoil depths (Houses, boulevard, parks)
- Disconnected roof leaders to discharge to rear yards in private blocks (medium density)
- Infiltration trenches or galleries where feasible
- Permeable pavements where feasible

The preferred LID plan will be determined through consultation with the Town of Caledon at the detailed design stage.

6 Natural Heritage System & Buffer

The subject lands include approximately 8.82 hectares of environmental policy area, which will be dedicated as a natural heritage system (NHS) with a transition buffer to facilitate preservation. A portion of the stormwater management (SWM) pond will be situated within the NHS buffer, which is currently used for agricultural purposes.

To minimize impact, grading within the NHS buffer will be limited and only performed as necessary to match existing grades. Walk-out lots with a 2.4-meter drop over a 7.2-meter span will help reduce the need for extensive grading within the NHS buffer. Transition slopes within the buffer will be constructed at a maximum 3:1 slope.

Grading will also be required within the NHS to establish an outfall from the SWM pond headwall to the creek, with the outfall leading to a grassed swale.

Detailed grading plans will be provided at the detailed design stage. Preliminary grading and pond location are illustrated on Drawing PG-1.

The Stormwater Management Pond (Block 6) location is proposed within the Natural Heritage System (NHS) Buffer of the Protected Countryside of the Greenbelt Plan. As per section 4.2.3 of the Green Belt Plan, applications for development and site alteration in the Protected Countryside shall be accompanied by a SWM plan that demonstrates that:

> *a) Planning, design and construction practices will minimize vegetation removal, grading and soil compaction, sediment erosion and impervious surfaces.*
>
> *b) An integrated treatment approach will be used to minimize stormwater flows and mimic natural hydrology through lot level controls, low impact development and other conveyance techniques.*
>
> *c) Applicable recommendations, standards or targets within a subwatershed plan or equivalent and water budgets will be complied with; and*
>
> *d) Applicable objectives, targets, and any other requirements within a stormwater master plan will be met in accordance with the policies in subsection 3.2.7 of the Growth Plan.*

As outlined in Section 5 (Storm Drainage & Stormwater Management) of this report, all the above-mentioned stormwater management plan objectives are achieved without compromising the integrity of the NHS lands.

7 EROSION AND SEDIMENT CONTROL

Erosion and sedimentation are naturally occurring processes that involve particle detachment, sediment transport and deposition of soil particles. Construction activities commonly alter the landscapes where they are located, exacerbating these natural processes. One of the most significant alterations encountered during construction is the removal of the vegetation that stabilizes the subsoil. In the absence of the vegetation, the underlying soils are fully or partially exposed to various natural forces such as rain, flowing water, wind, and gravity[1]

The discharge of high sediment loads to natural watercourses has significant impacts on receiving waters and aquatic habitat. Some specific examples include:

- Degradation of water quality;
- Damage or destruction of fish habitat;
- Increased flooding.

In consideration of the above, it is necessary as part of the Final Design and implementation of infrastructure and development servicing to incorporate a comprehensive Erosion and Sediment Control Plan. The objectives are:

(i) Minimize wherever possible the extent of vegetation removal;
(ii) Provide appropriate sediment control measures to minimize the off-site transport of sediment;
(iii) Minimize the extent of time that sites are devoid of stabilizing vegetation;
(iv) Provide interim erosion control measures where permanent restoration is not feasible.
(v) Provide permanent restoration to eliminate future erosion.

The Erosion and Sediment Control Plan should consider the specific characteristics of each development site and address the requirements relating to the following typical construction stages:

---

[1] *Erosion and Sediment Control Guidelines for Urban Construction,* December 2006, Greater Horseshoe Conservation Authorities.

- Topsoil Stripping and Site Pre-Grading
- Infrastructure Servicing
- Building Construction

A “treatment train” approach is recommended in the development of an appropriate Erosion and Sediment Control Plan in compliance with the *Erosion and Sediment Control Guidelines for Urban Construction.* Typical sediment control measures include:

- Installation of double silt fencing along the boundary of work areas adjacent to the NHS;
- Construction of vegetated cut off swales including sediment traps and rock check dams;
- Stabilization of temporary sediment traps and provision of vegetated filter strips adjacent to the NHS;
- Provision of catch basin sediment controls.

Inherent in the Erosion and Sediment Control Plan is a monitoring program with an Action Plan to implement remedial measures in a timely manner where required.

As part of the final engineering design, the Sediment and Erosion Control Plan will be prepared including sizing of temporary sedimentation ponds and sediment traps.

8 CONCLUSIONS

8.1 Summary

This Functional Servicing Report was prepared as a technical document in support of the Draft Plan of Subdivision. The report addresses sanitary, water and storm drainage servicing and stormwater management.

The report outlines a proposed servicing strategy for the proposed subdivision development and provides preliminary engineering design for sanitary, water, storm drainage and stormwater management in accordance with the technical requirements of the Region of Peel, Town of Caledon, Toronto and Region Conservation Authority and MECP guidelines.

8.2 Conclusion

Based on the findings of this report, the conclusions and recommendations are as follows:

(i) Sanitary sewer servicing can be achieved by connecting to the existing Sanitary sewer on Bonnieglen Farm Boulevard and the future pumping station proposed to the west of Kennedy Road.

(ii) Water supply can be achieved by connecting to the existing watermains on Kennedy Road, Old School Road and Bonnieglen Farm Boulevard

(iii) Storm water quality, quantity and erosion control requirements will be provided by a Stormwater Management Wet Pond Facility to be located within the limits of Block 6.

(iv) Erosion and sediment control measures will be installed as recommended.

SA

Scott Lang, P. Eng

Scott Ahonen

APPENDIX A

Sanitary Sewer Design Sheets

Subdivision:	**Trend Kennedy**	**Town of Caledon**	**Project No.:** **W22068**
File No.:		**SANITARY DRAINAGE**	**Date:** **2024-09-09**
Consultant:	**Candevcon Limited**		**Prepared By:** **SAA**
Drainage Area Plan:	**SA-1**		**Checked By:**

LOCATION				**SECTION AREA (Ha)**									**POPULATION**					**FLOWS**											**REMARKS**
STREET	AREA ID	MAINTANANCE HOLES		Right of Way	Low Density	Semi-Detached	Medium Density (Towns)	Medium Density (Condos)	Commercial /Retail	Junior School	Senior School	High School	Residential	Commercial	School	TOTAL POP	**ACCUM. POP.**	PEAK FACTOR	AREA (ha)	**ACCUM. AREA (ha)**	PK. DAY FLOW (m^3/s)	INFILT. (m^3/s)	***TOTAL FLOW* (m^3/s)**	SIZE (mm)	SLOPE (%)	**CAPACITY** (m^3/s)	**VELOCITY**		DESIGN FLOW / FULL FLOW %
		Upstream	Downstream																								FULL FLOW (m/s)	ACT. FLOW (m/s)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	**18**	19	20	**21**	22	23	24	25	26	27	28	29	30
OUTLET TO KENNEDY ROAD - South																													
Kennedy Road	60	PLUG	MH54A					1.17					205	0	0.00	205	**205**	4	1.17	**1.17**	0.0027	0.000	**0.003**	250	0.50%	**0.042**	0.86	0.28	7
Kennedy Road	59	MH54A	MH55A	0.37									0	0	0.00	0	**205**	4	0.37	**1.54**	0.0027	0.000	**0.003**	250	0.50%	**0.042**	0.86	0.28	7
Kennedy Road		MH55A	MH56A										0	0	0.00	0	**205**	4	0.00	**1.54**	0.0027	0.000	**0.003**	250	0.50%	**0.042**	0.86	0.28	7
OUTLET TO KENNEDY ROAD - North																													
STREET 'E'	2	MH2A	MH4A				0.33						60	0	0.00	60	**60**	4	0.33	**0.33**	0.0008	0.000	**0.001**	250	1.00%	**0.060**	1.21	0.07	2
STREET 'C'	3	MH3A	MH4A	0.16									0	0.00	0.00	0	**0**	4	0.16	**0.16**	0.0000	0.000	**0.000**	250	1.00%	**0.060**	1.21	0.00	0
																												0.00	
STREET 'D'	4	MH4A	MH5A				0.16						29	0.00	0.00	29	**90**	4	0.16	**0.65**	0.0012	0.000	**0.001**	250	0.50%	**0.042**	0.86	0.14	3
STREET 'D'	5	MH5A	MH6A	0.03									0	0.00	0.00	0	**90**	4	0.03	**0.68**	0.0012	0.000	**0.001**	250	0.50%	**0.042**	0.86	0.14	3
STREET 'D'	6	MH6A	MH11A	0.11									0	0.00	0.00	0	**90**	4	0.11	**0.79**	0.0012	0.000	**0.001**	250	0.50%	**0.042**	0.86	0.14	3
																												0.00	
STREET 'E'	7	MH2A	MH7A			0.07							14	0.00	0.00	14	**14**	4	0.07	**0.07**	0.0002	0.000	**0.000**	250	1.00%	**0.060**	1.21	0.00	0
STREET 'E'	8	MH7A	MH8A			0.28							55	0.00	0.00	55	**69**	4	0.28	**0.35**	0.0009	0.000	**0.001**	250	0.50%	**0.042**	0.86	0.10	2
STREET 'E'	9	MH8A	MH9A			0.11							22	0.00	0.00	22	**91**	4	0.11	**0.46**	0.0012	0.000	**0.001**	250	0.50%	**0.042**	0.86	0.14	3
STREET 'E'	10, 10A	MH9A	MH10A			0.26	0.22						91	0.00	0.00	91	**182**	4	0.48	**0.94**	0.0024	0.000	**0.003**	250	0.50%	**0.042**	0.86	0.26	6
STREET 'E'	11	MH10A	MH11A				0.38						70	0.00	0.00	70	**251**	4	0.38	**1.32**	0.0034	0.000	**0.004**	250	0.50%	**0.042**	0.86	0.31	9
STREET 'D'	12	MH11A	MH13A					1.54					270	0.00	0.00	270	**611**	3.93	1.54	**3.65**	0.0081	0.001	**0.009**	250	0.50%	**0.042**	0.86	0.55	21
STREET 'F'	13	MH12A	MH13A					0.78					137	0.00	0.00	137	**137**	4	0.78	**0.78**	0.0018	0.000	**0.002**	250	1.00%	**0.060**	1.21	0.20	3
STREET 'B'	1, 14, 15, 15A	MH13A	MH14A	0.13	0.10	0.03	0.35						82	0.00	0.00	82	**829**	3.85	0.61	**5.04**	0.0107	0.001	**0.012**	250	0.50%	**0.042**	0.86	0.66	29
STREET 'B'	16, 16A	MH14A	MH15A		0.30	0.30							94	0.00	0.00	94	**923**	3.82	0.60	**5.64**	0.0118	0.001	**0.013**	250	0.50%	**0.042**	0.86	0.70	32
STREET 'B	17, 17A	MH15A	MH42A		0.20	0.18							59	0.00	0.00	59	**982**	3.81	0.38	**6.02**	0.0125	0.002	**0.014**	250	0.50%	**0.042**	0.86	0.72	33
STREET 'F'	19	MH12A	MH16A		0.07								8	0.00	0.00	8	**8**	4	0.07	**0.07**	0.0001	0.000	**0.000**	250	1.00%	**0.060**	1.21	0.00	0
STREET 'F'	20, 20A	MH16A	MH17A		0.39		0.15						73	0.00	0.00	73	**81**	4	0.54	**0.61**	0.0011	0.000	**0.001**	250	0.50%	**0.042**	0.86	0.10	3
STREET 'F'	21	MH17A	MH18A		0.59								69	0.00	0.00	69	**150**	4	0.59	**1.20**	0.0020	0.000	**0.002**	251	0.50%	**0.043**	0.86	0.24	5
STREET 'F'	22	MH18A	MH19A		0.48								56	0.00	0.00	56	**206**	4	0.48	**1.68**	0.0028	0.000	**0.003**	250	0.50%				
STREET 'F'	23	MH19A	MH20A		0.16								19	0.00	0.00	19	**225**	4	0.16	**1.84**	0.0030	0.000	**0.004**	250	1.00%	**0.060**	1.21	0.34	6
STREET 'F'	24	MH20A	MH21A		0.54								63	0.00	0.00	63	**288**	4	0.54	**2.38**	0.0039	0.001	**0.004**	250	0.50%	**0.042**	0.86	0.35	11
STREET 'F'	25	MH21A	MH42A		0.19								22	0.00	0.00	22	**311**	4	0.19	**2.57**	0.0042	0.001	**0.005**	250	0.50%	**0.042**	0.86	0.37	11
STREET 'I'	26	MH22A	MH23A		0.47								55	0.00	0.00	55	**55**	4	0.47	**0.47**	0.0007	0.000	**0.001**	250	0.50%	**0.042**	0.86	0.10	2
STREET 'I'	27	MH23A	MH24A		0.37								43	0.00	0.00	43	**98**	4	0.37	**0.84**	0.0013	0.000	**0.002**	250	0.50%	**0.042**	0.86	0.14	4
STREET 'I'	28	MH24A	MH25A		0.15								18	0.00	0.00	18	**116**	4	0.15	**0.99**	0.0016	0.000	**0.002**	250	0.50%	**0.042**	0.86	0.19	4
STREET 'I'	29	MH25A	MH26A		0.80								94	0.00	0.00	94	**209**	4	0.80	**1.79**	0.0028	0.000	**0.003**	250	0.50%	**0.042**	0.86	0.28	8
STREET 'I'	30	MH26A	MH30A		0.20								23	0.00	0.00	23	**233**	4	0.20	**1.99**	0.0031	0.001	**0.004**	250	0.50%	**0.042**	0.86	0.31	9
STREET 'K'	31	MH27A-1	MH27A		0.38								44	0.00	0.00	44	**44**	4	0.38	**0.38**	0.0006	0.000	**0.001**	250	0.50%	**0.042**	0.86	0.05	2
STREET 'J'	32	MH27A-2	MH27A		0.40								47	0.00	0.00	47	**47**	4	0.40	**0.40**	0.0006	0.000	**0.001**	252	200.50%	**0.861**	17.28	0.00	0
STREET 'J'	33	MH27A	MH28A		0.16								19	0.00	0.00	19	**110**	4	0.16	**0.94**	0.0015	0.000	**0.002**	254	400.50%	**1.243**	24.55	0.00	0
STREET 'J'	59	MH28A	MH29A		0.11								13	0.00	0.00	13	**123**	4	0.11	**1.05**	0.0016	0.000	**0.002**	250	1.00%	**0.060**	1.21	0.20	3
STREET 'J'	60	MH29A	MH30A		0.29								34	0.00	0.00	34	**157**	4	0.29	**1.34**	0.0021	0.000	**0.002**	250	1.00%	**0.060**	1.21	0.27	4
STREET 'I'	35	MH30A	MH35A		0.52								61	0.00	0.00	61	**450**	4.00	0.52	**3.85**	0.0060	0.001	**0.007**	250	0.50%	**0.042**	0.86	0.46	17
STREET 'I'	36	MH22A	MH31A		0.50								59	0.00	0.00	59	**59**	4	0.50	**0.50**	0.0008	0.000	**0.001**	250	0.50%	**0.042**	0.86	0.10	2
STREET 'I'	37	MH31A	MH32A		0.14								16	0.00	0.00	16	**75**	4	0.14	**0.64**	0.0010	0.000	**0.001**	250	1.00%	**0.060**	1.21	0.07	2
STREET 'I'	38	MH32A	MH33A		0.49								57	0.00	0.00	57	**132**	4	0.49	**1.13**	0.0018	0.000	**0.002**	250	0.50%	**0.042**	0.86	0.19	5
STREET 'I'	39	MH33A	MH34A		0.50								59	0.00	0.00	59	**191**	4	0.50	**1.63**	0.0026	0.000	**0.003**	250	0.50%	**0.042**	0.86	0.28	7
STREET 'I'	40	MH34A	MH35A		0.27								32	0.00	0.00	32	**222**	4	0.27	**1.90**	0.0030	0.000	**0.003**	250	0.50%	**0.042**	0.86	0.31	8
STREET 'I'	41	MH35A	MH37A		0.46								54	0.00	0.00	54	**727**	3.89	0.46	**6.21**	0.0095	0.002	**0.011**	250	0.50%	**0.042**	0.86	0.62	26
STREET 'I'	60	MH57A	MH37A		0.10								12	0.00	0.00	12	**12**	4	0.10	**0.10**	0.0002	0.000	**0.000**	250	1.00%	**0.060**	1.21	0.00	0
STREET 'G'	43	MH37A	MH38A		0.20								23	0.00	0.00	23	**762**	3.87	0.20	**6.51**	0.0099	0.002	**0.012**	250	1.00%	**0.060**	1.21	0.74	19
STREET 'G'	44	MH37A	MH40A		0.52								61	0.00	0.00	61	**823**	3.85	0.52	**7.03**	0.0106	0.002	**0.012**	250	0.50%	**0.042**	0.86	0.67	30
STREET 'G'	46, 46A	MH40A	MH41A		0.33		0.36						104	0.00	0.00	104	**927**	3.82	0.69	**7.72**	0.0119	0.002	**0.014**	250	0.50%	**0.042**	0.86	0.72	33
STREET 'G'	47	MH41A	MH42A				0.11						20	0.00	0.00	20	**947**	3.82	0.11	**7.83**	0.0121	0.002	**0.014**	250	0.50%	**0.042**	0.86	0.72	34

LOCATION				SECTION AREA (Ha)									POPULATION					FLOWS											REMARKS
STREET	AREA ID	MAINTANANCE HOLES		Right of Way	Low Density	Semi-Detached	Medium Density (Towns)	Medium Density (Condos)	Commercial /Retail	Junior School	Senior School	High School	Residential	Commercial	School	TOTAL POP	**ACCUM. POP.**	PEAK FACTOR	AREA (ha)	**ACCUM. AREA (ha)**	PK. DAY FLOW (m^3/s)	INFILT. (m^3/s)	***TOTAL FLOW*** **(m^3/s)**	SIZE (mm)	SLOPE (%)	**CAPACITY** (m^3/s)	**VELOCITY**		DESIGN FLOW / FULL FLOW %
		Upstream	Downstream																								FULL FLOW (m/s)	ACT. FLOW (m/s)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	**18**	19	20	**21**	22	23	24	25	26	27	28	29	30
STREET 'A'	48	MH42A	MH43A			0.26							51	0.00	0.00	51	**2291**	3.54	0.26	**16.68**	0.0272	0.004	**0.032**	250	0.50%	**0.042**	0.86	0.97	75
STREET 'A'	49	MH43A	MH44A			0.28							55	0.00	0.00	55	**2346**	3.53	0.28	**16.96**	0.0278	0.004	**0.032**	250	0.50%	**0.042**	0.86	0.97	76
STREET 'A'	50	MH44A	MH45A			0.36							71	0.00	0.00	71	**2417**	3.52	0.36	**17.32**	0.0286	0.005	**0.033**	250	0.50%	**0.042**	0.86	0.97	79
STREET 'A'	51	MH45A	MH46A					1.15					201	0.00	0.00	201	**2618**	3.49	1.15	**18.47**	0.0307	0.005	**0.035**	250	0.50%	**0.042**	0.86	0.96	84
		MH46A	**MH56A**										0	0.00	0.00	0	**2618**	3.49	0.00	**18.47**	0.0307	0.005	**0.0355**	250	0.50%	**0.042**	0.86	0.96	84
			18.47	0.43	10.38	2.13	2.06	3.47	0.00																				
OUTLET TO EXISTING SANITARY SEWER - ARCADIA - BONNIEGLEN FARM BOULEVARD																													
STREET 'H'	45	MH40A	MH39A		0.27								32	0.00	0.00	32	**32**	4	0.27	**0.27**	0.0004	0.000	**0.000**	250	1.00%	**0.060**	1.21	0.00	1
STREET 'H'	52	MH39A	MH47A				0.09						16	0.00	0.00	16	**48**	4	0.09	**0.36**	0.0006	0.000	**0.001**	250	0.50%	**0.042**	0.86	0.05	2
STREET 'H'	53, 53A	MH47A	MH48A		0.18		0.29						74	0.00	0.00	74	**122**	4	0.47	**0.83**	0.0016	0.000	**0.002**	250	0.50%	**0.042**	0.86	0.19	4
STREET 'H'	54, 54A	MH48A	MH36A		0.11		0.24						57	0.00	0.00	57	**179**	4	0.35	**1.18**	0.0024	0.000	**0.003**	250	0.50%	**0.042**	0.86	0.26	6
STREET 'I'	42	MH57A	MH36A		0.39								46	0.00	0.00	46	**46**	4	0.39	**0.39**	0.0006	0.000	**0.001**	250	0.50%	**0.042**	0.86	0.05	2
STREET 'I'	55	MH36A	MH49A	0.12	0.20								23	0.00	0.00	23	**248**	4	0.32	**1.89**	0.0033	0.000	**0.004**	250	0.50%	**0.042**	0.86	0.33	9
STREET 'I'	56	MH49A	MH50A	0.04									0	0.00	0.00	0	**248**	4	0.04	**1.93**	0.0033	0.001	**0.004**	250	0.50%	**0.042**	0.86	0.33	9
STREET 'I'	57	MH50A	MH51A	0.04									0	0.00	0.00	0	**248**	4	0.04	**1.97**	0.0033	0.001	**0.004**	250	0.50%	**0.042**	0.86	0.33	9
STREET 'I'	58	MH51A	**EX.MH**	0.08									0	0.00	0.00	0	**248**	4	0.08	**2.05**	0.0033	0.001	**0.0039**	250	0.50%	**0.042**	0.86	0.33	9
			1.78	0.28	0.88	0.00	0.62	0.00	0.00																				

DESIGN CRITERIA

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Check Sums							
Kennedy	2617.82	**2617.82**	Kennedy	18.47	**18.47**	0.0355	
Bonnieglen	247.96	**247.96**	Bonnieglen	2.05	**2.05**	0.0039	
KENNEDY SOUTH	204.75	**204.75**	Total	1.54	**1.54**	0.0031	
Total	2865.78	**452.71**	Total	22.06	**22.06**	42.5	L/s

Equivalent Populations	**people/ha**
Right of Way	0
Low Density (less than 10m frontage)	117
Semi Detached	196.854
Medium Density (Towns)	182.92
Medium Density (Condos)	175
Commercial/Retail	50

Average Day Flow: 290 Lpcd

Peaking Factor: 1+14/(4+(P)^0.5) P = Pop. in 1000's

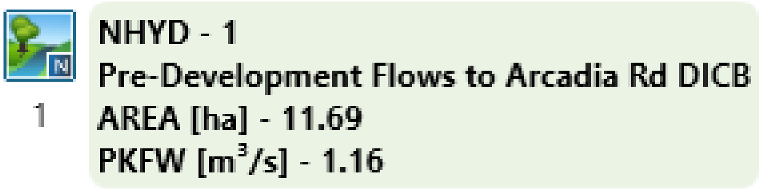
Infiltration: Pipes: 0.00026 m^3/s/ha

0.000028 m^3/s/m

Manning's Co-eff.: n = 0.013

APPENDIX B

Vo Results For Pre-Development Flows To Arcadia Road



1

NHYD - 1

Pre-Development Flows to Arcadia Rd DICB

AREA [ha] - 11.69

PKFW [m^3/s] - 1.16

VO LAYOUT (100-YR-6-HR Event)

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==========================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****
--------------------------------------------------------------------------
---------------------------------
  ************************************************
  ** SIMULATION : 100 Year 6 Hour AES (Bloor, T **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              8e084524-50e4-41c4-8ff6-
de9ed17bb177\05252cf9
| Ptotal= 80.31 mm |    Comments: 100 Year 6 Hour AES (Bloor, TRCA)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  1.75   27.30 |  3.50   11.24 |  5.25
1.61
                 0.25    1.61 |  2.00   27.30 |  3.75    6.42 |  5.50
1.61
                 0.50    1.61 |  2.25   73.88 |  4.00    6.42 |  5.75
1.61
                 0.75    1.61 |  2.50   73.88 |  4.25    3.21 |  6.00
1.61
                 1.00    1.61 |  2.75   20.88 |  4.50    3.21 |
                 1.25    9.64 |  3.00   20.88 |  4.75    1.61 |
                 1.50    9.64 |  3.25   11.24 |  5.00    1.61 |

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| CALIB            |
```

```
| NASHYD   (  0001)|   Area    (ha)=  11.69   Curve Number   (CN)= 80.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   18.47 | 3.500   11.24 |  5.17
1.61
                0.333    0.81 | 2.000   27.30 | 3.667   11.24 |  5.33
1.61
                0.500    1.61 | 2.167   27.30 | 3.833    8.83 |  5.50
1.61
                0.667    1.61 | 2.333   50.59 | 4.000    6.42 |  5.67
1.61
                0.833    1.61 | 2.500   73.88 | 4.167    6.42 |  5.83
1.61
                1.000    1.61 | 2.667   73.88 | 4.333    4.81 |  6.00
1.61
                1.167    1.61 | 2.833   47.38 | 4.500    3.21 |  6.17
1.61
                1.333    5.62 | 3.000   20.88 | 4.667    3.21 |  6.33
0.81
                1.500    9.64 | 3.167   20.88 | 4.833    2.41 |
                1.667    9.64 | 3.333   16.06 | 5.000    1.61 |

     Unit Hyd Qpeak  (cms)=   2.233

     PEAK FLOW       (cms)=   1.157 (i)
     TIME TO PEAK    (hrs)=   2.833
     RUNOFF VOLUME    (mm)=  39.797
     TOTAL RAINFALL   (mm)=  80.310
     RUNOFF COEFFICIENT   =   0.496

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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APPENDIX C

Stormwater Management Design Calculations

Humber River Stormwater Management Quantity Control Release Rates

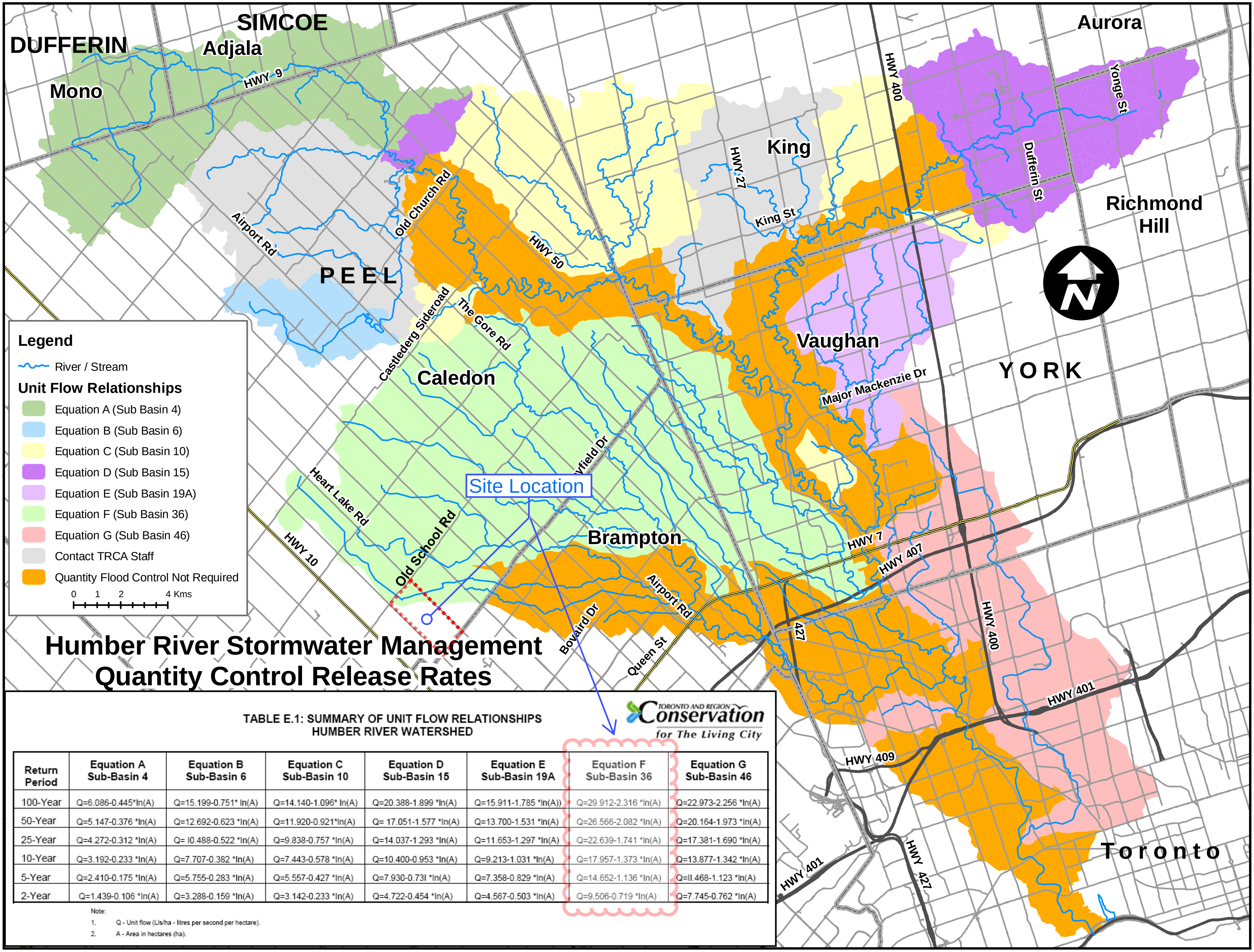


TABLE E.1: SUMMARY OF UNIT FLOW RELATIONSHIPS
HUMBER RIVER WATERSHED

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).

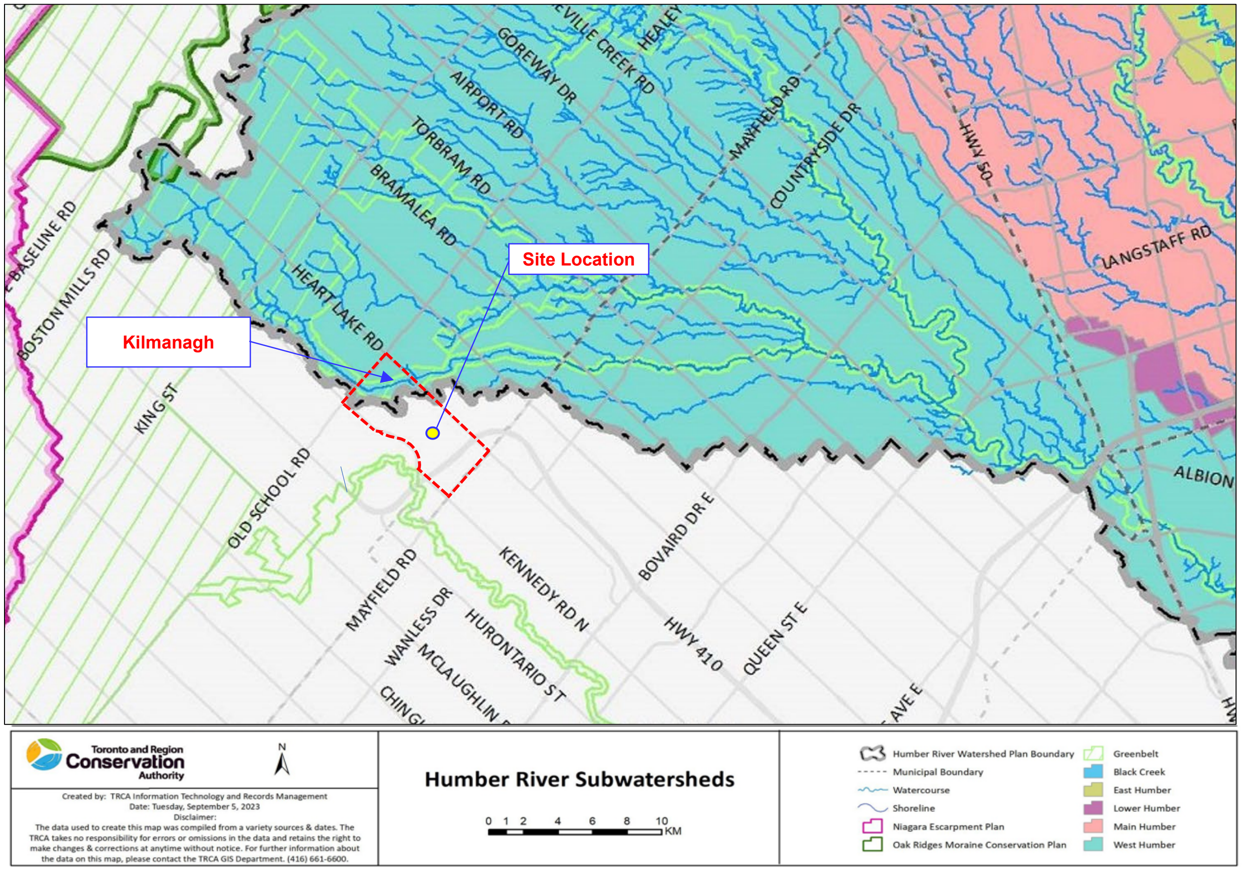
Drainage Area & Imperviousness

Catchment Id	Drainage Area (Ha)	% Imperviousness (TIMP)	Runoff "C" (XIMP)	(Refer to Storm Drainage Area Plan)	
1	0.79	80%	0.75	Medium Density	
2	0.33	80%	0.75	Medium Density	
3	0.15	100%	0.90	Road	
4	0.16	80%	0.75	Medium Density	
5	0.03	100%	0.90	Road	
6	0.11	100%	0.90	Road	
7	0.07	60%	0.50	Low Density	
8	0.28	60%	0.50	Low Density	
9	0.11	60%	0.50	Low Density	
10	0.24	80%	0.75	Medium Density	
10 A	0.26	60%	0.50	Low Density	
11	0.37	80%	0.75	Medium Density	
12	1.53	80%	0.75	Mixed-Use/Mid Rise	
13	0.27	80%	0.75	Medium Density	
14	0.30	60%	0.50	Low Density	
15	0.24	80%	0.75	Medium Density	
15 A	0.24	60%	0.50	Low Density	
16	0.33	60%	0.50	Low Density	
17	0.57	60%	0.50	Low Density	
18	0.25	60%	0.50	Low Density	
19	1.15	80%	0.75	Medium Density	
20	0.35	60%	0.50	Low Density	
21	0.30	60%	0.50	Low Density	
22	0.23	60%	0.50	Low Density	
23	0.06	60%	0.50	Low Density	
24	0.27	60%	0.50	Low Density	
25	0.27	60%	0.50	Low Density	
26	0.26	60%	0.50	Low Density	
27	0.13	60%	0.50	Low Density	
28	0.53	60%	0.50	Low Density	
29	0.19	60%	0.50	Low Density	
30	0.11	80%	0.75	Medium Density	
31	1.93	10%	0.25	Park	
32	0.33	80%	0.75	Medium Density	
32 A	0.35	60%	0.50	Low Density	
33	0.26	60%	0.50	Low Density	
34	0.45	60%	0.50	Low Density	
35	0.27	60%	0.50	Low Density	
36	0.07	80%	0.75	Medium Density	
37	0.27	80%	0.75	Medium Density	
37 A	0.20	60%	0.50	Low Density	
38	0.24	80%	0.75	Medium Density	
38 A	0.13	60%	0.50	Low Density	
39A	0.16	60%	0.50	Low Density	
40	0.53	60%	0.50	Low Density	
41	0.46	60%	0.50	Low Density	
42	0.14	60%	0.50	Low Density	
43	0.40	60%	0.50	Low Density	
44	0.16	60%	0.50	Low Density	
45	0.37	60%	0.50	Low Density	
46	0.26	60%	0.50	Low Density	
47	0.47	60%	0.50	Low Density	
48	0.37	60%	0.50	Low Density	
49	0.43	60%	0.50	Low Density	
50	0.23	60%	0.50	Low Density	
51	0.16	60%	0.50	Low Density	
52	0.10	60%	0.50	Low Density	
53	0.13	60%	0.50	Low Density	
54	0.54	60%	0.50	Low Density	
55	0.43	60%	0.50	Low Density	
56	0.30	60%	0.50	Low Density	
57	0.12	60%	0.50	Low Density	
58	0.57	60%	0.50	Low Density	
59	0.04	60%	0.50	Low Density	21.52
64	0.17	60%	0.50	Low Density	
Pond Area	2.13	100%	0.95		
	23.65	**65%**	**0.59**		
Total Drainage to SWM Pond (Ha) =			**23.65**		
Overall Imperviousness =			**65%**		
Composite Runoff C =			**0.59**		

STORMWATER MANAGEMENTS POND DESIGN

UNIT FLOW EQUATIONS - HUMBER RIVER
POND RELEASE RATE TARGETS (L/S)

Site Location : Town of Caledon



The proposed SWM Pond will drain to Kilmanagh Creek of the West Humber River. The Humber River Stormwater Management Quantity Control Release Rates Equation F for Sub-Basin 36 is applicable based on the site location.

Total Development Area (A) = 23.65 ha

Humber River Unit Flow Equation F (Sub Basin 36 is Applicable)

Storm Event	Humber River Sub-Basin 36	B	C	Pond to Tributary (L/s)
100-Year	Q = 29.912 - 2.316*ln(A)	29.912	-2.316	534
50-Year	Q = 26.566 - 2.082*ln(A)	26.566	-2.082	473
25-Year	Q = 22.639 - 1.741*ln(A)	22.639	-1.741	405
10-Year	Q = 17.957 - 1.373*ln(A)	17.957	-1.373	322
5-Year	Q = 14.652 - 1.136*ln(A)	14.652	-1.136	262
2-Year	Q = 9.506 - 0.719*ln(A)	9.506	-0.719	171

Drainage Area vs Landuse Type Breakdown (SWM Pond)

Total Site Area draining to Proposed SWM Pond = 23.65 Ha

Catchment Type	Typical Imperviousness	Typical Run-Off "C"	Area (Ha)
Park/Open Space	10%	0.25	1.93
LowDensity Residential	60%	0.50	12.91
Medium-Density Residential	80%	0.75	6.40
Roads	100%	0.90	0.29
SWM Pond Area	100%	0.90	2.12
			23.65

MOECP Requirements (@ 65% Imp) = 213 m^3/ha (Includes 40m^3/ha Extended Detention)

Permanent Pool Volume Required = 5,045 m^3

Elevations	Forebay Area	Main Cell Area	Total Area	Average Area	Depth	Delta Volume	Total Volume	
(m)	(m^2)	(m^2)	(m^2)	(m^2)	(m)	(m^3)	(m^3)	
266.00	576	1631	2207					
				2854	1.00	2854		
267.00	1127	2374	3502				2854	
				3868	0.50	1934		
267.50	1445	2789	4234				4788	
				4902	0.50	2451		
268.00			**5570**				**7239**	**Permanent Pool Storage**
268.00			5570				0	
				6341	0.50	3171		
268.50			7112				3171	
				7546	0.50	3773		
269.00			7980				6944	
				9063	0.00	0		
269.00			10145				6944	
				11068	1.00	11068		
270.00			11990				18011	**Top of Pond**

Water Quality Volume Design

TRCA's 25mm Erosion Control Requirement

Contributing Drainage Area (ha) = 23.65 Ha

25mm 4Hr Chicago Post Development Runoff Volume in Depth = 14.97 mm (Refer to VO Results)

(R. V x Drainage Area)

25mm Volume Required = **3,540 m^3**

25mm Volume Provided = **3,548** m^3 at Elv = 268.55m in pond

Drawdown Time for Erosion Control ;

Based on Equation 4.11 MOE SWM Planning and Design Manual

$$t = \frac{0.66\,C_2 h^{1.5} + 2\,C_3 h^{0.5}}{2.75\,A_o}$$

t = Drawdown time in seconds

A_p = Surface area of the pond (m^2)

C = Discharge Coefficient (typically 0.63)

A_o = Cross-sectional area of the orifice (m^2)

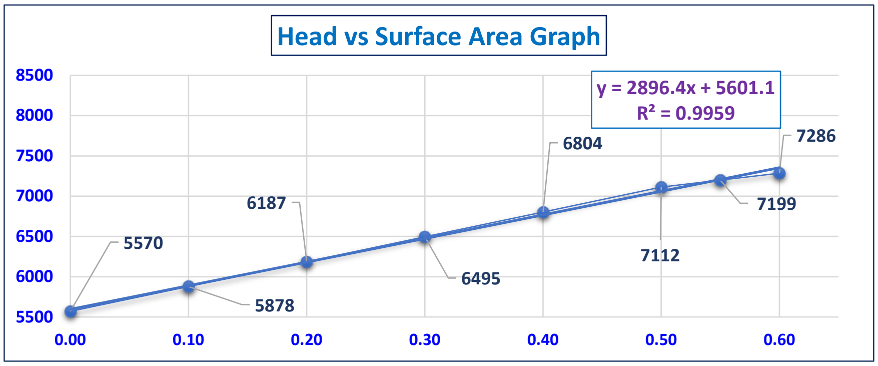
g = Gravitational acceleration constant (9.81 m/s)

h_1 = Starting water elevation above the orifice (m)

h_2 = Ending water elevation above the orifice (m)

C_2 = Slope coefficient from the area-depth linear regression

C_3 = Intercept from the area-depth linear regression



Elevation(m)	Head (m)	AREA (m^2)
268.00	0.00	5570
268.10	0.10	5878
268.20	0.20	6187
268.30	0.30	6495
268.40	0.40	6804
268.50	0.50	7112
268.55	**0.55**	**7199**
268.60	0.60	7286

Intercept of Regression , C_3 = 5601.1

Slope coef. of Regression, C_2 = 2896.4

Ultimate Ponding Elevation = 268.55 m (25mm Water Quality Level)

Depth over orifice = 0.55 m (25mm Level - Permanent Pool Elevation)

(268.55 - 268.00)

Orifice Diameter = 155 mm

Orifice Area = 0.01897 m^2

Drawdown Time (t) = 174229 seconds

48 hours

SWM POND CONTROL STRUCTURE DESIGN

Orifice No. 1 (To Control 25mm Erosion)

Orifice Plate Diameter =	0.155 m
	155 mm
Area =	0.0190 m^2
Orifice Coeff. (C)=	0.63
Invert =	268.00 m
Orifice Plate Centroid =	268.08 m

Submerged Orifice Equation = **Q_o = 0.63 x A x [2 x g x H]$^{1/2}$**

Where,

Q = Flow rate (m^3/s)
C = Constant
A = Area of opening (m^2)
H = Net head above the orifice (m)
g = Acceleration due to gravity (m/s)

Weir/Orifice No.2 (To Control 2 - 100-Year)

Orifice Width =	0.60 m
Orifice Height =	0.30 m
Area =	0.18 m^2
Orifice Coeff. (C)=	0.63
Invert =	268.65 m
Orifice Centroid =	268.80 m

BOX CUT-OUT DETAILS

Weir Equation = **Q_w = 1.67 x L x H^$^{1.5}$**

Weir Specifications

Length of Weir =	0.60
Weir Sill =	268.65 m
Weir Top =	268.95 m
Weir Coefficient =	1.67

Where,

Q_w = Flow rate (m^3/s)
C = Constant
L = Weir Length (m)
H = Net Head on the Orifice (m)

NOTE : *As per Vo Results Output, Peak flows generated by 100-year storm event are greater than Regional Storm, therefore, the Pond is designed for 100-year Storm Event*

			Stage (m):	**0.05**									
			ORIFICE CONTROL-1 (ORIFICE PLATE)		**ORIFICE/WEIR CONTROL-2 (BOX CUT-OUT)**				**(1 + 2)**				
	STORAGE IN POND (m^3)	**Elevation (m)**	**Depth above orifice Centroid (m)**	**Orifice No.1 Flow (m^3/s)**	**Depth above orifice Centroid (m)**	**Orifice No.2 Flow (m^3/s)**	**Depth Above Weir (m)**	**Weir No.2 Flow (m^3/s)**	**Total Flow (m^3/s)**				
	0	268.00	0	0					0.000				
	317	268.05	0.00	0.000					0.000				
	634	268.10	0.02	0.008					0.008				
	951	268.15	0.07	0.014					0.014				
	1268	268.20	0.12	0.019					0.019				
	1586	268.25	0.17	0.022					0.022				
	1903	268.30	0.22	0.025					0.025				
	2220	268.35	0.27	0.028					0.028				
	2537	268.40	0.32	0.030					0.030				
	2854	268.45	0.37	0.032					0.032				
	3171	268.50	0.42	0.034					0.034				
25mm	**3548**	**268.55**	**0.47**	**0.036**					**0.036**	**25mm Erosion Control**			
	3926	268.60	0.52	0.038					0.038				
	4303	268.65	0.57	0.040			0.00	0.000	0.040				
	4680	268.70	0.62	0.042			0.05	0.011	0.053				
2-Year	**5058**	**268.75**	**0.67**	**0.043**			**0.10**	**0.032**	**0.075**	**2-Year (171 L/s)**			
	5435	268.80	0.72	0.045			0.15	0.058	0.103				
	5812	268.85	0.77	0.047			0.20	0.090	0.136				
	6189	268.90	0.82	0.048			0.25	0.125	0.173				
	6567	268.95	0.87	0.049			0.30	0.165	0.214				
5-Year	**6944**	**268.97**	**0.89**	**0.050**			**0.32**	**0.181**	**0.231**	**5-Year (262 L/s)**			
	6944	269.00	0.92	0.051	0.20	0.225			0.275				
	7497	269.05	0.97	0.052	0.25	0.251			0.303				
10-Year	**7719**	**269.07**	**0.99**	**0.053**	**0.27**	**0.261**			**0.314**	**10-Year (322 L/s)**			
	8051	269.10	1.02	0.054	0.30	0.275			0.329				
	8604	269.15	1.07	0.055	0.35	0.297			0.352				
	9157	269.20	1.12	0.056	0.40	0.318			0.374				
25-Year	**9711**	**269.25**	**1.17**	**0.057**	**0.45**	**0.337**			**0.394**	**25-Year (405 L/s)**			
	10264	269.30	1.22	0.059	0.50	0.355			0.414				
	10817	269.35	1.27	0.060	0.55	0.373			0.432				
50-Year	**11371**	**269.40**	**1.32**	**0.061**	**0.60**	**0.389**			**0.450**	**50-Year (473 L/s)**			
	11924	269.45	1.37	0.062	0.65	0.405			0.467				
100-Year	**12478**	**269.50**	**1.42**	**0.063**	**0.70**	**0.420**			**0.483**	**100-Year (534 L/s)**			
	13031	269.55	1.47	0.064	0.75	0.435			0.499		0.28	**0.78**	
	13584	269.60	1.52	0.065	0.80	0.449			0.515		0.79	**1.31**	
	14138	269.65	1.57	0.07	0.85	0.463			0.529		1.46	**1.98**	
	14691	269.70	1.62	0.067	0.90	0.477			0.544		2.24	**2.78**	
	15022	269.73	1.65	0.068	0.93	0.484			0.552		2.76	**3.32**	**Regional Storage**
	15244	269.75	1.67	0.068	0.95	0.490			0.558		3.13	**3.69**	
	15798	269.80	1.72	0.069	1.00	0.502			0.572		4.12	**4.69**	
	16351	269.85	1.77	0.070	1.05	0.515			0.585		5.19	**5.77**	
	16904	269.90	1.82	0.071	1.10	0.527			0.598		6.34	**6.94**	
	17458	269.95	1.87	0.072	1.15	0.539			0.611		7.56	**8.17**	
Top of Pond	18011	270.00	1.92	0.073	1.20	0.550			0.624		8.86	**9.48**	

🟨 **Flows from Emergency Spillwa**

Visual Otthymo Results for AES storm, 2 to 100-Year storm events for 6 & 12 Hour Runs - SWM Pond

6 - HOUR RUN

Storm Event	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Target Release (m^3/s)	**171**	**262**	**322**	**405**	**473**	**534**
VO Peak Flows (m^3/s)	1.329	2.074	2.540	3.132	3.588	4.025
Outflow Rate (m^3/s)	0.069	**0.192**	**0.304**	**0.374**	**0.419**	**0.461**
Storage Volume (m^3)	4,671	**6,479**	**7,626**	**9,215**	**10,469**	**11,763**

12 - HOUR RUN

Storm Event	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Target Release (m^3/s)	**171**	**262**	**322**	**405**	**473**	**534**
VO Peak Flows (m^3/s)	0.844	1.254	1.531	1.893	2.138	2.381
Outflow Rate (m^3/s)	**0.073**	0.190	0.289	0.36	0.403	0.442
Storage Volume (m^3)	**4,925**	6,454	7,500	8,888	9,999	11,156

Control Structure Flows	**0.075**	**0.231**	**0.314**	**0.394**	**0.450**	**0.483**
Storage Provided in Pond (m^3)	**5,058**	**6,944**	**7,719**	**9,711**	**11,371**	**12,478**
Elevation in Pond (m)	**268.75**	**268.97**	**269.07**	**269.25**	**269.40**	**269.50**

Emergency Spillway Design

Notes : **** As per MOE SWM Manual definition, the Emergency Spillway is designed to convey strom drainage flows out of the facility in the event that the other outlets (in control structure) are not functioning properly.***

***** As per Vo Results 100-year Peak flows are greater than Regional Storm, therefore, emergency spillway is designed for 100-year peak flows***

The Emergency spillway is proposed at 100-year Elevation = 269.50 m

100-Year Storm Peak Flows (Qinflow) = 4.03 m^3/s (Refer to 100-Yr, 6 Hr Vo Results)

Regional Peak Flows (Qinflow) = 3.29 m^3/s (Refer to Hurrican Hazel-Regional VO Results)

Emergency Spillway Weir Parameters

Top Width of Weir =	18 m
Downstream Width of Weir =	12.0 m
Side Slopes =	10 : 1
Median Width (B) =	15 m
Weir Sill Elevation (At 100-Year) =	269.50 m
Weir Top Elevation =	270.00 m
Depth of Weir =	0.50 m

Weir Equation;

$$Q_w = (CL(H^{3/2})$$

Stage :	0.05		
	Depth	**Cd**	**Q**
269.50	0	1.67	0.00
269.55	0.05	1.67	0.28
269.60	0.10	1.67	0.79
269.65	0.15	1.67	1.46
269.70	0.20	1.67	2.24
269.75	0.25	1.67	3.13
269.80	0.30	1.67	4.12
269.85	0.35	1.67	5.19
269.90	0.40	1.67	6.34
269.95	0.45	1.67	7.56
270.00	0.50	1.67	8.86

Therefore, Maximum capacity of Spillway is = 8.857 m^3/s > 4.03 m^3/s

(100-Year Storm Peak Flows)

FOREBAY DESIGN CALCULATIONS

Settling Calculations

Forebay Settling Length (MOE Equation 4.5)

$$\text{Dist} = \sqrt{\frac{r\,Q_p}{V_s}}$$

For Forebay

Length-to-width ratio of forebay (r) = 4.0 : 1

Peak flow rate from the pond during design quality storm (Q_p) = 0.036 m^3/s (Refer to Control Structure Release Rates for 25mm)

Settling Velocity (V_s) = 0.0003 m/s (Recommended from MOEE Manual)
Forebay Settling Length Required = 22.0 m
Total Forebay Length Provided = 60.0 m

Dispersion Length Calculations

Length of Dispersion (MOE Equation 4.6)

$$\text{Dist} = \frac{8Q}{d\,V_f}$$

Inlet flow rate - 10 yr. (Q) = 3.31 m^3/s (Refer to Storm Design Sheet)
Depth of permanent pool in the forebay (d) = 2.0 m
Desired velocity in the forebay (V_f) = 0.5 m/s (Recommended from MOEE Manual)
Length of Dispersion = 26.5 m
Total Forebay Length Provided = 60.0 m

Minimum Forebay Deep Zone Bottom Width

Minimum Forebay Deep Zone Bottom Width (MOE Equation 4.7)

$$\text{Width} = \frac{\text{Dist}}{8}$$

Distance (D_R) = 26.5 m (Required Dispersion Length)
Width (W_R) = 3.31 m (Required Forebay Bottom Width)
Forebay Bottom Width (W_P) = 18.00 m (Provided Forebay Bottom Width)

Sediment Drying Area Calculation

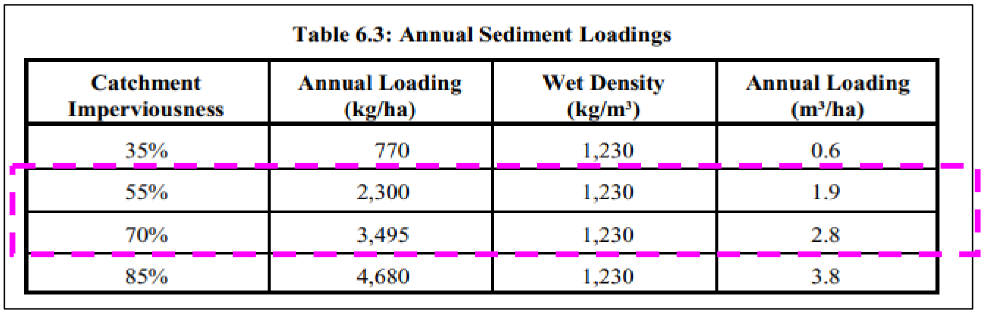


Table 6.3: Annual Sediment Loadings

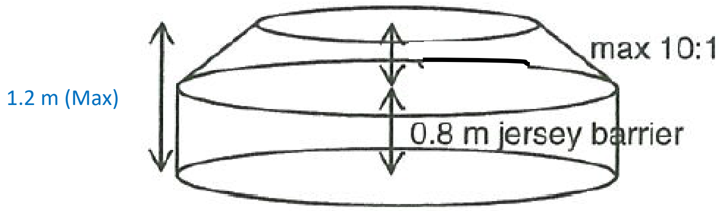
Catchment Imperviousness	Annual Loading (kg/ha)	Wet Density (kg/m³)	Annual Loading (m³/ha)
35%	770	1,230	0.6
55%	2,300	1,230	1.9
70%	3,495	1,230	2.8
85%	4,680	1,230	3.8

Above Table 6.3 is extracted from Stormwater Management Planning & Design Manual, March 2003

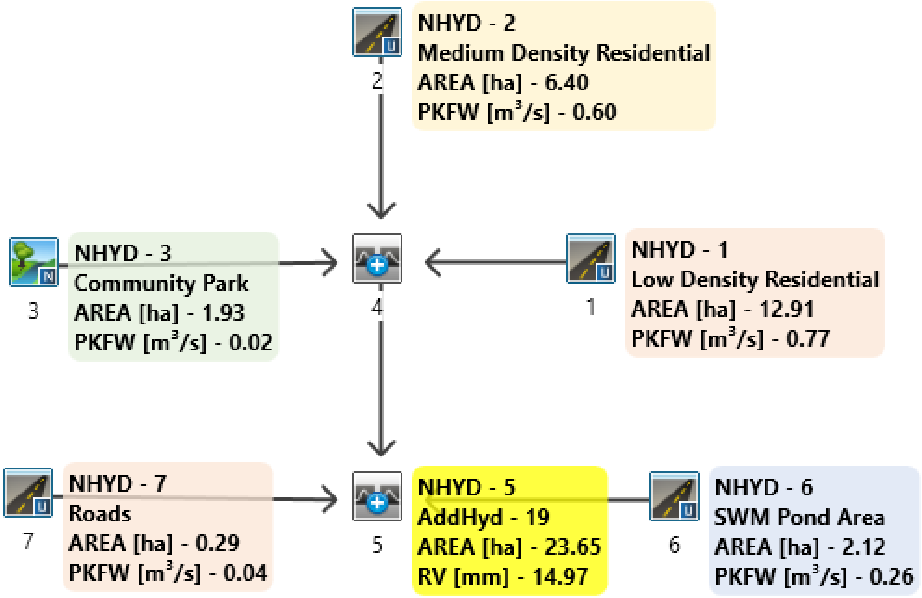
Area	% Imp	Annual Loading Rate	Annual Sediment Load	Volume Required for 10 Years	Area Required	Area Provided
(Ha)		(m^3/ha)	(m^3)	(m^3)	(m^2)	(m^2)
23.65	65%	2.5	59.13	591.3	493	500

Refer to M3 drawing for sediment drying area location and design details

Sediment Storage Configuration



VISUAL OTTHYMO MODELLING RESULTS



VO LAYOUT FOR 25mm STORM EVENT (Erosion Control)

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       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****

--------------------------------------------------------------------------
---------------------------------
  ************************************************
  ** SIMULATION : 25MM-4HR                      **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              e4cf23d1-d658-449c-8209-
a8195d79fce6\d576b9ee
| Ptotal= 25.00 mm |    Comments: 25MM-4HR
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    2.07 |  1.00    5.70 |  2.00    5.19 |  3.00
2.80
                 0.17    2.27 |  1.17   10.78 |  2.17    4.47 |  3.17
2.62
                 0.33    2.52 |  1.33   50.21 |  2.33    3.95 |  3.33
2.48
                 0.50    2.88 |  1.50   13.37 |  2.50    3.56 |  3.50
2.35
                 0.67    3.38 |  1.67    8.29 |  2.67    3.25 |  3.67
2.23
                 0.83    4.18 |  1.83    6.30 |  2.83    3.01 |  3.83
2.14

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```
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   1.93   Curve Number   (CN)= 80.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.369

     PEAK FLOW       (cms)=   0.020 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   4.664
     TOTAL RAINFALL   (mm)=  24.997
     RUNOFF COEFFICIENT   =   0.187

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  12.91
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.75         5.16
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     293.37        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      50.21        10.02
               over (min)       10.00        30.00
     Storage Coeff.  (min)=       6.42 (ii)   24.13 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.13         0.04
                                                        *  TOTALS*
     PEAK FLOW       (cms)=       0.75         0.07          0.771 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.83           1.50
     RUNOFF VOLUME    (mm)=      24.00         2.67          13.33
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.11           0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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```
| CALIB              |
| STANDHYD (  0002)|   Area    (ha)=   6.40
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.12         1.28
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     206.56        40.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      50.21        10.02
                over (min)      10.00        30.00
     Storage Coeff.  (min)=       5.20 (ii)   22.91 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.15         0.04
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       0.59         0.02           0.597 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.83            1.50
     RUNOFF VOLUME    (mm)=      24.00         2.67           18.67
     TOTAL RAINFALL   (mm)=      25.00        25.00           25.00
     RUNOFF COEFFICIENT   =       0.96         0.11            0.75

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-----

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    12.91   0.771     1.50    13.33
      + ID2= 2 (  0002):     6.40   0.597     1.50    18.67
        =======================================================
        ID = 3 (  0004):    19.31   1.369     1.50    15.10

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):    19.31   1.369     1.50    15.10
      + ID2= 2 (  0003):     1.93   0.020     1.67     4.66
```

```
        ====================================================
        ID = 1 (  0004):    21.24   1.384     1.50    14.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.29
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.28         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      43.97        40.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      50.21        63.34
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       2.06 (ii)   10.53 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.08
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       0.04         0.00           0.037 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.67            1.50
     RUNOFF VOLUME    (mm)=      24.00         5.65           22.16
     TOTAL RAINFALL   (mm)=      25.00        25.00           25.00
     RUNOFF COEFFICIENT   =       0.96         0.23            0.89

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   2.12
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     118.88        40.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      50.21        63.34
```

```
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       3.73 (ii)   12.21 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.16         0.07
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.25         0.01          0.256 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.67           1.50
     RUNOFF VOLUME    (mm)=      24.00         5.65          22.16
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.23           0.89

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):    21.24   1.384     1.50    14.15
      + ID2= 2 (  0006):     2.12   0.256     1.50    22.16
        ====================================================
        ID = 3 (  0005):    23.36   1.640     1.50    14.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    23.36   1.640     1.50    14.88
      + ID2= 2 (  0007):     0.29   0.037     1.50    22.16
        ====================================================
        ID = 1 (  0005):    23.65   1.677     1.50    14.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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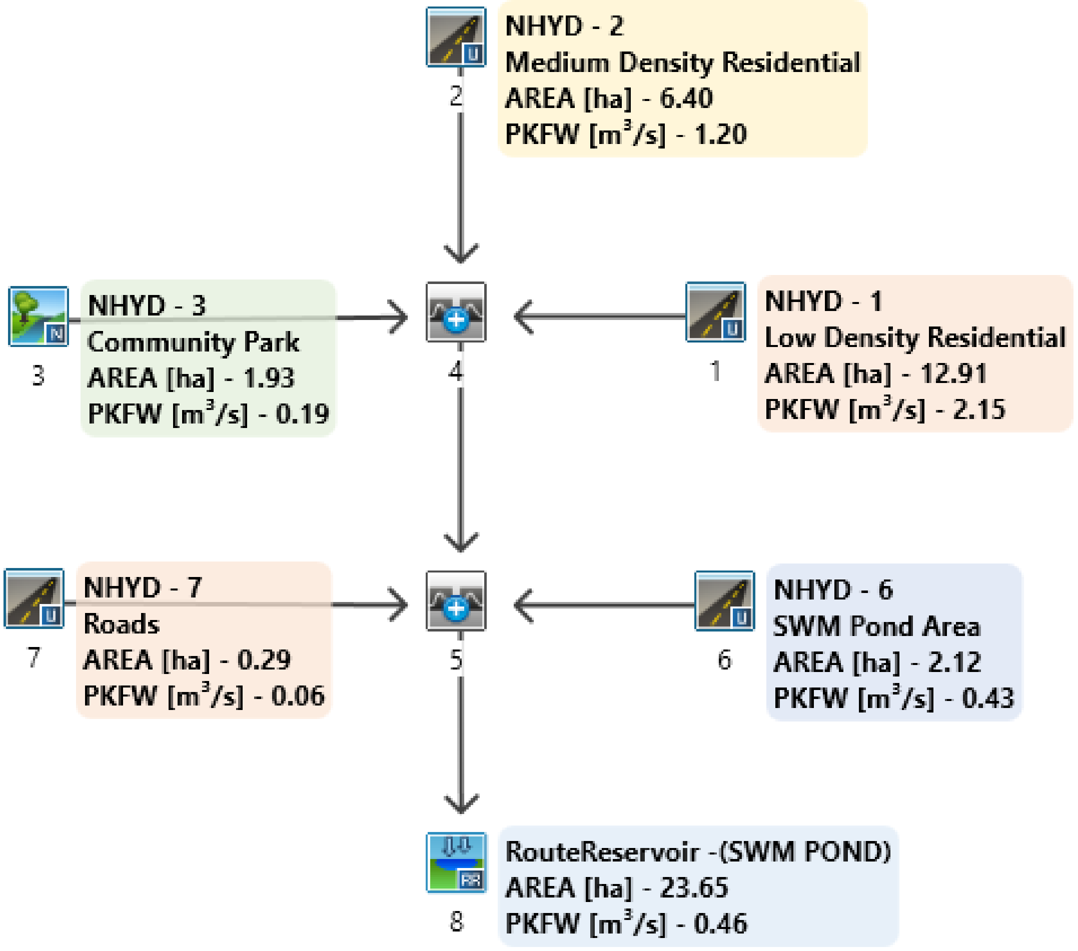

VO LAYOUT FOR 2 to 100 Year Storm Event (TRCA, AES Storm Event)

```
**************************************************
** SIMULATION:10 Year 12 Hour AES (Bloor, TRCA) **
**************************************************
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)      (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      1.531      5.17      43.84
   OUTFLOW: ID= 1 (  0008)     23.650      0.289      6.50      43.77

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 18.89
                   TIME SHIFT OF PEAK FLOW        (min)= 80.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.7500

--------------------------------------------------------------------------
-----
*************************************************
** SIMULATION:10 Year 6 Hour AES (Bloor, TRCA) **
*************************************************
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)      (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      2.540      2.67      40.17
   OUTFLOW: ID= 1 (  0008)     23.650      0.304      3.83      40.10

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.95
                   TIME SHIFT OF PEAK FLOW        (min)= 70.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.7626

--------------------------------------------------------------------------
-----
***************************************************
** SIMULATION:100 Year 12 Hour AES (Bloor, TRCA) **
***************************************************
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
```

```
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      2.381      5.17      66.98
   OUTFLOW: ID= 1 (  0008)     23.650      0.442      6.50      66.90

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 18.57
                   TIME SHIFT OF PEAK FLOW        (min)= 80.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.1158

--------------------------------------------------------------------------
-----
**************************************************
** SIMULATION:100 Year 6 Hour AES (Bloor, TRCA) **
**************************************************
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      4.025      2.67      63.13
   OUTFLOW: ID= 1 (  0008)     23.650      0.461      3.83      63.06

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.46
                   TIME SHIFT OF PEAK FLOW        (min)= 70.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.1763

--------------------------------------------------------------------------
-----
*************************************************
** SIMULATION:2 Year 12 Hour AES (Bloor, TRCA) **
*************************************************
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022
```

```
                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      0.844      5.17      26.05
   OUTFLOW: ID= 1 (  0008)     23.650      0.073      7.67      25.98

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.65
                  TIME SHIFT OF PEAK FLOW         (min)=150.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4925

--------------------------------------------------------------------------
-----
************************************************
** SIMULATION:2 Year 6 Hour AES (Bloor, TRCA) **
************************************************
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      1.329      2.67      22.71
   OUTFLOW: ID= 1 (  0008)     23.650      0.069      4.50      22.63

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.21
                  TIME SHIFT OF PEAK FLOW         (min)=110.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4671

--------------------------------------------------------------------------
-----
**************************************************
** SIMULATION:25 Year 12 Hour AES (Bloor, TRCA) **
**************************************************
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      1.893      5.17      53.11
   OUTFLOW: ID= 1 (  0008)     23.650      0.360      6.33      53.04
```

```
                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 19.05
                    TIME SHIFT OF PEAK FLOW         (min)= 70.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.8892

-----------------------------------------------------------------------------
-----
**************************************************
** SIMULATION:25 Year 6 Hour AES (Bloor, TRCA) **
**************************************************
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      3.132      2.67      49.30
   OUTFLOW: ID= 1 (  0008)     23.650      0.374      3.83      49.23

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.93
                    TIME SHIFT OF PEAK FLOW         (min)= 70.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.9215

-----------------------------------------------------------------------------
-----
**************************************************
** SIMULATION:5 Year 12 Hour AES (Bloor, TRCA) **
**************************************************
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      1.254      5.17      36.46
   OUTFLOW: ID= 1 (  0008)     23.650      0.190      6.67      36.38

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.17
                    TIME SHIFT OF PEAK FLOW         (min)= 90.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.6454

-----------------------------------------------------------------------------
-----
```

```
************************************************
** SIMULATION:5 Year 6 Hour AES (Bloor, TRCA) **
************************************************
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)      (ha.m.)   |   (cms)      (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650     2.074      2.67      33.04
   OUTFLOW: ID= 1 (  0008)     23.650     0.192      4.00      32.97

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.28
                   TIME SHIFT OF PEAK FLOW         (min)= 80.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.6479

---------------------------------------------------------------------------
-----
**************************************************
** SIMULATION:50 Year 12 Hour AES (Bloor, TRCA) **
**************************************************
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)      (ha.m.)   |   (cms)      (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650     2.138      5.17      59.98
   OUTFLOW: ID= 1 (  0008)     23.650     0.403      6.33      59.91

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 18.86
                   TIME SHIFT OF PEAK FLOW         (min)= 70.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.0002

---------------------------------------------------------------------------
-----
*************************************************
** SIMULATION:50 Year 6 Hour AES (Bloor, TRCA) **
*************************************************
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
```

```
| DT= 10.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)      (ha.m.)   |   (cms)      (ha.m.)
                           0.0000     0.0000    |   0.3940      0.9711
                           0.0750     0.5058    |   0.4500      1.1371
                           0.2310     0.6944    |   0.4830      1.2478
                           0.3140     0.7719    |   3.3200      1.5022

                                   AREA     QPEAK     TPEAK       R.V.
                                   (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)       23.650      3.588      2.67      56.23
   OUTFLOW: ID= 1 (  0008)       23.650      0.419      3.83      56.15

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.69
                   TIME SHIFT OF PEAK FLOW        (min)= 70.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.0471

---------------------------------------------------------------------------
-----
******************************************
** SIMULATION:Hurricane Hazel-Regional  **
******************************************
--------------------
| RESERVOIR(  0008)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)      (ha.m.)   |   (cms)      (ha.m.)
                           0.0000     0.0000    |   0.3940      0.9711
                           0.0750     0.5058    |   0.4500      1.1371
                           0.2310     0.6944    |   0.4830      1.2478
                           0.3140     0.7719    |   3.3200      1.5022

                                   AREA     QPEAK     TPEAK       R.V.
                                   (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)       23.650      3.287     10.00     227.34
   OUTFLOW: ID= 1 (  0008)       23.650      3.139     10.00     227.27

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 95.50
                   TIME SHIFT OF PEAK FLOW        (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.4904

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==========================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****
--------------------------------------------------------------------------
---------------------------------
  ************************************************
  ** SIMULATION : 2 Year 6 Hour AES (Bloor, TRC **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              859d813f-8991-4bf3-9eb8-
6ea15636f4fe\ac2a428b
| Ptotal= 36.00 mm |    Comments: 2 Year 6 Hour AES (Bloor, TRCA)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  1.75   12.24 |  3.50    5.04 |  5.25
0.72
                 0.25    0.72 |  2.00   12.24 |  3.75    2.88 |  5.50
0.72
                 0.50    0.72 |  2.25   33.12 |  4.00    2.88 |  5.75
0.72
                 0.75    0.72 |  2.50   33.12 |  4.25    1.44 |  6.00
0.72
                 1.00    0.72 |  2.75    9.36 |  4.50    1.44 |
                 1.25    4.32 |  3.00    9.36 |  4.75    0.72 |
                 1.50    4.32 |  3.25    5.04 |  5.00    0.72 |

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| CALIB            |
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```
| NASHYD   (  0003)|   Area    (ha)=   1.93   Curve Number   (CN)= 80.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833    8.28 | 3.500    5.04 |  5.17
0.72
                0.333    0.36 | 2.000   12.24 | 3.667    5.04 |  5.33
0.72
                0.500    0.72 | 2.167   12.24 | 3.833    3.96 |  5.50
0.72
                0.667    0.72 | 2.333   22.68 | 4.000    2.88 |  5.67
0.72
                0.833    0.72 | 2.500   33.12 | 4.167    2.88 |  5.83
0.72
                1.000    0.72 | 2.667   33.12 | 4.333    2.16 |  6.00
0.72
                1.167    0.72 | 2.833   21.24 | 4.500    1.44 |  6.17
0.72
                1.333    2.52 | 3.000    9.36 | 4.667    1.44 |  6.33
0.36
                1.500    4.32 | 3.167    9.36 | 4.833    1.08 |
                1.667    4.32 | 3.333    7.20 | 5.000    0.72 |

     Unit Hyd Qpeak  (cms)=   0.369

     PEAK FLOW       (cms)=   0.048 (i)
     TIME TO PEAK    (hrs)=   2.833
     RUNOFF VOLUME    (mm)=   9.905
     TOTAL RAINFALL   (mm)=  36.000
     RUNOFF COEFFICIENT   =   0.275

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-----
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  12.91
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.75         5.16
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     293.37        40.00
     Mannings n           =      0.013        0.250
```

```
         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.

                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833    8.28 | 3.500    5.04 |  5.17
0.72
                0.333    0.36 | 2.000   12.24 | 3.667    5.04 |  5.33
0.72
                0.500    0.72 | 2.167   12.24 | 3.833    3.96 |  5.50
0.72
                0.667    0.72 | 2.333   22.68 | 4.000    2.88 |  5.67
0.72
                0.833    0.72 | 2.500   33.12 | 4.167    2.88 |  5.83
0.72
                1.000    0.72 | 2.667   33.12 | 4.333    2.16 |  6.00
0.72
                1.167    0.72 | 2.833   21.24 | 4.500    1.44 |  6.17
0.72
                1.333    2.52 | 3.000    9.36 | 4.667    1.44 |  6.33
0.36
                1.500    4.32 | 3.167    9.36 | 4.833    1.08 |
                1.667    4.32 | 3.333    7.20 | 5.000    0.72 |

     Max.Eff.Inten.(mm/hr)=      33.12        16.49
                over (min)       10.00        30.00
     Storage Coeff.  (min)=       7.58 (ii)   22.10 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.12         0.05
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.58         0.13          0.627 (iii)
     TIME TO PEAK    (hrs)=       2.67         3.00           2.67
     RUNOFF VOLUME    (mm)=      35.00         5.55          20.28
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.97         0.15           0.56

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
-----
--------------------
| CALIB             |
| STANDHYD (  0002)|   Area    (ha)=   6.40
```

```
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.12         1.28
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     206.56        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833    8.28 | 3.500    5.04 |  5.17
0.72
                0.333    0.36 | 2.000   12.24 | 3.667    5.04 |  5.33
0.72
                0.500    0.72 | 2.167   12.24 | 3.833    3.96 |  5.50
0.72
                0.667    0.72 | 2.333   22.68 | 4.000    2.88 |  5.67
0.72
                0.833    0.72 | 2.500   33.12 | 4.167    2.88 |  5.83
0.72
                1.000    0.72 | 2.667   33.12 | 4.333    2.16 |  6.00
0.72
                1.167    0.72 | 2.833   21.24 | 4.500    1.44 |  6.17
0.72
                1.333    2.52 | 3.000    9.36 | 4.667    1.44 |  6.33
0.36
                1.500    4.32 | 3.167    9.36 | 4.833    1.08 |
                1.667    4.32 | 3.333    7.20 | 5.000    0.72 |

     Max.Eff.Inten.(mm/hr)=      33.12        16.49
               over (min)      10.00        30.00
     Storage Coeff.  (min)=       6.14 (ii)   20.66 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.14         0.05
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.44         0.03           0.448 (iii)
     TIME TO PEAK    (hrs)=       2.67         3.00            2.67
     RUNOFF VOLUME    (mm)=      35.00         5.55           27.64
     TOTAL RAINFALL   (mm)=      36.00        36.00           36.00
     RUNOFF COEFFICIENT   =       0.97         0.15            0.77

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```

```
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    12.91   0.627     2.67    20.28
      + ID2= 2 (  0002):     6.40   0.448     2.67    27.64
        ====================================================
        ID = 3 (  0004):    19.31   1.075     2.67    22.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):    19.31   1.075     2.67    22.72
      + ID2= 2 (  0003):     1.93   0.048     2.83     9.90
        ====================================================
        ID = 1 (  0004):    21.24   1.119     2.67    21.55

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   2.12
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     118.88        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833    8.28 | 3.500    5.04 |  5.17
0.72
```

```
                0.333    0.36 | 2.000   12.24 | 3.667    5.04 |  5.33
0.72
                0.500    0.72 | 2.167   12.24 | 3.833    3.96 |  5.50
0.72
                0.667    0.72 | 2.333   22.68 | 4.000    2.88 |  5.67
0.72
                0.833    0.72 | 2.500   33.12 | 4.167    2.88 |  5.83
0.72
                1.000    0.72 | 2.667   33.12 | 4.333    2.16 |  6.00
0.72
                1.167    0.72 | 2.833   21.24 | 4.500    1.44 |  6.17
0.72
                1.333    2.52 | 3.000    9.36 | 4.667    1.44 |  6.33
0.36
                1.500    4.32 | 3.167    9.36 | 4.833    1.08 |
                1.667    4.32 | 3.333    7.20 | 5.000    0.72 |

     Max.Eff.Inten.(mm/hr)=      33.12        51.18
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.41 (ii)   13.64 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       0.17         0.01           0.185 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83            2.67
     RUNOFF VOLUME    (mm)=      35.00        13.87           32.89
     TOTAL RAINFALL   (mm)=      36.00        36.00           36.00
     RUNOFF COEFFICIENT   =       0.97         0.39            0.91

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc    (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB              |
| STANDHYD (  0007)|   Area    (ha)=   0.29
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       0.28         0.01
     Dep. Storage      (mm)=       1.00         1.50
     Average Slope      (%)=       1.00         2.00
     Length             (m)=      43.97        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.
```

```
                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833    8.28 | 3.500    5.04 |  5.17
0.72
                0.333    0.36 | 2.000   12.24 | 3.667    5.04 |  5.33
0.72
                0.500    0.72 | 2.167   12.24 | 3.833    3.96 |  5.50
0.72
                0.667    0.72 | 2.333   22.68 | 4.000    2.88 |  5.67
0.72
                0.833    0.72 | 2.500   33.12 | 4.167    2.88 |  5.83
0.72
                1.000    0.72 | 2.667   33.12 | 4.333    2.16 |  6.00
0.72
                1.167    0.72 | 2.833   21.24 | 4.500    1.44 |  6.17
0.72
                1.333    2.52 | 3.000    9.36 | 4.667    1.44 |  6.33
0.36
                1.500    4.32 | 3.167    9.36 | 4.833    1.08 |
                1.667    4.32 | 3.333    7.20 | 5.000    0.72 |

     Max.Eff.Inten.(mm/hr)=      33.12        51.18
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       2.43 (ii)   11.65 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.08
                                                         *  TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00           0.025 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83            2.67
     RUNOFF VOLUME     (mm)=     35.00        13.87           32.89
     TOTAL RAINFALL    (mm)=     36.00        36.00           36.00
     RUNOFF COEFFICIENT   =       0.97         0.39            0.91

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc    (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):    21.24   1.119     2.67    21.55
```

```
      + ID2= 2 (  0006):     2.12   0.185     2.67    32.89
        ====================================================
        ID = 3 (  0005):    23.36   1.304     2.67    22.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    23.36   1.304     2.67    22.58
      + ID2= 2 (  0007):     0.29   0.025     2.67    32.89
        ====================================================
        ID = 1 (  0005):    23.65   1.329     2.67    22.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      1.329      2.67      22.71
   OUTFLOW: ID= 1 (  0008)     23.650      0.069      4.50      22.63

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.21
                   TIME SHIFT OF PEAK FLOW         (min)=110.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.4671

---------------------------------------------------------------------------
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```

```
==========================================================================
================================

      V    V   I    SSSSS  U   U    A    L            (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****
--------------------------------------------------------------------------
---------------------------------
  ************************************************
  ** SIMULATION : 2 Year 12 Hour AES (Bloor, TR **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              859d813f-8991-4bf3-9eb8-
6ea15636f4fe\fc24c798
| Ptotal= 42.00 mm |    Comments: 2 Year 12 Hour AES (Bloor, TRCA)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  3.25    7.14 |  6.50    2.94 |  9.75
0.42
                 0.25    0.42 |  3.50    7.14 |  6.75    2.94 | 10.00
0.42
                 0.50    0.42 |  3.75    7.14 |  7.00    2.94 | 10.25
0.42
                 0.75    0.42 |  4.00    7.14 |  7.25    1.68 | 10.50
0.42
                 1.00    0.42 |  4.25   19.32 |  7.50    1.68 | 10.75
0.42
                 1.25    0.42 |  4.50   19.32 |  7.75    1.68 | 11.00
0.42
                 1.50    0.42 |  4.75   19.32 |  8.00    1.68 | 11.25
0.42
                 1.75    0.42 |  5.00   19.32 |  8.25    0.84 | 11.50
0.42
```

```
                 2.00    0.42 |  5.25    5.46 |  8.50    0.84 | 11.75
0.42
                 2.25    2.52 |  5.50    5.46 |  8.75    0.84 | 12.00
0.42
                 2.50    2.52 |  5.75    5.46 |  9.00    0.84 |
                 2.75    2.52 |  6.00    5.46 |  9.25    0.42 |
                 3.00    2.52 |  6.25    2.94 |  9.50    0.42 |

---------------------------------------------------------------------------
-----

--------------------
| CALIB              |
| NASHYD   (  0003)|   Area    (ha)=   1.93   Curve Number   (CN)= 80.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN | TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |  hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    4.83 | 6.500    2.94 |  9.67
0.42
                0.333    0.21 | 3.500    7.14 | 6.667    2.94 |  9.83
0.42
                0.500    0.42 | 3.667    7.14 | 6.833    2.94 | 10.00
0.42
                0.667    0.42 | 3.833    7.14 | 7.000    2.94 | 10.17
0.42
                0.833    0.42 | 4.000    7.14 | 7.167    2.94 | 10.33
0.42
                1.000    0.42 | 4.167    7.14 | 7.333    2.31 | 10.50
0.42
                1.167    0.42 | 4.333   13.23 | 7.500    1.68 | 10.67
0.42
                1.333    0.42 | 4.500   19.32 | 7.667    1.68 | 10.83
0.42
                1.500    0.42 | 4.667   19.32 | 7.833    1.68 | 11.00
0.42
                1.667    0.42 | 4.833   19.32 | 8.000    1.68 | 11.17
0.42
                1.833    0.42 | 5.000   19.32 | 8.167    1.68 | 11.33
0.42
                2.000    0.42 | 5.167   19.32 | 8.333    1.26 | 11.50
0.42
                2.167    0.42 | 5.333   12.39 | 8.500    0.84 | 11.67
0.42
                2.333    1.47 | 5.500    5.46 | 8.667    0.84 | 11.83
0.42
```

```
                2.500    2.52 | 5.667    5.46 | 8.833    0.84 | 12.00
0.42
                2.667    2.52 | 5.833    5.46 | 9.000    0.84 | 12.17
0.42
                2.833    2.52 | 6.000    5.46 | 9.167    0.84 | 12.33
0.21
                3.000    2.52 | 6.167    5.46 | 9.333    0.63 |
                3.167    2.52 | 6.333    4.20 | 9.500    0.42 |

     Unit Hyd Qpeak  (cms)=   0.369

     PEAK FLOW       (cms)=   0.041 (i)
     TIME TO PEAK    (hrs)=   5.167
     RUNOFF VOLUME    (mm)=  13.268
     TOTAL RAINFALL   (mm)=  42.000
     RUNOFF COEFFICIENT   =   0.316

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  12.91
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.75         5.16
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     293.37        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    4.83 | 6.500    2.94 |  9.67
0.42
                0.333    0.21 | 3.500    7.14 | 6.667    2.94 |  9.83
0.42
                0.500    0.42 | 3.667    7.14 | 6.833    2.94 | 10.00
0.42
                0.667    0.42 | 3.833    7.14 | 7.000    2.94 | 10.17
0.42
                0.833    0.42 | 4.000    7.14 | 7.167    2.94 | 10.33
0.42
                1.000    0.42 | 4.167    7.14 | 7.333    2.31 | 10.50
0.42
```

```
                1.167    0.42 | 4.333   13.23 | 7.500    1.68 | 10.67
0.42
                1.333    0.42 | 4.500   19.32 | 7.667    1.68 | 10.83
0.42
                1.500    0.42 | 4.667   19.32 | 7.833    1.68 | 11.00
0.42
                1.667    0.42 | 4.833   19.32 | 8.000    1.68 | 11.17
0.42
                1.833    0.42 | 5.000   19.32 | 8.167    1.68 | 11.33
0.42
                2.000    0.42 | 5.167   19.32 | 8.333    1.26 | 11.50
0.42
                2.167    0.42 | 5.333   12.39 | 8.500    0.84 | 11.67
0.42
                2.333    1.47 | 5.500    5.46 | 8.667    0.84 | 11.83
0.42
                2.500    2.52 | 5.667    5.46 | 8.833    0.84 | 12.00
0.42
                2.667    2.52 | 5.833    5.46 | 9.000    0.84 | 12.17
0.42
                2.833    2.52 | 6.000    5.46 | 9.167    0.84 | 12.33
0.21
                3.000    2.52 | 6.167    5.46 | 9.333    0.63 |
                3.167    2.52 | 6.333    4.20 | 9.500    0.42 |

     Max.Eff.Inten.(mm/hr)=      19.32        11.69
                over (min)       10.00        30.00
     Storage Coeff.  (min)=       9.41 (ii)   26.06 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.11         0.04
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       0.35         0.09           0.406 (iii)
     TIME TO PEAK    (hrs)=       5.17         5.50            5.17
     RUNOFF VOLUME    (mm)=      41.00         4.58           22.79
     TOTAL RAINFALL   (mm)=      42.00        42.00           42.00
     RUNOFF COEFFICIENT   =       0.98         0.11            0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-----
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   6.40
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area      (ha)=       5.12         1.28
     Dep. Storage      (mm)=       1.00         1.50
     Average Slope      (%)=       1.00         2.00
     Length             (m)=     206.56        40.00
     Mannings n            =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    4.83 | 6.500    2.94 |  9.67
0.42
                0.333    0.21 | 3.500    7.14 | 6.667    2.94 |  9.83
0.42
                0.500    0.42 | 3.667    7.14 | 6.833    2.94 | 10.00
0.42
                0.667    0.42 | 3.833    7.14 | 7.000    2.94 | 10.17
0.42
                0.833    0.42 | 4.000    7.14 | 7.167    2.94 | 10.33
0.42
                1.000    0.42 | 4.167    7.14 | 7.333    2.31 | 10.50
0.42
                1.167    0.42 | 4.333   13.23 | 7.500    1.68 | 10.67
0.42
                1.333    0.42 | 4.500   19.32 | 7.667    1.68 | 10.83
0.42
                1.500    0.42 | 4.667   19.32 | 7.833    1.68 | 11.00
0.42
                1.667    0.42 | 4.833   19.32 | 8.000    1.68 | 11.17
0.42
                1.833    0.42 | 5.000   19.32 | 8.167    1.68 | 11.33
0.42
                2.000    0.42 | 5.167   19.32 | 8.333    1.26 | 11.50
0.42
                2.167    0.42 | 5.333   12.39 | 8.500    0.84 | 11.67
0.42
                2.333    1.47 | 5.500    5.46 | 8.667    0.84 | 11.83
0.42
                2.500    2.52 | 5.667    5.46 | 8.833    0.84 | 12.00
0.42
                2.667    2.52 | 5.833    5.46 | 9.000    0.84 | 12.17
0.42
                2.833    2.52 | 6.000    5.46 | 9.167    0.84 | 12.33
0.21
                3.000    2.52 | 6.167    5.46 | 9.333    0.63 |
                3.167    2.52 | 6.333    4.20 | 9.500    0.42 |

     Max.Eff.Inten.(mm/hr)=      19.32        11.69
                over (min)       10.00        30.00
     Storage Coeff.  (min)=       7.62 (ii)   24.28 (ii)
```

```
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.12         0.04
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       0.26         0.02           0.273 (iii)
     TIME TO PEAK    (hrs)=       5.17         5.50            5.17
     RUNOFF VOLUME    (mm)=      41.00         4.58           31.89
     TOTAL RAINFALL   (mm)=      42.00        42.00           42.00
     RUNOFF COEFFICIENT   =       0.98         0.11            0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    12.91   0.406     5.17    22.79
      + ID2= 2 (  0002):     6.40   0.273     5.17    31.89
        ====================================================
        ID = 3 (  0004):    19.31   0.679     5.17    25.81

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):    19.31   0.679     5.17    25.81
      + ID2= 2 (  0003):     1.93   0.041     5.17    13.27
        ====================================================
        ID = 1 (  0004):    21.24   0.719     5.17    24.67

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   2.12
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01         0.11
     Dep. Storage     (mm)=       1.00         1.50
```

```
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     118.88        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    4.83 | 6.500    2.94 |  9.67
0.42
                0.333    0.21 | 3.500    7.14 | 6.667    2.94 |  9.83
0.42
                0.500    0.42 | 3.667    7.14 | 6.833    2.94 | 10.00
0.42
                0.667    0.42 | 3.833    7.14 | 7.000    2.94 | 10.17
0.42
                0.833    0.42 | 4.000    7.14 | 7.167    2.94 | 10.33
0.42
                1.000    0.42 | 4.167    7.14 | 7.333    2.31 | 10.50
0.42
                1.167    0.42 | 4.333   13.23 | 7.500    1.68 | 10.67
0.42
                1.333    0.42 | 4.500   19.32 | 7.667    1.68 | 10.83
0.42
                1.500    0.42 | 4.667   19.32 | 7.833    1.68 | 11.00
0.42
                1.667    0.42 | 4.833   19.32 | 8.000    1.68 | 11.17
0.42
                1.833    0.42 | 5.000   19.32 | 8.167    1.68 | 11.33
0.42
                2.000    0.42 | 5.167   19.32 | 8.333    1.26 | 11.50
0.42
                2.167    0.42 | 5.333   12.39 | 8.500    0.84 | 11.67
0.42
                2.333    1.47 | 5.500    5.46 | 8.667    0.84 | 11.83
0.42
                2.500    2.52 | 5.667    5.46 | 8.833    0.84 | 12.00
0.42
                2.667    2.52 | 5.833    5.46 | 9.000    0.84 | 12.17
0.42
                2.833    2.52 | 6.000    5.46 | 9.167    0.84 | 12.33
0.21
                3.000    2.52 | 6.167    5.46 | 9.333    0.63 |
                3.167    2.52 | 6.333    4.20 | 9.500    0.42 |

     Max.Eff.Inten.(mm/hr)=      19.32        28.79
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.47 (ii)   17.08 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
```

```
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       0.10         0.01          0.110 (iii)
     TIME TO PEAK    (hrs)=       5.17         5.17           5.17
     RUNOFF VOLUME    (mm)=      41.00        13.73          38.27
     TOTAL RAINFALL   (mm)=      42.00        42.00          42.00
     RUNOFF COEFFICIENT   =       0.98         0.33           0.91

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc    (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.29
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.28         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      43.97        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    4.83 | 6.500    2.94 |  9.67
0.42
                0.333    0.21 | 3.500    7.14 | 6.667    2.94 |  9.83
0.42
                0.500    0.42 | 3.667    7.14 | 6.833    2.94 | 10.00
0.42
                0.667    0.42 | 3.833    7.14 | 7.000    2.94 | 10.17
0.42
                0.833    0.42 | 4.000    7.14 | 7.167    2.94 | 10.33
0.42
                1.000    0.42 | 4.167    7.14 | 7.333    2.31 | 10.50
0.42
                1.167    0.42 | 4.333   13.23 | 7.500    1.68 | 10.67
0.42
                1.333    0.42 | 4.500   19.32 | 7.667    1.68 | 10.83
0.42
```

```
               1.500    0.42 | 4.667   19.32 | 7.833    1.68 | 11.00
0.42
               1.667    0.42 | 4.833   19.32 | 8.000    1.68 | 11.17
0.42
               1.833    0.42 | 5.000   19.32 | 8.167    1.68 | 11.33
0.42
               2.000    0.42 | 5.167   19.32 | 8.333    1.26 | 11.50
0.42
               2.167    0.42 | 5.333   12.39 | 8.500    0.84 | 11.67
0.42
               2.333    1.47 | 5.500    5.46 | 8.667    0.84 | 11.83
0.42
               2.500    2.52 | 5.667    5.46 | 8.833    0.84 | 12.00
0.42
               2.667    2.52 | 5.833    5.46 | 9.000    0.84 | 12.17
0.42
               2.833    2.52 | 6.000    5.46 | 9.167    0.84 | 12.33
0.21
               3.000    2.52 | 6.167    5.46 | 9.333    0.63 |
               3.167    2.52 | 6.333    4.20 | 9.500    0.42 |

     Max.Eff.Inten.(mm/hr)=      19.32        28.79
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       3.01 (ii)   14.63 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.16         0.07
                                                        *  TOTALS*
     PEAK FLOW       (cms)=       0.01         0.00          0.015 (iii)
     TIME TO PEAK    (hrs)=       5.00         5.17           5.17
     RUNOFF VOLUME    (mm)=      41.00        13.73          38.27
     TOTAL RAINFALL   (mm)=      42.00        42.00          42.00
     RUNOFF COEFFICIENT   =       0.98         0.33           0.91

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):    21.24   0.719     5.17    24.67
      + ID2= 2 (  0006):     2.12   0.110     5.17    38.27
        =======================================================
        ID = 3 (  0005):    23.36   0.829     5.17    25.90
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    23.36   0.829     5.17    25.90
      + ID2= 2 (  0007):     0.29   0.015     5.17    38.27
        ===================================================
        ID = 1 (  0005):    23.65   0.844     5.17    26.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      0.844      5.17      26.05
   OUTFLOW: ID= 1 (  0008)     23.650      0.073      7.67      25.98

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.65
                   TIME SHIFT OF PEAK FLOW         (min)=150.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.4925

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```

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==========================================================================
=================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****
--------------------------------------------------------------------------
---------------------------------
  ************************************************
  ** SIMULATION : 5 Year 6 Hour AES (Bloor, TRC **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              859d813f-8991-4bf3-9eb8-
6ea15636f4fe\465a7276
| Ptotal= 47.81 mm |    Comments: 5 Year 6 Hour AES (Bloor, TRCA)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  1.75   16.25 |  3.50    6.69 |  5.25
0.96
                 0.25    0.96 |  2.00   16.25 |  3.75    3.82 |  5.50
0.96
                 0.50    0.96 |  2.25   43.98 |  4.00    3.82 |  5.75
0.96
                 0.75    0.96 |  2.50   43.98 |  4.25    1.91 |  6.00
0.96
                 1.00    0.96 |  2.75   12.43 |  4.50    1.91 |
                 1.25    5.74 |  3.00   12.43 |  4.75    0.96 |
                 1.50    5.74 |  3.25    6.69 |  5.00    0.96 |

--------------------------------------------------------------------------
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--------------------
| CALIB            |
```

```
| NASHYD   (  0003)|   Area    (ha)=   1.93   Curve Number   (CN)= 80.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
               0.167    0.00 | 1.833   10.99 | 3.500    6.69 |  5.17
0.96
               0.333    0.48 | 2.000   16.25 | 3.667    6.69 |  5.33
0.96
               0.500    0.96 | 2.167   16.25 | 3.833    5.25 |  5.50
0.96
               0.667    0.96 | 2.333   30.11 | 4.000    3.82 |  5.67
0.96
               0.833    0.96 | 2.500   43.98 | 4.167    3.82 |  5.83
0.96
               1.000    0.96 | 2.667   43.98 | 4.333    2.86 |  6.00
0.96
               1.167    0.96 | 2.833   28.20 | 4.500    1.91 |  6.17
0.96
               1.333    3.35 | 3.000   12.43 | 4.667    1.91 |  6.33
0.48
               1.500    5.74 | 3.167   12.43 | 4.833    1.43 |
               1.667    5.74 | 3.333    9.56 | 5.000    0.96 |

     Unit Hyd Qpeak  (cms)=   0.369

     PEAK FLOW       (cms)=   0.081 (i)
     TIME TO PEAK    (hrs)=   2.833
     RUNOFF VOLUME    (mm)=  16.791
     TOTAL RAINFALL   (mm)=  47.810
     RUNOFF COEFFICIENT   =   0.351

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  12.91
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.75         5.16
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     293.37        40.00
     Mannings n           =      0.013        0.250
```

```
          NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
               0.167    0.00 | 1.833   10.99 | 3.500    6.69 |  5.17
0.96
               0.333    0.48 | 2.000   16.25 | 3.667    6.69 |  5.33
0.96
               0.500    0.96 | 2.167   16.25 | 3.833    5.25 |  5.50
0.96
               0.667    0.96 | 2.333   30.11 | 4.000    3.82 |  5.67
0.96
               0.833    0.96 | 2.500   43.98 | 4.167    3.82 |  5.83
0.96
               1.000    0.96 | 2.667   43.98 | 4.333    2.86 |  6.00
0.96
               1.167    0.96 | 2.833   28.20 | 4.500    1.91 |  6.17
0.96
               1.333    3.35 | 3.000   12.43 | 4.667    1.91 |  6.33
0.48
               1.500    5.74 | 3.167   12.43 | 4.833    1.43 |
               1.667    5.74 | 3.333    9.56 | 5.000    0.96 |

     Max.Eff.Inten.(mm/hr)=      43.98        36.38
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       6.77 (ii)   17.34 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.13         0.06
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.77         0.36          1.058 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      46.81        14.26          30.53
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.98         0.30           0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-----
--------------------
| CALIB              |
| STANDHYD (  0002)|   Area    (ha)=   6.40
```

```
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.12         1.28
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     206.56        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   10.99 | 3.500    6.69 |  5.17
0.96
                0.333    0.48 | 2.000   16.25 | 3.667    6.69 |  5.33
0.96
                0.500    0.96 | 2.167   16.25 | 3.833    5.25 |  5.50
0.96
                0.667    0.96 | 2.333   30.11 | 4.000    3.82 |  5.67
0.96
                0.833    0.96 | 2.500   43.98 | 4.167    3.82 |  5.83
0.96
                1.000    0.96 | 2.667   43.98 | 4.333    2.86 |  6.00
0.96
                1.167    0.96 | 2.833   28.20 | 4.500    1.91 |  6.17
0.96
                1.333    3.35 | 3.000   12.43 | 4.667    1.91 |  6.33
0.48
                1.500    5.74 | 3.167   12.43 | 4.833    1.43 |
                1.667    5.74 | 3.333    9.56 | 5.000    0.96 |

     Max.Eff.Inten.(mm/hr)=      43.98        36.38
               over  (min)      10.00        20.00
     Storage Coeff.  (min)=       5.48 (ii)   16.06 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                       *  TOTALS*
     PEAK FLOW       (cms)=       0.58         0.09          0.655 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      46.81        14.26          38.67
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.98         0.30           0.81

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc    (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```

```
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    12.91   1.058     2.67    30.53
      + ID2= 2 (  0002):     6.40   0.655     2.67    38.67
        ===================================================
        ID = 3 (  0004):    19.31   1.713     2.67    33.23

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):    19.31   1.713     2.67    33.23
      + ID2= 2 (  0003):     1.93   0.081     2.83    16.79
        ===================================================
        ID = 1 (  0004):    21.24   1.790     2.67    31.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   2.12
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     118.88        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   10.99 | 3.500    6.69 |  5.17
0.96
```

```
                0.333    0.48 | 2.000   16.25 | 3.667    6.69 |  5.33
0.96
                0.500    0.96 | 2.167   16.25 | 3.833    5.25 |  5.50
0.96
                0.667    0.96 | 2.333   30.11 | 4.000    3.82 |  5.67
0.96
                0.833    0.96 | 2.500   43.98 | 4.167    3.82 |  5.83
0.96
                1.000    0.96 | 2.667   43.98 | 4.333    2.86 |  6.00
0.96
                1.167    0.96 | 2.833   28.20 | 4.500    1.91 |  6.17
0.96
                1.333    3.35 | 3.000   12.43 | 4.667    1.91 |  6.33
0.48
                1.500    5.74 | 3.167   12.43 | 4.833    1.43 |
                1.667    5.74 | 3.333    9.56 | 5.000    0.96 |

     Max.Eff.Inten.(mm/hr)=      43.98        74.73
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       3.94 (ii)   11.87 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.16         0.08
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       0.23         0.02          0.249 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      46.81        24.11          44.54
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.98         0.50           0.93

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc    (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.29
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       0.28         0.01
     Dep. Storage      (mm)=       1.00         1.50
     Average Slope      (%)=       1.00         2.00
     Length             (m)=      43.97        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.
```

```
                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   10.99 | 3.500    6.69 |  5.17
0.96
                0.333    0.48 | 2.000   16.25 | 3.667    6.69 |  5.33
0.96
                0.500    0.96 | 2.167   16.25 | 3.833    5.25 |  5.50
0.96
                0.667    0.96 | 2.333   30.11 | 4.000    3.82 |  5.67
0.96
                0.833    0.96 | 2.500   43.98 | 4.167    3.82 |  5.83
0.96
                1.000    0.96 | 2.667   43.98 | 4.333    2.86 |  6.00
0.96
                1.167    0.96 | 2.833   28.20 | 4.500    1.91 |  6.17
0.96
                1.333    3.35 | 3.000   12.43 | 4.667    1.91 |  6.33
0.48
                1.500    5.74 | 3.167   12.43 | 4.833    1.43 |
                1.667    5.74 | 3.333    9.56 | 5.000    0.96 |

     Max.Eff.Inten.(mm/hr)=      43.98        74.73
               over (min)       10.00        20.00
     Storage Coeff.  (min)=       2.17 (ii)   10.10 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.08
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.03         0.00           0.034 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83            2.67
     RUNOFF VOLUME    (mm)=      46.81        24.11           44.54
     TOTAL RAINFALL   (mm)=      47.81        47.81           47.81
     RUNOFF COEFFICIENT   =       0.98         0.50            0.93

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):    21.24   1.790     2.67    31.74
```

```
      + ID2= 2 (  0006):     2.12   0.249     2.67    44.54
        ====================================================
        ID = 3 (  0005):    23.36   2.039     2.67    32.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    23.36   2.039     2.67    32.90
      + ID2= 2 (  0007):     0.29   0.034     2.67    44.54
        ====================================================
        ID = 1 (  0005):    23.65   2.074     2.67    33.04

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------
-----
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      2.074      2.67      33.04
   OUTFLOW: ID= 1 (  0008)     23.650      0.192      4.00      32.97

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.28
                   TIME SHIFT OF PEAK FLOW         (min)= 80.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.6479

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==========================================================================
=================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****
--------------------------------------------------------------------------
---------------------------------
  ************************************************
  ** SIMULATION : 5 Year 12 Hour AES (Bloor, TR **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              859d813f-8991-4bf3-9eb8-
6ea15636f4fe\4d23ff77
| Ptotal= 54.38 mm |    Comments: 5 Year 12 Hour AES (Bloor, TRCA)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  3.25    9.25 |  6.50    3.81 |  9.75
0.54
                 0.25    0.54 |  3.50    9.25 |  6.75    3.81 | 10.00
0.54
                 0.50    0.54 |  3.75    9.25 |  7.00    3.81 | 10.25
0.54
                 0.75    0.54 |  4.00    9.25 |  7.25    2.18 | 10.50
0.54
                 1.00    0.54 |  4.25   25.02 |  7.50    2.18 | 10.75
0.54
                 1.25    0.54 |  4.50   25.02 |  7.75    2.18 | 11.00
0.54
                 1.50    0.54 |  4.75   25.02 |  8.00    2.18 | 11.25
0.54
                 1.75    0.54 |  5.00   25.02 |  8.25    1.09 | 11.50
0.54
```

```
                  2.00    0.54 |  5.25    7.07 |  8.50    1.09 | 11.75
0.54
                  2.25    3.26 |  5.50    7.07 |  8.75    1.09 | 12.00
0.54
                  2.50    3.26 |  5.75    7.07 |  9.00    1.09 |
                  2.75    3.26 |  6.00    7.07 |  9.25    0.54 |
                  3.00    3.26 |  6.25    3.81 |  9.50    0.54 |

----------------------------------------------------------------------------
-----

--------------------
| CALIB             |
| NASHYD   (  0003)|   Area    (ha)=   1.93   Curve Number   (CN)= 80.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.167    0.00 | 3.333    6.26 | 6.500    3.81 |  9.67
0.54
                 0.333    0.27 | 3.500    9.25 | 6.667    3.81 |  9.83
0.54
                 0.500    0.54 | 3.667    9.25 | 6.833    3.81 | 10.00
0.54
                 0.667    0.54 | 3.833    9.25 | 7.000    3.81 | 10.17
0.54
                 0.833    0.54 | 4.000    9.25 | 7.167    3.81 | 10.33
0.54
                 1.000    0.54 | 4.167    9.25 | 7.333    3.00 | 10.50
0.54
                 1.167    0.54 | 4.333   17.14 | 7.500    2.18 | 10.67
0.54
                 1.333    0.54 | 4.500   25.02 | 7.667    2.18 | 10.83
0.54
                 1.500    0.54 | 4.667   25.02 | 7.833    2.18 | 11.00
0.54
                 1.667    0.54 | 4.833   25.02 | 8.000    2.18 | 11.17
0.54
                 1.833    0.54 | 5.000   25.02 | 8.167    2.18 | 11.33
0.54
                 2.000    0.54 | 5.167   25.02 | 8.333    1.64 | 11.50
0.54
                 2.167    0.54 | 5.333   16.05 | 8.500    1.09 | 11.67
0.54
                 2.333    1.90 | 5.500    7.07 | 8.667    1.09 | 11.83
0.54
```

```
                2.500    3.26 | 5.667    7.07 | 8.833    1.09 | 12.00
0.54
                2.667    3.26 | 5.833    7.07 | 9.000    1.09 | 12.17
0.54
                2.833    3.26 | 6.000    7.07 | 9.167    1.09 | 12.33
0.27
                3.000    3.26 | 6.167    7.07 | 9.333    0.82 |
                3.167    3.26 | 6.333    5.44 | 9.500    0.54 |

     Unit Hyd Qpeak  (cms)=   0.369

     PEAK FLOW       (cms)=   0.064 (i)
     TIME TO PEAK    (hrs)=   5.167
     RUNOFF VOLUME    (mm)=  21.040
     TOTAL RAINFALL   (mm)=  54.380
     RUNOFF COEFFICIENT   =   0.387

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  12.91
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.75         5.16
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     293.37        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    6.26 | 6.500    3.81 |  9.67
0.54
                0.333    0.27 | 3.500    9.25 | 6.667    3.81 |  9.83
0.54
                0.500    0.54 | 3.667    9.25 | 6.833    3.81 | 10.00
0.54
                0.667    0.54 | 3.833    9.25 | 7.000    3.81 | 10.17
0.54
                0.833    0.54 | 4.000    9.25 | 7.167    3.81 | 10.33
0.54
                1.000    0.54 | 4.167    9.25 | 7.333    3.00 | 10.50
0.54
```

```
                1.167    0.54 | 4.333   17.14 | 7.500    2.18 | 10.67
0.54
                1.333    0.54 | 4.500   25.02 | 7.667    2.18 | 10.83
0.54
                1.500    0.54 | 4.667   25.02 | 7.833    2.18 | 11.00
0.54
                1.667    0.54 | 4.833   25.02 | 8.000    2.18 | 11.17
0.54
                1.833    0.54 | 5.000   25.02 | 8.167    2.18 | 11.33
0.54
                2.000    0.54 | 5.167   25.02 | 8.333    1.64 | 11.50
0.54
                2.167    0.54 | 5.333   16.05 | 8.500    1.09 | 11.67
0.54
                2.333    1.90 | 5.500    7.07 | 8.667    1.09 | 11.83
0.54
                2.500    3.26 | 5.667    7.07 | 8.833    1.09 | 12.00
0.54
                2.667    3.26 | 5.833    7.07 | 9.000    1.09 | 12.17
0.54
                2.833    3.26 | 6.000    7.07 | 9.167    1.09 | 12.33
0.27
                3.000    3.26 | 6.167    7.07 | 9.333    0.82 |
                3.167    3.26 | 6.333    5.44 | 9.500    0.54 |

     Max.Eff.Inten.(mm/hr)=     25.02        20.42
                over (min)      10.00        30.00
     Storage Coeff.  (min)=      8.48 (ii)   21.81 (ii)
     Unit Hyd. Tpeak (min)=     10.00        30.00
     Unit Hyd. peak  (cms)=      0.12         0.05
                                                           *  TOTALS*
     PEAK FLOW       (cms)=      0.45         0.22          0.643 (iii)
     TIME TO PEAK    (hrs)=      5.17         5.33           5.17
     RUNOFF VOLUME    (mm)=     53.38        12.35          32.86
     TOTAL RAINFALL   (mm)=     54.38        54.38          54.38
     RUNOFF COEFFICIENT   =      0.98         0.23           0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc    (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   6.40
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area      (ha)=       5.12          1.28
     Dep. Storage      (mm)=       1.00          1.50
     Average Slope      (%)=       1.00          2.00
     Length             (m)=     206.56         40.00
     Mannings n            =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                           ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
               0.167    0.00 | 3.333    6.26 | 6.500    3.81 |  9.67
0.54
               0.333    0.27 | 3.500    9.25 | 6.667    3.81 |  9.83
0.54
               0.500    0.54 | 3.667    9.25 | 6.833    3.81 | 10.00
0.54
               0.667    0.54 | 3.833    9.25 | 7.000    3.81 | 10.17
0.54
               0.833    0.54 | 4.000    9.25 | 7.167    3.81 | 10.33
0.54
               1.000    0.54 | 4.167    9.25 | 7.333    3.00 | 10.50
0.54
               1.167    0.54 | 4.333   17.14 | 7.500    2.18 | 10.67
0.54
               1.333    0.54 | 4.500   25.02 | 7.667    2.18 | 10.83
0.54
               1.500    0.54 | 4.667   25.02 | 7.833    2.18 | 11.00
0.54
               1.667    0.54 | 4.833   25.02 | 8.000    2.18 | 11.17
0.54
               1.833    0.54 | 5.000   25.02 | 8.167    2.18 | 11.33
0.54
               2.000    0.54 | 5.167   25.02 | 8.333    1.64 | 11.50
0.54
               2.167    0.54 | 5.333   16.05 | 8.500    1.09 | 11.67
0.54
               2.333    1.90 | 5.500    7.07 | 8.667    1.09 | 11.83
0.54
               2.500    3.26 | 5.667    7.07 | 8.833    1.09 | 12.00
0.54
               2.667    3.26 | 5.833    7.07 | 9.000    1.09 | 12.17
0.54
               2.833    3.26 | 6.000    7.07 | 9.167    1.09 | 12.33
0.27
               3.000    3.26 | 6.167    7.07 | 9.333    0.82 |
               3.167    3.26 | 6.333    5.44 | 9.500    0.54 |

     Max.Eff.Inten.(mm/hr)=      25.02         20.42
                over (min)       10.00         30.00
     Storage Coeff.  (min)=       6.87 (ii)    20.20 (ii)
```

```
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.13         0.05
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       0.33         0.06         0.383 (iii)
     TIME TO PEAK    (hrs)=       5.17         5.33          5.17
     RUNOFF VOLUME    (mm)=      53.38        12.35         43.12
     TOTAL RAINFALL   (mm)=      54.38        54.38         54.38
     RUNOFF COEFFICIENT   =       0.98         0.23          0.79

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    12.91   0.643     5.17    32.86
      + ID2= 2 (  0002):     6.40   0.383     5.17    43.12
        ====================================================
        ID = 3 (  0004):    19.31   1.026     5.17    36.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):    19.31   1.026     5.17    36.26
      + ID2= 2 (  0003):     1.93   0.064     5.17    21.04
        ====================================================
        ID = 1 (  0004):    21.24   1.090     5.17    34.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   2.12
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01         0.11
     Dep. Storage     (mm)=       1.00         1.50
```

```
     Average Slope      (%)=       1.00         2.00
     Length             (m)=     118.88        40.00
     Mannings n            =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
               0.167    0.00 | 3.333    6.26 | 6.500    3.81 |  9.67
0.54
               0.333    0.27 | 3.500    9.25 | 6.667    3.81 |  9.83
0.54
               0.500    0.54 | 3.667    9.25 | 6.833    3.81 | 10.00
0.54
               0.667    0.54 | 3.833    9.25 | 7.000    3.81 | 10.17
0.54
               0.833    0.54 | 4.000    9.25 | 7.167    3.81 | 10.33
0.54
               1.000    0.54 | 4.167    9.25 | 7.333    3.00 | 10.50
0.54
               1.167    0.54 | 4.333   17.14 | 7.500    2.18 | 10.67
0.54
               1.333    0.54 | 4.500   25.02 | 7.667    2.18 | 10.83
0.54
               1.500    0.54 | 4.667   25.02 | 7.833    2.18 | 11.00
0.54
               1.667    0.54 | 4.833   25.02 | 8.000    2.18 | 11.17
0.54
               1.833    0.54 | 5.000   25.02 | 8.167    2.18 | 11.33
0.54
               2.000    0.54 | 5.167   25.02 | 8.333    1.64 | 11.50
0.54
               2.167    0.54 | 5.333   16.05 | 8.500    1.09 | 11.67
0.54
               2.333    1.90 | 5.500    7.07 | 8.667    1.09 | 11.83
0.54
               2.500    3.26 | 5.667    7.07 | 8.833    1.09 | 12.00
0.54
               2.667    3.26 | 5.833    7.07 | 9.000    1.09 | 12.17
0.54
               2.833    3.26 | 6.000    7.07 | 9.167    1.09 | 12.33
0.27
               3.000    3.26 | 6.167    7.07 | 9.333    0.82 |
               3.167    3.26 | 6.333    5.44 | 9.500    0.54 |

     Max.Eff.Inten.(mm/hr)=      25.02        41.29
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.93 (ii)   14.99 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
```

```
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       0.13          0.01          0.144 (iii)
     TIME TO PEAK    (hrs)=       5.17          5.17           5.17
     RUNOFF VOLUME    (mm)=      53.38         23.03          50.34
     TOTAL RAINFALL   (mm)=      54.38         54.38          54.38
     RUNOFF COEFFICIENT   =       0.98          0.42           0.93

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.29
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.28          0.01
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      43.97         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    6.26 | 6.500    3.81 |  9.67
0.54
                0.333    0.27 | 3.500    9.25 | 6.667    3.81 |  9.83
0.54
                0.500    0.54 | 3.667    9.25 | 6.833    3.81 | 10.00
0.54
                0.667    0.54 | 3.833    9.25 | 7.000    3.81 | 10.17
0.54
                0.833    0.54 | 4.000    9.25 | 7.167    3.81 | 10.33
0.54
                1.000    0.54 | 4.167    9.25 | 7.333    3.00 | 10.50
0.54
                1.167    0.54 | 4.333   17.14 | 7.500    2.18 | 10.67
0.54
                1.333    0.54 | 4.500   25.02 | 7.667    2.18 | 10.83
0.54
```

```
               1.500    0.54 | 4.667   25.02 | 7.833    2.18 | 11.00
0.54
               1.667    0.54 | 4.833   25.02 | 8.000    2.18 | 11.17
0.54
               1.833    0.54 | 5.000   25.02 | 8.167    2.18 | 11.33
0.54
               2.000    0.54 | 5.167   25.02 | 8.333    1.64 | 11.50
0.54
               2.167    0.54 | 5.333   16.05 | 8.500    1.09 | 11.67
0.54
               2.333    1.90 | 5.500    7.07 | 8.667    1.09 | 11.83
0.54
               2.500    3.26 | 5.667    7.07 | 8.833    1.09 | 12.00
0.54
               2.667    3.26 | 5.833    7.07 | 9.000    1.09 | 12.17
0.54
               2.833    3.26 | 6.000    7.07 | 9.167    1.09 | 12.33
0.27
               3.000    3.26 | 6.167    7.07 | 9.333    0.82 |
               3.167    3.26 | 6.333    5.44 | 9.500    0.54 |

     Max.Eff.Inten.(mm/hr)=      25.02        41.29
               over (min)       10.00        20.00
     Storage Coeff.  (min)=       2.72 (ii)   12.77 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.07
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00          0.020 (iii)
     TIME TO PEAK    (hrs)=       5.00         5.17           5.17
     RUNOFF VOLUME    (mm)=      53.38        23.03          50.34
     TOTAL RAINFALL   (mm)=      54.38        54.38          54.38
     RUNOFF COEFFICIENT   =       0.98         0.42           0.93

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):    21.24   1.090     5.17    34.88
      + ID2= 2 (  0006):     2.12   0.144     5.17    50.34
        ===================================================
        ID = 3 (  0005):    23.36   1.234     5.17    36.28
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0005):    23.36   1.234     5.17    36.28
      + ID2= 2 (  0007):     0.29   0.020     5.17    50.34
        ===================================================
        ID = 1 (  0005):    23.65   1.254     5.17    36.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650     1.254      5.17      36.46
   OUTFLOW: ID= 1 (  0008)     23.650     0.190      6.67      36.38

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.17
                   TIME SHIFT OF PEAK FLOW         (min)= 90.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.6454

---------------------------------------------------------------------------
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=====================================================================================
=====================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****
-------------------------------------------------------------------------------------
-------------------------------------
  ************************************************
  ** SIMULATION : 10 Year 6 Hour AES (Bloor, TR **
  ************************************************



--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              859d813f-8991-4bf3-9eb8-
6ea15636f4fe\6881b5fd
| Ptotal= 55.69 mm |    Comments: 10 Year 6 Hour AES (Bloor, TRCA)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  1.75   18.94 |  3.50    7.80 |  5.25
1.11
                 0.25    1.11 |  2.00   18.94 |  3.75    4.46 |  5.50
1.11
                 0.50    1.11 |  2.25   51.24 |  4.00    4.46 |  5.75
1.11
                 0.75    1.11 |  2.50   51.24 |  4.25    2.23 |  6.00
1.11
                 1.00    1.11 |  2.75   14.48 |  4.50    2.23 |
                 1.25    6.68 |  3.00   14.48 |  4.75    1.11 |
                 1.50    6.68 |  3.25    7.80 |  5.00    1.11 |

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| CALIB            |
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```
| NASHYD   (  0003)|   Area    (ha)=   1.93   Curve Number   (CN)= 80.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   12.81 | 3.500    7.80 |  5.17
1.11
                0.333    0.56 | 2.000   18.94 | 3.667    7.80 |  5.33
1.11
                0.500    1.11 | 2.167   18.94 | 3.833    6.13 |  5.50
1.11
                0.667    1.11 | 2.333   35.09 | 4.000    4.46 |  5.67
1.11
                0.833    1.11 | 2.500   51.24 | 4.167    4.46 |  5.83
1.11
                1.000    1.11 | 2.667   51.24 | 4.333    3.34 |  6.00
1.11
                1.167    1.11 | 2.833   32.86 | 4.500    2.23 |  6.17
1.11
                1.333    3.89 | 3.000   14.48 | 4.667    2.23 |  6.33
0.56
                1.500    6.68 | 3.167   14.48 | 4.833    1.67 |
                1.667    6.68 | 3.333   11.14 | 5.000    1.11 |

     Unit Hyd Qpeak  (cms)=   0.369

     PEAK FLOW       (cms)=   0.106 (i)
     TIME TO PEAK    (hrs)=   2.833
     RUNOFF VOLUME    (mm)=  21.917
     TOTAL RAINFALL   (mm)=  55.690
     RUNOFF COEFFICIENT   =   0.394

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  12.91
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.75         5.16
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     293.37        40.00
     Mannings n          =      0.013        0.250
```

```
          NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                                  ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   12.81 | 3.500    7.80 |  5.17
1.11
                0.333    0.56 | 2.000   18.94 | 3.667    7.80 |  5.33
1.11
                0.500    1.11 | 2.167   18.94 | 3.833    6.13 |  5.50
1.11
                0.667    1.11 | 2.333   35.09 | 4.000    4.46 |  5.67
1.11
                0.833    1.11 | 2.500   51.24 | 4.167    4.46 |  5.83
1.11
                1.000    1.11 | 2.667   51.24 | 4.333    3.34 |  6.00
1.11
                1.167    1.11 | 2.833   32.86 | 4.500    2.23 |  6.17
1.11
                1.333    3.89 | 3.000   14.48 | 4.667    2.23 |  6.33
0.56
                1.500    6.68 | 3.167   14.48 | 4.833    1.67 |
                1.667    6.68 | 3.333   11.14 | 5.000    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        48.66
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       6.37 (ii)   15.78 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.13         0.06
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       0.90         0.49         1.319 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83          2.67
     RUNOFF VOLUME    (mm)=      54.69        20.62         37.66
     TOTAL RAINFALL   (mm)=      55.69        55.69         55.69
     RUNOFF COEFFICIENT   =       0.98         0.37          0.68

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| STANDHYD (  0002)|   Area    (ha)=   6.40
```

```
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.12         1.28
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     206.56        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   12.81 | 3.500    7.80 |  5.17
1.11
                0.333    0.56 | 2.000   18.94 | 3.667    7.80 |  5.33
1.11
                0.500    1.11 | 2.167   18.94 | 3.833    6.13 |  5.50
1.11
                0.667    1.11 | 2.333   35.09 | 4.000    4.46 |  5.67
1.11
                0.833    1.11 | 2.500   51.24 | 4.167    4.46 |  5.83
1.11
                1.000    1.11 | 2.667   51.24 | 4.333    3.34 |  6.00
1.11
                1.167    1.11 | 2.833   32.86 | 4.500    2.23 |  6.17
1.11
                1.333    3.89 | 3.000   14.48 | 4.667    2.23 |  6.33
0.56
                1.500    6.68 | 3.167   14.48 | 4.833    1.67 |
                1.667    6.68 | 3.333   11.14 | 5.000    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        48.66
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       5.16 (ii)   14.57 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.68         0.13          0.785 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      54.69        20.62          46.17
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.98         0.37           0.83

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc    (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
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           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    12.91   1.319     2.67    37.66
      + ID2= 2 (  0002):     6.40   0.785     2.67    46.17
        ==================================================
        ID = 3 (  0004):    19.31   2.105     2.67    40.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
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--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):    19.31   2.105     2.67    40.48
      + ID2= 2 (  0003):     1.93   0.106     2.83    21.92
        ==================================================
        ID = 1 (  0004):    21.24   2.207     2.67    38.79

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   2.12
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01          0.11
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     118.88         40.00
     Mannings n          =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
               0.167    0.00 | 1.833   12.81 | 3.500    7.80 |  5.17
1.11
```

```
                0.333    0.56 | 2.000   18.94 | 3.667    7.80 |  5.33
1.11
                0.500    1.11 | 2.167   18.94 | 3.833    6.13 |  5.50
1.11
                0.667    1.11 | 2.333   35.09 | 4.000    4.46 |  5.67
1.11
                0.833    1.11 | 2.500   51.24 | 4.167    4.46 |  5.83
1.11
                1.000    1.11 | 2.667   51.24 | 4.333    3.34 |  6.00
1.11
                1.167    1.11 | 2.833   32.86 | 4.500    2.23 |  6.17
1.11
                1.333    3.89 | 3.000   14.48 | 4.667    2.23 |  6.33
0.56
                1.500    6.68 | 3.167   14.48 | 4.833    1.67 |
                1.667    6.68 | 3.333   11.14 | 5.000    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        89.83
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       3.70 (ii)   11.07 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.16         0.08
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.27         0.02          0.292 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      54.69        31.32          52.35
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.98         0.56           0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
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--------------------
| CALIB              |
| STANDHYD (  0007)|   Area    (ha)=   0.29
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.28         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      43.97        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.
```

```
                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   12.81 | 3.500    7.80 |  5.17
1.11
                0.333    0.56 | 2.000   18.94 | 3.667    7.80 |  5.33
1.11
                0.500    1.11 | 2.167   18.94 | 3.833    6.13 |  5.50
1.11
                0.667    1.11 | 2.333   35.09 | 4.000    4.46 |  5.67
1.11
                0.833    1.11 | 2.500   51.24 | 4.167    4.46 |  5.83
1.11
                1.000    1.11 | 2.667   51.24 | 4.333    3.34 |  6.00
1.11
                1.167    1.11 | 2.833   32.86 | 4.500    2.23 |  6.17
1.11
                1.333    3.89 | 3.000   14.48 | 4.667    2.23 |  6.33
0.56
                1.500    6.68 | 3.167   14.48 | 4.833    1.67 |
                1.667    6.68 | 3.333   11.14 | 5.000    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        89.83
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       2.04 (ii)    9.41 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.11
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.04         0.00          0.041 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.67           2.67
     RUNOFF VOLUME     (mm)=      54.69        31.32          52.35
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.98         0.56           0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc    (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
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--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):    21.24   2.207     2.67    38.79
```

```
      + ID2= 2 (  0006):     2.12   0.292     2.67    52.35
        ===================================================
        ID = 3 (  0005):    23.36   2.499     2.67    40.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
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--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    23.36   2.499     2.67    40.02
      + ID2= 2 (  0007):     0.29   0.041     2.67    52.35
        ===================================================
        ID = 1 (  0005):    23.65   2.540     2.67    40.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      2.540      2.67      40.17
   OUTFLOW: ID= 1 (  0008)     23.650      0.304      3.83      40.10

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.95
                   TIME SHIFT OF PEAK FLOW         (min)= 70.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.7626

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==========================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****
--------------------------------------------------------------------------
---------------------------------
  ************************************************
  ** SIMULATION : 10 Year 12 Hour AES (Bloor, T **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              859d813f-8991-4bf3-9eb8-
6ea15636f4fe\eb41fbb2
| Ptotal= 62.71 mm |    Comments: 10 Year 12 Hour AES (Bloor, TRCA)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  3.25   10.66 |  6.50    4.39 |  9.75
0.63
                 0.25    0.63 |  3.50   10.66 |  6.75    4.39 | 10.00
0.63
                 0.50    0.63 |  3.75   10.66 |  7.00    4.39 | 10.25
0.63
                 0.75    0.63 |  4.00   10.66 |  7.25    2.51 | 10.50
0.63
                 1.00    0.63 |  4.25   28.84 |  7.50    2.51 | 10.75
0.63
                 1.25    0.63 |  4.50   28.84 |  7.75    2.51 | 11.00
0.63
                 1.50    0.63 |  4.75   28.84 |  8.00    2.51 | 11.25
0.63
                 1.75    0.63 |  5.00   28.84 |  8.25    1.25 | 11.50
0.63
```

```
                 2.00    0.63 |  5.25    8.15 |  8.50    1.25 | 11.75
0.63
                 2.25    3.76 |  5.50    8.15 |  8.75    1.25 | 12.00
0.63
                 2.50    3.76 |  5.75    8.15 |  9.00    1.25 |
                 2.75    3.76 |  6.00    8.15 |  9.25    0.63 |
                 3.00    3.76 |  6.25    4.39 |  9.50    0.63 |

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| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   1.93   Curve Number   (CN)= 80.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    7.21 | 6.500    4.39 |  9.67
0.63
                0.333    0.32 | 3.500   10.66 | 6.667    4.39 |  9.83
0.63
                0.500    0.63 | 3.667   10.66 | 6.833    4.39 | 10.00
0.63
                0.667    0.63 | 3.833   10.66 | 7.000    4.39 | 10.17
0.63
                0.833    0.63 | 4.000   10.66 | 7.167    4.39 | 10.33
0.63
                1.000    0.63 | 4.167   10.66 | 7.333    3.45 | 10.50
0.63
                1.167    0.63 | 4.333   19.75 | 7.500    2.51 | 10.67
0.63
                1.333    0.63 | 4.500   28.84 | 7.667    2.51 | 10.83
0.63
                1.500    0.63 | 4.667   28.84 | 7.833    2.51 | 11.00
0.63
                1.667    0.63 | 4.833   28.84 | 8.000    2.51 | 11.17
0.63
                1.833    0.63 | 5.000   28.84 | 8.167    2.51 | 11.33
0.63
                2.000    0.63 | 5.167   28.84 | 8.333    1.88 | 11.50
0.63
                2.167    0.63 | 5.333   18.50 | 8.500    1.25 | 11.67
0.63
                2.333    2.19 | 5.500    8.15 | 8.667    1.25 | 11.83
0.63
```

```
                2.500    3.76 | 5.667    8.15 | 8.833    1.25 | 12.00
0.63
                2.667    3.76 | 5.833    8.15 | 9.000    1.25 | 12.17
0.63
                2.833    3.76 | 6.000    8.15 | 9.167    1.25 | 12.33
0.31
                3.000    3.76 | 6.167    8.15 | 9.333    0.94 |
                3.167    3.76 | 6.333    6.27 | 9.500    0.63 |

     Unit Hyd Qpeak  (cms)=   0.369

     PEAK FLOW       (cms)=   0.081 (i)
     TIME TO PEAK    (hrs)=   5.167
     RUNOFF VOLUME    (mm)=  26.762
     TOTAL RAINFALL   (mm)=  62.710
     RUNOFF COEFFICIENT   =   0.427

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  12.91
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.75         5.16
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     293.37        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    7.21 | 6.500    4.39 |  9.67
0.63
                0.333    0.32 | 3.500   10.66 | 6.667    4.39 |  9.83
0.63
                0.500    0.63 | 3.667   10.66 | 6.833    4.39 | 10.00
0.63
                0.667    0.63 | 3.833   10.66 | 7.000    4.39 | 10.17
0.63
                0.833    0.63 | 4.000   10.66 | 7.167    4.39 | 10.33
0.63
                1.000    0.63 | 4.167   10.66 | 7.333    3.45 | 10.50
0.63
```

```
                1.167    0.63 | 4.333   19.75 | 7.500    2.51 | 10.67
0.63
                1.333    0.63 | 4.500   28.84 | 7.667    2.51 | 10.83
0.63
                1.500    0.63 | 4.667   28.84 | 7.833    2.51 | 11.00
0.63
                1.667    0.63 | 4.833   28.84 | 8.000    2.51 | 11.17
0.63
                1.833    0.63 | 5.000   28.84 | 8.167    2.51 | 11.33
0.63
                2.000    0.63 | 5.167   28.84 | 8.333    1.88 | 11.50
0.63
                2.167    0.63 | 5.333   18.50 | 8.500    1.25 | 11.67
0.63
                2.333    2.19 | 5.500    8.15 | 8.667    1.25 | 11.83
0.63
                2.500    3.76 | 5.667    8.15 | 8.833    1.25 | 12.00
0.63
                2.667    3.76 | 5.833    8.15 | 9.000    1.25 | 12.17
0.63
                2.833    3.76 | 6.000    8.15 | 9.167    1.25 | 12.33
0.31
                3.000    3.76 | 6.167    8.15 | 9.333    0.94 |
                3.167    3.76 | 6.333    6.27 | 9.500    0.63 |

     Max.Eff.Inten.(mm/hr)=      28.84        25.88
                over (min)       10.00        30.00
     Storage Coeff.  (min)=       8.01 (ii)   20.13 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.12         0.05
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       0.52         0.30          0.798 (iii)
     TIME TO PEAK    (hrs)=       5.17         5.33           5.17
     RUNOFF VOLUME     (mm)=     61.71        18.56          40.13
     TOTAL RAINFALL    (mm)=     62.71        62.71          62.71
     RUNOFF COEFFICIENT   =       0.98         0.30           0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc    (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   6.40
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area      (ha)=       5.12         1.28
     Dep. Storage      (mm)=       1.00         1.50
     Average Slope      (%)=       1.00         2.00
     Length             (m)=     206.56        40.00
     Mannings n            =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                           ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
               0.167    0.00 | 3.333    7.21 | 6.500    4.39 |  9.67
0.63
               0.333    0.32 | 3.500   10.66 | 6.667    4.39 |  9.83
0.63
               0.500    0.63 | 3.667   10.66 | 6.833    4.39 | 10.00
0.63
               0.667    0.63 | 3.833   10.66 | 7.000    4.39 | 10.17
0.63
               0.833    0.63 | 4.000   10.66 | 7.167    4.39 | 10.33
0.63
               1.000    0.63 | 4.167   10.66 | 7.333    3.45 | 10.50
0.63
               1.167    0.63 | 4.333   19.75 | 7.500    2.51 | 10.67
0.63
               1.333    0.63 | 4.500   28.84 | 7.667    2.51 | 10.83
0.63
               1.500    0.63 | 4.667   28.84 | 7.833    2.51 | 11.00
0.63
               1.667    0.63 | 4.833   28.84 | 8.000    2.51 | 11.17
0.63
               1.833    0.63 | 5.000   28.84 | 8.167    2.51 | 11.33
0.63
               2.000    0.63 | 5.167   28.84 | 8.333    1.88 | 11.50
0.63
               2.167    0.63 | 5.333   18.50 | 8.500    1.25 | 11.67
0.63
               2.333    2.19 | 5.500    8.15 | 8.667    1.25 | 11.83
0.63
               2.500    3.76 | 5.667    8.15 | 8.833    1.25 | 12.00
0.63
               2.667    3.76 | 5.833    8.15 | 9.000    1.25 | 12.17
0.63
               2.833    3.76 | 6.000    8.15 | 9.167    1.25 | 12.33
0.31
               3.000    3.76 | 6.167    8.15 | 9.333    0.94 |
               3.167    3.76 | 6.333    6.27 | 9.500    0.63 |

     Max.Eff.Inten.(mm/hr)=      28.84        25.88
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       6.49 (ii)   18.61 (ii)
```

```
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.13         0.06
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.38         0.08          0.462 (iii)
     TIME TO PEAK    (hrs)=       5.17         5.17           5.17
     RUNOFF VOLUME    (mm)=      61.71        18.56          50.92
     TOTAL RAINFALL   (mm)=      62.71        62.71          62.71
     RUNOFF COEFFICIENT   =       0.98         0.30           0.81

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    12.91   0.798     5.17    40.13
      + ID2= 2 (  0002):     6.40   0.462     5.17    50.92
        ====================================================
        ID = 3 (  0004):    19.31   1.260     5.17    43.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):    19.31   1.260     5.17    43.71
      + ID2= 2 (  0003):     1.93   0.081     5.17    26.76
        ====================================================
        ID = 1 (  0004):    21.24   1.342     5.17    42.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   2.12
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01         0.11
     Dep. Storage     (mm)=       1.00         1.50
```

```
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     118.88        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    7.21 | 6.500    4.39 |  9.67
0.63
                0.333    0.32 | 3.500   10.66 | 6.667    4.39 |  9.83
0.63
                0.500    0.63 | 3.667   10.66 | 6.833    4.39 | 10.00
0.63
                0.667    0.63 | 3.833   10.66 | 7.000    4.39 | 10.17
0.63
                0.833    0.63 | 4.000   10.66 | 7.167    4.39 | 10.33
0.63
                1.000    0.63 | 4.167   10.66 | 7.333    3.45 | 10.50
0.63
                1.167    0.63 | 4.333   19.75 | 7.500    2.51 | 10.67
0.63
                1.333    0.63 | 4.500   28.84 | 7.667    2.51 | 10.83
0.63
                1.500    0.63 | 4.667   28.84 | 7.833    2.51 | 11.00
0.63
                1.667    0.63 | 4.833   28.84 | 8.000    2.51 | 11.17
0.63
                1.833    0.63 | 5.000   28.84 | 8.167    2.51 | 11.33
0.63
                2.000    0.63 | 5.167   28.84 | 8.333    1.88 | 11.50
0.63
                2.167    0.63 | 5.333   18.50 | 8.500    1.25 | 11.67
0.63
                2.333    2.19 | 5.500    8.15 | 8.667    1.25 | 11.83
0.63
                2.500    3.76 | 5.667    8.15 | 8.833    1.25 | 12.00
0.63
                2.667    3.76 | 5.833    8.15 | 9.000    1.25 | 12.17
0.63
                2.833    3.76 | 6.000    8.15 | 9.167    1.25 | 12.33
0.31
                3.000    3.76 | 6.167    8.15 | 9.333    0.94 |
                3.167    3.76 | 6.333    6.27 | 9.500    0.63 |

     Max.Eff.Inten.(mm/hr)=      28.84        49.39
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.66 (ii)   14.02 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
```

```
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.15         0.01          0.167 (iii)
     TIME TO PEAK    (hrs)=       5.17         5.17           5.17
     RUNOFF VOLUME    (mm)=      61.71        30.02          58.54
     TOTAL RAINFALL   (mm)=      62.71        62.71          62.71
     RUNOFF COEFFICIENT   =       0.98         0.48           0.93

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.29
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.28         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      43.97        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    7.21 | 6.500    4.39 |  9.67
0.63
                0.333    0.32 | 3.500   10.66 | 6.667    4.39 |  9.83
0.63
                0.500    0.63 | 3.667   10.66 | 6.833    4.39 | 10.00
0.63
                0.667    0.63 | 3.833   10.66 | 7.000    4.39 | 10.17
0.63
                0.833    0.63 | 4.000   10.66 | 7.167    4.39 | 10.33
0.63
                1.000    0.63 | 4.167   10.66 | 7.333    3.45 | 10.50
0.63
                1.167    0.63 | 4.333   19.75 | 7.500    2.51 | 10.67
0.63
                1.333    0.63 | 4.500   28.84 | 7.667    2.51 | 10.83
0.63
```

```
                1.500    0.63 | 4.667   28.84 | 7.833    2.51 | 11.00
0.63
                1.667    0.63 | 4.833   28.84 | 8.000    2.51 | 11.17
0.63
                1.833    0.63 | 5.000   28.84 | 8.167    2.51 | 11.33
0.63
                2.000    0.63 | 5.167   28.84 | 8.333    1.88 | 11.50
0.63
                2.167    0.63 | 5.333   18.50 | 8.500    1.25 | 11.67
0.63
                2.333    2.19 | 5.500    8.15 | 8.667    1.25 | 11.83
0.63
                2.500    3.76 | 5.667    8.15 | 8.833    1.25 | 12.00
0.63
                2.667    3.76 | 5.833    8.15 | 9.000    1.25 | 12.17
0.63
                2.833    3.76 | 6.000    8.15 | 9.167    1.25 | 12.33
0.31
                3.000    3.76 | 6.167    8.15 | 9.333    0.94 |
                3.167    3.76 | 6.333    6.27 | 9.500    0.63 |

     Max.Eff.Inten.(mm/hr)=      28.84        49.39
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       2.57 (ii)   11.92 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.08
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00          0.023 (iii)
     TIME TO PEAK    (hrs)=       5.00         5.17           5.17
     RUNOFF VOLUME    (mm)=      61.71        30.02          58.54
     TOTAL RAINFALL   (mm)=      62.71        62.71          62.71
     RUNOFF COEFFICIENT   =       0.98         0.48           0.93

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):    21.24   1.342     5.17    42.17
      + ID2= 2 (  0006):     2.12   0.167     5.17    58.54
        ==================================================
        ID = 3 (  0005):    23.36   1.508     5.17    43.65
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
----------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0005):    23.36   1.508     5.17    43.65
      + ID2= 2 (  0007):     0.29   0.023     5.17    58.54
        =====================================================
        ID = 1 (  0005):    23.65   1.531     5.17    43.84

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
----------------------------------------------------------------------------
-----
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      1.531      5.17      43.84
   OUTFLOW: ID= 1 (  0008)     23.650      0.289      6.50      43.77

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 18.89
                   TIME SHIFT OF PEAK FLOW         (min)= 80.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.7500

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==========================================================================
=================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****
--------------------------------------------------------------------------
---------------------------------
  ************************************************
  ** SIMULATION : 25 Year 6 Hour AES (Bloor, TR **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              859d813f-8991-4bf3-9eb8-
6ea15636f4fe\c6cd8f0e
| Ptotal= 65.59 mm |    Comments: 25 Year 6 Hour AES (Bloor, TRCA)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  1.75   22.30 |  3.50    9.18 |  5.25
1.31
                 0.25    1.31 |  2.00   22.30 |  3.75    5.25 |  5.50
1.31
                 0.50    1.31 |  2.25   60.35 |  4.00    5.25 |  5.75
1.31
                 0.75    1.31 |  2.50   60.35 |  4.25    2.62 |  6.00
1.31
                 1.00    1.31 |  2.75   17.06 |  4.50    2.62 |
                 1.25    7.87 |  3.00   17.06 |  4.75    1.31 |
                 1.50    7.87 |  3.25    9.18 |  5.00    1.31 |

--------------------------------------------------------------------------
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| CALIB            |
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```
| NASHYD   (  0003)|   Area     (ha)=   1.93   Curve Number   (CN)= 80.0
|ID= 1 DT=10.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   15.08 | 3.500    9.18 |  5.17
1.31
                0.333    0.65 | 2.000   22.30 | 3.667    9.18 |  5.33
1.31
                0.500    1.31 | 2.167   22.30 | 3.833    7.21 |  5.50
1.31
                0.667    1.31 | 2.333   41.32 | 4.000    5.25 |  5.67
1.31
                0.833    1.31 | 2.500   60.35 | 4.167    5.25 |  5.83
1.31
                1.000    1.31 | 2.667   60.35 | 4.333    3.93 |  6.00
1.31
                1.167    1.31 | 2.833   38.70 | 4.500    2.62 |  6.17
1.31
                1.333    4.59 | 3.000   17.06 | 4.667    2.62 |  6.33
0.66
                1.500    7.87 | 3.167   17.06 | 4.833    1.97 |
                1.667    7.87 | 3.333   13.12 | 5.000    1.31 |

     Unit Hyd Qpeak  (cms)=   0.369

     PEAK FLOW       (cms)=   0.139 (i)
     TIME TO PEAK    (hrs)=   2.833
     RUNOFF VOLUME    (mm)=  28.816
     TOTAL RAINFALL   (mm)=  65.590
     RUNOFF COEFFICIENT   =   0.439

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area     (ha)=  12.91
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.75         5.16
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     293.37        40.00
     Mannings n           =      0.013        0.250
```

```
         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   15.08 | 3.500    9.18 |  5.17
1.31
                0.333    0.65 | 2.000   22.30 | 3.667    9.18 |  5.33
1.31
                0.500    1.31 | 2.167   22.30 | 3.833    7.21 |  5.50
1.31
                0.667    1.31 | 2.333   41.32 | 4.000    5.25 |  5.67
1.31
                0.833    1.31 | 2.500   60.35 | 4.167    5.25 |  5.83
1.31
                1.000    1.31 | 2.667   60.35 | 4.333    3.93 |  6.00
1.31
                1.167    1.31 | 2.833   38.70 | 4.500    2.62 |  6.17
1.31
                1.333    4.59 | 3.000   17.06 | 4.667    2.62 |  6.33
0.66
                1.500    7.87 | 3.167   17.06 | 4.833    1.97 |
                1.667    7.87 | 3.333   13.12 | 5.000    1.31 |

     Max.Eff.Inten.(mm/hr)=      60.35        61.43
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.96 (ii)   14.54 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.07
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       1.07         0.66          1.652 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      64.59        29.00          46.79
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.98         0.44           0.71

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
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--------------------
| CALIB             |
| STANDHYD (  0002)|   Area    (ha)=   6.40
```

```
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.12         1.28
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     206.56        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
               0.167    0.00 | 1.833   15.08 | 3.500    9.18 |  5.17
1.31
               0.333    0.65 | 2.000   22.30 | 3.667    9.18 |  5.33
1.31
               0.500    1.31 | 2.167   22.30 | 3.833    7.21 |  5.50
1.31
               0.667    1.31 | 2.333   41.32 | 4.000    5.25 |  5.67
1.31
               0.833    1.31 | 2.500   60.35 | 4.167    5.25 |  5.83
1.31
               1.000    1.31 | 2.667   60.35 | 4.333    3.93 |  6.00
1.31
               1.167    1.31 | 2.833   38.70 | 4.500    2.62 |  6.17
1.31
               1.333    4.59 | 3.000   17.06 | 4.667    2.62 |  6.33
0.66
               1.500    7.87 | 3.167   17.06 | 4.833    1.97 |
               1.667    7.87 | 3.333   13.12 | 5.000    1.31 |

     Max.Eff.Inten.(mm/hr)=      60.35        61.43
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.83 (ii)   13.41 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                        *  TOTALS*
     PEAK FLOW       (cms)=       0.80         0.17          0.950 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      64.59        29.00          55.69
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.98         0.44           0.85

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc    (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```

```
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    12.91   1.652     2.67    46.79
      + ID2= 2 (  0002):     6.40   0.950     2.67    55.69
        ==================================================
        ID = 3 (  0004):    19.31   2.602     2.67    49.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):    19.31   2.602     2.67    49.74
      + ID2= 2 (  0003):     1.93   0.139     2.83    28.82
        ==================================================
        ID = 1 (  0004):    21.24   2.738     2.67    47.84

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   2.12
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     118.88        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   15.08 | 3.500    9.18 |  5.17
1.31
```

```
                0.333    0.65 | 2.000   22.30 | 3.667    9.18 |  5.33
1.31
                0.500    1.31 | 2.167   22.30 | 3.833    7.21 |  5.50
1.31
                0.667    1.31 | 2.333   41.32 | 4.000    5.25 |  5.67
1.31
                0.833    1.31 | 2.500   60.35 | 4.167    5.25 |  5.83
1.31
                1.000    1.31 | 2.667   60.35 | 4.333    3.93 |  6.00
1.31
                1.167    1.31 | 2.833   38.70 | 4.500    2.62 |  6.17
1.31
                1.333    4.59 | 3.000   17.06 | 4.667    2.62 |  6.33
0.66
                1.500    7.87 | 3.167   17.06 | 4.833    1.97 |
                1.667    7.87 | 3.333   13.12 | 5.000    1.31 |

     Max.Eff.Inten.(mm/hr)=      60.35       108.76
               over (min)        10.00        20.00
     Storage Coeff.  (min)=       3.47 (ii)   10.29 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.16         0.08
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       0.32         0.03           0.346 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83            2.67
     RUNOFF VOLUME    (mm)=      64.59        40.39           62.17
     TOTAL RAINFALL   (mm)=      65.59        65.59           65.59
     RUNOFF COEFFICIENT   =       0.98         0.62            0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.29
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       0.28         0.01
     Dep. Storage      (mm)=       1.00         1.50
     Average Slope      (%)=       1.00         2.00
     Length             (m)=      43.97        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.
```

```
                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   15.08 | 3.500    9.18 |  5.17
1.31
                0.333    0.65 | 2.000   22.30 | 3.667    9.18 |  5.33
1.31
                0.500    1.31 | 2.167   22.30 | 3.833    7.21 |  5.50
1.31
                0.667    1.31 | 2.333   41.32 | 4.000    5.25 |  5.67
1.31
                0.833    1.31 | 2.500   60.35 | 4.167    5.25 |  5.83
1.31
                1.000    1.31 | 2.667   60.35 | 4.333    3.93 |  6.00
1.31
                1.167    1.31 | 2.833   38.70 | 4.500    2.62 |  6.17
1.31
                1.333    4.59 | 3.000   17.06 | 4.667    2.62 |  6.33
0.66
                1.500    7.87 | 3.167   17.06 | 4.833    1.97 |
                1.667    7.87 | 3.333   13.12 | 5.000    1.31 |

     Max.Eff.Inten.(mm/hr)=      60.35       108.76
               over (min)       10.00        10.00
     Storage Coeff.  (min)=       1.91 (ii)    8.73 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                         *  TOTALS*
     PEAK FLOW       (cms)=       0.04         0.00           0.048 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.67           2.67
     RUNOFF VOLUME    (mm)=      64.59        40.39          62.17
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.98         0.62           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):    21.24   2.738     2.67    47.84
```

```
      + ID2= 2 (  0006):     2.12   0.346     2.67    62.17
        ====================================================
        ID = 3 (  0005):    23.36   3.084     2.67    49.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    23.36   3.084     2.67    49.14
      + ID2= 2 (  0007):     0.29   0.048     2.67    62.17
        ====================================================
        ID = 1 (  0005):    23.65   3.132     2.67    49.30

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      3.132      2.67      49.30
   OUTFLOW: ID= 1 (  0008)     23.650      0.374      3.83      49.23

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.93
                   TIME SHIFT OF PEAK FLOW         (min)= 70.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.9215

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==========================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****
--------------------------------------------------------------------------
---------------------------------
  ************************************************
  ** SIMULATION : 25 Year 12 Hour AES (Bloor, T **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              859d813f-8991-4bf3-9eb8-
6ea15636f4fe\30a179c6
| Ptotal= 73.10 mm |    Comments: 25 Year 12 Hour AES (Bloor, TRCA)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  3.25   12.43 |  6.50    5.12 |  9.75
0.73
                 0.25    0.73 |  3.50   12.43 |  6.75    5.12 | 10.00
0.73
                 0.50    0.73 |  3.75   12.43 |  7.00    5.12 | 10.25
0.73
                 0.75    0.73 |  4.00   12.43 |  7.25    2.92 | 10.50
0.73
                 1.00    0.73 |  4.25   33.63 |  7.50    2.92 | 10.75
0.73
                 1.25    0.73 |  4.50   33.63 |  7.75    2.92 | 11.00
0.73
                 1.50    0.73 |  4.75   33.63 |  8.00    2.92 | 11.25
0.73
                 1.75    0.73 |  5.00   33.63 |  8.25    1.46 | 11.50
0.73
```

```
                  2.00    0.73 |  5.25    9.50 |  8.50    1.46 | 11.75
0.73
                  2.25    4.39 |  5.50    9.50 |  8.75    1.46 | 12.00
0.73
                  2.50    4.39 |  5.75    9.50 |  9.00    1.46 |
                  2.75    4.39 |  6.00    9.50 |  9.25    0.73 |
                  3.00    4.39 |  6.25    5.12 |  9.50    0.73 |

------------------------------------------------------------------------------
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--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   1.93   Curve Number   (CN)= 80.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.167    0.00 | 3.333    8.41 | 6.500    5.12 |  9.67
0.73
                 0.333    0.37 | 3.500   12.43 | 6.667    5.12 |  9.83
0.73
                 0.500    0.73 | 3.667   12.43 | 6.833    5.12 | 10.00
0.73
                 0.667    0.73 | 3.833   12.43 | 7.000    5.12 | 10.17
0.73
                 0.833    0.73 | 4.000   12.43 | 7.167    5.12 | 10.33
0.73
                 1.000    0.73 | 4.167   12.43 | 7.333    4.02 | 10.50
0.73
                 1.167    0.73 | 4.333   23.03 | 7.500    2.92 | 10.67
0.73
                 1.333    0.73 | 4.500   33.63 | 7.667    2.92 | 10.83
0.73
                 1.500    0.73 | 4.667   33.63 | 7.833    2.92 | 11.00
0.73
                 1.667    0.73 | 4.833   33.63 | 8.000    2.92 | 11.17
0.73
                 1.833    0.73 | 5.000   33.63 | 8.167    2.92 | 11.33
0.73
                 2.000    0.73 | 5.167   33.63 | 8.333    2.19 | 11.50
0.73
                 2.167    0.73 | 5.333   21.57 | 8.500    1.46 | 11.67
0.73
                 2.333    2.56 | 5.500    9.50 | 8.667    1.46 | 11.83
0.73
```

```
                2.500    4.39 | 5.667    9.50 | 8.833    1.46 | 12.00
0.73
                2.667    4.39 | 5.833    9.50 | 9.000    1.46 | 12.17
0.73
                2.833    4.39 | 6.000    9.50 | 9.167    1.46 | 12.33
0.36
                3.000    4.39 | 6.167    9.50 | 9.333    1.10 |
                3.167    4.39 | 6.333    7.31 | 9.500    0.73 |

     Unit Hyd Qpeak  (cms)=   0.369

     PEAK FLOW       (cms)=   0.104 (i)
     TIME TO PEAK    (hrs)=   5.167
     RUNOFF VOLUME    (mm)=  34.324
     TOTAL RAINFALL   (mm)=  73.100
     RUNOFF COEFFICIENT   =   0.470

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-----
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  12.91
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.75          5.16
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     293.37         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                                 ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    8.41 | 6.500    5.12 |  9.67
0.73
                0.333    0.37 | 3.500   12.43 | 6.667    5.12 |  9.83
0.73
                0.500    0.73 | 3.667   12.43 | 6.833    5.12 | 10.00
0.73
                0.667    0.73 | 3.833   12.43 | 7.000    5.12 | 10.17
0.73
                0.833    0.73 | 4.000   12.43 | 7.167    5.12 | 10.33
0.73
                1.000    0.73 | 4.167   12.43 | 7.333    4.02 | 10.50
0.73
```

```
               1.167    0.73 | 4.333   23.03 | 7.500    2.92 | 10.67
0.73
               1.333    0.73 | 4.500   33.63 | 7.667    2.92 | 10.83
0.73
               1.500    0.73 | 4.667   33.63 | 7.833    2.92 | 11.00
0.73
               1.667    0.73 | 4.833   33.63 | 8.000    2.92 | 11.17
0.73
               1.833    0.73 | 5.000   33.63 | 8.167    2.92 | 11.33
0.73
               2.000    0.73 | 5.167   33.63 | 8.333    2.19 | 11.50
0.73
               2.167    0.73 | 5.333   21.57 | 8.500    1.46 | 11.67
0.73
               2.333    2.56 | 5.500    9.50 | 8.667    1.46 | 11.83
0.73
               2.500    4.39 | 5.667    9.50 | 8.833    1.46 | 12.00
0.73
               2.667    4.39 | 5.833    9.50 | 9.000    1.46 | 12.17
0.73
               2.833    4.39 | 6.000    9.50 | 9.167    1.46 | 12.33
0.36
               3.000    4.39 | 6.167    9.50 | 9.333    1.10 |
               3.167    4.39 | 6.333    7.31 | 9.500    0.73 |

     Max.Eff.Inten.(mm/hr)=      33.63        32.59
              over (min)       10.00        20.00
     Storage Coeff.  (min)=       7.54 (ii)   18.59 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.12         0.06
                                                        *  TOTALS*
     PEAK FLOW       (cms)=       0.60         0.41          1.015 (iii)
     TIME TO PEAK    (hrs)=       5.17         5.17           5.17
     RUNOFF VOLUME    (mm)=      72.10        26.39          49.24
     TOTAL RAINFALL   (mm)=      73.10        73.10          73.10
     RUNOFF COEFFICIENT   =       0.99         0.36           0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB             |
| STANDHYD (  0002)|   Area    (ha)=   6.40
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area      (ha)=       5.12         1.28
     Dep. Storage      (mm)=       1.00         1.50
     Average Slope      (%)=       1.00         2.00
     Length             (m)=     206.56        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                                 ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    8.41 | 6.500    5.12 |  9.67
0.73
                0.333    0.37 | 3.500   12.43 | 6.667    5.12 |  9.83
0.73
                0.500    0.73 | 3.667   12.43 | 6.833    5.12 | 10.00
0.73
                0.667    0.73 | 3.833   12.43 | 7.000    5.12 | 10.17
0.73
                0.833    0.73 | 4.000   12.43 | 7.167    5.12 | 10.33
0.73
                1.000    0.73 | 4.167   12.43 | 7.333    4.02 | 10.50
0.73
                1.167    0.73 | 4.333   23.03 | 7.500    2.92 | 10.67
0.73
                1.333    0.73 | 4.500   33.63 | 7.667    2.92 | 10.83
0.73
                1.500    0.73 | 4.667   33.63 | 7.833    2.92 | 11.00
0.73
                1.667    0.73 | 4.833   33.63 | 8.000    2.92 | 11.17
0.73
                1.833    0.73 | 5.000   33.63 | 8.167    2.92 | 11.33
0.73
                2.000    0.73 | 5.167   33.63 | 8.333    2.19 | 11.50
0.73
                2.167    0.73 | 5.333   21.57 | 8.500    1.46 | 11.67
0.73
                2.333    2.56 | 5.500    9.50 | 8.667    1.46 | 11.83
0.73
                2.500    4.39 | 5.667    9.50 | 8.833    1.46 | 12.00
0.73
                2.667    4.39 | 5.833    9.50 | 9.000    1.46 | 12.17
0.73
                2.833    4.39 | 6.000    9.50 | 9.167    1.46 | 12.33
0.36
                3.000    4.39 | 6.167    9.50 | 9.333    1.10 |
                3.167    4.39 | 6.333    7.31 | 9.500    0.73 |

     Max.Eff.Inten.(mm/hr)=      33.63        32.59
                over  (min)      10.00        20.00
     Storage Coeff.  (min)=       6.10  (ii)   17.16  (ii)
```

```
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.45         0.10          0.552 (iii)
     TIME TO PEAK    (hrs)=       5.17         5.17           5.17
     RUNOFF VOLUME    (mm)=      72.10        26.39          60.67
     TOTAL RAINFALL   (mm)=      73.10        73.10          73.10
     RUNOFF COEFFICIENT   =       0.99         0.36           0.83

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    12.91   1.015     5.17    49.24
      + ID2= 2 (  0002):     6.40   0.552     5.17    60.67
        ====================================================
        ID = 3 (  0004):    19.31   1.567     5.17    53.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):    19.31   1.567     5.17    53.03
      + ID2= 2 (  0003):     1.93   0.104     5.17    34.32
        ====================================================
        ID = 1 (  0004):    21.24   1.671     5.17    51.33

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   2.12
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01         0.11
     Dep. Storage     (mm)=       1.00         1.50
```

```
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     118.88        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
               0.167    0.00 | 3.333    8.41 | 6.500    5.12 |  9.67
0.73
               0.333    0.37 | 3.500   12.43 | 6.667    5.12 |  9.83
0.73
               0.500    0.73 | 3.667   12.43 | 6.833    5.12 | 10.00
0.73
               0.667    0.73 | 3.833   12.43 | 7.000    5.12 | 10.17
0.73
               0.833    0.73 | 4.000   12.43 | 7.167    5.12 | 10.33
0.73
               1.000    0.73 | 4.167   12.43 | 7.333    4.02 | 10.50
0.73
               1.167    0.73 | 4.333   23.03 | 7.500    2.92 | 10.67
0.73
               1.333    0.73 | 4.500   33.63 | 7.667    2.92 | 10.83
0.73
               1.500    0.73 | 4.667   33.63 | 7.833    2.92 | 11.00
0.73
               1.667    0.73 | 4.833   33.63 | 8.000    2.92 | 11.17
0.73
               1.833    0.73 | 5.000   33.63 | 8.167    2.92 | 11.33
0.73
               2.000    0.73 | 5.167   33.63 | 8.333    2.19 | 11.50
0.73
               2.167    0.73 | 5.333   21.57 | 8.500    1.46 | 11.67
0.73
               2.333    2.56 | 5.500    9.50 | 8.667    1.46 | 11.83
0.73
               2.500    4.39 | 5.667    9.50 | 8.833    1.46 | 12.00
0.73
               2.667    4.39 | 5.833    9.50 | 9.000    1.46 | 12.17
0.73
               2.833    4.39 | 6.000    9.50 | 9.167    1.46 | 12.33
0.36
               3.000    4.39 | 6.167    9.50 | 9.333    1.10 |
               3.167    4.39 | 6.333    7.31 | 9.500    0.73 |

     Max.Eff.Inten.(mm/hr)=      33.63        59.14
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.38 (ii)   13.09 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
```

```
                                                       *  TOTALS*
     PEAK FLOW       (cms)=       0.18          0.02           0.195 (iii)
     TIME TO PEAK    (hrs)=       5.17          5.17            5.17
     RUNOFF VOLUME    (mm)=      72.10         39.03           68.79
     TOTAL RAINFALL   (mm)=      73.10         73.10           73.10
     RUNOFF COEFFICIENT   =       0.99          0.53            0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD (  0007)|   Area    (ha)=   0.29
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.28          0.01
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      43.97         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    8.41 | 6.500    5.12 |  9.67
0.73
                0.333    0.37 | 3.500   12.43 | 6.667    5.12 |  9.83
0.73
                0.500    0.73 | 3.667   12.43 | 6.833    5.12 | 10.00
0.73
                0.667    0.73 | 3.833   12.43 | 7.000    5.12 | 10.17
0.73
                0.833    0.73 | 4.000   12.43 | 7.167    5.12 | 10.33
0.73
                1.000    0.73 | 4.167   12.43 | 7.333    4.02 | 10.50
0.73
                1.167    0.73 | 4.333   23.03 | 7.500    2.92 | 10.67
0.73
                1.333    0.73 | 4.500   33.63 | 7.667    2.92 | 10.83
0.73
```

```
               1.500    0.73 | 4.667   33.63 | 7.833    2.92 | 11.00
0.73
               1.667    0.73 | 4.833   33.63 | 8.000    2.92 | 11.17
0.73
               1.833    0.73 | 5.000   33.63 | 8.167    2.92 | 11.33
0.73
               2.000    0.73 | 5.167   33.63 | 8.333    2.19 | 11.50
0.73
               2.167    0.73 | 5.333   21.57 | 8.500    1.46 | 11.67
0.73
               2.333    2.56 | 5.500    9.50 | 8.667    1.46 | 11.83
0.73
               2.500    4.39 | 5.667    9.50 | 8.833    1.46 | 12.00
0.73
               2.667    4.39 | 5.833    9.50 | 9.000    1.46 | 12.17
0.73
               2.833    4.39 | 6.000    9.50 | 9.167    1.46 | 12.33
0.36
               3.000    4.39 | 6.167    9.50 | 9.333    1.10 |
               3.167    4.39 | 6.333    7.31 | 9.500    0.73 |

     Max.Eff.Inten.(mm/hr)=      33.63        59.14
               over (min)        10.00        20.00
     Storage Coeff.  (min)=       2.41 (ii)   11.12 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.08
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00          0.027 (iii)
     TIME TO PEAK    (hrs)=       5.00         5.17           5.17
     RUNOFF VOLUME    (mm)=      72.10        39.03          68.79
     TOTAL RAINFALL   (mm)=      73.10        73.10          73.10
     RUNOFF COEFFICIENT   =       0.99         0.53           0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):    21.24   1.671     5.17    51.33
      + ID2= 2 (  0006):     2.12   0.195     5.17    68.79
        ==================================================
        ID = 3 (  0005):    23.36   1.866     5.17    52.92
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    23.36   1.866     5.17    52.92
      + ID2= 2 (  0007):     0.29   0.027     5.17    68.79
        ====================================================
        ID = 1 (  0005):    23.65   1.893     5.17    53.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      1.893      5.17      53.11
   OUTFLOW: ID= 1 (  0008)     23.650      0.360      6.33      53.04

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 19.05
                   TIME SHIFT OF PEAK FLOW         (min)= 70.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.8892

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==========================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****
--------------------------------------------------------------------------
---------------------------------
  ************************************************
  ** SIMULATION : 50 Year 6 Hour AES (Bloor, TR **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              859d813f-8991-4bf3-9eb8-
6ea15636f4fe\62f78494
| Ptotal= 73.00 mm |    Comments: 50 Year 6 Hour AES (Bloor, TRCA)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  1.75   24.82 |  3.50   10.22 |  5.25
1.46
                 0.25    1.46 |  2.00   24.82 |  3.75    5.84 |  5.50
1.46
                 0.50    1.46 |  2.25   67.16 |  4.00    5.84 |  5.75
1.46
                 0.75    1.46 |  2.50   67.16 |  4.25    2.92 |  6.00
1.46
                 1.00    1.46 |  2.75   18.98 |  4.50    2.92 |
                 1.25    8.76 |  3.00   18.98 |  4.75    1.46 |
                 1.50    8.76 |  3.25   10.22 |  5.00    1.46 |

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| CALIB            |
```

```
| NASHYD   (  0003)|   Area    (ha)=   1.93   Curve Number   (CN)= 80.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   16.79 | 3.500   10.22 |  5.17
1.46
                0.333    0.73 | 2.000   24.82 | 3.667   10.22 |  5.33
1.46
                0.500    1.46 | 2.167   24.82 | 3.833    8.03 |  5.50
1.46
                0.667    1.46 | 2.333   45.99 | 4.000    5.84 |  5.67
1.46
                0.833    1.46 | 2.500   67.16 | 4.167    5.84 |  5.83
1.46
                1.000    1.46 | 2.667   67.16 | 4.333    4.38 |  6.00
1.46
                1.167    1.46 | 2.833   43.07 | 4.500    2.92 |  6.17
1.46
                1.333    5.11 | 3.000   18.98 | 4.667    2.92 |  6.33
0.73
                1.500    8.76 | 3.167   18.98 | 4.833    2.19 |
                1.667    8.76 | 3.333   14.60 | 5.000    1.46 |

     Unit Hyd Qpeak  (cms)=   0.369

     PEAK FLOW       (cms)=   0.165 (i)
     TIME TO PEAK    (hrs)=   2.833
     RUNOFF VOLUME    (mm)=  34.250
     TOTAL RAINFALL   (mm)=  73.000
     RUNOFF COEFFICIENT   =   0.469

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  12.91
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      7.75        5.16
     Dep. Storage     (mm)=      1.00        1.50
     Average Slope     (%)=      1.00        2.00
     Length            (m)=    293.37       40.00
     Mannings n          =      0.013       0.250
```

```
         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   16.79 | 3.500   10.22 |  5.17
1.46
                0.333    0.73 | 2.000   24.82 | 3.667   10.22 |  5.33
1.46
                0.500    1.46 | 2.167   24.82 | 3.833    8.03 |  5.50
1.46
                0.667    1.46 | 2.333   45.99 | 4.000    5.84 |  5.67
1.46
                0.833    1.46 | 2.500   67.16 | 4.167    5.84 |  5.83
1.46
                1.000    1.46 | 2.667   67.16 | 4.333    4.38 |  6.00
1.46
                1.167    1.46 | 2.833   43.07 | 4.500    2.92 |  6.17
1.46
                1.333    5.11 | 3.000   18.98 | 4.667    2.92 |  6.33
0.73
                1.500    8.76 | 3.167   18.98 | 4.833    2.19 |
                1.667    8.76 | 3.333   14.60 | 5.000    1.46 |

     Max.Eff.Inten.(mm/hr)=      67.16        70.55
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.71 (ii)   13.83 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.07
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       1.19         0.79          1.907 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      72.00        35.47          53.74
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.99         0.49           0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   6.40
```

```
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.12         1.28
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     206.56        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
               0.167    0.00 | 1.833   16.79 | 3.500   10.22 |  5.17
1.46
               0.333    0.73 | 2.000   24.82 | 3.667   10.22 |  5.33
1.46
               0.500    1.46 | 2.167   24.82 | 3.833    8.03 |  5.50
1.46
               0.667    1.46 | 2.333   45.99 | 4.000    5.84 |  5.67
1.46
               0.833    1.46 | 2.500   67.16 | 4.167    5.84 |  5.83
1.46
               1.000    1.46 | 2.667   67.16 | 4.333    4.38 |  6.00
1.46
               1.167    1.46 | 2.833   43.07 | 4.500    2.92 |  6.17
1.46
               1.333    5.11 | 3.000   18.98 | 4.667    2.92 |  6.33
0.73
               1.500    8.76 | 3.167   18.98 | 4.833    2.19 |
               1.667    8.76 | 3.333   14.60 | 5.000    1.46 |

     Max.Eff.Inten.(mm/hr)=      67.16        70.55
               over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.63 (ii)   12.74 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                         *  TOTALS*
     PEAK FLOW       (cms)=       0.89         0.20          1.075 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      72.00        35.47          62.87
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.99         0.49           0.86

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```

```
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
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--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    12.91   1.907     2.67    53.74
      + ID2= 2 (  0002):     6.40   1.075     2.67    62.87
        ==================================================
        ID = 3 (  0004):    19.31   2.982     2.67    56.76

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
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--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):    19.31   2.982     2.67    56.76
      + ID2= 2 (  0003):     1.93   0.165     2.83    34.25
        ==================================================
        ID = 1 (  0004):    21.24   3.145     2.67    54.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   2.12
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       2.01         0.11
     Dep. Storage      (mm)=       1.00         1.50
     Average Slope      (%)=       1.00         2.00
     Length             (m)=     118.88        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   16.79 | 3.500   10.22 |  5.17
1.46
```

```
                0.333    0.73 | 2.000   24.82 | 3.667   10.22 |  5.33
1.46
                0.500    1.46 | 2.167   24.82 | 3.833    8.03 |  5.50
1.46
                0.667    1.46 | 2.333   45.99 | 4.000    5.84 |  5.67
1.46
                0.833    1.46 | 2.500   67.16 | 4.167    5.84 |  5.83
1.46
                1.000    1.46 | 2.667   67.16 | 4.333    4.38 |  6.00
1.46
                1.167    1.46 | 2.833   43.07 | 4.500    2.92 |  6.17
1.46
                1.333    5.11 | 3.000   18.98 | 4.667    2.92 |  6.33
0.73
                1.500    8.76 | 3.167   18.98 | 4.833    2.19 |
                1.667    8.76 | 3.333   14.60 | 5.000    1.46 |

     Max.Eff.Inten.(mm/hr)=      67.16       122.68
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       3.32 (ii)    9.83 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.11
                                                        *  TOTALS*
     PEAK FLOW       (cms)=       0.36         0.03          0.389 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.67           2.67
     RUNOFF VOLUME    (mm)=      72.00        47.31          69.53
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.99         0.65           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
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--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.29
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.28         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      43.97        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.
```

```
                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
               0.167    0.00 | 1.833   16.79 | 3.500   10.22 |  5.17
1.46
               0.333    0.73 | 2.000   24.82 | 3.667   10.22 |  5.33
1.46
               0.500    1.46 | 2.167   24.82 | 3.833    8.03 |  5.50
1.46
               0.667    1.46 | 2.333   45.99 | 4.000    5.84 |  5.67
1.46
               0.833    1.46 | 2.500   67.16 | 4.167    5.84 |  5.83
1.46
               1.000    1.46 | 2.667   67.16 | 4.333    4.38 |  6.00
1.46
               1.167    1.46 | 2.833   43.07 | 4.500    2.92 |  6.17
1.46
               1.333    5.11 | 3.000   18.98 | 4.667    2.92 |  6.33
0.73
               1.500    8.76 | 3.167   18.98 | 4.833    2.19 |
               1.667    8.76 | 3.333   14.60 | 5.000    1.46 |

     Max.Eff.Inten.(mm/hr)=      67.16       122.68
               over (min)        10.00        10.00
     Storage Coeff.  (min)=       1.83 (ii)    8.33 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       0.05         0.00           0.053 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.67            2.67
     RUNOFF VOLUME    (mm)=      72.00        47.31           69.53
     TOTAL RAINFALL   (mm)=      73.00        73.00           73.00
     RUNOFF COEFFICIENT   =       0.99         0.65            0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):    21.24   3.145     2.67    54.72
```

```
      + ID2= 2 (  0006):     2.12   0.389     2.67    69.53
        ====================================================
        ID = 3 (  0005):    23.36   3.534     2.67    56.06

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    23.36   3.534     2.67    56.06
      + ID2= 2 (  0007):     0.29   0.053     2.67    69.53
        ====================================================
        ID = 1 (  0005):    23.65   3.588     2.67    56.23

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      3.588      2.67      56.23
   OUTFLOW: ID= 1 (  0008)     23.650      0.419      3.83      56.15

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.69
                   TIME SHIFT OF PEAK FLOW         (min)= 70.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.0471

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==========================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****
--------------------------------------------------------------------------
---------------------------------
  ************************************************
  ** SIMULATION : 50 Year 12 Hour AES (Bloor, T **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              859d813f-8991-4bf3-9eb8-
6ea15636f4fe\0eb7d3e5
| Ptotal= 80.82 mm |    Comments: 50 Year 12 Hour AES (Bloor, TRCA)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  3.25   13.74 |  6.50    5.66 |  9.75
0.81
                 0.25    0.81 |  3.50   13.74 |  6.75    5.66 | 10.00
0.81
                 0.50    0.81 |  3.75   13.74 |  7.00    5.66 | 10.25
0.81
                 0.75    0.81 |  4.00   13.74 |  7.25    3.23 | 10.50
0.81
                 1.00    0.81 |  4.25   37.17 |  7.50    3.23 | 10.75
0.81
                 1.25    0.81 |  4.50   37.17 |  7.75    3.23 | 11.00
0.81
                 1.50    0.81 |  4.75   37.17 |  8.00    3.23 | 11.25
0.81
                 1.75    0.81 |  5.00   37.17 |  8.25    1.62 | 11.50
0.81
```

```
                 2.00    0.81 |  5.25   10.50 |  8.50    1.62 | 11.75
0.81
                 2.25    4.85 |  5.50   10.50 |  8.75    1.62 | 12.00
0.81
                 2.50    4.85 |  5.75   10.50 |  9.00    1.62 |
                 2.75    4.85 |  6.00   10.50 |  9.25    0.81 |
                 3.00    4.85 |  6.25    5.66 |  9.50    0.81 |

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--------------------
| CALIB             |
| NASHYD   (  0003)|   Area     (ha)=   1.93   Curve Number   (CN)= 80.0
|ID= 1 DT=10.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    9.30 | 6.500    5.66 |  9.67
0.81
                0.333    0.41 | 3.500   13.74 | 6.667    5.66 |  9.83
0.81
                0.500    0.81 | 3.667   13.74 | 6.833    5.66 | 10.00
0.81
                0.667    0.81 | 3.833   13.74 | 7.000    5.66 | 10.17
0.81
                0.833    0.81 | 4.000   13.74 | 7.167    5.66 | 10.33
0.81
                1.000    0.81 | 4.167   13.74 | 7.333    4.45 | 10.50
0.81
                1.167    0.81 | 4.333   25.46 | 7.500    3.23 | 10.67
0.81
                1.333    0.81 | 4.500   37.17 | 7.667    3.23 | 10.83
0.81
                1.500    0.81 | 4.667   37.17 | 7.833    3.23 | 11.00
0.81
                1.667    0.81 | 4.833   37.17 | 8.000    3.23 | 11.17
0.81
                1.833    0.81 | 5.000   37.17 | 8.167    3.23 | 11.33
0.81
                2.000    0.81 | 5.167   37.17 | 8.333    2.43 | 11.50
0.81
                2.167    0.81 | 5.333   23.84 | 8.500    1.62 | 11.67
0.81
                2.333    2.83 | 5.500   10.50 | 8.667    1.62 | 11.83
0.81
```

```
                2.500    4.85 | 5.667   10.50 | 8.833    1.62 | 12.00
0.81
                2.667    4.85 | 5.833   10.50 | 9.000    1.62 | 12.17
0.81
                2.833    4.85 | 6.000   10.50 | 9.167    1.62 | 12.33
0.40
                3.000    4.85 | 6.167   10.50 | 9.333    1.22 |
                3.167    4.85 | 6.333    8.08 | 9.500    0.81 |

     Unit Hyd Qpeak  (cms)=   0.369

     PEAK FLOW       (cms)=   0.121 (i)
     TIME TO PEAK    (hrs)=   5.167
     RUNOFF VOLUME    (mm)=  40.190
     TOTAL RAINFALL   (mm)=  80.820
     RUNOFF COEFFICIENT   =   0.497

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-----
--------------------
| CALIB             |
| STANDHYD (  0001)|   Area    (ha)=  12.91
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.75         5.16
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     293.37        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                                   ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    9.30 | 6.500    5.66 |  9.67
0.81
                0.333    0.41 | 3.500   13.74 | 6.667    5.66 |  9.83
0.81
                0.500    0.81 | 3.667   13.74 | 6.833    5.66 | 10.00
0.81
                0.667    0.81 | 3.833   13.74 | 7.000    5.66 | 10.17
0.81
                0.833    0.81 | 4.000   13.74 | 7.167    5.66 | 10.33
0.81
                1.000    0.81 | 4.167   13.74 | 7.333    4.45 | 10.50
0.81
```

```
                1.167    0.81 | 4.333   25.46 | 7.500    3.23 | 10.67
0.81
                1.333    0.81 | 4.500   37.17 | 7.667    3.23 | 10.83
0.81
                1.500    0.81 | 4.667   37.17 | 7.833    3.23 | 11.00
0.81
                1.667    0.81 | 4.833   37.17 | 8.000    3.23 | 11.17
0.81
                1.833    0.81 | 5.000   37.17 | 8.167    3.23 | 11.33
0.81
                2.000    0.81 | 5.167   37.17 | 8.333    2.43 | 11.50
0.81
                2.167    0.81 | 5.333   23.84 | 8.500    1.62 | 11.67
0.81
                2.333    2.83 | 5.500   10.50 | 8.667    1.62 | 11.83
0.81
                2.500    4.85 | 5.667   10.50 | 8.833    1.62 | 12.00
0.81
                2.667    4.85 | 5.833   10.50 | 9.000    1.62 | 12.17
0.81
                2.833    4.85 | 6.000   10.50 | 9.167    1.62 | 12.33
0.40
                3.000    4.85 | 6.167   10.50 | 9.333    1.22 |
                3.167    4.85 | 6.333    8.08 | 9.500    0.81 |

     Max.Eff.Inten.(mm/hr)=      37.17        37.47
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       7.24 (ii)   17.69 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.13         0.06
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       0.67         0.49          1.153 (iii)
     TIME TO PEAK    (hrs)=       5.17         5.17           5.17
     RUNOFF VOLUME    (mm)=      79.82        32.09          55.95
     TOTAL RAINFALL   (mm)=      80.82        80.82          80.82
     RUNOFF COEFFICIENT   =       0.99         0.40           0.69

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   6.40
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area     (ha)=       5.12          1.28
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     206.56         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
               0.167    0.00 | 3.333    9.30 | 6.500    5.66 |  9.67
0.81
               0.333    0.41 | 3.500   13.74 | 6.667    5.66 |  9.83
0.81
               0.500    0.81 | 3.667   13.74 | 6.833    5.66 | 10.00
0.81
               0.667    0.81 | 3.833   13.74 | 7.000    5.66 | 10.17
0.81
               0.833    0.81 | 4.000   13.74 | 7.167    5.66 | 10.33
0.81
               1.000    0.81 | 4.167   13.74 | 7.333    4.45 | 10.50
0.81
               1.167    0.81 | 4.333   25.46 | 7.500    3.23 | 10.67
0.81
               1.333    0.81 | 4.500   37.17 | 7.667    3.23 | 10.83
0.81
               1.500    0.81 | 4.667   37.17 | 7.833    3.23 | 11.00
0.81
               1.667    0.81 | 4.833   37.17 | 8.000    3.23 | 11.17
0.81
               1.833    0.81 | 5.000   37.17 | 8.167    3.23 | 11.33
0.81
               2.000    0.81 | 5.167   37.17 | 8.333    2.43 | 11.50
0.81
               2.167    0.81 | 5.333   23.84 | 8.500    1.62 | 11.67
0.81
               2.333    2.83 | 5.500   10.50 | 8.667    1.62 | 11.83
0.81
               2.500    4.85 | 5.667   10.50 | 8.833    1.62 | 12.00
0.81
               2.667    4.85 | 5.833   10.50 | 9.000    1.62 | 12.17
0.81
               2.833    4.85 | 6.000   10.50 | 9.167    1.62 | 12.33
0.40
               3.000    4.85 | 6.167   10.50 | 9.333    1.22 |
               3.167    4.85 | 6.333    8.08 | 9.500    0.81 |

     Max.Eff.Inten.(mm/hr)=      37.17         37.47
                over (min)       10.00         20.00
     Storage Coeff.  (min)=       5.87 (ii)    16.32 (ii)
```

```
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.50         0.12          0.618 (iii)
     TIME TO PEAK    (hrs)=       5.17         5.17           5.17
     RUNOFF VOLUME    (mm)=      79.82        32.09          67.89
     TOTAL RAINFALL   (mm)=      80.82        80.82          80.82
     RUNOFF COEFFICIENT   =       0.99         0.40           0.84

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc    (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    12.91   1.153     5.17    55.95
      + ID2= 2 (  0002):     6.40   0.618     5.17    67.89
        =====================================================
        ID = 3 (  0004):    19.31   1.771     5.17    59.91

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):    19.31   1.771     5.17    59.91
      + ID2= 2 (  0003):     1.93   0.121     5.17    40.19
        =====================================================
        ID = 1 (  0004):    21.24   1.893     5.17    58.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   2.12
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01         0.11
     Dep. Storage     (mm)=       1.00         1.50
```

```
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     118.88        40.00
     Mannings n          =       0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    9.30 | 6.500    5.66 |  9.67
0.81
                0.333    0.41 | 3.500   13.74 | 6.667    5.66 |  9.83
0.81
                0.500    0.81 | 3.667   13.74 | 6.833    5.66 | 10.00
0.81
                0.667    0.81 | 3.833   13.74 | 7.000    5.66 | 10.17
0.81
                0.833    0.81 | 4.000   13.74 | 7.167    5.66 | 10.33
0.81
                1.000    0.81 | 4.167   13.74 | 7.333    4.45 | 10.50
0.81
                1.167    0.81 | 4.333   25.46 | 7.500    3.23 | 10.67
0.81
                1.333    0.81 | 4.500   37.17 | 7.667    3.23 | 10.83
0.81
                1.500    0.81 | 4.667   37.17 | 7.833    3.23 | 11.00
0.81
                1.667    0.81 | 4.833   37.17 | 8.000    3.23 | 11.17
0.81
                1.833    0.81 | 5.000   37.17 | 8.167    3.23 | 11.33
0.81
                2.000    0.81 | 5.167   37.17 | 8.333    2.43 | 11.50
0.81
                2.167    0.81 | 5.333   23.84 | 8.500    1.62 | 11.67
0.81
                2.333    2.83 | 5.500   10.50 | 8.667    1.62 | 11.83
0.81
                2.500    4.85 | 5.667   10.50 | 8.833    1.62 | 12.00
0.81
                2.667    4.85 | 5.833   10.50 | 9.000    1.62 | 12.17
0.81
                2.833    4.85 | 6.000   10.50 | 9.167    1.62 | 12.33
0.40
                3.000    4.85 | 6.167   10.50 | 9.333    1.22 |
                3.167    4.85 | 6.333    8.08 | 9.500    0.81 |

     Max.Eff.Inten.(mm/hr)=      37.17        66.28
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.21 (ii)   12.53 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
```

```
                                                         *  TOTALS*
     PEAK FLOW       (cms)=       0.20          0.02          0.216 (iii)
     TIME TO PEAK    (hrs)=       5.17          5.17           5.17
     RUNOFF VOLUME    (mm)=      79.82         45.86          76.42
     TOTAL RAINFALL   (mm)=      80.82         80.82          80.82
     RUNOFF COEFFICIENT   =       0.99          0.57           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-----
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.29
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.28          0.01
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      43.97         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333    9.30 | 6.500    5.66 |  9.67
0.81
                0.333    0.41 | 3.500   13.74 | 6.667    5.66 |  9.83
0.81
                0.500    0.81 | 3.667   13.74 | 6.833    5.66 | 10.00
0.81
                0.667    0.81 | 3.833   13.74 | 7.000    5.66 | 10.17
0.81
                0.833    0.81 | 4.000   13.74 | 7.167    5.66 | 10.33
0.81
                1.000    0.81 | 4.167   13.74 | 7.333    4.45 | 10.50
0.81
                1.167    0.81 | 4.333   25.46 | 7.500    3.23 | 10.67
0.81
                1.333    0.81 | 4.500   37.17 | 7.667    3.23 | 10.83
0.81
```

```
                1.500    0.81 | 4.667   37.17 | 7.833    3.23 | 11.00
0.81
                1.667    0.81 | 4.833   37.17 | 8.000    3.23 | 11.17
0.81
                1.833    0.81 | 5.000   37.17 | 8.167    3.23 | 11.33
0.81
                2.000    0.81 | 5.167   37.17 | 8.333    2.43 | 11.50
0.81
                2.167    0.81 | 5.333   23.84 | 8.500    1.62 | 11.67
0.81
                2.333    2.83 | 5.500   10.50 | 8.667    1.62 | 11.83
0.81
                2.500    4.85 | 5.667   10.50 | 8.833    1.62 | 12.00
0.81
                2.667    4.85 | 5.833   10.50 | 9.000    1.62 | 12.17
0.81
                2.833    4.85 | 6.000   10.50 | 9.167    1.62 | 12.33
0.40
                3.000    4.85 | 6.167   10.50 | 9.333    1.22 |
                3.167    4.85 | 6.333    8.08 | 9.500    0.81 |

     Max.Eff.Inten.(mm/hr)=      37.17        66.28
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       2.32 (ii)   10.64 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.08
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       0.03         0.00          0.030 (iii)
     TIME TO PEAK    (hrs)=       5.00         5.17           5.17
     RUNOFF VOLUME    (mm)=      79.82        45.86          76.42
     TOTAL RAINFALL   (mm)=      80.82        80.82          80.82
     RUNOFF COEFFICIENT   =       0.99         0.57           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):    21.24   1.893     5.17    58.12
      + ID2= 2 (  0006):     2.12   0.216     5.17    76.42
        ==================================================
        ID = 3 (  0005):    23.36   2.109     5.17    59.78
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-----

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    23.36   2.109     5.17    59.78
      + ID2= 2 (  0007):     0.29   0.030     5.17    76.42
        ==================================================
        ID = 1 (  0005):    23.65   2.138     5.17    59.98

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      2.138      5.17      59.98
   OUTFLOW: ID= 1 (  0008)     23.650      0.403      6.33      59.91

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 18.86
                   TIME SHIFT OF PEAK FLOW         (min)= 70.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.0002

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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****
-------------------------------------------------------------------------------------
-------------------------------------
  ************************************************
  ** SIMULATION : 100 Year 6 Hour AES (Bloor, T **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              859d813f-8991-4bf3-9eb8-
6ea15636f4fe\9a0f1096
| Ptotal= 80.31 mm |    Comments: 100 Year 6 Hour AES (Bloor, TRCA)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  1.75   27.30 |  3.50   11.24 |  5.25
1.61
                 0.25    1.61 |  2.00   27.30 |  3.75    6.42 |  5.50
1.61
                 0.50    1.61 |  2.25   73.88 |  4.00    6.42 |  5.75
1.61
                 0.75    1.61 |  2.50   73.88 |  4.25    3.21 |  6.00
1.61
                 1.00    1.61 |  2.75   20.88 |  4.50    3.21 |
                 1.25    9.64 |  3.00   20.88 |  4.75    1.61 |
                 1.50    9.64 |  3.25   11.24 |  5.00    1.61 |

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| CALIB            |
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| NASHYD   (  0003)|   Area     (ha)=   1.93   Curve Number   (CN)= 80.0
|ID= 1 DT=10.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
               0.167    0.00 | 1.833   18.47 | 3.500   11.24 |  5.17
1.61
               0.333    0.81 | 2.000   27.30 | 3.667   11.24 |  5.33
1.61
               0.500    1.61 | 2.167   27.30 | 3.833    8.83 |  5.50
1.61
               0.667    1.61 | 2.333   50.59 | 4.000    6.42 |  5.67
1.61
               0.833    1.61 | 2.500   73.88 | 4.167    6.42 |  5.83
1.61
               1.000    1.61 | 2.667   73.88 | 4.333    4.81 |  6.00
1.61
               1.167    1.61 | 2.833   47.38 | 4.500    3.21 |  6.17
1.61
               1.333    5.62 | 3.000   20.88 | 4.667    3.21 |  6.33
0.81
               1.500    9.64 | 3.167   20.88 | 4.833    2.41 |
               1.667    9.64 | 3.333   16.06 | 5.000    1.61 |

     Unit Hyd Qpeak  (cms)=   0.369

     PEAK FLOW       (cms)=   0.191 (i)
     TIME TO PEAK    (hrs)=   2.833
     RUNOFF VOLUME    (mm)=  39.797
     TOTAL RAINFALL   (mm)=  80.310
     RUNOFF COEFFICIENT   =   0.496

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area     (ha)=  12.91
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      7.75         5.16
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    293.37        40.00
     Mannings n          =      0.013        0.250
```

```
          NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
               0.167    0.00 | 1.833   18.47 | 3.500   11.24 |  5.17
1.61
               0.333    0.81 | 2.000   27.30 | 3.667   11.24 |  5.33
1.61
               0.500    1.61 | 2.167   27.30 | 3.833    8.83 |  5.50
1.61
               0.667    1.61 | 2.333   50.59 | 4.000    6.42 |  5.67
1.61
               0.833    1.61 | 2.500   73.88 | 4.167    6.42 |  5.83
1.61
               1.000    1.61 | 2.667   73.88 | 4.333    4.81 |  6.00
1.61
               1.167    1.61 | 2.833   47.38 | 4.500    3.21 |  6.17
1.61
               1.333    5.62 | 3.000   20.88 | 4.667    3.21 |  6.33
0.81
               1.500    9.64 | 3.167   20.88 | 4.833    2.41 |
               1.667    9.64 | 3.333   16.06 | 5.000    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88        79.29
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.50 (ii)   13.24 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.07
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       1.31         0.90          2.151 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      79.31        42.03          60.67
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.99         0.52           0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   6.40
```

```
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.12         1.28
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     206.56        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   18.47 | 3.500   11.24 |  5.17
1.61
                0.333    0.81 | 2.000   27.30 | 3.667   11.24 |  5.33
1.61
                0.500    1.61 | 2.167   27.30 | 3.833    8.83 |  5.50
1.61
                0.667    1.61 | 2.333   50.59 | 4.000    6.42 |  5.67
1.61
                0.833    1.61 | 2.500   73.88 | 4.167    6.42 |  5.83
1.61
                1.000    1.61 | 2.667   73.88 | 4.333    4.81 |  6.00
1.61
                1.167    1.61 | 2.833   47.38 | 4.500    3.21 |  6.17
1.61
                1.333    5.62 | 3.000   20.88 | 4.667    3.21 |  6.33
0.81
                1.500    9.64 | 3.167   20.88 | 4.833    2.41 |
                1.667    9.64 | 3.333   16.06 | 5.000    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88        79.29
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.46 (ii)   12.20 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.98         0.23          1.196 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      79.31        42.03          69.99
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.99         0.52           0.87

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc    (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
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```
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    12.91   2.151     2.67    60.67
      + ID2= 2 (  0002):     6.40   1.196     2.67    69.99
        =================================================
        ID = 3 (  0004):    19.31   3.347     2.67    63.76

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):    19.31   3.347     2.67    63.76
      + ID2= 2 (  0003):     1.93   0.191     2.83    39.80
        =================================================
        ID = 1 (  0004):    21.24   3.538     2.67    61.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   2.12
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01          0.11
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     118.88         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   18.47 | 3.500   11.24 |  5.17
1.61
```

```
                0.333    0.81 | 2.000   27.30 | 3.667   11.24 |  5.33
1.61
                0.500    1.61 | 2.167   27.30 | 3.833    8.83 |  5.50
1.61
                0.667    1.61 | 2.333   50.59 | 4.000    6.42 |  5.67
1.61
                0.833    1.61 | 2.500   73.88 | 4.167    6.42 |  5.83
1.61
                1.000    1.61 | 2.667   73.88 | 4.333    4.81 |  6.00
1.61
                1.167    1.61 | 2.833   47.38 | 4.500    3.21 |  6.17
1.61
                1.333    5.62 | 3.000   20.88 | 4.667    3.21 |  6.33
0.81
                1.500    9.64 | 3.167   20.88 | 4.833    2.41 |
                1.667    9.64 | 3.333   16.06 | 5.000    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88       136.37
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       3.20 (ii)    9.43 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.11
                                                        *  TOTALS*
     PEAK FLOW       (cms)=       0.39         0.04          0.429 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.67           2.67
     RUNOFF VOLUME    (mm)=      79.31        54.16          76.79
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.99         0.67           0.96

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.29
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.28         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      43.97        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.
```

```
                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 1.833   18.47 | 3.500   11.24 |  5.17
1.61
                0.333    0.81 | 2.000   27.30 | 3.667   11.24 |  5.33
1.61
                0.500    1.61 | 2.167   27.30 | 3.833    8.83 |  5.50
1.61
                0.667    1.61 | 2.333   50.59 | 4.000    6.42 |  5.67
1.61
                0.833    1.61 | 2.500   73.88 | 4.167    6.42 |  5.83
1.61
                1.000    1.61 | 2.667   73.88 | 4.333    4.81 |  6.00
1.61
                1.167    1.61 | 2.833   47.38 | 4.500    3.21 |  6.17
1.61
                1.333    5.62 | 3.000   20.88 | 4.667    3.21 |  6.33
0.81
                1.500    9.64 | 3.167   20.88 | 4.833    2.41 |
                1.667    9.64 | 3.333   16.06 | 5.000    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88       136.37
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       1.76 (ii)    8.00 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.05         0.01          0.059 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.67           2.67
     RUNOFF VOLUME     (mm)=      79.31        54.16          76.79
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.99         0.67           0.96

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
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--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):    21.24   3.538     2.67    61.58
```

```
      + ID2= 2 (  0006):     2.12   0.429     2.67    76.79
        ===================================================
        ID = 3 (  0005):    23.36   3.967     2.67    62.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    23.36   3.967     2.67    62.96
      + ID2= 2 (  0007):     0.29   0.059     2.67    76.79
        ===================================================
        ID = 1 (  0005):    23.65   4.025     2.67    63.13

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      4.025      2.67      63.13
   OUTFLOW: ID= 1 (  0008)     23.650      0.461      3.83      63.06

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.46
                  TIME SHIFT OF PEAK FLOW         (min)= 70.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.1763

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=====================================================================================
==============================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****
-------------------------------------------------------------------------------------
------------------------------
  ************************************************
  ** SIMULATION : 100 Year 12 Hour AES (Bloor,  **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              859d813f-8991-4bf3-9eb8-
6ea15636f4fe\3314361b
| Ptotal= 88.54 mm |    Comments: 100 Year 12 Hour AES (Bloor, TRCA)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  3.25   15.05 |  6.50    6.20 |  9.75
0.89
                 0.25    0.89 |  3.50   15.05 |  6.75    6.20 | 10.00
0.89
                 0.50    0.89 |  3.75   15.05 |  7.00    6.20 | 10.25
0.89
                 0.75    0.89 |  4.00   15.05 |  7.25    3.54 | 10.50
0.89
                 1.00    0.89 |  4.25   40.71 |  7.50    3.54 | 10.75
0.89
                 1.25    0.89 |  4.50   40.71 |  7.75    3.54 | 11.00
0.89
                 1.50    0.89 |  4.75   40.71 |  8.00    3.54 | 11.25
0.89
                 1.75    0.89 |  5.00   40.71 |  8.25    1.77 | 11.50
0.89
```

```
                 2.00    0.89 |  5.25   11.51 |  8.50    1.77 | 11.75
0.89
                 2.25    5.31 |  5.50   11.51 |  8.75    1.77 | 12.00
0.89
                 2.50    5.31 |  5.75   11.51 |  9.00    1.77 |
                 2.75    5.31 |  6.00   11.51 |  9.25    0.89 |
                 3.00    5.31 |  6.25    6.20 |  9.50    0.89 |

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--------------------
| CALIB             |
| NASHYD   (  0003)|   Area     (ha)=   1.93   Curve Number   (CN)= 80.0
|ID= 1 DT=10.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333   10.18 | 6.500    6.20 |  9.67
0.89
                0.333    0.45 | 3.500   15.05 | 6.667    6.20 |  9.83
0.89
                0.500    0.89 | 3.667   15.05 | 6.833    6.20 | 10.00
0.89
                0.667    0.89 | 3.833   15.05 | 7.000    6.20 | 10.17
0.89
                0.833    0.89 | 4.000   15.05 | 7.167    6.20 | 10.33
0.89
                1.000    0.89 | 4.167   15.05 | 7.333    4.87 | 10.50
0.89
                1.167    0.89 | 4.333   27.88 | 7.500    3.54 | 10.67
0.89
                1.333    0.89 | 4.500   40.71 | 7.667    3.54 | 10.83
0.89
                1.500    0.89 | 4.667   40.71 | 7.833    3.54 | 11.00
0.89
                1.667    0.89 | 4.833   40.71 | 8.000    3.54 | 11.17
0.89
                1.833    0.89 | 5.000   40.71 | 8.167    3.54 | 11.33
0.89
                2.000    0.89 | 5.167   40.71 | 8.333    2.66 | 11.50
0.89
                2.167    0.89 | 5.333   26.11 | 8.500    1.77 | 11.67
0.89
                2.333    3.10 | 5.500   11.51 | 8.667    1.77 | 11.83
0.89
```

```
                2.500    5.31 | 5.667   11.51 | 8.833    1.77 | 12.00
0.89
                2.667    5.31 | 5.833   11.51 | 9.000    1.77 | 12.17
0.89
                2.833    5.31 | 6.000   11.51 | 9.167    1.77 | 12.33
0.44
                3.000    5.31 | 6.167   11.51 | 9.333    1.33 |
                3.167    5.31 | 6.333    8.86 | 9.500    0.89 |

     Unit Hyd Qpeak  (cms)=   0.369

     PEAK FLOW       (cms)=   0.139 (i)
     TIME TO PEAK    (hrs)=   5.167
     RUNOFF VOLUME    (mm)=  46.229
     TOTAL RAINFALL   (mm)=  88.540
     RUNOFF COEFFICIENT   =   0.522

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  12.91
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.75         5.16
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     293.37        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333   10.18 | 6.500    6.20 |  9.67
0.89
                0.333    0.45 | 3.500   15.05 | 6.667    6.20 |  9.83
0.89
                0.500    0.89 | 3.667   15.05 | 6.833    6.20 | 10.00
0.89
                0.667    0.89 | 3.833   15.05 | 7.000    6.20 | 10.17
0.89
                0.833    0.89 | 4.000   15.05 | 7.167    6.20 | 10.33
0.89
                1.000    0.89 | 4.167   15.05 | 7.333    4.87 | 10.50
0.89
```

```
                1.167    0.89 | 4.333   27.88 | 7.500    3.54 | 10.67
0.89
                1.333    0.89 | 4.500   40.71 | 7.667    3.54 | 10.83
0.89
                1.500    0.89 | 4.667   40.71 | 7.833    3.54 | 11.00
0.89
                1.667    0.89 | 4.833   40.71 | 8.000    3.54 | 11.17
0.89
                1.833    0.89 | 5.000   40.71 | 8.167    3.54 | 11.33
0.89
                2.000    0.89 | 5.167   40.71 | 8.333    2.66 | 11.50
0.89
                2.167    0.89 | 5.333   26.11 | 8.500    1.77 | 11.67
0.89
                2.333    3.10 | 5.500   11.51 | 8.667    1.77 | 11.83
0.89
                2.500    5.31 | 5.667   11.51 | 8.833    1.77 | 12.00
0.89
                2.667    5.31 | 5.833   11.51 | 9.000    1.77 | 12.17
0.89
                2.833    5.31 | 6.000   11.51 | 9.167    1.77 | 12.33
0.44
                3.000    5.31 | 6.167   11.51 | 9.333    1.33 |
                3.167    5.31 | 6.333    8.86 | 9.500    0.89 |

     Max.Eff.Inten.(mm/hr)=      40.71        42.38
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       6.98 (ii)   16.93 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.13         0.06
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       0.73         0.56          1.290 (iii)
     TIME TO PEAK    (hrs)=       5.17         5.17           5.17
     RUNOFF VOLUME    (mm)=      87.54        38.10          62.82
     TOTAL RAINFALL   (mm)=      88.54        88.54          88.54
     RUNOFF COEFFICIENT   =       0.99         0.43           0.71

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   6.40
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area      (ha)=       5.12         1.28
     Dep. Storage      (mm)=       1.00         1.50
     Average Slope      (%)=       1.00         2.00
     Length             (m)=     206.56        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
               0.167    0.00 | 3.333   10.18 | 6.500    6.20 |  9.67
0.89
               0.333    0.45 | 3.500   15.05 | 6.667    6.20 |  9.83
0.89
               0.500    0.89 | 3.667   15.05 | 6.833    6.20 | 10.00
0.89
               0.667    0.89 | 3.833   15.05 | 7.000    6.20 | 10.17
0.89
               0.833    0.89 | 4.000   15.05 | 7.167    6.20 | 10.33
0.89
               1.000    0.89 | 4.167   15.05 | 7.333    4.87 | 10.50
0.89
               1.167    0.89 | 4.333   27.88 | 7.500    3.54 | 10.67
0.89
               1.333    0.89 | 4.500   40.71 | 7.667    3.54 | 10.83
0.89
               1.500    0.89 | 4.667   40.71 | 7.833    3.54 | 11.00
0.89
               1.667    0.89 | 4.833   40.71 | 8.000    3.54 | 11.17
0.89
               1.833    0.89 | 5.000   40.71 | 8.167    3.54 | 11.33
0.89
               2.000    0.89 | 5.167   40.71 | 8.333    2.66 | 11.50
0.89
               2.167    0.89 | 5.333   26.11 | 8.500    1.77 | 11.67
0.89
               2.333    3.10 | 5.500   11.51 | 8.667    1.77 | 11.83
0.89
               2.500    5.31 | 5.667   11.51 | 8.833    1.77 | 12.00
0.89
               2.667    5.31 | 5.833   11.51 | 9.000    1.77 | 12.17
0.89
               2.833    5.31 | 6.000   11.51 | 9.167    1.77 | 12.33
0.44
               3.000    5.31 | 6.167   11.51 | 9.333    1.33 |
               3.167    5.31 | 6.333    8.86 | 9.500    0.89 |

     Max.Eff.Inten.(mm/hr)=      40.71        42.38
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.66 (ii)   15.61 (ii)
```

```
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.07
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       0.54         0.14          0.684 (iii)
     TIME TO PEAK    (hrs)=       5.17         5.17           5.17
     RUNOFF VOLUME    (mm)=      87.54        38.10          75.18
     TOTAL RAINFALL   (mm)=      88.54        88.54          88.54
     RUNOFF COEFFICIENT   =       0.99         0.43           0.85

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    12.91   1.290     5.17    62.82
      + ID2= 2 (  0002):     6.40   0.684     5.17    75.18
        ====================================================
        ID = 3 (  0004):    19.31   1.973     5.17    66.92

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):    19.31   1.973     5.17    66.92
      + ID2= 2 (  0003):     1.93   0.139     5.17    46.23
        ====================================================
        ID = 1 (  0004):    21.24   2.112     5.17    65.04

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   2.12
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01         0.11
     Dep. Storage     (mm)=       1.00         1.50
```

```
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     118.88        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
               0.167    0.00 | 3.333   10.18 | 6.500    6.20 |  9.67
0.89
               0.333    0.45 | 3.500   15.05 | 6.667    6.20 |  9.83
0.89
               0.500    0.89 | 3.667   15.05 | 6.833    6.20 | 10.00
0.89
               0.667    0.89 | 3.833   15.05 | 7.000    6.20 | 10.17
0.89
               0.833    0.89 | 4.000   15.05 | 7.167    6.20 | 10.33
0.89
               1.000    0.89 | 4.167   15.05 | 7.333    4.87 | 10.50
0.89
               1.167    0.89 | 4.333   27.88 | 7.500    3.54 | 10.67
0.89
               1.333    0.89 | 4.500   40.71 | 7.667    3.54 | 10.83
0.89
               1.500    0.89 | 4.667   40.71 | 7.833    3.54 | 11.00
0.89
               1.667    0.89 | 4.833   40.71 | 8.000    3.54 | 11.17
0.89
               1.833    0.89 | 5.000   40.71 | 8.167    3.54 | 11.33
0.89
               2.000    0.89 | 5.167   40.71 | 8.333    2.66 | 11.50
0.89
               2.167    0.89 | 5.333   26.11 | 8.500    1.77 | 11.67
0.89
               2.333    3.10 | 5.500   11.51 | 8.667    1.77 | 11.83
0.89
               2.500    5.31 | 5.667   11.51 | 8.833    1.77 | 12.00
0.89
               2.667    5.31 | 5.833   11.51 | 9.000    1.77 | 12.17
0.89
               2.833    5.31 | 6.000   11.51 | 9.167    1.77 | 12.33
0.44
               3.000    5.31 | 6.167   11.51 | 9.333    1.33 |
               3.167    5.31 | 6.333    8.86 | 9.500    0.89 |

     Max.Eff.Inten.(mm/hr)=      40.71        73.43
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.06 (ii)   12.05 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.16         0.07
```

```
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.22          0.02          0.237 (iii)
     TIME TO PEAK    (hrs)=       5.17          5.17           5.17
     RUNOFF VOLUME    (mm)=      87.54         52.69          84.05
     TOTAL RAINFALL   (mm)=      88.54         88.54          88.54
     RUNOFF COEFFICIENT   =       0.99          0.60           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.29
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.28          0.01
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      43.97         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                                   ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    0.00 | 3.333   10.18 | 6.500    6.20 |  9.67
0.89
                0.333    0.45 | 3.500   15.05 | 6.667    6.20 |  9.83
0.89
                0.500    0.89 | 3.667   15.05 | 6.833    6.20 | 10.00
0.89
                0.667    0.89 | 3.833   15.05 | 7.000    6.20 | 10.17
0.89
                0.833    0.89 | 4.000   15.05 | 7.167    6.20 | 10.33
0.89
                1.000    0.89 | 4.167   15.05 | 7.333    4.87 | 10.50
0.89
                1.167    0.89 | 4.333   27.88 | 7.500    3.54 | 10.67
0.89
                1.333    0.89 | 4.500   40.71 | 7.667    3.54 | 10.83
0.89
```

```
                1.500    0.89 | 4.667   40.71 | 7.833    3.54 | 11.00
0.89
                1.667    0.89 | 4.833   40.71 | 8.000    3.54 | 11.17
0.89
                1.833    0.89 | 5.000   40.71 | 8.167    3.54 | 11.33
0.89
                2.000    0.89 | 5.167   40.71 | 8.333    2.66 | 11.50
0.89
                2.167    0.89 | 5.333   26.11 | 8.500    1.77 | 11.67
0.89
                2.333    3.10 | 5.500   11.51 | 8.667    1.77 | 11.83
0.89
                2.500    5.31 | 5.667   11.51 | 8.833    1.77 | 12.00
0.89
                2.667    5.31 | 5.833   11.51 | 9.000    1.77 | 12.17
0.89
                2.833    5.31 | 6.000   11.51 | 9.167    1.77 | 12.33
0.44
                3.000    5.31 | 6.167   11.51 | 9.333    1.33 |
                3.167    5.31 | 6.333    8.86 | 9.500    0.89 |

     Max.Eff.Inten.(mm/hr)=      40.71        73.43
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       2.24 (ii)   10.22 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.08
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.03         0.00          0.032 (iii)
     TIME TO PEAK    (hrs)=       5.00         5.17           5.17
     RUNOFF VOLUME    (mm)=      87.54        52.69          84.05
     TOTAL RAINFALL   (mm)=      88.54        88.54          88.54
     RUNOFF COEFFICIENT   =       0.99         0.60           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):    21.24   2.112     5.17    65.04
      + ID2= 2 (  0006):     2.12   0.237     5.17    84.05
        ====================================================
        ID = 3 (  0005):    23.36   2.349     5.17    66.76
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    23.36   2.349     5.17    66.76
      + ID2= 2 (  0007):     0.29   0.032     5.17    84.05
        ====================================================
        ID = 1 (  0005):    23.65   2.381     5.17    66.98

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                             AREA     QPEAK     TPEAK       R.V.
                             (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      2.381      5.17       66.98
   OUTFLOW: ID= 1 (  0008)     23.650      0.442      6.50       66.90

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 18.57
                  TIME SHIFT OF PEAK FLOW        (min)= 80.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.1158

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=====================================================================================
=====================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****
-------------------------------------------------------------------------------------
-------------------------------------
  ************************************************
  ** SIMULATION : Hurricane Hazel-Regional      **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              859d813f-8991-4bf3-9eb8-
6ea15636f4fe\ebffa7f8
| Ptotal=285.00 mm |    Comments: Hurricane Hazel-Regional
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    6.00 | 12.00    2.00 | 24.00    2.00 | 36.00
2.00
                 1.00    4.00 | 13.00    2.00 | 25.00    2.00 | 37.00
2.00
                 2.00    6.00 | 14.00    2.00 | 26.00    2.00 | 38.00
2.00
                 3.00   13.00 | 15.00    2.00 | 27.00    2.00 | 39.00
2.00
                 4.00   17.00 | 16.00    2.00 | 28.00    2.00 | 40.00
2.00
                 5.00   13.00 | 17.00    2.00 | 29.00    2.00 | 41.00
2.00
                 6.00   23.00 | 18.00    2.00 | 30.00    2.00 | 42.00
2.00
                 7.00   13.00 | 19.00    2.00 | 31.00    2.00 | 43.00
2.00
```

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                8.00   13.00 | 20.00    2.00 | 32.00    2.00 | 44.00
2.00
                9.00   53.00 | 21.00    2.00 | 33.00    2.00 | 45.00
2.00
               10.00   38.00 | 22.00    2.00 | 34.00    2.00 | 46.00
2.00
               11.00   13.00 | 23.00    2.00 | 35.00    2.00 | 47.00
3.00

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--------------------
| CALIB              |
| NASHYD   (  0003)|   Area     (ha)=   1.93   Curve Number   (CN)= 80.0
|ID= 1 DT=10.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
               0.167    6.00 |12.167    2.00 |24.167    2.00 | 36.17
2.00
               0.333    6.00 |12.333    2.00 |24.333    2.00 | 36.33
2.00
               0.500    6.00 |12.500    2.00 |24.500    2.00 | 36.50
2.00
               0.667    6.00 |12.667    2.00 |24.667    2.00 | 36.67
2.00
               0.833    6.00 |12.833    2.00 |24.833    2.00 | 36.83
2.00
               1.000    6.00 |13.000    2.00 |25.000    2.00 | 37.00
2.00
               1.167    4.00 |13.167    2.00 |25.167    2.00 | 37.17
2.00
               1.333    4.00 |13.333    2.00 |25.333    2.00 | 37.33
2.00
               1.500    4.00 |13.500    2.00 |25.500    2.00 | 37.50
2.00
               1.667    4.00 |13.667    2.00 |25.667    2.00 | 37.67
2.00
               1.833    4.00 |13.833    2.00 |25.833    2.00 | 37.83
2.00
               2.000    4.00 |14.000    2.00 |26.000    2.00 | 38.00
2.00
               2.167    6.00 |14.167    2.00 |26.167    2.00 | 38.17
2.00
               2.333    6.00 |14.333    2.00 |26.333    2.00 | 38.33
2.00
```

```
                2.500    6.00 |14.500    2.00 |26.500    2.00 | 38.50
2.00
                2.667    6.00 |14.667    2.00 |26.667    2.00 | 38.67
2.00
                2.833    6.00 |14.833    2.00 |26.833    2.00 | 38.83
2.00
                3.000    6.00 |15.000    2.00 |27.000    2.00 | 39.00
2.00
                3.167   13.00 |15.167    2.00 |27.167    2.00 | 39.17
2.00
                3.333   13.00 |15.333    2.00 |27.333    2.00 | 39.33
2.00
                3.500   13.00 |15.500    2.00 |27.500    2.00 | 39.50
2.00
                3.667   13.00 |15.667    2.00 |27.667    2.00 | 39.67
2.00
                3.833   13.00 |15.833    2.00 |27.833    2.00 | 39.83
2.00
                4.000   13.00 |16.000    2.00 |28.000    2.00 | 40.00
2.00
                4.167   17.00 |16.167    2.00 |28.167    2.00 | 40.17
2.00
                4.333   17.00 |16.333    2.00 |28.333    2.00 | 40.33
2.00
                4.500   17.00 |16.500    2.00 |28.500    2.00 | 40.50
2.00
                4.667   17.00 |16.667    2.00 |28.667    2.00 | 40.67
2.00
                4.833   17.00 |16.833    2.00 |28.833    2.00 | 40.83
2.00
                5.000   17.00 |17.000    2.00 |29.000    2.00 | 41.00
2.00
                5.167   13.00 |17.167    2.00 |29.167    2.00 | 41.17
2.00
                5.333   13.00 |17.333    2.00 |29.333    2.00 | 41.33
2.00
                5.500   13.00 |17.500    2.00 |29.500    2.00 | 41.50
2.00
                5.667   13.00 |17.667    2.00 |29.667    2.00 | 41.67
2.00
                5.833   13.00 |17.833    2.00 |29.833    2.00 | 41.83
2.00
                6.000   13.00 |18.000    2.00 |30.000    2.00 | 42.00
2.00
                6.167   23.00 |18.167    2.00 |30.167    2.00 | 42.17
2.00
                6.333   23.00 |18.333    2.00 |30.333    2.00 | 42.33
2.00
                6.500   23.00 |18.500    2.00 |30.500    2.00 | 42.50
2.00
                6.667   23.00 |18.667    2.00 |30.667    2.00 | 42.67
2.00
                6.833   23.00 |18.833    2.00 |30.833    2.00 | 42.83
2.00
```

```
                  7.000   23.00 |19.000    2.00 |31.000    2.00 | 43.00
2.00
                  7.167   13.00 |19.167    2.00 |31.167    2.00 | 43.17
2.00
                  7.333   13.00 |19.333    2.00 |31.333    2.00 | 43.33
2.00
                  7.500   13.00 |19.500    2.00 |31.500    2.00 | 43.50
2.00
                  7.667   13.00 |19.667    2.00 |31.667    2.00 | 43.67
2.00
                  7.833   13.00 |19.833    2.00 |31.833    2.00 | 43.83
2.00
                  8.000   13.00 |20.000    2.00 |32.000    2.00 | 44.00
2.00
                  8.167   13.00 |20.167    2.00 |32.167    2.00 | 44.17
2.00
                  8.333   13.00 |20.333    2.00 |32.333    2.00 | 44.33
2.00
                  8.500   13.00 |20.500    2.00 |32.500    2.00 | 44.50
2.00
                  8.667   13.00 |20.667    2.00 |32.667    2.00 | 44.67
2.00
                  8.833   13.00 |20.833    2.00 |32.833    2.00 | 44.83
2.00
                  9.000   13.00 |21.000    2.00 |33.000    2.00 | 45.00
2.00
                  9.167   53.00 |21.167    2.00 |33.167    2.00 | 45.17
2.00
                  9.333   53.00 |21.333    2.00 |33.333    2.00 | 45.33
2.00
                  9.500   53.00 |21.500    2.00 |33.500    2.00 | 45.50
2.00
                  9.667   53.00 |21.667    2.00 |33.667    2.00 | 45.67
2.00
                  9.833   53.00 |21.833    2.00 |33.833    2.00 | 45.83
2.00
                 10.000   53.00 |22.000    2.00 |34.000    2.00 | 46.00
2.00
                 10.167   38.00 |22.167    2.00 |34.167    2.00 | 46.17
2.00
                 10.333   38.00 |22.333    2.00 |34.333    2.00 | 46.33
2.00
                 10.500   38.00 |22.500    2.00 |34.500    2.00 | 46.50
2.00
                 10.667   38.00 |22.667    2.00 |34.667    2.00 | 46.67
2.00
                 10.833   38.00 |22.833    2.00 |34.833    2.00 | 46.83
2.00
                 11.000   38.00 |23.000    2.00 |35.000    2.00 | 47.00
2.00
                 11.167   13.00 |23.167    2.00 |35.167    2.00 | 47.17
3.00
                 11.333   13.00 |23.333    2.00 |35.333    2.00 | 47.33
3.00
```

```
               11.500   13.00 |23.500    2.00 |35.500    2.00 | 47.50
3.00
               11.667   13.00 |23.667    2.00 |35.667    2.00 | 47.67
3.00
               11.833   13.00 |23.833    2.00 |35.833    2.00 | 47.83
3.00
               12.000   13.00 |24.000    2.00 |36.000    2.00 | 48.00
3.00

     Unit Hyd Qpeak  (cms)=   0.369

     PEAK FLOW       (cms)=   0.250 (i)
     TIME TO PEAK    (hrs)=  10.000
     RUNOFF VOLUME    (mm)= 222.308
     TOTAL RAINFALL   (mm)= 285.000
     RUNOFF COEFFICIENT   =   0.780

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  12.91
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.75         5.16
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     293.37        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    6.00 |12.167    2.00 |24.167    2.00 | 36.17
2.00
                0.333    6.00 |12.333    2.00 |24.333    2.00 | 36.33
2.00
                0.500    6.00 |12.500    2.00 |24.500    2.00 | 36.50
2.00
                0.667    6.00 |12.667    2.00 |24.667    2.00 | 36.67
2.00
                0.833    6.00 |12.833    2.00 |24.833    2.00 | 36.83
2.00
                1.000    6.00 |13.000    2.00 |25.000    2.00 | 37.00
2.00
```

```
                           1.167    4.00 |13.167    2.00 |25.167    2.00 | 37.17
           2.00
                           1.333    4.00 |13.333    2.00 |25.333    2.00 | 37.33
           2.00
                           1.500    4.00 |13.500    2.00 |25.500    2.00 | 37.50
           2.00
                           1.667    4.00 |13.667    2.00 |25.667    2.00 | 37.67
           2.00
                           1.833    4.00 |13.833    2.00 |25.833    2.00 | 37.83
           2.00
                           2.000    4.00 |14.000    2.00 |26.000    2.00 | 38.00
           2.00
                           2.167    6.00 |14.167    2.00 |26.167    2.00 | 38.17
           2.00
                           2.333    6.00 |14.333    2.00 |26.333    2.00 | 38.33
           2.00
                           2.500    6.00 |14.500    2.00 |26.500    2.00 | 38.50
           2.00
                           2.667    6.00 |14.667    2.00 |26.667    2.00 | 38.67
           2.00
                           2.833    6.00 |14.833    2.00 |26.833    2.00 | 38.83
           2.00
                           3.000    6.00 |15.000    2.00 |27.000    2.00 | 39.00
           2.00
                           3.167   13.00 |15.167    2.00 |27.167    2.00 | 39.17
           2.00
                           3.333   13.00 |15.333    2.00 |27.333    2.00 | 39.33
           2.00
                           3.500   13.00 |15.500    2.00 |27.500    2.00 | 39.50
           2.00
                           3.667   13.00 |15.667    2.00 |27.667    2.00 | 39.67
           2.00
                           3.833   13.00 |15.833    2.00 |27.833    2.00 | 39.83
           2.00
                           4.000   13.00 |16.000    2.00 |28.000    2.00 | 40.00
           2.00
                           4.167   17.00 |16.167    2.00 |28.167    2.00 | 40.17
           2.00
                           4.333   17.00 |16.333    2.00 |28.333    2.00 | 40.33
           2.00
                           4.500   17.00 |16.500    2.00 |28.500    2.00 | 40.50
           2.00
                           4.667   17.00 |16.667    2.00 |28.667    2.00 | 40.67
           2.00
                           4.833   17.00 |16.833    2.00 |28.833    2.00 | 40.83
           2.00
                           5.000   17.00 |17.000    2.00 |29.000    2.00 | 41.00
           2.00
                           5.167   13.00 |17.167    2.00 |29.167    2.00 | 41.17
           2.00
                           5.333   13.00 |17.333    2.00 |29.333    2.00 | 41.33
           2.00
                           5.500   13.00 |17.500    2.00 |29.500    2.00 | 41.50
           2.00
```

```
                5.667   13.00 |17.667    2.00 |29.667    2.00 | 41.67
2.00
                5.833   13.00 |17.833    2.00 |29.833    2.00 | 41.83
2.00
                6.000   13.00 |18.000    2.00 |30.000    2.00 | 42.00
2.00
                6.167   23.00 |18.167    2.00 |30.167    2.00 | 42.17
2.00
                6.333   23.00 |18.333    2.00 |30.333    2.00 | 42.33
2.00
                6.500   23.00 |18.500    2.00 |30.500    2.00 | 42.50
2.00
                6.667   23.00 |18.667    2.00 |30.667    2.00 | 42.67
2.00
                6.833   23.00 |18.833    2.00 |30.833    2.00 | 42.83
2.00
                7.000   23.00 |19.000    2.00 |31.000    2.00 | 43.00
2.00
                7.167   13.00 |19.167    2.00 |31.167    2.00 | 43.17
2.00
                7.333   13.00 |19.333    2.00 |31.333    2.00 | 43.33
2.00
                7.500   13.00 |19.500    2.00 |31.500    2.00 | 43.50
2.00
                7.667   13.00 |19.667    2.00 |31.667    2.00 | 43.67
2.00
                7.833   13.00 |19.833    2.00 |31.833    2.00 | 43.83
2.00
                8.000   13.00 |20.000    2.00 |32.000    2.00 | 44.00
2.00
                8.167   13.00 |20.167    2.00 |32.167    2.00 | 44.17
2.00
                8.333   13.00 |20.333    2.00 |32.333    2.00 | 44.33
2.00
                8.500   13.00 |20.500    2.00 |32.500    2.00 | 44.50
2.00
                8.667   13.00 |20.667    2.00 |32.667    2.00 | 44.67
2.00
                8.833   13.00 |20.833    2.00 |32.833    2.00 | 44.83
2.00
                9.000   13.00 |21.000    2.00 |33.000    2.00 | 45.00
2.00
                9.167   53.00 |21.167    2.00 |33.167    2.00 | 45.17
2.00
                9.333   53.00 |21.333    2.00 |33.333    2.00 | 45.33
2.00
                9.500   53.00 |21.500    2.00 |33.500    2.00 | 45.50
2.00
                9.667   53.00 |21.667    2.00 |33.667    2.00 | 45.67
2.00
                9.833   53.00 |21.833    2.00 |33.833    2.00 | 45.83
2.00
               10.000   53.00 |22.000    2.00 |34.000    2.00 | 46.00
2.00
```

```
              10.167   38.00 |22.167    2.00 |34.167    2.00 | 46.17
2.00
              10.333   38.00 |22.333    2.00 |34.333    2.00 | 46.33
2.00
              10.500   38.00 |22.500    2.00 |34.500    2.00 | 46.50
2.00
              10.667   38.00 |22.667    2.00 |34.667    2.00 | 46.67
2.00
              10.833   38.00 |22.833    2.00 |34.833    2.00 | 46.83
2.00
              11.000   38.00 |23.000    2.00 |35.000    2.00 | 47.00
2.00
              11.167   13.00 |23.167    2.00 |35.167    2.00 | 47.17
3.00
              11.333   13.00 |23.333    2.00 |35.333    2.00 | 47.33
3.00
              11.500   13.00 |23.500    2.00 |35.500    2.00 | 47.50
3.00
              11.667   13.00 |23.667    2.00 |35.667    2.00 | 47.67
3.00
              11.833   13.00 |23.833    2.00 |35.833    2.00 | 47.83
3.00
              12.000   13.00 |24.000    2.00 |36.000    2.00 | 48.00
3.00

     Max.Eff.Inten.(mm/hr)=      53.00        58.75
               over (min)       10.00        20.00
     Storage Coeff.  (min)=       6.28 (ii)   15.01 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.07
                                                         *  TOTALS*
     PEAK FLOW       (cms)=       0.95         0.82          1.772 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.00         10.00
     RUNOFF VOLUME    (mm)=     284.00       136.09        210.05
     TOTAL RAINFALL   (mm)=     285.00       285.00        285.00
     RUNOFF COEFFICIENT   =       1.00         0.48          0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   6.40
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area      (ha)=       5.12          1.28
     Dep. Storage      (mm)=       1.00          1.50
     Average Slope      (%)=       1.00          2.00
     Length             (m)=     206.56         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                                  ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    6.00 |12.167    2.00 |24.167    2.00 | 36.17
2.00
                0.333    6.00 |12.333    2.00 |24.333    2.00 | 36.33
2.00
                0.500    6.00 |12.500    2.00 |24.500    2.00 | 36.50
2.00
                0.667    6.00 |12.667    2.00 |24.667    2.00 | 36.67
2.00
                0.833    6.00 |12.833    2.00 |24.833    2.00 | 36.83
2.00
                1.000    6.00 |13.000    2.00 |25.000    2.00 | 37.00
2.00
                1.167    4.00 |13.167    2.00 |25.167    2.00 | 37.17
2.00
                1.333    4.00 |13.333    2.00 |25.333    2.00 | 37.33
2.00
                1.500    4.00 |13.500    2.00 |25.500    2.00 | 37.50
2.00
                1.667    4.00 |13.667    2.00 |25.667    2.00 | 37.67
2.00
                1.833    4.00 |13.833    2.00 |25.833    2.00 | 37.83
2.00
                2.000    4.00 |14.000    2.00 |26.000    2.00 | 38.00
2.00
                2.167    6.00 |14.167    2.00 |26.167    2.00 | 38.17
2.00
                2.333    6.00 |14.333    2.00 |26.333    2.00 | 38.33
2.00
                2.500    6.00 |14.500    2.00 |26.500    2.00 | 38.50
2.00
                2.667    6.00 |14.667    2.00 |26.667    2.00 | 38.67
2.00
                2.833    6.00 |14.833    2.00 |26.833    2.00 | 38.83
2.00
                3.000    6.00 |15.000    2.00 |27.000    2.00 | 39.00
2.00
                3.167   13.00 |15.167    2.00 |27.167    2.00 | 39.17
2.00
                3.333   13.00 |15.333    2.00 |27.333    2.00 | 39.33
2.00
```

```
              3.500   13.00 |15.500    2.00 |27.500    2.00 | 39.50
2.00
              3.667   13.00 |15.667    2.00 |27.667    2.00 | 39.67
2.00
              3.833   13.00 |15.833    2.00 |27.833    2.00 | 39.83
2.00
              4.000   13.00 |16.000    2.00 |28.000    2.00 | 40.00
2.00
              4.167   17.00 |16.167    2.00 |28.167    2.00 | 40.17
2.00
              4.333   17.00 |16.333    2.00 |28.333    2.00 | 40.33
2.00
              4.500   17.00 |16.500    2.00 |28.500    2.00 | 40.50
2.00
              4.667   17.00 |16.667    2.00 |28.667    2.00 | 40.67
2.00
              4.833   17.00 |16.833    2.00 |28.833    2.00 | 40.83
2.00
              5.000   17.00 |17.000    2.00 |29.000    2.00 | 41.00
2.00
              5.167   13.00 |17.167    2.00 |29.167    2.00 | 41.17
2.00
              5.333   13.00 |17.333    2.00 |29.333    2.00 | 41.33
2.00
              5.500   13.00 |17.500    2.00 |29.500    2.00 | 41.50
2.00
              5.667   13.00 |17.667    2.00 |29.667    2.00 | 41.67
2.00
              5.833   13.00 |17.833    2.00 |29.833    2.00 | 41.83
2.00
              6.000   13.00 |18.000    2.00 |30.000    2.00 | 42.00
2.00
              6.167   23.00 |18.167    2.00 |30.167    2.00 | 42.17
2.00
              6.333   23.00 |18.333    2.00 |30.333    2.00 | 42.33
2.00
              6.500   23.00 |18.500    2.00 |30.500    2.00 | 42.50
2.00
              6.667   23.00 |18.667    2.00 |30.667    2.00 | 42.67
2.00
              6.833   23.00 |18.833    2.00 |30.833    2.00 | 42.83
2.00
              7.000   23.00 |19.000    2.00 |31.000    2.00 | 43.00
2.00
              7.167   13.00 |19.167    2.00 |31.167    2.00 | 43.17
2.00
              7.333   13.00 |19.333    2.00 |31.333    2.00 | 43.33
2.00
              7.500   13.00 |19.500    2.00 |31.500    2.00 | 43.50
2.00
              7.667   13.00 |19.667    2.00 |31.667    2.00 | 43.67
2.00
              7.833   13.00 |19.833    2.00 |31.833    2.00 | 43.83
2.00
```

```
               8.000   13.00 |20.000    2.00 |32.000    2.00 | 44.00
2.00
               8.167   13.00 |20.167    2.00 |32.167    2.00 | 44.17
2.00
               8.333   13.00 |20.333    2.00 |32.333    2.00 | 44.33
2.00
               8.500   13.00 |20.500    2.00 |32.500    2.00 | 44.50
2.00
               8.667   13.00 |20.667    2.00 |32.667    2.00 | 44.67
2.00
               8.833   13.00 |20.833    2.00 |32.833    2.00 | 44.83
2.00
               9.000   13.00 |21.000    2.00 |33.000    2.00 | 45.00
2.00
               9.167   53.00 |21.167    2.00 |33.167    2.00 | 45.17
2.00
               9.333   53.00 |21.333    2.00 |33.333    2.00 | 45.33
2.00
               9.500   53.00 |21.500    2.00 |33.500    2.00 | 45.50
2.00
               9.667   53.00 |21.667    2.00 |33.667    2.00 | 45.67
2.00
               9.833   53.00 |21.833    2.00 |33.833    2.00 | 45.83
2.00
              10.000   53.00 |22.000    2.00 |34.000    2.00 | 46.00
2.00
              10.167   38.00 |22.167    2.00 |34.167    2.00 | 46.17
2.00
              10.333   38.00 |22.333    2.00 |34.333    2.00 | 46.33
2.00
              10.500   38.00 |22.500    2.00 |34.500    2.00 | 46.50
2.00
              10.667   38.00 |22.667    2.00 |34.667    2.00 | 46.67
2.00
              10.833   38.00 |22.833    2.00 |34.833    2.00 | 46.83
2.00
              11.000   38.00 |23.000    2.00 |35.000    2.00 | 47.00
2.00
              11.167   13.00 |23.167    2.00 |35.167    2.00 | 47.17
3.00
              11.333   13.00 |23.333    2.00 |35.333    2.00 | 47.33
3.00
              11.500   13.00 |23.500    2.00 |35.500    2.00 | 47.50
3.00
              11.667   13.00 |23.667    2.00 |35.667    2.00 | 47.67
3.00
              11.833   13.00 |23.833    2.00 |35.833    2.00 | 47.83
3.00
              12.000   13.00 |24.000    2.00 |36.000    2.00 | 48.00
3.00

     Max.Eff.Inten.(mm/hr)=      53.00        58.75
               over (min)        10.00        20.00
     Storage Coeff.  (min)=       5.09 (ii)   13.82 (ii)
```

```
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       0.71         0.21          0.912 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.00          10.00
     RUNOFF VOLUME    (mm)=     284.00       136.09         247.02
     TOTAL RAINFALL   (mm)=     285.00       285.00         285.00
     RUNOFF COEFFICIENT   =       1.00         0.48           0.87

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    12.91   1.772    10.00   210.05
      + ID2= 2 (  0002):     6.40   0.912    10.00   247.02
        ====================================================
        ID = 3 (  0004):    19.31   2.684    10.00   222.30

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):    19.31   2.684    10.00   222.30
      + ID2= 2 (  0003):     1.93   0.250    10.00   222.31
        ====================================================
        ID = 1 (  0004):    21.24   2.935    10.00   222.30

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   2.12
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.01         0.11
     Dep. Storage     (mm)=       1.00         1.50
```

```
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     118.88        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
               0.167    6.00 |12.167    2.00 |24.167    2.00 | 36.17
2.00
               0.333    6.00 |12.333    2.00 |24.333    2.00 | 36.33
2.00
               0.500    6.00 |12.500    2.00 |24.500    2.00 | 36.50
2.00
               0.667    6.00 |12.667    2.00 |24.667    2.00 | 36.67
2.00
               0.833    6.00 |12.833    2.00 |24.833    2.00 | 36.83
2.00
               1.000    6.00 |13.000    2.00 |25.000    2.00 | 37.00
2.00
               1.167    4.00 |13.167    2.00 |25.167    2.00 | 37.17
2.00
               1.333    4.00 |13.333    2.00 |25.333    2.00 | 37.33
2.00
               1.500    4.00 |13.500    2.00 |25.500    2.00 | 37.50
2.00
               1.667    4.00 |13.667    2.00 |25.667    2.00 | 37.67
2.00
               1.833    4.00 |13.833    2.00 |25.833    2.00 | 37.83
2.00
               2.000    4.00 |14.000    2.00 |26.000    2.00 | 38.00
2.00
               2.167    6.00 |14.167    2.00 |26.167    2.00 | 38.17
2.00
               2.333    6.00 |14.333    2.00 |26.333    2.00 | 38.33
2.00
               2.500    6.00 |14.500    2.00 |26.500    2.00 | 38.50
2.00
               2.667    6.00 |14.667    2.00 |26.667    2.00 | 38.67
2.00
               2.833    6.00 |14.833    2.00 |26.833    2.00 | 38.83
2.00
               3.000    6.00 |15.000    2.00 |27.000    2.00 | 39.00
2.00
               3.167   13.00 |15.167    2.00 |27.167    2.00 | 39.17
2.00
               3.333   13.00 |15.333    2.00 |27.333    2.00 | 39.33
2.00
               3.500   13.00 |15.500    2.00 |27.500    2.00 | 39.50
2.00
```

```
                 3.667   13.00 |15.667    2.00 |27.667    2.00 | 39.67
2.00
                 3.833   13.00 |15.833    2.00 |27.833    2.00 | 39.83
2.00
                 4.000   13.00 |16.000    2.00 |28.000    2.00 | 40.00
2.00
                 4.167   17.00 |16.167    2.00 |28.167    2.00 | 40.17
2.00
                 4.333   17.00 |16.333    2.00 |28.333    2.00 | 40.33
2.00
                 4.500   17.00 |16.500    2.00 |28.500    2.00 | 40.50
2.00
                 4.667   17.00 |16.667    2.00 |28.667    2.00 | 40.67
2.00
                 4.833   17.00 |16.833    2.00 |28.833    2.00 | 40.83
2.00
                 5.000   17.00 |17.000    2.00 |29.000    2.00 | 41.00
2.00
                 5.167   13.00 |17.167    2.00 |29.167    2.00 | 41.17
2.00
                 5.333   13.00 |17.333    2.00 |29.333    2.00 | 41.33
2.00
                 5.500   13.00 |17.500    2.00 |29.500    2.00 | 41.50
2.00
                 5.667   13.00 |17.667    2.00 |29.667    2.00 | 41.67
2.00
                 5.833   13.00 |17.833    2.00 |29.833    2.00 | 41.83
2.00
                 6.000   13.00 |18.000    2.00 |30.000    2.00 | 42.00
2.00
                 6.167   23.00 |18.167    2.00 |30.167    2.00 | 42.17
2.00
                 6.333   23.00 |18.333    2.00 |30.333    2.00 | 42.33
2.00
                 6.500   23.00 |18.500    2.00 |30.500    2.00 | 42.50
2.00
                 6.667   23.00 |18.667    2.00 |30.667    2.00 | 42.67
2.00
                 6.833   23.00 |18.833    2.00 |30.833    2.00 | 42.83
2.00
                 7.000   23.00 |19.000    2.00 |31.000    2.00 | 43.00
2.00
                 7.167   13.00 |19.167    2.00 |31.167    2.00 | 43.17
2.00
                 7.333   13.00 |19.333    2.00 |31.333    2.00 | 43.33
2.00
                 7.500   13.00 |19.500    2.00 |31.500    2.00 | 43.50
2.00
                 7.667   13.00 |19.667    2.00 |31.667    2.00 | 43.67
2.00
                 7.833   13.00 |19.833    2.00 |31.833    2.00 | 43.83
2.00
                 8.000   13.00 |20.000    2.00 |32.000    2.00 | 44.00
2.00
```

```
                8.167   13.00 |20.167    2.00 |32.167    2.00 | 44.17
2.00
                8.333   13.00 |20.333    2.00 |32.333    2.00 | 44.33
2.00
                8.500   13.00 |20.500    2.00 |32.500    2.00 | 44.50
2.00
                8.667   13.00 |20.667    2.00 |32.667    2.00 | 44.67
2.00
                8.833   13.00 |20.833    2.00 |32.833    2.00 | 44.83
2.00
                9.000   13.00 |21.000    2.00 |33.000    2.00 | 45.00
2.00
                9.167   53.00 |21.167    2.00 |33.167    2.00 | 45.17
2.00
                9.333   53.00 |21.333    2.00 |33.333    2.00 | 45.33
2.00
                9.500   53.00 |21.500    2.00 |33.500    2.00 | 45.50
2.00
                9.667   53.00 |21.667    2.00 |33.667    2.00 | 45.67
2.00
                9.833   53.00 |21.833    2.00 |33.833    2.00 | 45.83
2.00
               10.000   53.00 |22.000    2.00 |34.000    2.00 | 46.00
2.00
               10.167   38.00 |22.167    2.00 |34.167    2.00 | 46.17
2.00
               10.333   38.00 |22.333    2.00 |34.333    2.00 | 46.33
2.00
               10.500   38.00 |22.500    2.00 |34.500    2.00 | 46.50
2.00
               10.667   38.00 |22.667    2.00 |34.667    2.00 | 46.67
2.00
               10.833   38.00 |22.833    2.00 |34.833    2.00 | 46.83
2.00
               11.000   38.00 |23.000    2.00 |35.000    2.00 | 47.00
2.00
               11.167   13.00 |23.167    2.00 |35.167    2.00 | 47.17
3.00
               11.333   13.00 |23.333    2.00 |35.333    2.00 | 47.33
3.00
               11.500   13.00 |23.500    2.00 |35.500    2.00 | 47.50
3.00
               11.667   13.00 |23.667    2.00 |35.667    2.00 | 47.67
3.00
               11.833   13.00 |23.833    2.00 |35.833    2.00 | 47.83
3.00
               12.000   13.00 |24.000    2.00 |36.000    2.00 | 48.00
3.00

     Max.Eff.Inten.(mm/hr)=      53.00        98.50
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       3.65 (ii)   10.75 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.16         0.08
```

```
                                                               *  TOTALS*
     PEAK FLOW       (cms)=       0.28          0.03          0.310 (iii)
     TIME TO PEAK    (hrs)=      10.00         10.00          10.00
     RUNOFF VOLUME    (mm)=     284.00        161.23         271.72
     TOTAL RAINFALL   (mm)=     285.00        285.00         285.00
     RUNOFF COEFFICIENT   =       1.00          0.57           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc   (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.29
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.28          0.01
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      43.97         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                0.167    6.00 |12.167    2.00 |24.167    2.00 | 36.17
2.00
                0.333    6.00 |12.333    2.00 |24.333    2.00 | 36.33
2.00
                0.500    6.00 |12.500    2.00 |24.500    2.00 | 36.50
2.00
                0.667    6.00 |12.667    2.00 |24.667    2.00 | 36.67
2.00
                0.833    6.00 |12.833    2.00 |24.833    2.00 | 36.83
2.00
                1.000    6.00 |13.000    2.00 |25.000    2.00 | 37.00
2.00
                1.167    4.00 |13.167    2.00 |25.167    2.00 | 37.17
2.00
                1.333    4.00 |13.333    2.00 |25.333    2.00 | 37.33
2.00
```

```
                1.500    4.00 |13.500    2.00 |25.500    2.00 | 37.50
2.00
                1.667    4.00 |13.667    2.00 |25.667    2.00 | 37.67
2.00
                1.833    4.00 |13.833    2.00 |25.833    2.00 | 37.83
2.00
                2.000    4.00 |14.000    2.00 |26.000    2.00 | 38.00
2.00
                2.167    6.00 |14.167    2.00 |26.167    2.00 | 38.17
2.00
                2.333    6.00 |14.333    2.00 |26.333    2.00 | 38.33
2.00
                2.500    6.00 |14.500    2.00 |26.500    2.00 | 38.50
2.00
                2.667    6.00 |14.667    2.00 |26.667    2.00 | 38.67
2.00
                2.833    6.00 |14.833    2.00 |26.833    2.00 | 38.83
2.00
                3.000    6.00 |15.000    2.00 |27.000    2.00 | 39.00
2.00
                3.167   13.00 |15.167    2.00 |27.167    2.00 | 39.17
2.00
                3.333   13.00 |15.333    2.00 |27.333    2.00 | 39.33
2.00
                3.500   13.00 |15.500    2.00 |27.500    2.00 | 39.50
2.00
                3.667   13.00 |15.667    2.00 |27.667    2.00 | 39.67
2.00
                3.833   13.00 |15.833    2.00 |27.833    2.00 | 39.83
2.00
                4.000   13.00 |16.000    2.00 |28.000    2.00 | 40.00
2.00
                4.167   17.00 |16.167    2.00 |28.167    2.00 | 40.17
2.00
                4.333   17.00 |16.333    2.00 |28.333    2.00 | 40.33
2.00
                4.500   17.00 |16.500    2.00 |28.500    2.00 | 40.50
2.00
                4.667   17.00 |16.667    2.00 |28.667    2.00 | 40.67
2.00
                4.833   17.00 |16.833    2.00 |28.833    2.00 | 40.83
2.00
                5.000   17.00 |17.000    2.00 |29.000    2.00 | 41.00
2.00
                5.167   13.00 |17.167    2.00 |29.167    2.00 | 41.17
2.00
                5.333   13.00 |17.333    2.00 |29.333    2.00 | 41.33
2.00
                5.500   13.00 |17.500    2.00 |29.500    2.00 | 41.50
2.00
                5.667   13.00 |17.667    2.00 |29.667    2.00 | 41.67
2.00
                5.833   13.00 |17.833    2.00 |29.833    2.00 | 41.83
2.00
```

```
               6.000  13.00 |18.000   2.00 |30.000   2.00 | 42.00
2.00
               6.167  23.00 |18.167   2.00 |30.167   2.00 | 42.17
2.00
               6.333  23.00 |18.333   2.00 |30.333   2.00 | 42.33
2.00
               6.500  23.00 |18.500   2.00 |30.500   2.00 | 42.50
2.00
               6.667  23.00 |18.667   2.00 |30.667   2.00 | 42.67
2.00
               6.833  23.00 |18.833   2.00 |30.833   2.00 | 42.83
2.00
               7.000  23.00 |19.000   2.00 |31.000   2.00 | 43.00
2.00
               7.167  13.00 |19.167   2.00 |31.167   2.00 | 43.17
2.00
               7.333  13.00 |19.333   2.00 |31.333   2.00 | 43.33
2.00
               7.500  13.00 |19.500   2.00 |31.500   2.00 | 43.50
2.00
               7.667  13.00 |19.667   2.00 |31.667   2.00 | 43.67
2.00
               7.833  13.00 |19.833   2.00 |31.833   2.00 | 43.83
2.00
               8.000  13.00 |20.000   2.00 |32.000   2.00 | 44.00
2.00
               8.167  13.00 |20.167   2.00 |32.167   2.00 | 44.17
2.00
               8.333  13.00 |20.333   2.00 |32.333   2.00 | 44.33
2.00
               8.500  13.00 |20.500   2.00 |32.500   2.00 | 44.50
2.00
               8.667  13.00 |20.667   2.00 |32.667   2.00 | 44.67
2.00
               8.833  13.00 |20.833   2.00 |32.833   2.00 | 44.83
2.00
               9.000  13.00 |21.000   2.00 |33.000   2.00 | 45.00
2.00
               9.167  53.00 |21.167   2.00 |33.167   2.00 | 45.17
2.00
               9.333  53.00 |21.333   2.00 |33.333   2.00 | 45.33
2.00
               9.500  53.00 |21.500   2.00 |33.500   2.00 | 45.50
2.00
               9.667  53.00 |21.667   2.00 |33.667   2.00 | 45.67
2.00
               9.833  53.00 |21.833   2.00 |33.833   2.00 | 45.83
2.00
              10.000  53.00 |22.000   2.00 |34.000   2.00 | 46.00
2.00
              10.167  38.00 |22.167   2.00 |34.167   2.00 | 46.17
2.00
              10.333  38.00 |22.333   2.00 |34.333   2.00 | 46.33
2.00
```

```
              10.500   38.00 |22.500    2.00 |34.500    2.00 | 46.50
2.00
              10.667   38.00 |22.667    2.00 |34.667    2.00 | 46.67
2.00
              10.833   38.00 |22.833    2.00 |34.833    2.00 | 46.83
2.00
              11.000   38.00 |23.000    2.00 |35.000    2.00 | 47.00
2.00
              11.167   13.00 |23.167    2.00 |35.167    2.00 | 47.17
3.00
              11.333   13.00 |23.333    2.00 |35.333    2.00 | 47.33
3.00
              11.500   13.00 |23.500    2.00 |35.500    2.00 | 47.50
3.00
              11.667   13.00 |23.667    2.00 |35.667    2.00 | 47.67
3.00
              11.833   13.00 |23.833    2.00 |35.833    2.00 | 47.83
3.00
              12.000   13.00 |24.000    2.00 |36.000    2.00 | 48.00
3.00

     Max.Eff.Inten.(mm/hr)=      53.00        98.50
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       2.01 (ii)    9.11 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.11
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       0.04         0.00          0.042 (iii)
     TIME TO PEAK    (hrs)=       9.67        10.00          10.00
     RUNOFF VOLUME    (mm)=     284.00       161.23         271.72
     TOTAL RAINFALL   (mm)=     285.00       285.00         285.00
     RUNOFF COEFFICIENT   =       1.00         0.57           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 50.00           K  (1/hr)=  2.00
            Fc    (mm/hr)=  7.50     Cum.Inf.   (mm)=  0.00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):    21.24   2.935    10.00   222.30
      + ID2= 2 (  0006):     2.12   0.310    10.00   271.72
        =====================================================
        ID = 3 (  0005):    23.36   3.244    10.00   226.79
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-----

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    23.36   3.244    10.00   226.79
      + ID2= 2 (  0007):     0.29   0.042    10.00   271.72
        =====================================================
        ID = 1 (  0005):    23.65   3.287    10.00   227.34

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3940      0.9711
                          0.0750     0.5058   |   0.4500      1.1371
                          0.2310     0.6944   |   0.4830      1.2478
                          0.3140     0.7719   |   3.3200      1.5022

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     23.650      3.287     10.00     227.34
   OUTFLOW: ID= 1 (  0008)     23.650      3.139     10.00     227.27

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 95.50
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.4904

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 FINISH
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APPENDIX D

Storm Sewer Design Sheets

CANDEVCON GROUP INC.
CONSULTING ENGINEERS & PLANNERS
TEL (905) 794-0600 FAX (905) 794-0611

Subdivision: **Trent Kennedy**
File No.: **W22068**
Consultant: **Candevcon Limited**
Drainage Area Plan: **ST-1**
Region: **Peel**
Municipality: **Town of Caledon**

STORM DRAINAGE Design Sheet

DATE **August 6, 2024**
PREPARED BY **SAA**

Run-off Coefficients

Park	0.25
Single family	0.40
Condo/Towns	0.70
Roads	0.90

Town of Caledon Guidelines

Vmax	4.00 m/s
Vmin	0.75 m/s
Min. Dia	300mm
Capacity	90% max

For 2-yr storm I_2 = 1070 / (t+7.85)^0.8759
For 10-yr storm I_{10} = 2221 / (t+12)^0.9080
For 100-yr storm I_{100} = 4688 / (t+17)^0.9624
*Min time of concentration = 10 mins

Core System	Area No.	Up-stream	Down-stream	Contributing Area (ha)			Breakdown of Areas				Area x Storm Co-eff				C	Total	Cummulative	Time (min)		I_2	I_{10}	**FLOW** Q= 2.78AC I/1000	PIPE						
		Node	Node	In Area	Control	Cumul. Total	0.25	0.50	0.70	0.90	0.25	0.50	0.70	0.90		A x C	AxC	Tc (min)	Total			Q_{design}	Length (m)	Size (mm)	Grade (%)	**Capacity (m^3/sec)**	Velocity (m/s)	Time (min)	% Full
POND P1																													
	1	MH1	MH13	0.79	0.00	0.79			0.79		0.00	0.00	0.55	0.00	0.70	0.55	0.55	10.0	10.7		134.2	**0.206**	59.3	525	0.50	**0.304**	1.40	0.70	68%
	2	MH2	MH4	0.33	0.00	0.33			0.33		0.00	0.00	0.23	0.00	0.70	0.23	0.23	10.0	11.4		134.2	**0.086**	74.7	375	0.30	**0.096**	0.87	1.43	90%
	3	MH3	MH4	0.15	0.00	0.15				0.15	0.00	0.00	0.00	0.14	0.90	0.14	0.14	10.0	10.8		134.2	**0.050**	42.6	375	0.30	**0.096**	0.87	0.82	52%
	4	MH4	MH5	0.16	0.48	0.64			0.16		0.00	0.00	0.11	0.00	0.70	0.11	0.48	11.4	12.0		126.7	**0.168**	40.2	525	0.30	**0.235**	1.09	0.62	72%
	5	MH5	MH6	0.03	0.64	0.67				0.03	0.00	0.00	0.00	0.03	0.90	0.03	0.51	12.0	12.2		123.7	**0.174**	12.0	525	0.30	**0.235**	1.09	0.18	74%
	6	MH6	MH11	0.11	0.67	0.78				0.11	0.00	0.00	0.00	0.10	0.90	0.10	0.60	12.2	13.3		122.9	**0.206**	67.6	525	0.30	**0.235**	1.09	1.04	88%
	7	MH2	MH7	0.07	0.00	0.07		0.07			0.00	0.04	0.00	0.00	0.50	0.04	0.04	10.0	10.3		134.2	**0.013**	14.7	300	0.30	**0.053**	0.75	0.33	25%
	8	MH7	MH8	0.28	0.07	0.35		0.28			0.00	0.14	0.00	0.00	0.50	0.14	0.18	10.3	11.4		132.4	**0.064**	56.4	375	0.30	**0.096**	0.87	1.08	67%
	9	MH8	MH9	0.11	0.35	0.46		0.11			0.00	0.06	0.00	0.00	0.50	0.06	0.23	11.4	11.6		126.8	**0.081**	11.9	450	0.30	**0.156**	0.98	0.20	52%
	10, 10A	MH9	MH10	0.50	0.46	0.96		0.26	0.24		0.00	0.13	0.17	0.00	0.60	0.30	0.53	11.6	12.6		125.8	**0.185**	63.6	525	0.30	**0.235**	1.09	0.97	78%
	11	MH10	MH11	0.37	0.96	1.33			0.37		0.00	0.00	0.26	0.00	0.70	0.26	0.79	12.6	13.5		121.3	**0.265**	63.6	600	0.30	**0.336**	1.19	0.89	79%
	12	MH11	MH13	1.53	2.11	3.64			1.53		0.00	0.00	1.07	0.00	0.70	1.07	2.46	13.5	14.2		117.4	**0.804**	66.3	900	0.30	**0.991**	1.56	0.71	81%
	13	MH12	MH13	0.11	0.00	0.11				0.11	0.00	0.00	0.00	0.10	0.90	0.10	0.10	10.0	11.0		134.2	**0.037**	70.3	375	0.50	**0.124**	1.12	1.04	30%
	14, 15	MH13	MH14	0.51	4.54	5.05		0.16	0.35		0.00	0.08	0.25	0.00	0.64	0.33	3.44	14.2	14.9		114.5	**1.095**	75.1	1050	0.30	**1.495**	1.73	0.72	73%
	16	MH14	MH15	0.60	5.05	5.65		0.60			0.00	0.30	0.00	0.00	0.50	0.30	3.74	14.9	15.6		111.7	**1.161**	72.6	1050	0.30	**1.495**	1.72739	0.70	78%
	17	MH15	MH26	0.38	5.65	6.03		0.38			0.00	0.19	0.00	0.00	0.50	0.19	3.93	15.6	16.3		109.2	**1.192**	71.4	1050	0.30	**1.495**	1.73	0.69	80%
	19	MH16	MH17	1.15	0.00	1.15			1.15		0.00	0.00	0.81	0.00	0.70	0.81	0.81	10.0	10.2		134.2	**0.300**	13.3	600	0.30	**0.336**	1.19	0.19	89%
	20	MH17	MH18	0.35	1.15	1.50		0.35			0.00	0.18	0.00	0.00	0.50	0.18	0.98	10.2	11.1		133.1	**0.363**	70.7	675	0.30	**0.460**	1.29	0.92	79%
	21	MH18	MH19	0.30	1.50	1.80		0.30			0.00	0.15	0.00	0.00	0.50	0.15	1.13	11.1	11.9		128.3	**0.403**	59.7	675	0.30	**0.460**	1.29	0.77	88%
	22	MH19	MH26	0.23	1.80	2.03		0.23			0.00	0.12	0.00	0.00	0.50	0.12	1.25	11.9	12.5		124.6	**0.431**	51.8	750	0.30	**0.610**	1.38	0.63	71%
	23	MH12	MH20	0.06	0.00	0.06		0.06			0.00	0.03	0.00	0.00	0.50	0.03	0.03	10.0	10.3		134.2	**0.011**	15.1	300	0.50	**0.068**	0.97	0.26	16%
	24, 24A	MH20	MH21	0.48	0.06	0.54		0.31	0.17		0.00	0.16	0.12	0.00	0.57	0.27	0.30	12.0	13.0		123.7	**0.105**	64.5	375	0.50	**0.124**	1.12	0.96	84%

CANDEVCON GROUP INC.
CONSULTING ENGINEERS & PLANNERS
TEL (905) 794-0600 FAX (905) 794-0611

Subdivision:	**Trent Kennedy**
File No.:	**W22068**
Consultant:	**Candevcon Limited**
Drainage Area Plan:	**ST-1**
Region:	**Peel**
Municipality:	**Town of Caledon**

STORM DRAINAGE Design Sheet	
DATE	**August 6, 2024**
PREPARED BY	**SAA**

Run-off Coefficients

Park	0.25
Single family	0.40
Condo/Towns	0.70
Roads	0.90

Town of Caledon Guidelines

Vmax	4.00 m/s
Vmin	0.75 m/s
Min. Dia	300mm
Capacity	90% max

For 2-yr storm I_2 = 1070 / (t+7.85)^0.8759
For 10-yr storm I_{10} = 2221 / (t+12)^0.9080
For 100-yr storm I_{100} = 4688 / (t+17)^0.9624
*Min time of concentration = 10 mins

Core System	Area No.	Up-stream	Down-stream	Contributing Area (ha)			Breakdown of Areas				Area x Storm Co-eff				C	Total	Cummulative	Time (min)		I_2	I_{10}	**FLOW** Q= 2.78AC I/1000	PIPE						
		Node	Node	In Area	Control	Cumul. Total	0.25	0.50	0.70	0.90	0.25	0.50	0.70	0.90		A x C	AxC	Tc (min)	Total			Q_{design}	Length (m)	Size (mm)	Grade (%)	**Capacity (m^3/sec)**	Velocity (m/s)	Time (min)	% Full
	25	MH21	MH22	0.52	0.54	1.06		0.52			0.00	0.26	0.00	0.00	0.50	0.26	0.56	13.0	14.0		119.4	**0.187**	72.0	450	0.50	**0.202**	1.27	0.95	93%
	26	MH22	MH23	0.39	1.06	1.45		0.39			0.00	0.20	0.00	0.00	0.50	0.20	0.76	14.0	14.8		115.5	**0.244**	61.4	450	0.50	**0.202**	1.27	0.81	121%
	27	MH23	MH24	0.13	1.45	1.58		0.13			0.00	0.07	0.00	0.00	0.50	0.07	0.82	14.8	14.9		112.3	**0.257**	14.8	525	0.50	**0.304**	1.40	0.18	85%
	28	MH24	MH25	0.53	1.58	2.11		0.53			0.00	0.27	0.00	0.00	0.50	0.27	1.09	10.0	10.8		134.2	**0.406**	75.7	600	0.50	**0.434**	1.54	0.82	94%
	29	MH25	MH26	0.19	2.11	2.30		0.19			0.00	0.10	0.00	0.00	0.50	0.10	1.18	14.8	15.1		112.3	**0.370**	31.4	600	0.50	**0.434**	1.54	0.34	85%
	30	MH26	MH27	0.11	10.36	10.47			0.11		0.00	0.00	0.08	0.00	0.70	0.08	6.44	16.3	16.5		106.7	**1.910**	28.3	1350	0.30	**2.922**	2.04	0.23	65%
	32, 32A	MH27	MH29	0.69	10.47	11.16		0.36	0.33		0.00	0.18	0.23	0.00	0.60	0.41	6.85	16.5	17.4		106.0	**2.017**	104.2	1350	0.30	**2.922**	2.04	0.85	69%
	31,33	MH28	MH29	2.19	0.00	2.19	1.93	0.26			0.48	0.13	0.00	0.00	0.28	0.61	0.61	10.0	10.7		134.2	**0.228**	63	525	0.50	**0.304**	1.40	0.75	75%
	34	MH29	MH30	0.45	13.35	13.80		0.45			0.00	0.23	0.00	0.00	0.50	0.23	7.68	17.4	18.0		103.2	**2.204**	81.7	1350	0.30	**2.922**	2.04	0.67	75%
	35	MH30	MH30X	0.27	13.80	14.07		0.27			0.00	0.14	0.00	0.00	0.50	0.14	7.82	18.0	18.5		101.1	**2.197**	55.5	1350	0.30	**2.922**	2.04	0.45	75%
	36	MH30X	MH35	0.00	14.07	14.07					0.00	0.00	0.00	0.00		0.00	7.82	18.5	18.6		99.7	**2.168**	10.5	1350	0.30	**2.922**	2.04	0.09	74%
	36	MH28	MH31	0.07	0.00	0.07			0.07		0.00	0.00	0.05	0.00	0.70	0.05	0.05	10.0	10.2		134.2	**0.018**	12.7	300	0.50	**0.068**	0.97	0.22	27%
	37, 37A	MH31	MH32	0.47	0.07	0.54		0.20	0.27		0.00	0.10	0.19	0.00	0.61	0.29	0.34	10.2	11.2		133.0	**0.125**	74	450	0.50	**0.202**	1.27	0.97	62%
	38, 38A	MH32	MH34	0.37	0.54	0.91		0.13	0.24		0.00	0.07	0.17	0.00	0.63	0.23	0.57	11.2	12.0		127.9	**0.203**	70.9	525	0.50	**0.304**	1.40	0.84	67%
	39	MH33	MH34	0.16	0.00	0.16		0.16			0.00	0.08	0.00	0.00	0.50	0.08	0.08	10.0	10.7		134.2	**0.030**	41.1	300	0.50	**0.068**	0.97	0.71	44%
	40	MH34	MH35	0.53	1.07	1.60		0.53			0.00	0.27	0.00	0.00	0.50	0.27	0.92	12.0	12.9		123.8	**0.315**	80.8	600	0.50	**0.434**	1.54	0.88	73%
	41	MH35	MH40	0.46	15.67	16.13		0.46			0.00	0.23	0.00	0.00	0.50	0.23	8.96	18.5	19.0		99.7	**2.485**	67.4	1350	0.30	**2.922**	2.04	0.55	85%
	42	MH36	MH37	0.14	0.00	0.14		0.14			0.00	0.07	0.00	0.00	0.50	0.07	0.07	10.0	10.2		134.2	**0.026**	10.5	300	0.30	**0.053**	0.75	0.23	49%
	43	MH37	MH38	0.49	0.14	0.63		0.49			0.00	0.25	0.00	0.00	0.50	0.25	0.32	10.2	11.2		132.9	**0.116**	59.1	450	0.30	**0.156**	0.98	1.00	75%
	44	MH38	MH39	0.50	0.63	1.13		0.50			0.00	0.25	0.00	0.00	0.50	0.25	0.57	11.2	12.4		127.7	**0.201**	72.8	525	0.30	**0.235**	1.09	1.11	85%
	45	MH39	MH40	0.26	1.13	1.39		0.26			0.00	0.13	0.00	0.00	0.50	0.13	0.70	12.4	13.2		122.3	**0.236**	62.8	600	0.30	**0.336**	1.19	0.88	70%
	46	MH40	MH44	0.52	17.52	18.04		0.52			0.00	0.26	0.00	0.00	0.50	0.26	9.92	19.0	19.6		98.1	**2.706**	69.5	1500	0.30	**3.870**	2.19	0.53	70%

CANDEVCON GROUP INC.
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Subdivision: Trent Kennedy
File No.: W22068
Consultant: Candevcon Limited
Drainage Area Plan: ST-1
Region: Peel
Municipality: Town of Caledon

STORM DRAINAGE Design Sheet
DATE August 6, 2024
PREPARED BY SAA

Run-off Coefficients

Park	0.25
Single family	0.40
Condo/Towns	0.70
Roads	0.90

Town of Caledon Guidelines

Vmax	4.00 m/s
Vmin	0.75 m/s
Min. Dia	300mm
Capacity	90% max

For 2-yr storm I_2 = 1070 / (t+7.85)^0.8759
For 10-yr storm I_{10} = 2221 / (t+12)^0.9080
For 100-yr storm I_{100} = 4688 / (t+17)^0.9624
*Min time of concentration = 10 mins

Core System	Area No.	Up-stream	Down-stream	Contributing Area (ha)			Breakdown of Areas				Area x Storm Co-eff				C	Total	Cummulative	Time (min)		I_2	I_{10}	FLOW Q= 2.78AC I/1000	PIPE						
		Node	Node	In Area	Control	Cumul. Total	0.25	0.50	0.70	0.90	0.25	0.50	0.70	0.90		A x C	AxC	Tc (min)	Total			Q_{design}	Length (m)	Size (mm)	Grade (%)	**Capacity (m^3/sec)**	Velocity (m/s)	Time (min)	% Full
	48	MH41-1	MH41	0.38	0.00	0.38		0.38			0.00	0.19	0.00	0.00	0.50	0.19	0.19	10.0	10.8		134.2	**0.071**	40.3	375	0.30	**0.096**	0.87	0.77	74%
	47	MH41-2	MH41	0.40	0.00	0.40		0.40			0.00	0.20	0.00	0.00	0.50	0.20	0.20	10.0	11.1		134.2	**0.075**	56.7	375	0.30	**0.096**	0.87	1.09	78%
	49	MH41	MH42	0.16	0.78	0.94		0.16			0.00	0.08	0.00	0.00	0.50	0.08	0.47	11.1	11.6		128.4	**0.168**	31.1	525	0.30	**0.235**	1.09	0.48	71%
	50	MH42	MH43	0.17	0.94	1.11		0.17			0.00	0.09	0.00	0.00	0.50	0.09	0.56	11.6	11.8		126.1	**0.194**	12.7	525	0.30	**0.235**	1.09	0.19	83%
	51	MH43	MH44	0.23	1.11	1.34		0.23			0.00	0.12	0.00	0.00	0.50	0.12	0.51	11.8	12.6		125.1	**0.176**	53.0	525	0.30	**0.235**	1.09	0.81	75%
	52	MH44	MH45	0.16	19.38	19.54		0.16			0.00	0.08	0.00	0.00	0.50	0.08	10.50	19.6	19.8		96.6	**2.822**	35.4	1500	0.30	**3.870**	2.19	0.27	73%
	53	MH45	MH46	0.10	19.54	19.64		0.10			0.00	0.05	0.00	0.00	0.50	0.05	10.55	19.8	20.0		95.9	**2.814**	15.6	1500	0.30	**3.870**	2.19	0.12	73%
	54	MH46	MH52	0.13	19.64	19.77		0.13			0.00	0.07	0.00	0.00	0.50	0.07	10.62	20.0	20.1		95.6	**2.821**	15.1	1500	0.30	**3.870**	2.19	0.11	73%
	55	MH36	MH47	0.46	0.00	0.46		0.46			0.00	0.23	0.00	0.00	0.50	0.23	0.23	10.0	11.2		134.2	**0.086**	72.4	450	0.30	**0.156**	0.98	1.23	55%
	56	MH47	MH48	0.42	0.46	0.88		0.42			0.00	0.21	0.00	0.00	0.50	0.21	0.44	11.2	12.4		127.7	**0.156**	77.3	525	0.30	**0.235**	1.09	1.18	66%
	57	MH48	MH49	0.30	0.88	1.18		0.30			0.00	0.15	0.00	0.00	0.50	0.15	0.59	12.4	13.5		122.1	**0.200**	76.8	600	0.30	**0.336**	1.19	1.08	60%
	58	MH49	MH50	0.12	1.18	1.30		0.12			0.00	0.06	0.00	0.00	0.50	0.06	0.65	13.5	13.6		117.4	**0.212**	11.3	600	0.30	**0.336**	1.19	0.16	63%
	59	MH50	MH51	0.57	1.30	1.87		0.57			0.00	0.29	0.00	0.00	0.50	0.29	0.94	13.6	14.6		116.7	**0.303**	75.4	675	0.30	**0.460**	1.29	0.98	66%
	60	MH51	MH52	0.04	1.87	1.91		0.04			0.00	0.02	0.00	0.00	0.50	0.02	0.96	14.6	14.8		112.8	**0.300**	15.1	750	0.30	**0.610**	1.38	0.18	49%
		MH52	MH55	0.00	21.68	21.68										0.00	11.57	20.0	20.2		95.6	**3.075**	29.0	1500	0.30	**3.870**	2.19	0.22	79%
		MH55	MH56	0.00	21.68	21.68										0.00	11.57	20.0	20.1		95.6	**3.075**	14.0	1500	0.30	**3.870**	2.19	0.11	79%
		MH56	HW	0.00	21.68	21.68										0.00	11.57	20.1	20.2		95.3	**3.065**	22.2	1500	0.30	**3.870**	2.19	0.17	79%
	TOTALS			21.68	21.68		1.93	13.24	6.11	0.40	0.48	6.62	4.28	0.36	**0.541**	11.74	11.74												

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Subdivision: Trent Kennedy
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STORM DRAINAGE Design Sheet
DATE August 6, 2024
PREPARED BY SAA

Run-off Coefficients

Park	0.25
Single family	0.40
Condo/Towns	0.70
Roads	0.90

Town of Caledon Guidelines

Vmax	4.00 m/s
Vmin	0.75 m/s
Min. Dia	300mm
Capacity	90% max

For 2-yr storm I_2 = 1070 / (t+7.85)^0.8759
For 10-yr storm I_{10} = 2221 / (t+12)^0.9080
For 100-yr storm I_{100} = 4688 / (t+17)^0.9624
*Min time of concentration = 10 mins

Core System	Area No.	Up-stream	Down-stream	Contributing Area (ha)			Breakdown of Areas				Area x Storm Co-eff				C	Total	Cummulative	Time (min)		I_{10}	I_{100}	FLOW Q= 2.78AC I/1000	Flow 100yr	PIPE						
		Node	Node	In Area	Control	Cumul. Total	0.25	0.50	0.70	0.90	0.25	0.50	0.70	0.90		A x C	AxC	Tc (min)	Total			Q_{design}		Length (m)	Size (mm)	Grade (%)	**Capacity (m^3/sec)**	Velocity (m/s)	Time (min)	% Full
Arcadia Road - 100 Year Pipe																														
	60,61,EXT-1	MH33	MH53	2.27	0.00	2.27	1.02	0.12	1.13		0.26	0.06	0.79	0.00	0.49	1.11	1.11	10.0	10.3	134.2	196.5	**0.604**		28.6	750	0.50	**0.787**	1.78	0.27	77%
	62	MH53	MH54	0.03	2.27	2.30				0.03	0.00	0.00	0.00	0.03	0.90	0.03	1.13	10.3	10.4	132.7	194.7	**0.613**		16.2	750	0.50	**0.787**	1.78	0.15	78%
	63	MH54	EXMH	0.05	2.30	2.35				0.05	0.00	0.00	0.00	0.05	0.90	0.05	1.18	10.4	10.7	131.9	193.6	**0.634**		32.1	825	0.50	**1.015**	1.90	0.28	63%
		EXMH	EXMH																					40.7	1050	0.59	**2.097**	2.42	0.28	
	TOTALS			**2.35**	**2.35**		**1.02**	**0.12**	**1.13**	**0.08**	**0.26**	**0.06**	**0.79**	**0.07**	**0.501**	**1.18**	**1.18**													

APPENDIX E

Preliminary Geotechnical Investigation Report

Revised Report on
Preliminary Geotechnical Investigation And Slope Stability Assessment
Proposed Residential Subdivision
12909 Kennedy Road North
Caledon, Ontario

Prepared For:
Trend Developments Inc.
& Trend 12909 Kennedy Developments Inc.

DS CONSULTANTS LTD.
6221 Highway 7, Unit 16
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Project No: 22-371-100-R
Date: January 11, 2023

Table of Contents

1. INTRODUCTION

DS Consultants Ltd. (DS) was retained by Trend Developments Inc. & Trend 12909 Kennedy Developments Inc. to undertake a preliminary geotechnical investigation for the proposed development located at 12909 Kennedy Road North, in the Town of Caledon, Ontario.

It is understood that the proposed development will consist of low-rise house units. A network of underground utilities and roads will be constructed for the proposed development. No design details of the proposed development were available when preparing this report.

A creek was observed running through the north/northeast portion of the site. Slope stability assessment is presented in **Appendix B**.

The purpose of this preliminary geotechnical investigation was to obtain information about the subsurface conditions at twelve (12) borehole locations and from the findings in the boreholes to provide preliminary recommendations pertaining to the geotechnical design of underground utilities, subdivision roads, and to comment on the foundation conditions for general house construction.

This report is provided on the basis of the terms of reference presented above and, on the assumption, that the design will be in accordance with the applicable codes and standards. If there are any changes in the design features relevant to the geotechnical analyses, or if any questions arise concerning the geotechnical aspects of the codes and standards, this office should be contacted to review the design. It may then be necessary to carry out additional borings and reporting before the recommendations of this office can be relied upon.

The site investigation and recommendations follow generally accepted practice for geotechnical consultants in Ontario. Laboratory testing for most part follows ASTM or CSA Standards or modifications of these standards that have become standard practice.

This report has been prepared for Trend Developments Inc. & Trend 12909 Kennedy Developments Inc., and its architect and designers, as well as Review Agencies. Third party use of this report without DS consent is prohibited.

2. FIELD AND LABORATORY WORK

A total of twelve (12) boreholes (BH22-1 to BH22-12, see **Drawing 1** for borehole locations) were drilled to depths ranging from 6.7 to 9.1 m below existing grade.

The boreholes were drilled with solid stem continuous flight augers equipment by a drilling sub-contractor under the direction and supervision of DS personnel. Samples were retrieved at regular intervals with a 50 mm O.D. split-barrel sampler driven with a hammer weighing 624 N and dropping 760 mm in accordance with the Standard Penetration Test (SPT) method. The samples were logged in the field and returned to the DS laboratory for detailed examination by the project engineer and for laboratory testing.

In addition to visual examination in the laboratory, all soil samples were tested for water contents. Selected five (5) soil samples were subjected to grain size analyses and four (4) samples were submitted for Atterberg Limits testing. The results of lab testing are provided on the respective borehole logs and presented on **Drawings 14** and **15**.

Water level observations were made during drilling and in the open boreholes at the completion of the drilling operations. Monitoring wells were installed in six (6) boreholes for the long-term groundwater level monitoring and hydrogeological study.

The elevation surveying of the borehole locations was undertaken by DS personnel, using the differential GPS unit. It should be noted that the elevations at the as-drilled borehole/well locations were not provided by a professional surveyor and should be considered to be approximate. Contractors performing any work referenced to the borehole elevations should confirm the borehole elevations for their work.

3. SUBSURFACE CONDITIONS

The site is a parcel of land situated within a mixed residential and agricultural neighbourhood in the Town of Caledon, Ontario. It is located at the southeast quadrant of Kennedy Road North and Old School Road. A portion of the site near Kennedy Road and about mid-way of the property is occupied by some small structures used for residential and agricultural purposes. The remainder of the site is vacant agricultural land, and a creek is present running through the north/northeast portion of the site.

The borehole location plan is shown on **Drawing 1**. General notes on sample description are provided on **Drawing 1A**. The subsurface conditions in the boreholes are presented in the individual borehole logs presented on **Drawings 2 to 20**.

The following is a summarized account of the subsurface conditions encountered in the boreholes, followed by more detailed descriptions of the major soil strata and the groundwater conditions encountered in the boreholes drilled at the site.

3.1 SOIL CONDITIONS

In summary, underlying the topsoil, weathered/disturbed soils were encountered in all boreholes and extended to depths ranging from about 0.8 m to 1.5 m below existing ground surface. The native soils encountered at the site consisted mainly of clayey silt to silty clay (till) overlain by cohesionless deposits of sandy silt to silty sand, gravelly sand, and sandy silt (till) and/or underlain by sandy silt till at some borehole locations.

Topsoil:

A surficial topsoil layer, ranging in thickness from 200 to 430 mm was encountered at all borehole locations.

It should be noted that the thickness of the topsoil explored at the borehole locations may not be representative for the site and should not be relied on to calculate the amount of topsoil at the site. Shallow test-pits, closely spaced, should be carried out to further explore the topsoil conditions.

Weathered/Disturbed Soils:

Weathered/disturbed soils generally consisting of sandy silt to silty sand were encountered in all boreholes and extended to depths ranging from about 0.8 to 1.5 m below existing ground surface. Some reworked (weathered/disturbed) soils might be fill materials. These materials typically contain trace to some organic matter, trace gravel and trace clay to clayey. Standard penetration tests carried out within the weathered/disturbed sandy silt to silty sand gave N values ranging from 0 to 11 blows per 0.3 m penetration, indicating a very loose to compact relative density.

Silty Sand:

Below weathered/disturbed soils, a cohesionless silty sand deposit was encountered in boreholes BH22-5, BH22-6, and BH22-9 extended to depths ranging from 1.7 to 7.8 m below existing ground surface. The silty sand deposit was present in a loose to compact state, with measured SPT ‘N’ values ranging from 8 to 21 blows per 300 mm of penetration.

Grain size analysis of one (1) soil sample from silty sand deposit (BH22-9/SS3) was conducted and the results are provided on the respective borehole log and on **Drawing 14**, with the following fractions:

Clay:	3%
Silt:	37%
Sand:	60%
Gravel:	0%

Gravelly Sand / Sandy Gravel to Sand and Gravel:

Deposits of gravelly sand and sandy gravel to sand and gravel were encountered below the weathered/disturbed soils in boreholes BH22-1 and BH22-2, below a sandy silt till deposit in boreholes BH22-3 and below the silty sand deposit in BH22-9 and extended to depths ranging from 1.4 to 8.1 m below existing ground surface, i.e., depth explored in BH22-9. The gravelly sand and sandy gravel to sand and gravel deposits were present in a compact to very dense state, with measured SPT ‘N’ values ranging from 14 to over 50 blows per 300 mm of penetration.

Silt:

A deposit of silt material with trace to some sand, trace clay and trace gravel was encountered below the silty sand deposit in borehole BH22-5 and extended to a depth of 2.8 m below existing ground surface. The silt deposit was present in a compact state, with measured SPT ‘N’ values ranging from 16 to 24 blows per 300 mm of penetration.

Upper Sandy Silt to Silty Sand (Till):

Sandy silt to silty sand till deposits were encountered below the gravelly sand in BH22-1 and below the weathered/disturbed soils in BH22-3, BH22-7 and BH22-8 and extended to depths ranging from 1.0 to 2.4 m below existing ground surface. The sandy silt to silty sand till deposits were present in a loose to compact state, with measured SPT ‘N’ values ranging from 6 to 16 blows per 300 mm of penetration.

Clayey Silt to Silty Clay (Till):

Below the upper sandy silt to silty sand till in boreholes BH22-1, BH22-7 and BH22-8, the weathered/disturbed soils in boreholes BH22-4, BH22-8 and BH22-10 to BH22-12, the gravelly sand in boreholes BH22-2 and BH22-3, the silt deposit in borehole BH22-5 and the silty sand deposit in borehole BH22-6, clayey silt to silty clay (till) deposits were encountered and extended to depths ranging from 6.3 to 9.1 m below existing ground surface. Boreholes BH22-1, BH22-3, BH22-4, BH22-5, BH22-6, BH22-8, and BH22-10 to BH22-12 were terminated in the clayey silt to silty (till) deposits. The clayey silt to silty clay (till) deposits were present in a stiff to hard consistency, with measured SPT ‘N’ values ranging from 11 to 61 blows per 300 mm of penetration. Cobbles/boulders were inferred within the till deposits during drilling.

Grain size analyses of four (4) soil samples from clayey silt to silty clay (till) (BH22-1/SS5, BH22-2/SS5, BH22-45/SS6 and BH22-12/SS5) were conducted and the results are provided on the respective borehole logs and on **Drawing 14**, with the following fractions:

Clay:	17 to 22%
Silt:	40 to 55%
Sand:	23 to 35%
Gravel:	3 to 8%

Atterberg limits tests of the above noted same samples (BH22-1/SS5, BH22-2/SS5, BH22-45/SS6 and BH22-12/SS5) were conducted. The results are shown on the borehole logs and on **Drawing 15**, and are summarized as follows:

Liquid limit (W_L):	18.3 to 21.7%
Plastic limit (W_P):	12.1 to 13.4%
Plasticity index (PI):	5.7 to 8.7

Lower Sandy Silt (Till):

A lower sandy silt (till) deposit was encountered below the clayey silt to silty clay till in boreholes BH22-2 and BH22-7 and extended to depths of 9.6 and 6.7 m below existing ground surface, respectively, i.e., depth explored in the two boreholes. The lower sandy silt (till) was present in a compact to very dense state, with measured SPT ‘N’ value ranging from 26 to over 50 blows per 300 mm of penetration.

3.2 GROUNDWATER CONDITIONS

Water was observed during drilling at boreholes BH22-5, BH22-6 and BH22-9 at depths ranging from 1.7 to 4.6 m below existing ground surface.

Monitoring wells were installed in boreholes BH22-1, BH22-2, BH22-4, BH22-10, BH22-11 and BH22-12 for the long-term groundwater level monitoring and hydrogeological study. The groundwater levels in the monitoring wells were measured on November 4, 2022. The groundwater levels measured in the monitoring wells are summarized in **Table 1**. BH22-11 was dry and water levels in the remaining monitoring wells ranged from a depth of 1.91 to 6.10 m below existing ground surface, i.e., Elev. 265.3 to 270.0 m.

Table 1: Summary of Groundwater Level Measurements in Monitoring Wells

Borehole No.	Ground Surface Elev. (m)	Date of Observation	Depth of Groundwater (m)	Elevation of Groundwater (m)
BH22-1	272.1	Nov. 4, 2022	2.10	270.0
BH22-2	271.4	Nov. 4, 2022	6.10	265.3
BH22-4	268.3	Nov. 4, 2022	1.91	266.4
BH22-10	272.6	Nov. 4, 2022	6.10	266.5
BH22-11	272.5	Nov. 4, 2022	dry	Not Applicable
BH22-12	272.3	Nov. 4, 2022	3.47	268.9

Further measurements of groundwater levels in the monitoring wells are recommended.

It should be noted that the groundwater levels can vary and are subject to seasonal fluctuations in response to major weather events.

4. GEOTECHNICAL RECOMMENDATIONS FOR RESIDENTIAL DEVELOPMENT

Based on the borehole information, preliminary geotechnical discussion and recommendations for the proposed development are presented as follows.

4.1 SITE GRADING AND ENGINEERED FILL

The development of the site may require cut and fill operations to meet the design grading plans. In the areas where earth fill is required for the site grading purposes, an engineered fill can be constructed below foundations, roads/driveways, parking lots, etc.

Prior to the placement of engineered fill, all the existing topsoil, fills (if any) and weathered/disturbed native soils must be removed, and the exposed undisturbed native surface proof rolled. Any soft spots revealed during proof rolling must be sub-excavated and re-engineered. The engineered fill consisting of approved inorganic material must be compacted to 100% Standard Proctor Maximum Dry Density (SPMDD) throughout. To reduce the risk of improperly placed engineered compacted fill, full-time supervision of the contractor is essential.

General guidelines and requirements for the placement and preparation of engineered fill are presented on **Appendix A**. Bearing capacity values of 150 kPa at SLS and 225 kPa at ULS can be used on engineered fill, provided that all requirements in **Appendix A** are adhered to. To reduce the risk of improperly placed engineered compacted fill, full-time supervision of the contractor is essential.

The following is a recommended procedure for an engineered fill:

1. Prior to site work involving engineered fill, a site meeting to discuss all aspects must be convened. The surveyor, contractor, design engineer and geotechnical engineer must attend the meeting. At this meeting, the limits of the engineered fill will be defined. The contractor must make known where all fill material will be obtained and samples must be provided to the geotechnical engineer for review, and approval before filling begins.

2. Detailed drawings indicating the lower boundaries as well as the upper boundaries of the engineered fill must be available at the site meeting and be approved by the geotechnical engineer.

3. The building footprint and base of the pad, including basements, garages, etc. must be defined by offset stakes that remain in place until the footings and service connections are all constructed. Confirmation that the footings are within the pad, service lines are in place, and that the grade conforms to drawings, must be obtained by the owner in writing from the surveyor and DS. Without this confirmation no responsibility for the performance of the structure can be accepted by DS. Survey drawing of the pre, and post fill location and elevations will also be required.

4. The area must be stripped of all topsoil and fill materials. Subgrade must be proof-rolled. Soft spots must be dug out. The stripped native subgrade must be examined and approved by a DS engineer prior to placement of fill.

5. The approved engineered fill must be compacted to 100% Standard Proctor Maximum Dry Density throughout. Granular Fill preferred. Engineered fill should not be placed (where it will support footings) during the winter months. Engineered fill compacted to 100% SPMDD will settle under its own weight approximately 0.5% of the fill height and the structural engineer must be aware of this settlement. In addition to the settlement of the fill, additional settlement due to consolidation of the underlying soils from the structural and fill loads will occur.

6. Full-time geotechnical inspection by DS during placement of engineered fill is required. Work cannot commence or continue without the presence of the DS representative.

7. The fill must be placed such that the specified geometry is achieved. Refer to sketches for minimum requirements. Take careful note that the projection of the compacted pad beyond the footing at footing level is a minimum of 2 m. The base of the compacted pad extends 2 m plus the depth of excavation beyond the edge of the footing.

8. Bearing capacity values of 150 kPa at SLS and 225 kPa at ULS may be used provided that all conditions outlined above are adhered to. A minimum footing width of 500 mm (20 inches) is suggested, and footings should be provided with nominal steel reinforcement.

9. All excavations must be done in accordance with the Occupational Health and Safety Regulations of Ontario.

10. After completion of the pad a second contractor may be selected to install footings. All excavations must be backfilled under full time supervision by DS to the same degree as the engineered fill pad. Surface water cannot be allowed to pond in excavations or to be trapped in clear stone backfill. Clear stone backfill can only be used with the approval of DS.

11. After completion of compaction, the surface of the pad must be protected from disturbance from traffic, rain, and frost.

12. If there is a delay in construction, the engineered fill pad must be inspected and accepted by the geotechnical engineer. The location of the structure must be reconfirmed that it remains within the pad.

The native soils free from topsoil and organics to be excavated from cut-areas are considered suitable for re-use as engineered fill, provided that their moisture contents at the time of construction are at or near optimum. Clayey tills are likely to be excavated in cohesive chunks or blocks and will be difficult to compact. They should be pulverized and placed in thin layers not exceeding 150 to 200 mm and compacted using heavy equipment suitable for these types of soils (e.g., heavy sheepsfoot compactors).

4.2 ROADS

The investigation has shown that the predominant subgrade soil, after stripping the topsoil, weathered/disturbed soils and any other organic and otherwise unsuitable subsoil, will generally consist of clayey silt to silty clay (till), sandy silt to silty sand till or cohesionless silty sand, gravelly sand or silt.

Based on the above and assuming that traffic usage will be residential within the sub-division, the following minimum pavement thicknesses are recommended for the local and collector roads to be constructed within the development:

Local Roads:	40 mm HL3 Asphaltic Concrete
	80 mm HL8 Asphaltic Concrete
	150 mm Granular ‘A’ or 130 mm of 19 mm Crusher Run Limestone (CRL)

300 mm Granular ‘B’ or 225 mm of 50 mm Crusher Run Limestone (CRL)

Collector (Access) Roads: 40 mm HL3 HS Asphaltic Concrete

90 mm HL8 Asphaltic Concrete

150 mm Granular ‘A’ or 130 mm of 19 mm Crusher Run Limestone (CRL)

450 mm Granular ‘B’ or 300 mm of 50 mm Crusher Run Limestone (CRL)

Roads and driveway pavements/aprons should be constructed as per the Town of Caledon standards.

The site subgrade and weather conditions (i.e., if wet) at the time of construction may necessitate the placement of thicker granular sub-base layer in order to facilitate the construction. The need for filter fabric/geo-grid can be evaluated during construction stage. Furthermore, heavy construction equipment may have to be kept off the newly constructed roads before the placement of asphalt and/or immediately thereafter, to avoid damaging the weak subgrade by heavy truck traffic.

4.2.1. STRIPPING, SUB-EXCAVATION AND GRADING

Presuming that the conventional practice of cut/fill operation to achieve proposed grades includes all roads, the site should be stripped of all topsoil, fill (if any), disturbed/weathered native and any organic, or otherwise unsuitable soils to the full depth of the roads, both in cut and fill areas. Following stripping, the site should be graded to the subgrade level and approved. The subgrade should then be proof-rolled, in the presence of the Geotechnical Engineer, by at least several passes of a heavy compactor having a rated capacity of at least 8 tonnes. Any soft spots thus exposed should be removed and replaced by select fill material, similar to the existing subgrade soil and approved by the Geotechnical Engineer. The subgrade should then be re-compacted from the surface to at least 98% of its Standard Proctor Maximum Dry Density (SPMDD). The final subgrade should be cambered or otherwise shaped properly to facilitate rapid drainage and to prevent the formation of local depressions in which water could accumulate.

Proper cambering is required to allow the surface water to escape towards the sides, where it can be removed by means of subdrains. Otherwise, any water collected in the granular sub-base materials could be trapped thus causing problems due to softened subgrade, differential frost heave, etc. For the same reason damaging the subgrade during and after placement of the granular materials by heavy construction traffic should be avoided. If the moisture content of the local material cannot be maintained at ±2% of the optimum moisture content, imported granular material may need to be used.

Any fill required for re-grading the site or backfill should be select, clean material, free of topsoil, organic or other foreign and unsuitable matter. The fill should be placed in thin layers and compacted to at least 98% of its SPMDD or as per Town Standards. The compaction of the new fill should be checked by frequent field density tests.

4.2.2. ROAD CONSTRUCTION

Once the subgrade has been inspected and approved, the granular base and sub-base course materials should be placed in layers not exceeding 200 mm (uncompacted thickness) and should be compacted to 100% of their respective SPMDD. The grading of the material should conform to current OPS Specifications.

The placing, spreading and rolling of the asphalt should be in accordance with OPS Specifications or, as required by the local authorities.

Frequent field density tests should be carried out on both the asphalt and granular base and sub-base materials to ensure that the required degree of compaction is achieved.

4.2.3. DRAINAGE

The installation of full-length subdrains is required on all roads. The subdrains should be properly filtered to prevent the loss of (and clogging by) soil fines.

All paved surfaces should be sloped to provide satisfactory drainage towards catch-basins. As discussed in Section 4.2.1, by means of good planning any water trapped in the granular sub-base materials should be drained rapidly towards subdrains or other interceptors.

4.3 SEWERS

As a part of the site development, a network of new sewers will be constructed. The inverts of utility pipes are unknown at the time of preparing this report. For the discussion purpose of this report, the invert of utility pipes is assumed not greater than 4 m below existing grade.

4.3.1. TRENCHING

Excavations can be carried out with heavy hydraulic backhoe. Cobbles and boulders are present at the site as evidence of auger grinding. Provisions should be provided in the contractor documents to deal with the boulders and cobbles encountered at the site.

Groundwater seepage within the clayey silt to silty clay (till) is expected to be slow and manageable by gravity drainage and pumping from filtered sumps. Positive dewatering will be required prior to any excavation in the cohesionless gravelly sand / sandy gravel to sand and gravel, silty sand, sandy silt to silty sand (till) and zone of sandy soils within the clayey silt to silty clay (till) below groundwater table. The groundwater level should be lowered to at least 1 m below the excavation base to maintain the stability of the base and side slopes of the trench excavations in these areas. To minimize any related problems, backfilling operations must follow closely after excavation and pipe installation. Surface water should be directed away from the open excavations. It should be recognized that groundwater and saturated soil levels may be influenced by the effects of precipitation as well as seasonal fluctuations. It is recommended that the construction be carried out during the dry seasons.

DS is currently completing a hydrogeological assessment at the subject site. More comments regarding the type and extent of groundwater control required during construction and permanent drainage will be addressed in our hydrogeological report.

All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). In accordance with OHSA, any fill, weathered/disturbed native and firm to stiff clayey silt to silty clay (till) can be classified as Type 3 Soil above groundwater table and Type 4 Soil below groundwater table. Very stiff to hard clayey silt to silty clay (till) deposits can be classified as Type 2 Soil above groundwater table and Type 3 Soil below groundwater table. Cohesionless silty sand, gravelly sand/sandy gravel to sand and gravel, and sandy silt to silty sand (till) can be classified as Type 3 Soil above groundwater table and Type 4 Soil below groundwater table.

The sides of excavations in the natural strata can be expected to be temporarily stable at relatively steep side slopes above the groundwater table for short periods of time but they should be cut back at slopes no steeper than 1V:1.5H in weathered/disturbed native soil or fill (if any) material and 1V:1H in clayey silt/silty clay till in order to comply with the safety regulations. The OHSA stipulates that any excavation deeper than 1.2 m must be shored or cut back at a slope of 1V:1H or flatter, depending on the soil type and groundwater conditions.

It should be noted that the till is a non-sorted sediment and therefore contain cobble and boulders. Possible obstructions may be present in any areas that have been filled. Provisions must be made in the excavation contract for the removal of possible boulders in the till and obstructions in the fill material.

4.3.2. BEDDING

The undisturbed native soils and/or engineered fill will provide adequate support for the sewer pipes and allow the use of normal Class B type bedding. The bedding should conform to the current Ontario Provincial Standard specifications (OPSS 401/OPSD 802) and/or standards set by the local municipality.

The recommended minimum thickness of Class B bedding below the invert of the pipes is 150 mm. The thickness of the bedding may, however, have to be increased depending on the pipe diameter or in accordance with local standards or if wet or weak subgrade conditions or fill materials are encountered at the trench base level. The bedding material should consist of well-graded granular material such as Granular ‘A’ or equivalent.

After installing the pipe on the bedding, a granular surround of approved bedding material, which extends at least 300 mm above the obvert of the pipe, or as set out by the local Authority, should be placed.

To avoid the loss of soil fines from the subgrade, uniformly graded clear stone should not be used unless, below the granular bedding material, a suitable, approved filter fabric (geotextile) is placed. The geotextile should extend along the sides of the trench and should be wrapped all around the uniformly graded bedding material.

4.3.3. BACKFILLING OF TRENCHES

Based on visual and tactile examination, the existing weathered/disturbed native material free from topsoil/organics and undisturbed native soils can be reused as backfill material provided its water content is within 2 percent of optimum moisture content. Significant aeration of the wet excavated soils will be required prior to their use as backfill material.

The clayey deposits especially when its consistency is hard is likely to be excavated in cohesive chunks or blocks and will be difficult to compact in confined areas. For use as backfill, the clayey material will have to pulverized and placed in thin layers. The clayey soils will have to be compacted using heavy equipment suitable for these soils which may be difficult to operate in the narrow confines of the trenches. Unless the clayey materials are properly pulverized and compacted in sufficiently thin lifts post-construction settlements could occur. Their use in narrow trenches such as laterals (where heavy compaction equipment cannot be operated) may not be feasible.

Loose lifts of soil, which are to be compacted, should not exceed 200 mm. Depending on the time of construction and weather, some excavated material may be too wet to compact and will require aeration prior to its use.

The backfill should be placed in maximum 200 mm thick layers at or near (±2%) their optimum water content and each layer should be compacted to at least 95% SPMDD. In the upper 1.0 m of the subgrade, underneath the road base, the compaction should be increased to 98% SPMDD. Unsuitable materials such as organic soils, boulders, cobbles, frozen soils, etc. should not be used for backfilling.

Granular B material should be used as backfill for trenches located under slab on grade or paved areas. Compaction of the granular soils should be carried out with vibratory compactors and loose lifts not exceeding about 200 mm.

Imported granular fill, which can be compacted with handheld equipment, should be used in confined areas.

The excavated soils are not considered to be free draining. Where free draining backfill is required, imported granular fill such as OPSS Granular B should be used.

It should be noted that the excavated soils are subject to moisture content increase during wet weather which would make these materials too wet for adequate compaction. Stockpiles should be compacted at the surface or be covered with tarpaulins to minimize moisture uptake.

cannot be reused as foundation or trench backfill material.

4.3.4. ANTI SEEPAGE COLLARS/TRENCH PLUGS

For pipes installed under the groundwater table, seepage between the trench backfill material and the trench wall may cause erosion of the backfill materials. it is recommended that nominal anti-seepage collars (maximum spacing 50 m) be provided to prevent erosion of the backfill materials. Anti seepage collar should not be located at pipe joint.

The anti-seepage collar may consist of a clay plug surrounding the sewer pipe. A typical clay plug will be about 1 m thick and extends laterally to a minimum distance of 0.5 m from the pipe circumference with a minimum of 0.3 m embedment into the shale or native sub-grade. Typical (not to scale) anti-seepage collar conceptual detail is provided on **Drawing 16.**

The on-site native clayey soils may be suitable for such purpose subject to additional sampling and testing.

4.3.5. THRUST BLOCKS AND JOINT RESTRAINTS

An allowable (or SLS) bearing resistance of 150 kPa and factored ULS bearing resistance of 225 kPa can be used in the design of thrust blocks constructed on undisturbed native soils or engineered fill.

4.4 FOUNDATION CONDITIONS

It is understood that the proposed subdivision will consist of single-family homes with a basement. The finish floor elevations of these proposed houses were not known to us at the time of writing this report.

The boreholes show that provided the foundation soil is undisturbed during the construction, in general, bearing capacity values of 150 kPa at SLS (Serviceability Limit State), and 225 kPa at ULS (Ultimate Limit State) are feasible on the undisturbed inorganic natural (native) soils below any fill (if any) and weathered/disturbed soil. These values would be suitable for the use of normal spread footing foundations to support normal single-family dwellings. All footings must be founded below the weathered/disturbed soils and any loose or soft soils.

Where the grade needs to be raised, the proposed structures can be supported by spread and strip footings founded on engineered fill for bearing capacity values of 150 kPa at SLS (Serviceability Limit State), and for a factored geotechnical resistance of 225 kPa at ULS (Ultimate Limit State). The engineered fill supporting footings should be constructed in accordance with the guidelines presented in **Appendix A** and in Section 4.1.

Variations in the soil conditions are expected in between the borehole locations, and during construction, the soil bearing pressures should be confirmed by the Geotechnical Engineer.

Foundations designed to the specified bearing capacities at the serviceability limit states (SLS) are expected to settle less than 25 mm total and 19 mm differential.

All footings exposed to seasonal freezing conditions must have at least 1.4 metres of soil cover for frost protection.

Where it is necessary to place footings at different levels, the upper footing must be founded below an imaginary 10 horizontal to 7 vertical line drawn up from the base of the lower footing. The lower footing must be installed first to help minimize the risk of undermining the upper footing.

It should be noted that the recommended bearing capacities have been calculated by DS from the borehole information for the design stage only. The investigation and comments are necessarily on-going as new information of the underground conditions becomes available. For example, more specific information is available with respect to conditions between boreholes when foundation construction is underway. The interpretation between boreholes and the recommendations of this report must therefore be checked through field inspections provided by DS to validate the information for use during the construction stage.

4.5 EARTH PRESSURES

The lateral earth pressures acting on retaining walls or underground structures may be calculated from the following expression:

$$p = k(\gamma\ h + q)$$

where, p = Lateral earth pressure in kPa acting at depth h

K = Earth pressure coefficient, assumed to be 0.40 for vertical walls and horizontal backfill for permanent construction

γ = Unit weight of backfill, a value of 21 kN/m^3 may be assumed

h = Depth to point of interest in metres

q = Equivalent value of surcharge on the ground surface in kPa

The above expression assumes that the perimeter drainage system prevents the build up of any hydrostatic pressure behind the wall.

4.6 STORMWATER MANAGEMENT POND

It is understood that a storm water management pond will be constructed for the proposed subdivision. Two boreholes BH22-1 and BH22-2 were drilled to a depth of 8.2 and 9.6 m below existing ground surface, respectively in the area of the proposed pond.

The pond design grades are not available at this stage. Due to the variable soil conditions and the presence of different types of soils at different depths, recommendations will be provided at a later stage including the clay liner recommendations, if required, when design information is available.

Based on the subsurface conditions encountered in boreholes BH22-1 and BH22-2 and subject to design grades, the soils at the pond sides and base after removing the existing weathered/disturbed native materials will consist of gravelly sand, sandy silt till and clayey silt/silt till. The groundwater levels measured in the monitoring wells within the pond areas ranged from 2.10 (BH22-1) to 6.10 m (BH22-2) below the existing grade, corresponding to Elevations 270.0 and 265.3 m, in boreholes BH22-1 and BH22-2, respectively. Further measurements of groundwater levels in the monitoring wells are recommended.

Where the pond bottom and sides consist of cohesionless (sandy) soils, a clay liner will be required to retain water in the pond. The required thickness and uplift stability of the liner must be estimated and analyzed when the design information for the pond is available.

Dewatering system will be required for excavations below groundwater levels, subject to depth of excavations and type of soils encountered, to be confirmed during design stage.

Anti-seepage collars should be considered for outlet works that direct flow out of the SWM pond as these outlet works are subject to hydraulic heads directly from the pond. The provision of anti-seepage collars would increase the seepage path along the outlet works and therefore reduce the quantity of potential seepage.

5. SLOPE STABILITY ASSESSMENT

Slope stability assessment for the site is presented in the letter report attached in **Appendix B**.

6. GENERAL COMMENTS AND LIMITATIONS OF REPORT

DS Consultants Ltd. (DS) should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, DS will assume no responsibility for interpretation of the recommendations in the report.

This report is intended solely for the Client named. The material in it reflects our best judgment in light of the information available to DS at the time of preparation. Unless otherwise agreed in writing by DS, it shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. No portion of this report may be used as a separate entity, it is written to be read in its entirety.

The conclusions and recommendations given in this report are based on information determined at the test hole locations. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the test holes may differ from those encountered at the test hole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the test hole locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of test holes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. DS accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.

We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

DS CONSULTANTS LTD

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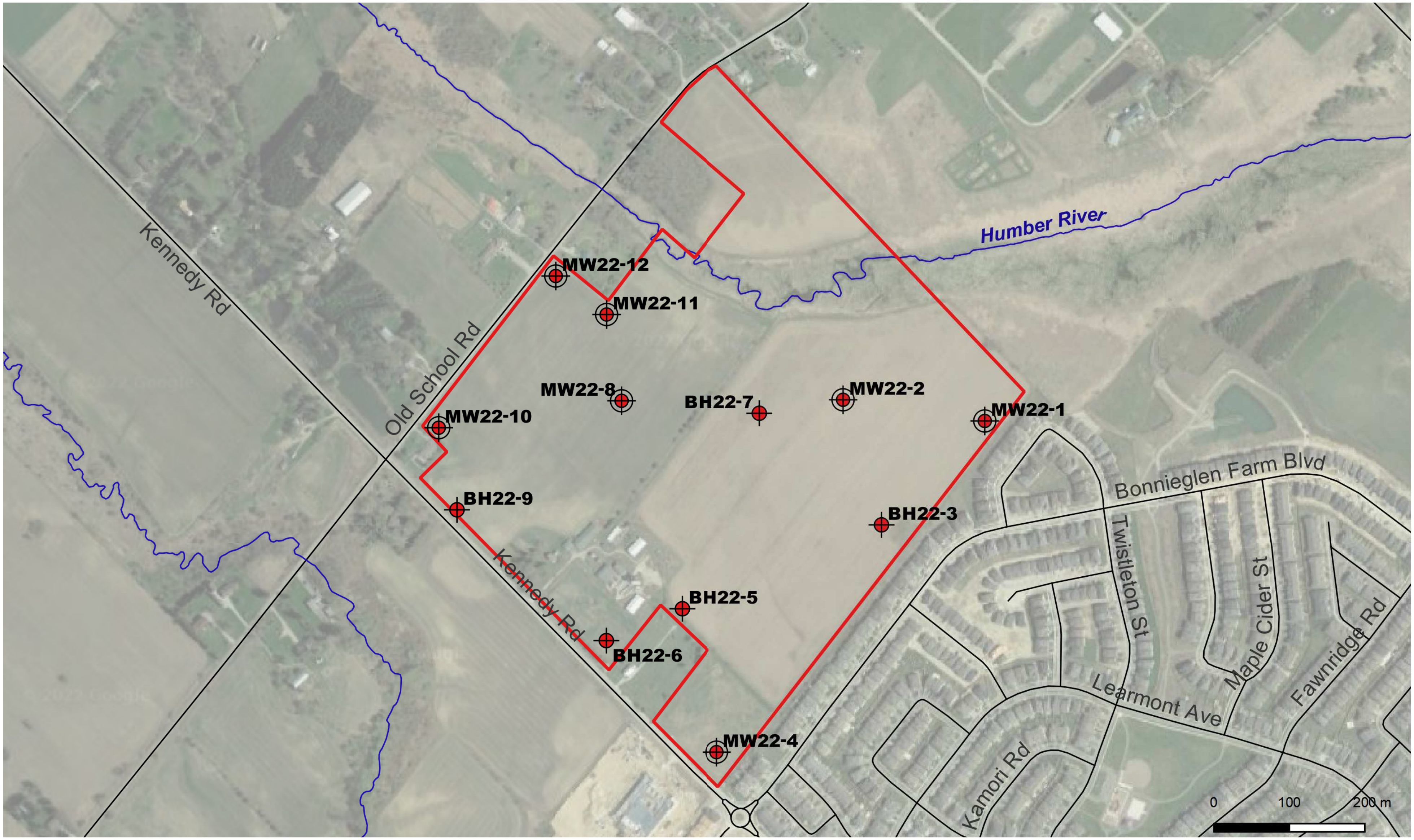
Drawings

J:\-GIS\2022 PROJECTS\22-371-100 12909 Kennedy Road, Caledon\1-QGIS\Geo\Drawing 1 – Borehole and Monitoring Well Locations.qgs Jan-11 15:49



Legend

▭ Russell Property Boundary

⊕ Borehole

⊕ Monitoring Well

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Project: GEOTECHNICAL INVESTIGATION
12909 Kennedy Road, Caledon, ON

Title: **BOREHOLE AND MONITORING WELL LOCATIONS**

N

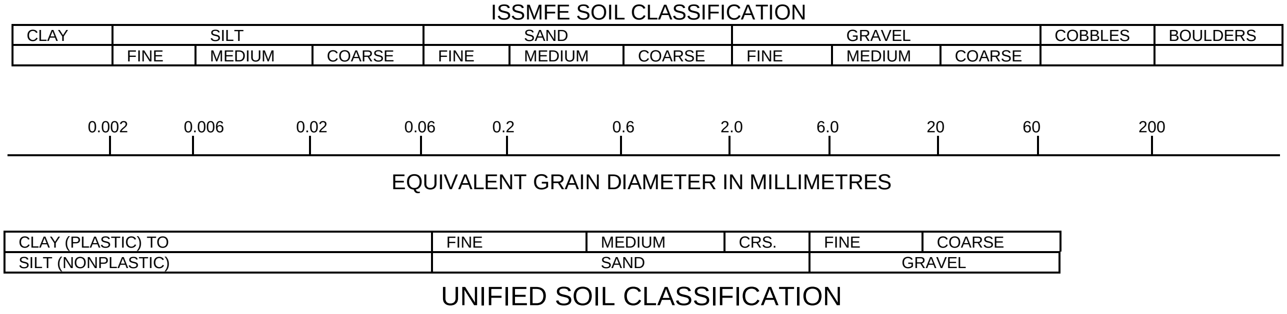
Client: TRENDS DEVELOPMENTS INC. &
TREND 12909 KENNEDY
DEVELOPMENTS INC.

Size: 8.5 x 11	Approved By:	O.B	Drawn By:	S.Y / P.P.	Date:	January 2023
Rev: 0	Scale:	As Shown	Project No.:	22-371-100	Drawing No.:	1

Image/Map Source: *Google Satellite Image*

Drawing 1A: Notes On Sample Descriptions

1. All sample descriptions included in this report generally follow the Unified Soil Classification. Laboratory grain size analyses provided by DS also follow the same system. Different classification systems may be used by others, such as the system by the International Society for Soil Mechanics and Foundation Engineering (ISSMFE). Please note that, with the exception of those samples where a grain size analysis and/or Atterberg Limits testing have been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.



2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional preliminary geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

LOG OF BOREHOLE BH22-1

1 OF 1

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846306.45 E 594064.95

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-27-2022

REF. NO.: 22-371-100
ENCL NO.: 2

SOIL PROFILE

(m) ELEV / DEPTH	DESCRIPTION
272.1 0.0	**TOPSOIL:** 200mm
271.9 0.2	**WEATHERED/DISTURBED SOIL:** sandy silt, trace clay, trace rootlets, trace gravel, brown, moist, loose
271.3 0.8	**GRAVELLY SAND:** trace silt, angular pieces of gravel, brown, moist, compact
270.5 1.6	**SANDY SILT TILL:** trace clay, trace gravel, brown, moist, compact
269.7 2.4	**CLAYEY SILT TO SILTY CLAY TILL:** some sand to sandy, trace gravel, grey, moist, very stiff
263.9 8.2	**END OF BOREHOLE:**

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date: Water Level(mbgl):
Nov. 4, 2022 2.1

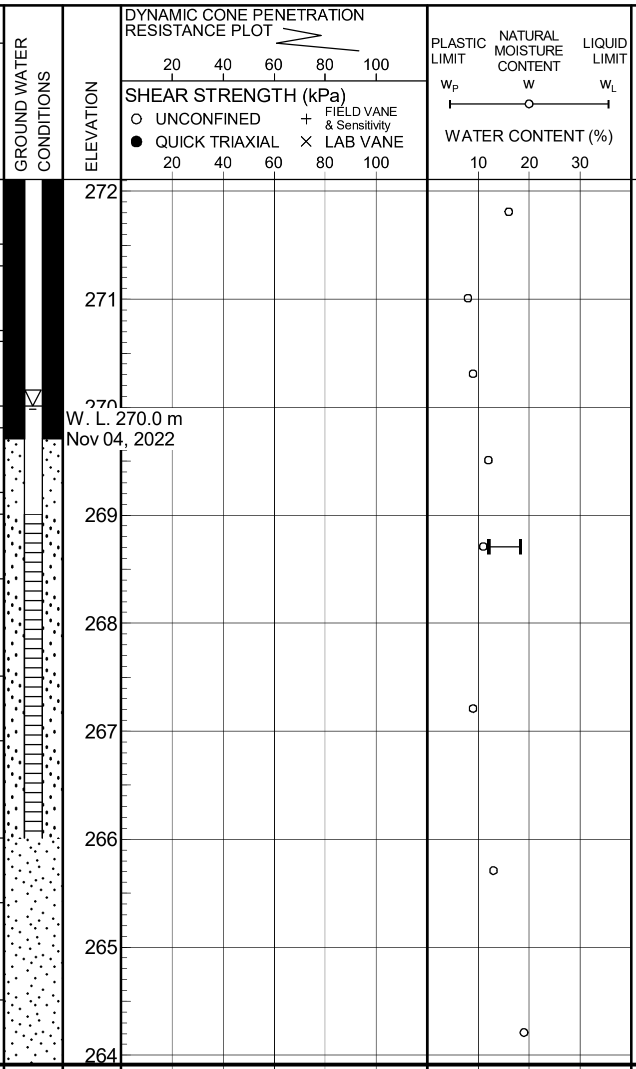
SAMPLES

NUMBER	TYPE	"N" BLOWS / 0.3 m	GR	SA	SI	CL
1	SS	7				
2	SS	14				
3	SS	16				
4	SS	29				
5	SS	27	8	35	40	17
6	SS	24				
7	SS	21				
8	SS	16				

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m^3)



GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
$+^3, \times^3$: Numbers refer to Sensitivity
○ ^{8}=3% Strain at Failure

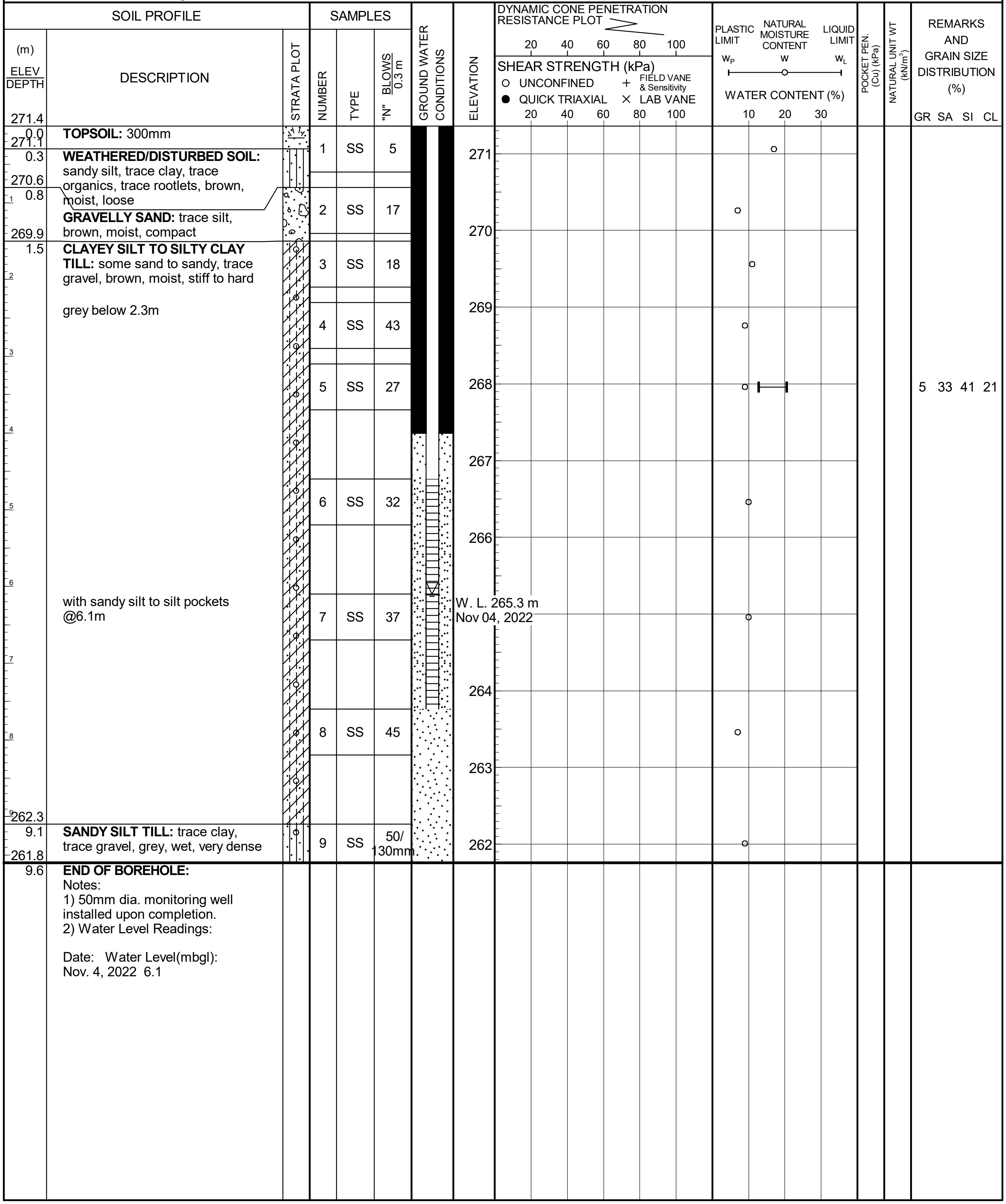
DS SOIL LOG-2021-FINAL 22-371-100 GEO COPY.GPJ DS.GDT 23-1-11

LOG OF BOREHOLE BH22-2

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846290.7 E 593872.09

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-27-2022

REF. NO.: 22-371-100
ENCL NO.: 3



ELEV (m) / DEPTH	DESCRIPTION
271.4	
0.0	**TOPSOIL:** 300mm
271.1 0.3	**WEATHERED/DISTURBED SOIL:** sandy silt, trace clay, trace organics, trace rootlets, brown, moist, loose
270.6 0.8	**GRAVELLY SAND:** trace silt, brown, moist, compact
269.9 1.5	**CLAYEY SILT TO SILTY CLAY TILL:** some sand to sandy, trace gravel, brown, moist, stiff to hard grey below 2.3m with sandy silt to silt pockets @6.1m
262.3 9.1	**SANDY SILT TILL:** trace clay, trace gravel, grey, wet, very dense
261.8 9.6	**END OF BOREHOLE:**

NUMBER	TYPE	"N" BLOWS/0.3 m	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
1	SS	5	
2	SS	17	
3	SS	18	
4	SS	43	
5	SS	27	5 33 41 21
6	SS	32	
7	SS	37	
8	SS	45	
9	SS	50/130mm	

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date: Water Level(mbgl):
Nov. 4, 2022 6.1

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
$+^3, \times^3$: Numbers refer to Sensitivity
○ ^{8}=3% Strain at Failure

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH22-3

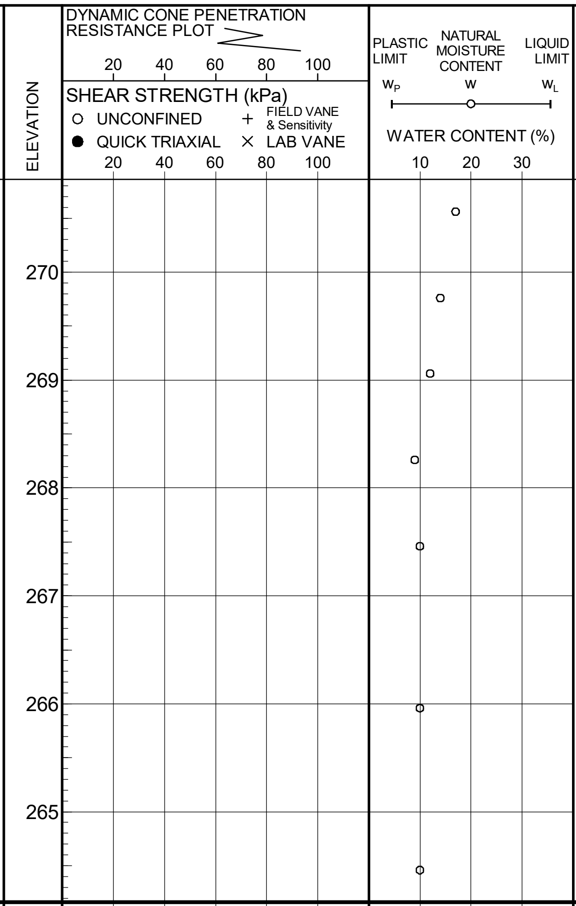
1 OF 1

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846159.17 E 593933.78

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-27-2022

REF. NO.: 22-371-100
ENCL NO.: 4

(m) ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3 m
270.9 0.0	**TOPSOIL:** 350mm	1	SS	7
270.5 0.4	**WEATHERED/DISTURBED SOIL:** sandy silt, trace clay, trace organics, trace rootlets, brown, moist, loose			
270.1 0.8	**SANDY SILT TO SILTY SAND TILL:** trace clay, trace gravel, brown, moist, compact	2	SS	15
269.5 1.4	**GRAVELLY SAND:** trace silt, brown, moist, compact	3	SS	13
269.2 1.7	**CLAYEY SILT TO SILTY CLAY TILL:** some sand to sandy, trace gravel, occasional cobble, brown, moist, stiff to hard grey below 2.3m	4 5 6 7	SS SS SS SS	32 28 31 32
264.2 6.7	**END OF BOREHOLE:** Notes: 1) Auger grinding @ 4.6m due to possible cobble/boulder. 2) No water observed in borehole upon completion of drilling.			



POCKET PEN. (Cu) (kPa) | NATURAL UNIT WT (kN/m³) | REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

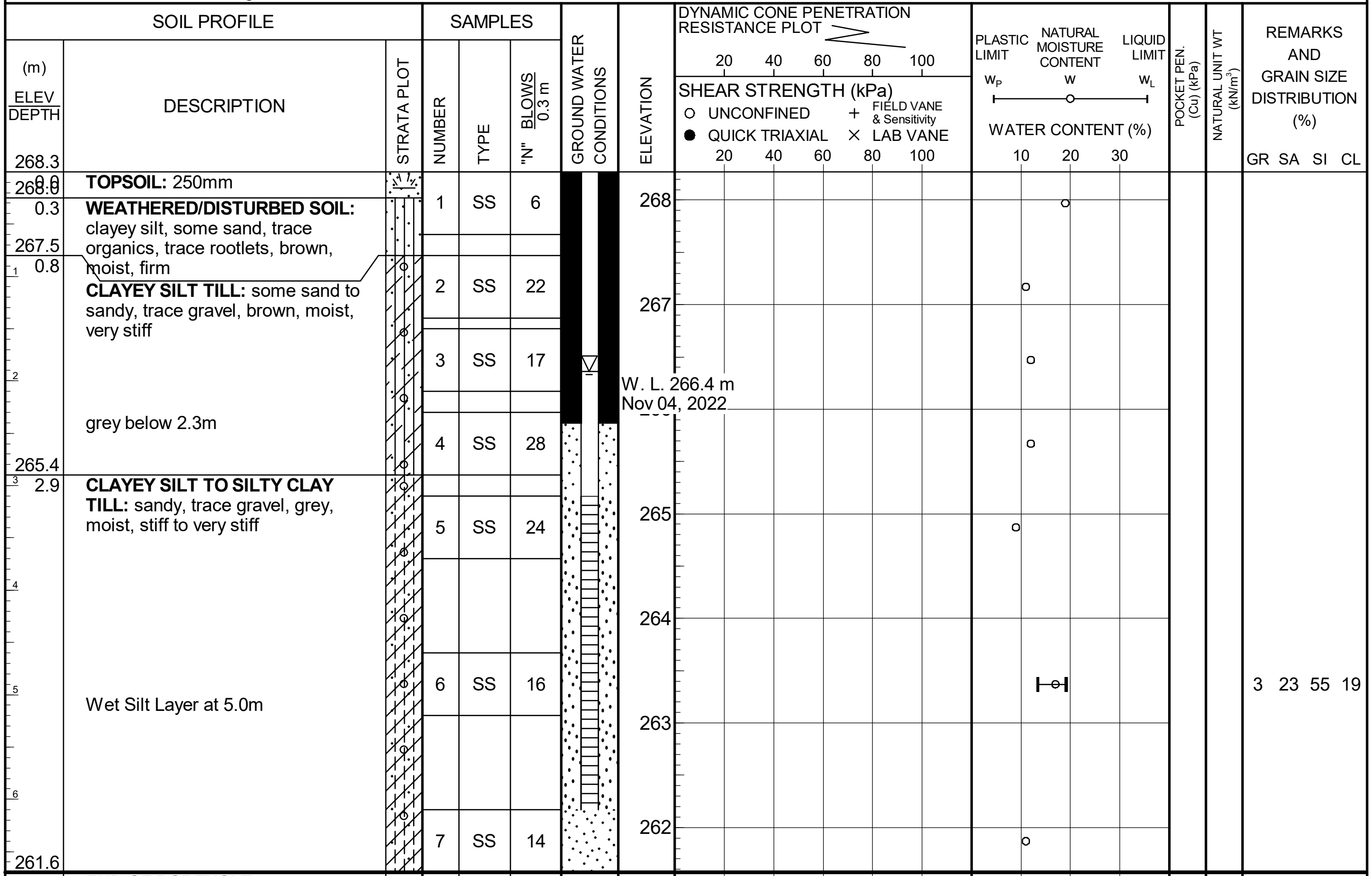
GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ 8=3% Strain at Failure

LOG OF BOREHOLE BH22-4

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4845863.99 E 593715.76

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-28-2022

REF. NO.: 22-371-100
ENCL NO.: 5



(m) ELEV DEPTH	DESCRIPTION	SAMPLE NUMBER	TYPE	"N" BLOWS 0.3 m	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
268.3 0.0	**TOPSOIL:** 250mm	1	SS	6	
268.0 0.3	**WEATHERED/DISTURBED SOIL:** clayey silt, some sand, trace organics, trace rootlets, brown, moist, firm				
267.5 0.8	**CLAYEY SILT TILL:** some sand to sandy, trace gravel, brown, moist, very stiff	2	SS	22	
		3	SS	17	
	grey below 2.3m	4	SS	28	
265.4 2.9	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, grey, moist, stiff to very stiff	5	SS	24	
	Wet Silt Layer at 5.0m	6	SS	16	3 23 55 19
		7	SS	14	
261.6 6.7	**END OF BOREHOLE:**				

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date: Water Level(mbgl):
Nov. 4, 2022 1.91

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
$+^3$, $\times^3$: Numbers refer to Sensitivity
○ ^{8}=3% Strain at Failure

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LOG OF BOREHOLE BH22-5

1 OF 1

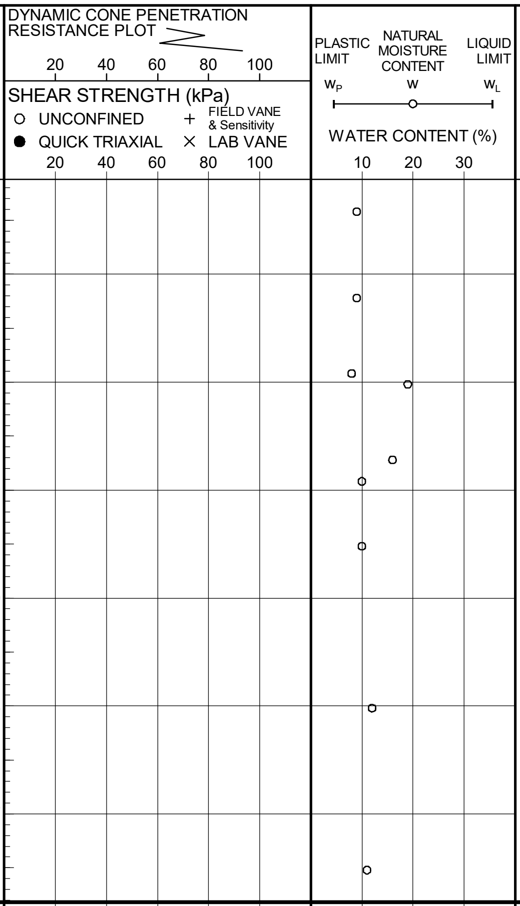
PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846054.38 E 593671.47

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-27-2022

REF. NO.: 22-371-100
ENCL NO.: 6

ELEV (m)	DEPTH (m)	DESCRIPTION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
272.9	0.0	**TOPSOIL:** 230mm	
272.7	0.2	**WEATHERED/DISTURBED SOIL:** sandy silt to silty sand, trace clay, trace organics, trace rootlets, brown, moist, loose	
271.9	1.0	**SILTY SAND:** trace clay, trace gravel, brown, moist, loose to compact	
271.2	1.7	**SILT:** trace to some sand, trace clay, trace gravel, brown, wet, compact grey, fine sand pockets@2.3m	
270.1	2.8	**CLAYEY SILT TO SILTY CLAY TILL:** some sand, trace gravel, occasional cobble, grey, moist, very stiff	Auger grinding, possible cobble/boulder
266.2	6.7	**END OF BOREHOLE:** Notes: 1) Water encountered at 1.7 m depth during drilling.	

SAMPLES NUMBER	TYPE	"N" BLOWS/0.3 m
1	SS	6
2	SS	8
3	SS	16
4	SS	24
5	SS	18
6	SS	19
7	SS	18



GROUND WATER CONDITIONS | POCKET PEN. (Cu) (kPa) | NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES + ³, × ³: Numbers refer to Sensitivity ○ ⁸=3% Strain at Failure

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LOG OF BOREHOLE BH22-6

1 OF 1

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846011.11 E 593571.54

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-28-2022

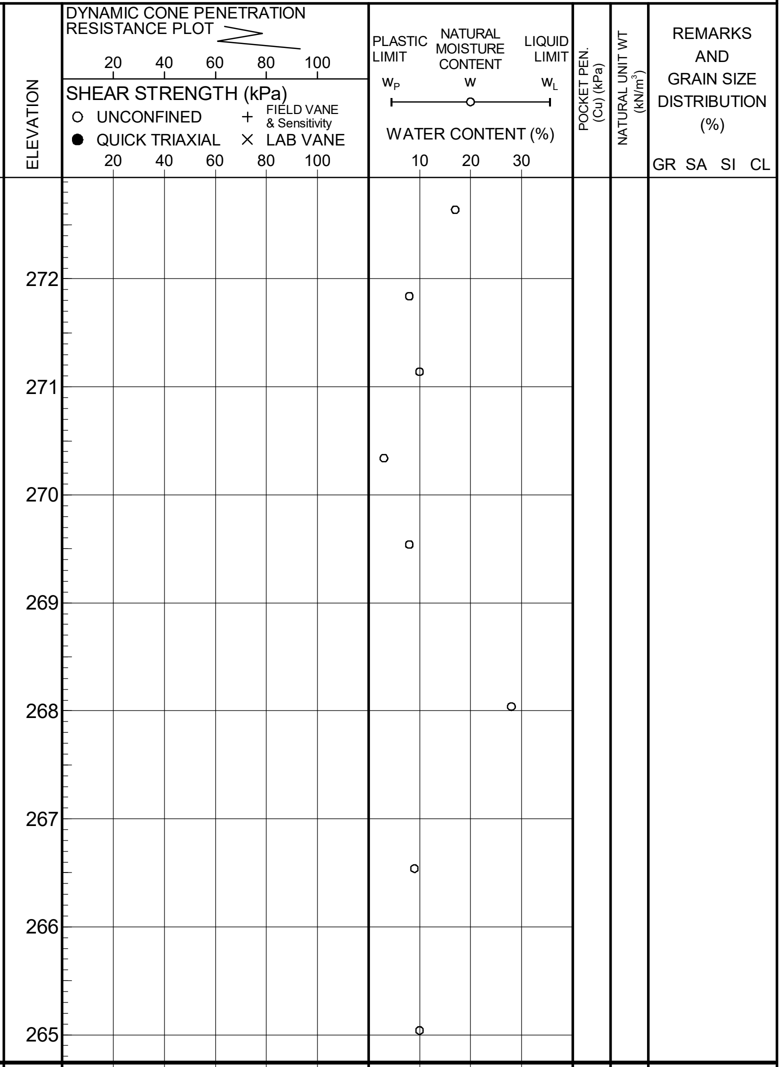
REF. NO.: 22-371-100
ENCL NO.: 7

SOIL PROFILE

(m) ELEV DEPTH	DESCRIPTION
272.9	
0.0	**TOPSOIL:** 330mm
272.6 0.3	**WEATHERED/DISTURBED SOIL:** silty sand, trace clay, trace organics, trace rootlets, brown to orange brown, moist, very loose to loose
271.4 1.5	**SILTY SAND:** trace clay, brown, moist, loose to compact saturated at 4.6m
266.8 6.1	**CLAYEY SILT TO SILTY CLAY TILL:** some sand, trace gravel, occasional cobbles, grey, moist, hard
264.7 8.2	**END OF BOREHOLE:** 1) Water encountered at 4.6 m depth during drilling.

SAMPLES

NUMBER	TYPE	"N" BLOWS / 0.3 m
1	SS	5
2	SS	0
3	SS	9
4	SS	14
5	SS	14
6	SS	8
7	SS	30
8	SS	34



GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES +³, ×³: Numbers refer to Sensitivity ○ ³=3% Strain at Failure

LOG OF BOREHOLE BH22-7

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846267 E 593724.46

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-27-2022

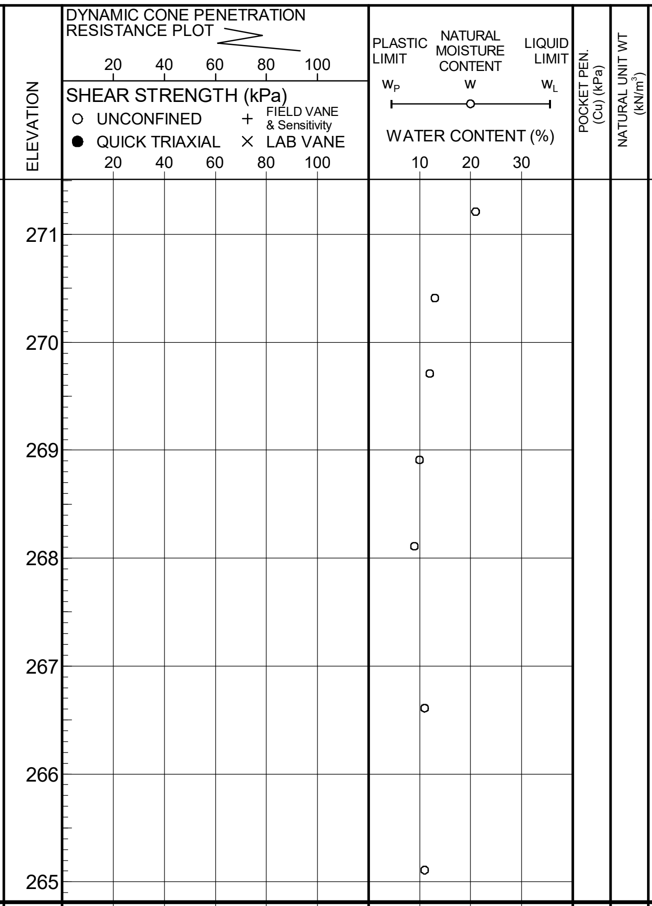
REF. NO.: 22-371-100
ENCL NO.: 8

SOIL PROFILE

(m) ELEV DEPTH	DESCRIPTION
271.5	
0.0	**TOPSOIL:** 430mm
271.1 0.4	**WEATHERED/DISTURBED SOIL:** sandy silt, trace clay, trace rootlets, brown, moist, loose
270.7 0.8	**SILTY SAND TO SANDY SILT TILL:** trace clay, trace gravel, brown, moist, loose
270.3 1.2	**CLAYEY SILT TO SILTY CLAY TILL:** some sand, occasional sand pockets, occasional cobbles, brown, moist, very stiff to hard grey below 2.3m
265.2 6.3	**SANDY SILT TILL:** some clay to clayey, trace gravel, grey, moist, compact
264.8 6.7	**END OF BOREHOLE:** Notes: 1) No water observed in borehole upon completion of drilling.

SAMPLES

NUMBER	TYPE	"N" BLOWS/0.3 m	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
1	SS	9	
2	SS	6	
3	SS	22	
4	SS	33	
5	SS	25	Auger grinding @3.0m due to cobble/boulder
6	SS	21	
7	SS	26	



GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES $+^3, \times^3$: Numbers refer to Sensitivity ○ ^{8}=3% Strain at Failure

LOG OF BOREHOLE BH22-8

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846277.26 E 593579.21

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-27-2022

REF. NO.: 22-371-100
ENCL NO.: 9

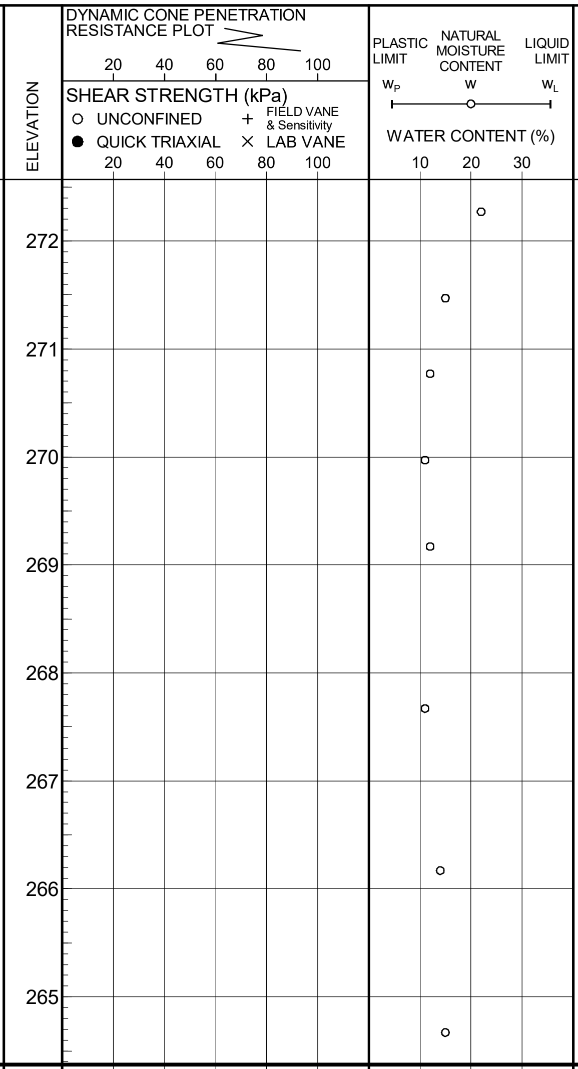
SOIL PROFILE

(m) ELEV / DEPTH	DESCRIPTION
272.6	
0.0	**TOPSOIL:** 300mm
272.3 0.3	**WEATHERED DISTURBED SOIL:** sandy silt, trace clay, trace rootlets, trace gravel, brown, moist, loose
271.8 0.8	**SILTY SAND TO SANDY SILT TILL:** trace clay, trace gravel, brown, moist, compact
271.6 1.0	**CLAYEY SILT TO SILTY CLAY TILL:** some sand, trace gravel, brown, moist, stiff to very stiff grey below 2.9m
264.4 8.2	**END OF BOREHOLE:** Notes: 1) No water observed in borehole upon completion of drilling.

SAMPLES

NUMBER	TYPE	"N" BLOWS / 0.3 m
1	SS	5
2	SS	15
3	SS	14
4	SS	17
5	SS	11
6	SS	11
7	SS	12
8	SS	18

GROUND WATER CONDITIONS



POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+³, ×³: Numbers refer to Sensitivity
○ ⁸=3% Strain at Failure

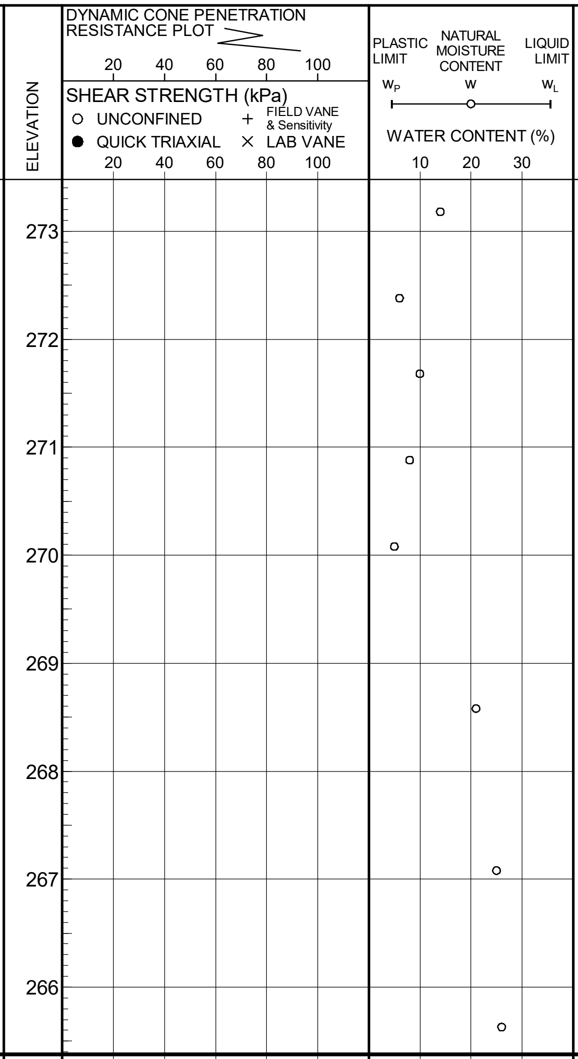
LOG OF BOREHOLE BH22-9

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846189.91 E 593373.22

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-28-2022

REF. NO.: 22-371-100
ENCL NO.: 10

SOIL PROFILE (m) ELEV DEPTH	DESCRIPTION	SAMPLES NUMBER	TYPE	"N" BLOWS/0.3 m	GROUND WATER CONDITIONS	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
273.5						
273.2 0.0	**TOPSOIL:** 250mm					
0.3	**WEATHERED/DISTURBED SOIL:** silty sand, trace clay, trace organics, trace rootlets, brown, moist, loose	1	SS	5		
272.7 0.8	**SILTY SAND:** trace clay, brown, moist, loose to compact	2	SS	12		
		3	SS	9		0 60 37 3
		4	SS	14		
		5	SS	18		
	wet below 4.6m	6	SS	21		
		7	SS	10		
265.7 7.8	**SANDY GRAVEL TO SAND AND GRAVEL:** trace silt, brown, wet, very dense	8	SS	50/130mm		
265.4 8.1	**END OF BOREHOLE:** Notes: 1) Water encountered at 4.6 m depth during drilling.					



POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

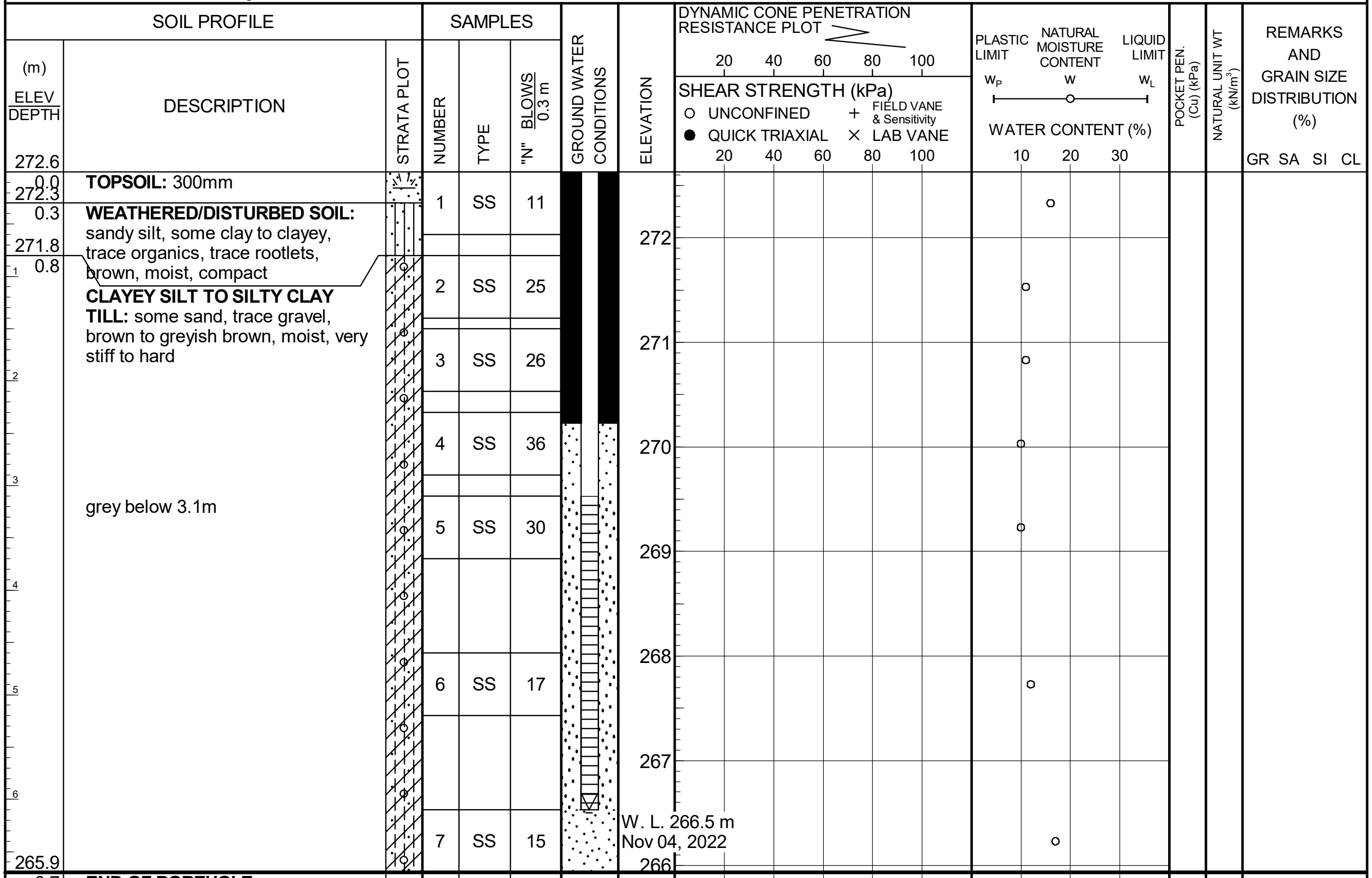
GRAPH NOTES $+^3, \times^3$: Numbers refer to Sensitivity
○ ^{8}=3% Strain at Failure

LOG OF BOREHOLE BH22-10

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846287.34 E 593341.04

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-28-2022

REF. NO.: 22-371-100
ENCL NO.: 11



ELEV DEPTH	DESCRIPTION
272.6	
0.0	**TOPSOIL:** 300mm
272.3 0.3	**WEATHERED/DISTURBED SOIL:** sandy silt, some clay to clayey, trace organics, trace rootlets, brown, moist, compact
271.8 0.8	**CLAYEY SILT TO SILTY CLAY TILL:** some sand, trace gravel, brown to greyish brown, moist, very stiff to hard grey below 3.1m
265.9 6.7	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Nov. 4, 2022 6.1

NUMBER	TYPE	"N" BLOWS/0.3 m
1	SS	11
2	SS	25
3	SS	26
4	SS	36
5	SS	30
6	SS	17
7	SS	15

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
$+^3, \times^3$: Numbers refer to Sensitivity
○ ^{8}=3% Strain at Failure

LOG OF BOREHOLE BH22-11

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846440.01 E 593561.37

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-28-2022

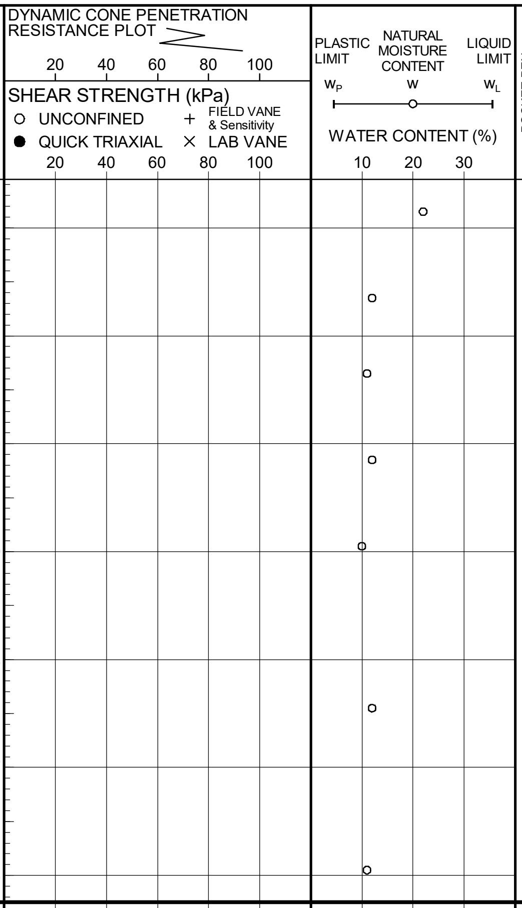
REF. NO.: 22-371-100
ENCL NO.: 12

SOIL PROFILE

(m) ELEV DEPTH	DESCRIPTION
272.5	
272.2 0.0	**TOPSOIL:** 250mm
0.3	**WEATHERED/DISTURBED SOIL:** sandy silt, trace clay, trace organics, trace rootlets, brown, moist, loose
271.7 0.8	**CLAYEY SILT TO SILTY CLAY TILL:** some sand, trace gravel, brown, moist, very stiff to hard greyish brown@3.1m grey below 4.6m
265.8 6.7	**END OF BOREHOLE:**

SAMPLES

NUMBER	TYPE	"N" BLOWS / 0.3 m
1	SS	4
2	SS	17
3	SS	21
4	SS	22
5	SS	34
6	SS	25
7	SS	18



POCKET PEN. (Cu) (kPa) | NATURAL UNIT WT (kN/m³) | REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date: Water Level(mbgl):
Nov. 4, 2022 dry

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

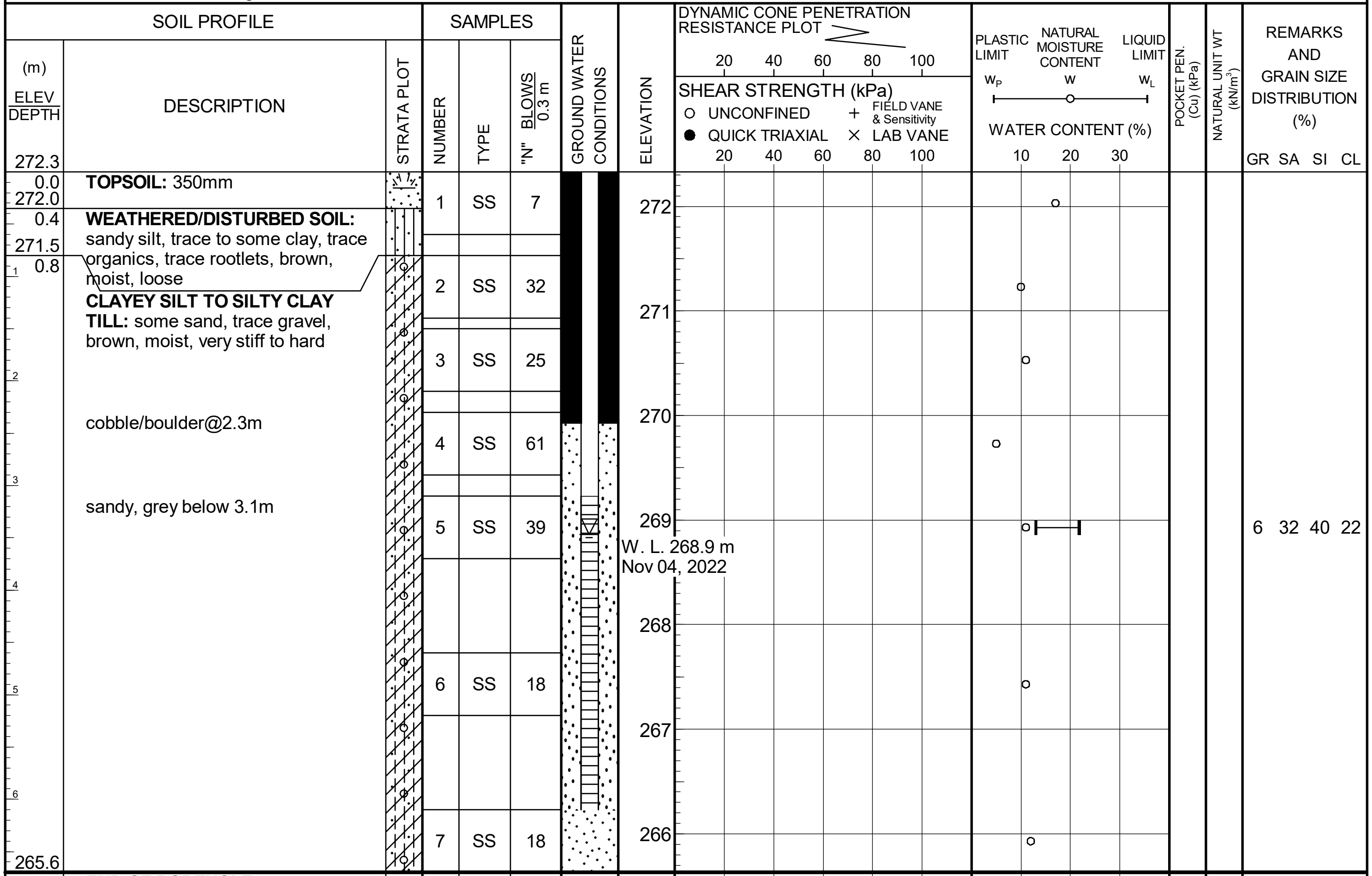
GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity
○ 8=3% Strain at Failure

LOG OF BOREHOLE BH22-12

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846489.9 E 593493.3

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-28-2022

REF. NO.: 22-371-100
ENCL NO.: 13



(m) ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3 m	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
272.3							
0.0	**TOPSOIL:** 350mm	1	SS	7			
272.0 0.4	**WEATHERED/DISTURBED SOIL:** sandy silt, trace to some clay, trace organics, trace rootlets, brown, moist, loose						
271.5 0.8	**CLAYEY SILT TO SILTY CLAY TILL:** some sand, trace gravel, brown, moist, very stiff to hard	2	SS	32			
		3	SS	25			
	cobble/boulder@2.3m	4	SS	61			
	sandy, grey below 3.1m	5	SS	39			6 32 40 22
		6	SS	18			
265.6		7	SS	18			
6.7	**END OF BOREHOLE:**						

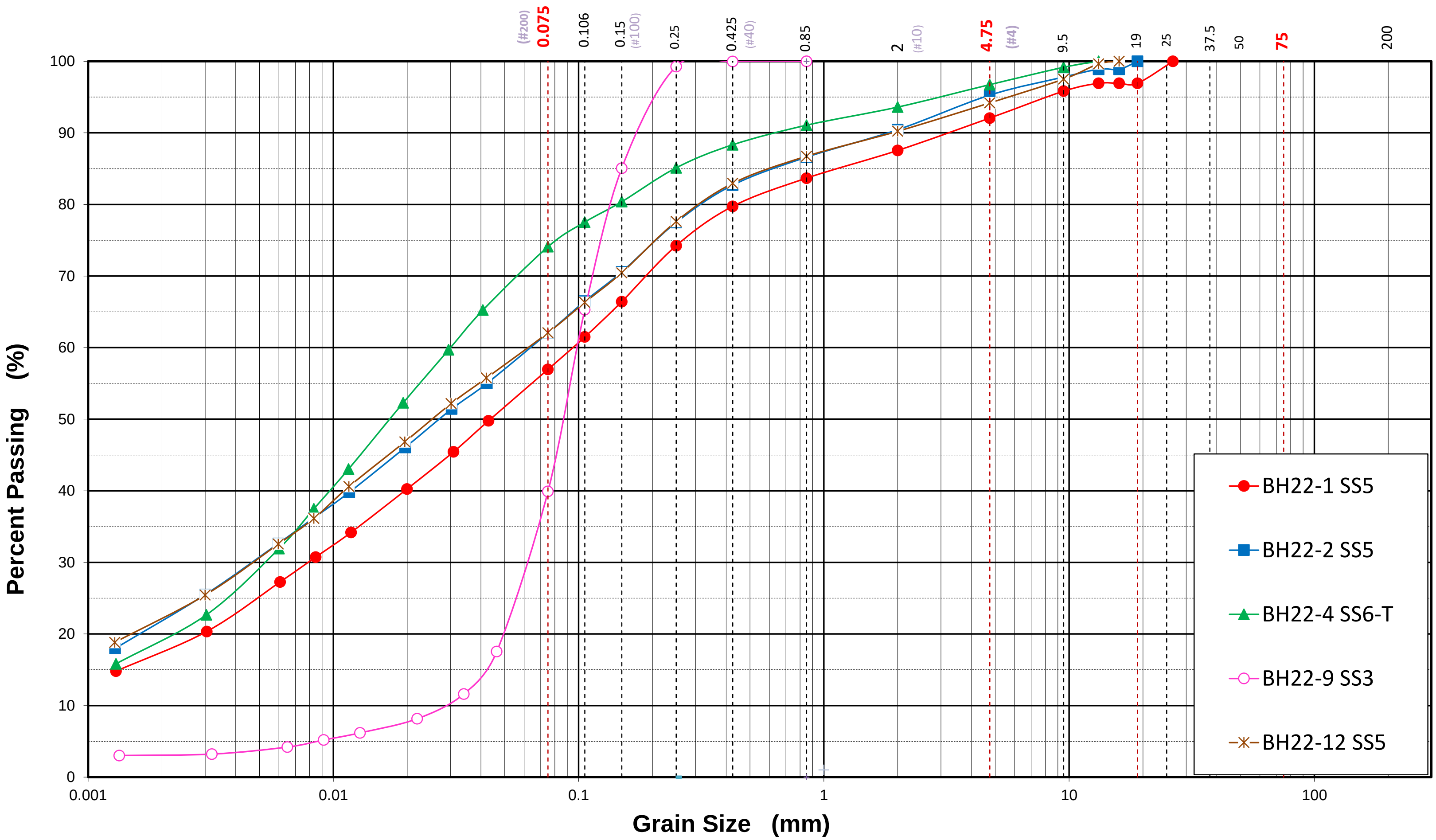
Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date: Water Level(mbgl):
Nov. 4, 2022 3.47

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ 8=3% Strain at Failure

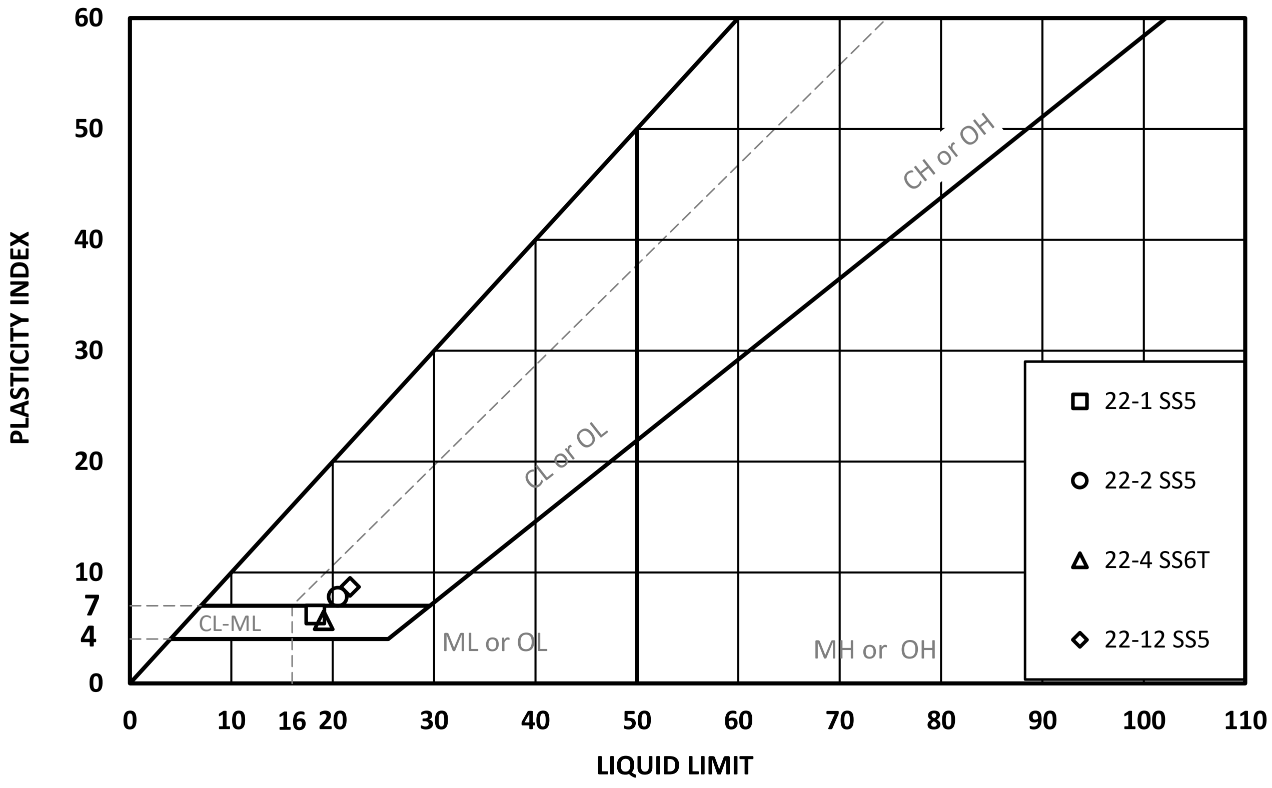
Particle Size Distribution (ASTM-D421/D422)



Silt and Clay		Sand			Gravel		Cobble +
Clay	Silt	Fine	Medium	Coarse	Fine	Coarse	

DS CONSULTANTS LTD. 6221 Highway 7, Unit 16 Vaughan, Ontario, L4H 0K8 Telephone: (905) 264-9393 www.dsconsultants.ca	Project	**Geotechnical Investigation**	Project No	**22-371-100**
	Location	**12909 Kennedy Rd., Caledon, ON**	Date	**Nov-01-2022**
	Client	**Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.**	Figure No	14

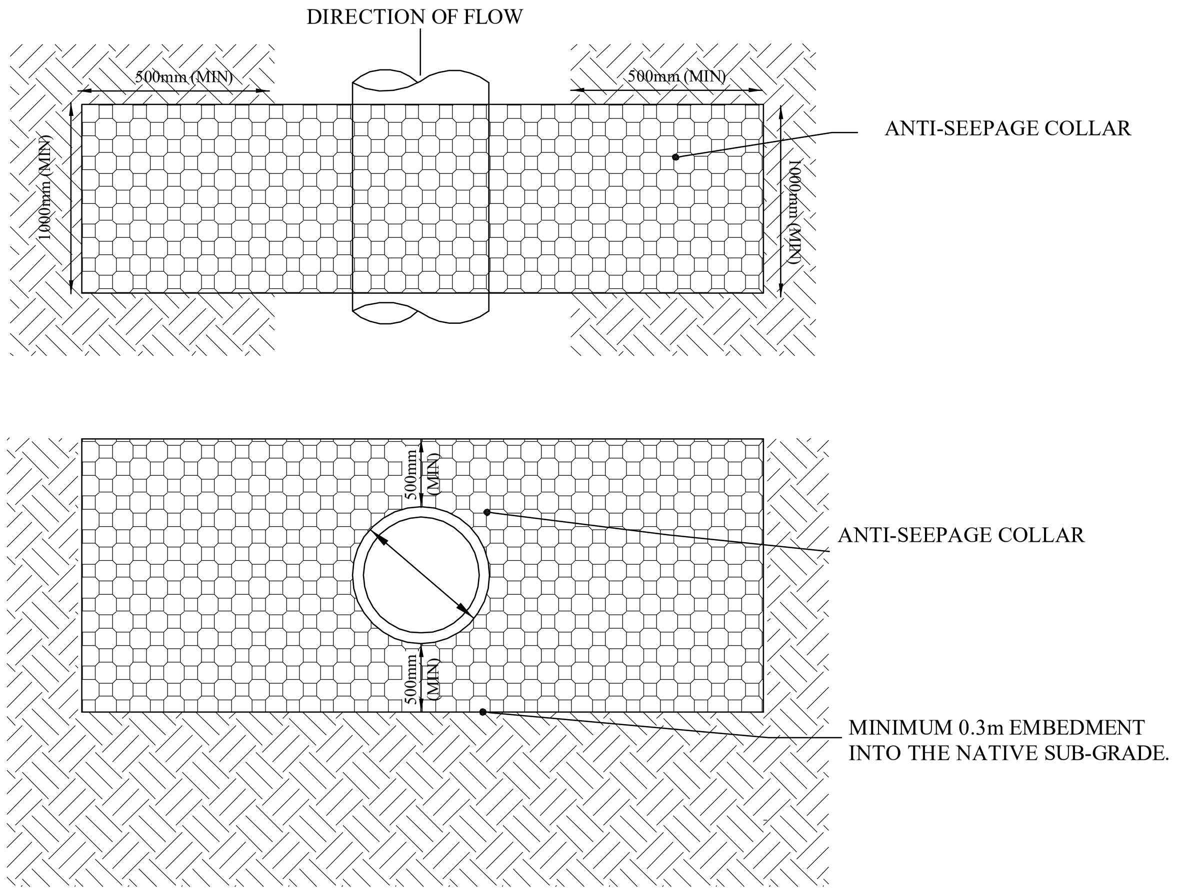
Atterberg Test (ASTM D-4318)



Code	Sample ID	Sample No.		Moisture Contant (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	**USCS Symbol**
1	□	22-1	SS5	11	18.3	12.1	6.2	CL-ML
2	○	22-2	SS5	9	20.5	12.7	7.8	CL
3	△	22-4	SS6T	12	19.1	13.4	5.7	CL-ML
4	◇	22-12	SS5	11	21.7	13	8.7	CL

DS CONSULTANTS LTD. 6221 Highway 7, Unit 16 Vaughan, Ontario, L4H 0K8 Telephone: (905) 264-9393 www.dsconsultants.ca	Project	**Geotechnical Investigation**	Project No	**22-371-100**
	Location	**12909 Kennedy Rd., Caledon, ON**	Date	**Nov-01-2022**
	Client	**Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.**	Figure No	15

Drawing No. 16: TYPICAL TRENCH PLUG INSTALLATION



ANTI-SEEPAGE COLLAR DETAIL

SCALE: N.T.S.

Appendix A

General Requirements for Engineered Fill

GENERAL REQUIREMENTS FOR ENGINEERED FILL

Compacted imported soil that meets specific engineering requirements and is free of organics and debris and that has been continually monitored on a full-time basis by a qualified geotechnical representative is classified as engineered fill. Engineered fill that meets these requirements and is bearing on suitable native subsoil can be used for the support of foundations.

Imported soil used as engineered fill can be removed from other portions of a site or can be brought in from other sites. In general, most of Ontario soils are too wet to achieve the 100% Standard Proctor Maximum Dry Density (SPMDD) and will require drying and careful site management if they are to be considered for engineered fill. Imported non-cohesive granular soil is preferred for all engineered fill. For engineered fill, we recommend use of OPSS Granular 'B' sand and gravel fill material.

Adverse weather conditions such as rain make the placement of engineered fill to the required degree of density difficult or impossible; engineered fill cannot be placed during freezing conditions, i.e. normally not between December 15 and April 1 of each year.

The location of the foundations on the engineered fill pad is critical and certification by a qualified surveyor that the foundations are within the stipulated boundaries is mandatory. Since layout stakes are often damaged or removed during fill placement, offset stakes must be installed and maintained by the surveyors during the course of fill placement so that the contractor and engineering staff are continually aware of where the engineered fill limits lie. Excavations within the engineered fill pad must be backfilled with the same conditions and quality control as the original pad.

To perform satisfactorily, engineered fill requires the cooperation of the designers, engineers, contractors and all parties must be aware of the requirements. The minimum requirements are as follows; however, the geotechnical report must be reviewed for specific information and requirements.

1. Prior to site work involving engineered fill, a site meeting to discuss all aspects must be convened. The surveyor, contractor, design engineer and geotechnical engineer must attend the meeting. At this meeting, the limits of the engineered fill will be defined. The contractor must make known where all fill material will be obtained from and samples must be provided to the geotechnical engineer for review, and approval before filling begins.

2. Detailed drawings indicating the lower boundaries as well as the upper boundaries of the engineered fill must be available at the site meeting and be approved by the geotechnical engineer.

3. The building footprint and base of the pad, including basements, garages, etc. must be defined by offset stakes that remain in place until the footings and service connections are all constructed. Confirmation that the footings are within the pad, service lines are in place, and that the grade conforms to drawings, must be obtained by the owner in writing from the surveyor and DS Consultants Ltd (DSCL). Without this confirmation no responsibility for the performance of the structure can be accepted by DSCL. Survey drawing of the pre and post fill location and elevations will also be required.

4. The area must be stripped of all topsoil and fill materials. Subgrade must be proof-rolled. Soft spots must be dug out. The stripped native subgrade must be examined and approved by a DSCL engineer prior to placement of fill.

5. The approved engineered fill material must be compacted to 100% Standard Proctor Maximum Dry Density throughout. Engineered fill should not be placed during the winter months. Engineered fill compacted to 100% SPMDD will settle under its own weight approximately 0.5% of the fill height and the structural engineer must be aware of this settlement. In addition to the settlement of the fill, additional settlement due to consolidation of the underlying soils from the structural and fill loads will occur and should be evaluated prior to placing the fill.

6. Full-time geotechnical inspection by DSCL during placement of engineered fill is required. Work cannot commence or continue without the presence of the DSCL representative.

7. The fill must be placed such that the specified geometry is achieved. Refer to the attached sketches for minimum requirements. Take careful note that the projection of the compacted pad beyond the footing at footing level is a minimum of 2 m. The base of the compacted pad extends 2 m plus the depth of excavation beyond the edge of the footing.

8. A bearing capacity of 150 kPa at SLS (225 kPa at ULS) can be used provided that all conditions outlined above are adhered to. A minimum footing width of 500 mm (20 inches) is suggested and footings must be provided with nominal steel reinforcement.

9. All excavations must be done in accordance with the Occupational Health and Safety Regulations of Ontario.

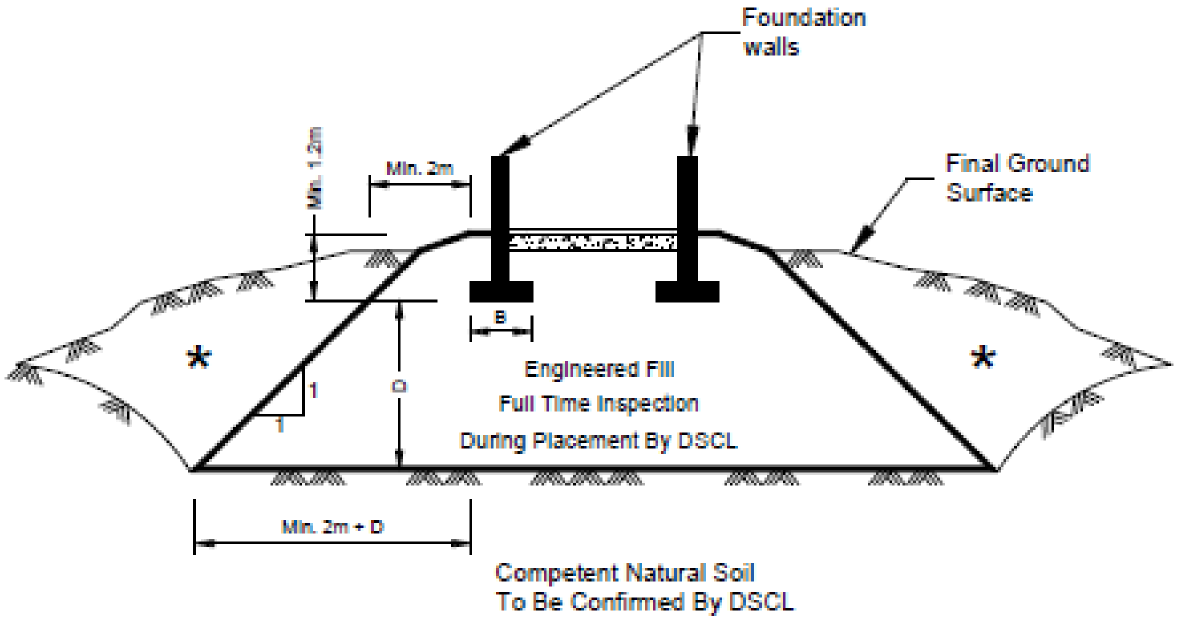
10. After completion of the engineered fill pad a second contractor may be selected to install footings. The prepared footing bases must be evaluated by engineering staff from DSCL prior to footing concrete placements. All excavations must be backfilled under full time supervision by DSCL to the same degree as the engineered fill pad. Surface water cannot be allowed to pond in excavations or to be trapped in clear stone backfill. Clear stone backfill can only be used with the approval of DSCL.

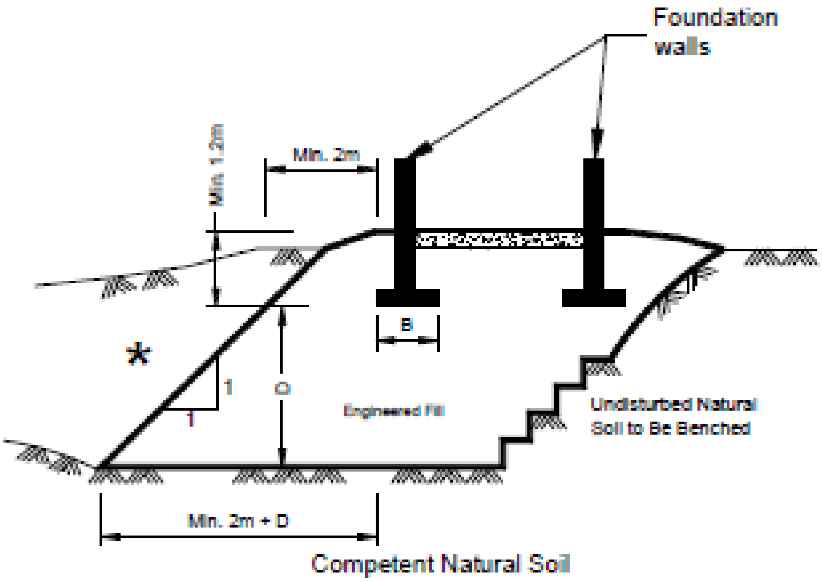
11. After completion of compaction, the surface of the engineered fill pad must be protected from disturbance from traffic, rain and frost. During the course of fill placement, the engineered fill must be smooth-graded, proof-rolled and sloped/crowned at the end of each day, prior to weekends and any stoppage in work in order to promote rapid runoff of rainwater and to avoid any ponding surface water. Any stockpiles of fill intended for use as engineered fill must also be smooth-bladed to promote runoff and/or protected from excessive moisture take up.

12. If there is a delay in construction, the engineered fill pad must be inspected and accepted by the geotechnical engineer. The location of the structure must be reconfirmed that it remains within the pad.

13. The geometry of the engineered fill as illustrated in these General Requirements is general in nature. Each project will have its own unique requirements. For example, if perimeter sidewalks are to be constructed around the building, then the projection of the engineered fill beyond the foundation wall may need to be greater.

14. These guidelines are to be read in conjunction with DS Consultants Ltd report attached.





* Backfill in this area to be
as per the DSCL report.

Appendix B

Slope Stability Assessment Letter Report

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

Project: 22-371-100-R January 11, 2023

Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
c/o Candevcon Limited
9350 Goreway Drive
Brampton, Ontario
L6P 0M7
Attention: Maria Jones, MCIP, RPP, Project Planner
By email: maria@candevcon.com

RE: Slope Stability Assessment
Trend Developments Inc. & Trend 12909 Kennedy Developments Inc. - 12909 Kennedy Road
Southeast of Kennedy Road and Old School Road
Caledon, Ontario

Dear Sir:

A slope stability assessment for the slopes at the Trend Developments Inc. & Trend 12909 Kennedy Developments Inc. property was carried out by DS Consultants Ltd. (DS).

A site visit was made on August 8, 2022 by a senior geotechnical engineer from DS to visually examine the slope conditions at the above noted site.

Selected photographs (**Photos P1 to P8**) taken during the site visit are presented in **Appendix I**. A Google image of the site and slope area is also shown in **Appendix I**.

Based on our site observations, the slope conditions are described as follows:

- The slope area is located at the northeast part of the subject site.
- There is a wide flood plain in the creek area, where the ground is covered with bushes and high grasses etc. The creek is typically 1 to 3 m wide and is about 1 to 2 m below the flood plain level (**Photo P3**). There are also some water areas in the middle part of the flood plain (**Photo P4**).
- The subject slopes are located to the south of the flood plain area. The slopes are generally gentle in steepness, flatter than 5 horizontal to 1 vertical (5H:1V). The slopes generally consist of farmlands, with grass areas at the lower portion of the slopes.
- It is difficult to accurately estimate the height of the slopes, as the top of slope locations are not obvious, and the slopes are gentle is steepness. Typically, the elevation between and flood plain level and the farmland line is approximately 2 to 4 m.

- The toe areas of the slopes near the flood plain are well covered with bushes and grasses and are well protected from erosions. No evidence of slope failure was observed at the site during our site visit.

Based on our site observations, the subject slopes are considered stable in terms of long-term stability.

We trust that the information contained in this letter is satisfactory. Should you have any questions, please do not hesitate to contact this office.

Yours Very Truly,
DS Consultants Ltd.

Sangar

Alka Sangar, M.Eng., P.Eng.

Fanyu Zhu, Ph.D., P.Eng.

Attachments:
Appendix I – Site Google Image and Site Photographs (Photos P1 to P8)

Appendix I

Site Google Image and
Site Photographs (Photos P1 to P8, taken on Aug.8, 2022)

Site Google Image:

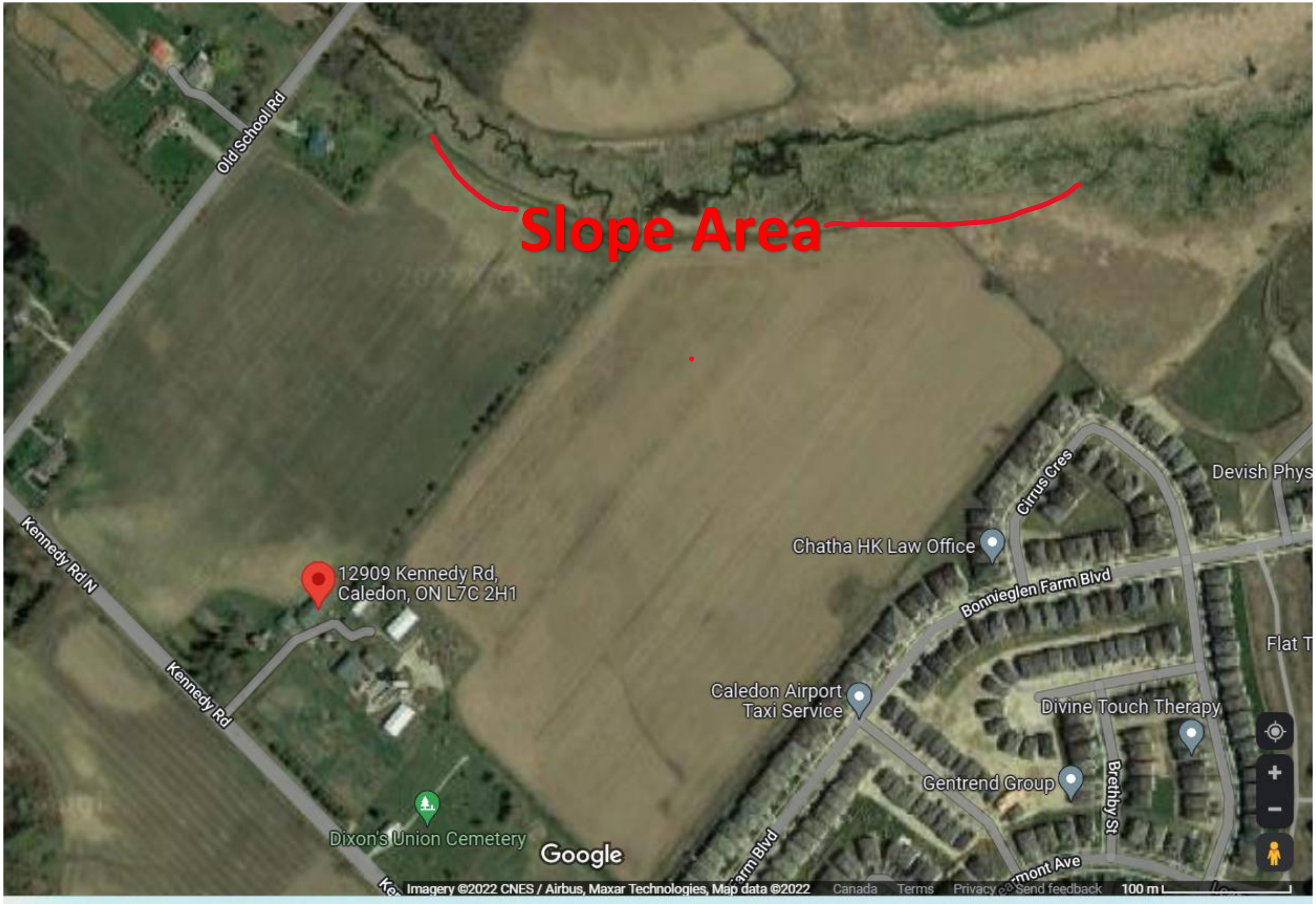


Photo P1: Flood plain area and slope (looking east – downstream from west part of site)

Photo P2: Flood plain area at west part of site (looking north)

Photo P3: Creek in Flood plain area at west part of site (looking east - downstream)

Photo P4: Water area in flood plain area at middle part of site (looking north)

Photo P5: West part slope and flood plain area (looking northwest from middle part of site)

Photo P6: East part slope and flood plain area (looking east from middle part of site)

Photo P7: General slope and flood plain conditions (looking northwest toward Old School Rd from high area at the middle-east part of site)

Photo P8: General slope and flood plain conditions (looking northeast from high area at the middle-east part of site)

APPENDIX F

Preliminary Hydrogeological Investigation Report

Preliminary Hydrogeological Investigation

12909 Kennedy Road
Caledon, Ontario

Prepared For:

Trends Development Inc.
c/o Trend 12909 Kennedy Developments Inc.

Project #: 22-371-100
Date: January 17, 2023

DS CONSULTANTS LTD.
6221 Highway 7, Unit 16
Vaughan, Ontario, L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

22-371-100 **January 17, 2023**

Maria Jones, MCIP, RPP, Project Planner
Trends Development Inc.
c/o Trend 12909 Kennedy Development Inc.
9350 Goreway Drive
Brampton, ON
L6P 0M7

Via email: maria@candevcon.com

RE: Preliminary Hydrogeological Investigation – 12909 Kennedy Road, Caledon, ON

DS Consultants Limited (DS) was retained by Trends Development Inc. & Trend 12909 Kennedy Developments Inc. to complete a preliminary hydrogeological Investigation for the proposed development at 12909 Kennedy Road (the Site). It is understood that the site is currently occupied by agricultural land, a 2-storey house, and eleven (11) other structures (i.e barns) associated with agricultural operations. It is further understood that the site will be developed with a residential subdivision consisting of single-family homes with a basement. The development is also to include a network of roads and underground utilities. This preliminary hydrogeological investigation was prepared in support of Site Plan Approval (SPA) submission. Detailed site plans were not available to DS at the time of preparing this report.

This hydrogeological assessment includes an overview of the existing geological and hydrogeological conditions at the Site and the surrounding area, an assessment of the hydrogeological constraints, impacts of the proposed development on the local groundwater and provides an estimation of construction dewatering and permanent drainage requirements during the proposed development. This investigation is based on monitoring wells installed by DS in support of geotechnical and hydrogeological investigations at the Site. If needed, the results of this investigation can be used in support of an application for a Category 3 Permit to Take Water (PTTW) or an Environmental Activity Sector Registry (EASR) for construction dewatering from the Ministry of the Environment Conservation and Parks (MECP) and discharge permitting from Peel Region.

Based on the results of our investigation, the following conclusions and recommendations are presented:

1. Based on the MECP water well records search, there are sixty-two (62) water wells within 500 meters of the Site. Thirty-two (32) wells were noted for domestic (DO) use and five (5) wells were noted for livestock (ST) use. All other wells were noted as test holes, monitoring well, not in use or unknown. A door-to-door water well survey was conducted on November 21st, 2022, to confirm the presence/absence of domestic wells within 500 m of the study area. Twenty-six (26) properties within the study area were canvassed. Of the properties canvassed, three (3) residents indicated that they are on domestic water supply.
2. In October 2022, DS advanced twelve (12) boreholes (BHs) to depths ranging from 6.7 to 9.1 meters below ground surface (mbgs). Monitoring wells (MWs) were installed into six (6) BHs (MW22-1,

MW22-2, MW22-4, MW22-10, MW22-11 and MW22-12) and screened to depths ranging from 6.1 to 7.5 mbgs.

3. The overburden at the site generally consists of 200 mm to 430 mm of topsoil overlying weathered/disturbed soils. Below the disturbed soils, cohesionless deposits of silty sand and gravelly sand/sandy gravel to sand and gravel, silt and sandy silt to silty sand were encountered extending to depths ranging between 1.5 to 8.1 mbgs at select borehole locations overlying a layer of clayey silt to silty clay till extending between 6.3 to 9.1 mbgs. The clayey silt to silty clay till overlays a lower sandy silt till deposit at some BH locations extending to the maximum explored depth.
4. Groundwater levels were measured on November 9th and January 13th, 2022. Groundwater was found in monitoring wells ranged from 265.3 meters above sea level (masl) to 271.6 masl, representing the groundwater elevation within the till overburden at the site. A groundwater level monitoring program is implemented at the site for a period of one (1) year with electronic level loggers installed at three (3) select wells programed to record daily water level readings. Manual water level readings will be recorded on a quarterly basis.
5. Four (4) Single Well Response Tests (SWRTs) were completed by DS in monitoring MW22-1, MW22-2, MW22-4 and MW22-12 in November 2022 to estimate hydraulic conductivity (k) for the representative geological units in which the wells were completed. The value of calculated hydraulic conductivity (k) ranges from 1.2×10^{-9} to 8.3×10^{-8} m/s within the clayey silt to silty clay till deposit.
6. One (1) unfiltered groundwater sample was collected from monitoring well MW22-4 on November 10th, 2022, and submitted to SGS Laboratories in Lakefield, Ontario. The groundwater sample was analyzed and compared against the parameters listed under the Peel Region Sanitary and Storm Sewer Use By-law 53_2010 and the Provincial Water Quality Objectives (PWQO) to assess groundwater quality before any discharge to Region's sewer and surface water system. The reported analytical results indicated that Total Suspended Solids (TSS) exceeded Peel Region's Storm Sewer Discharge By-Law criteria. All parameters met the Region's Sanitary Sewer Discharge By-Law criteria. Concentrations of phosphorus and 4AAP-Phenolics exceeded the PWQO standards. Discharge permits and agreements are required from the Peel Region for short-term discharge.
7. A preliminary site water balance analysis was completed to estimate pre-development and post-development evaporation, infiltration, and runoff for the development. The proposed development will produce a reduction in annual AET (120,399 m^3/yr), an increase in annual ET (25,964 m^3/yr), a reduction in annual infiltration (26,345 m^3/yr) and an increase in annual runoff (120,782 m^3/yr). The effects are mainly the result of increased impervious area and decreased pervious areas of the site.
8. The estimated maximum dewatering rate during construction for the unsealed excavation method of a basement for a single residential dwelling with estimated dimensions of 30 x 50 m is approximately 21,000 L/day. The anticipated pumping rate that is needed to achieve the required drawdown for a 30 m open cut trench to a depth of 4 mbgs for site servicing is approximately 5,000 L/day. These values incorporate a 100% safety factor and stormwater that may enter the excavation as a result of a 10 mm precipitation event in 24 hours.

9. Since the expected design dewatering rate(s) for the unsealed excavation(s) are below 50,000 L/day, a PTTW or an EASR for short-term dewatering are not required. However, should multiple excavations occur concurrently, and volumes exceed 50,000 L/day or 400,000 L/day an EASR or a PTTW will be required from the MECP.
10. The Humber River transects the northeastern quadrant of the site, with development proposed to occur approximately 400 m from the river. Therefore, temporary surface water impacts on the Humber River are not likely. However, it is recommended that a surface water quality sample be obtained from the Humber River to establish baseline conditions and that resampling occur during construction to ensure no adverse effects to the river from the proposed development.
11. There is a possibility of inducing settlement to neighboring structures when lowering water levels or depressurizing an aquifer. Due to the construction ending low permeable clayey silt to silty clay till, settlement due to construction dewatering activities is not likely.
12. In conformance with Regulation 903 of the Ontario Water Resources Act, the decommissioning of any dewatering system and monitoring wells should be carried out by a licensed contractor under the supervision of a licensed water well technician.

Should you have any questions regarding these findings, please contact the undersigned.

DS Consultants Ltd.

Prepared By:

Dorothy Santos, M.Sc.
Project Manager

Reviewed By:

Martin Gedeon

Martin Gedeon, M.Sc., P.Geo.
Senior Hydrogeologist

Table of Contents

FIGURES

APPENDICES:

1.0 INTRODUCTION

DS Consultants Limited (DS) was retained by Trends Development Inc. and Trend 12909 Kennedy Developments Inc. to complete a preliminary hydrogeological Investigation for the proposed development at 12909 Kennedy Road (the Site). It is understood that the site is currently occupied by agricultural land, a 2-storey house, and eleven (11) other structures (i.e. barns and silos) associated with agricultural operations. It is further understood that the site will be developed with a residential subdivision consisting of single-family homes with a basement. The development is to include a network of roads and underground utilities. This preliminary hydrogeological investigation was prepared in support of Site Plan Approval (SPA) submission. Detailed site plans were not available to DS at the time of preparing this report.

This hydrogeological assessment includes an overview of the existing geological and hydrogeological conditions at the Site and the surrounding area, an assessment of the hydrogeological constraints, impacts of the proposed development on the local groundwater and provides an estimation of construction dewatering and permanent drainage requirements during the proposed development. This investigation is based on monitoring wells installed by DS in support of geotechnical and hydrogeological investigations at the Site. If needed, the results of this investigation can be used in support of an application for a Category 3 Permit to Take Water (PTTW) or an Environmental Activity Sector Registry (EASR) for construction dewatering from the Ministry of the Environment Conservation and Parks (MECP) and discharge permitting from the Peel Region.

1.1 Purpose

The purpose of this investigation was to review and determine the need for dewatering, estimate dewatering rates, assess groundwater quality, and determine the need for a PTTW or an EASR from the MECP in addition to requirements to obtain discharge permits from the Peel Region. Potential impacts related to construction dewatering and associated monitoring/mitigation measures were also to be investigated.

1.2 Scope of Work

The scope of work for this investigation included:

(i) Site visits;

(ii) Desktop review of pertinent geological and hydrogeological resources;

(iii) Review the MECP Water Well Records and water use in the surrounding area;

(iv) Fieldwork including monitoring well drilling program consisting of twelve (12) boreholes and installation of six (6) monitoring wells;

(v) Conducting a residential water well survey within 500 m of the site to confirm the presence/absence of water wells in the area.

(vi) Conducting single well response tests (slug tests) to determine hydraulic conductivity values across the site;

(vii) Characterize the stratigraphy and measure the groundwater levels across the site;

(viii) Collection and analysis of groundwater samples to quantify and characterize any possible contaminants that may impact future discharge applications;

(ix) Estimation of construction dewatering volumes, which is to be used to predict the short-term groundwater control requirements for the construction of the proposed building on site.

(x) Estimation of long-term or permanent discharge rate after the construction;

(xi) Preliminary pre-development and post-development site water balance analysis to evaluate options for Low Impact Development (LID) measures as a mean of mitigation development impacts;

(xii) Data analyses and report preparation.

2.0 FIELD INVESTIGATION

In October 2022 DS advanced twelve (12) boreholes (BHs) to depths ranging from 6.7 to 9.1 mbgs. Monitoring wells (MWs) were installed into six (6) BHs (MW22-1, MW22-2, MW22-4, MW22-8, MW22-10, MW22-11 and MW22-12) and screened to depths ranging from 6.1 to 7.5 mbgs. Monitoring wells were constructed using 50 mm diameter PVC riser pipes and screens, which were installed into the select boreholes in accordance with O.Reg.903. All wells were developed before use to allow for groundwater level monitoring, hydraulic conductivity testing and assess groundwater quality. Four (4) single well response tests (SWRTs) were completed by performing a rising head test to estimate hydraulic conductivity values of formations/soils at the site. One (1) unfiltered groundwater sample was collected and analyzed for the parameters listed under the Peel Region Sewer Use Bylaw as well as PWQO to assess groundwater quality before any discharge to Region’s sewer and surface water system and establish baseline water quality conditions. The BH/MW location plan is shown in **Figure 3**.

3.0 PHYSICAL SETTING

Available topographic maps, environmental, geotechnical and hydrogeological reports and the Ontario Geological Survey (OGS) were used to develop an understanding of the physical setting of the study area. The borehole logs from the current investigation at the Site and the MECP WWRs were used to interpret the geological and hydrogeological conditions at the Site.

3.1 Physiography and Drainage

The topography at the development site is undulating with a surface elevation of approximately 265 to 276 masl. The topography within the study area generally slopes southwest and southeast towards the Humber River and Etobicoke Creek, respectively. Drainage is generally controlled by streams, artificial channels and the local topography. The Humber River transects the northeastern quadrant of the site and Etobicoke Creek is located approximately 120 m west of the site.

3.2 Geology

The following presents a brief description of regional and Site geology based on the review of available information and Site-specific soil investigations.

3.2.1 Quaternary Geology

The study area (500 m radius) lies within the South Slope physiographic region of southern Ontario and is characterized by drumlinized till plains landforms. Based on the regional mapping, the surficial geology at the Site and study area is characterized by till (5d) consisting of clay to silt-textured till deposits derived from glaciolacustrine deposits or shale. The northeastern corner is characterized by coarse-textured glaciolacustrine deposits (9c) consisting of sand, gravel, minor silt and clay from Foreshore and basinal deposits. The river and creek beds across the site and study area consist of is characterized by modern alluvial deposits (19) consisting of clay, silt, sand, gravel and some organic remains. The surficial geology map is shown in **Figure 2.**

3.2.2 Bedrock Geology

Available published mapping shows that bedrock in the area is predominantly shale, limestone, dolostone and siltstone of the Queenston Formation. Based on the review of existing boreholes logs and well record information, the depth to bedrock in the study area is estimated to be approximately 50 meters below the existing surface. Bedrock was not encountered during the current investigation and is not anticipated to have an impact of development activities.

3.2.3 Site Geology

On-Site subsurface soils were interpreted from the BHs/MWs advanced by DS at the site. A total of twelve (12) boreholes were drilled by DS in October 2022 as part of hydrogeological investigation concurrently with geotechnical investigation. The locations of the BHs/MWs are shown in **Figure 3** and geological cross-sections along (A-A’) and (B-B’) are shown in **Figures 5A** and **5B.** Detailed subsurface conditions are presented on the borehole Logs in **Appendix A**. The subsurface conditions in the boreholes are summarized in the following paragraphs.

Topsoil:

A surficial topsoil layer, ranging in thickness from 200 to 430 mm was encountered at all borehole locations.

Weathered/Disturbed Soils:

Weathered/disturbed soils generally consisting of sandy silt to silty sand were encountered in all boreholes and extended to depths ranging from about 0.8 to 1.5 m below existing ground surface. Some reworked (weathered/disturbed) soils might be fill materials. These materials typically contain trace to some organic matter, trace gravel and trace clay to clayey.

Silty Sand:

Below weathered/disturbed soils, a cohesionless silty sand deposit was encountered in boreholes BH22-5, BH22-6, and BH22-9 extended to depths ranging from 1.7 to 7.8 m below existing ground surface.

Gravelly Sand / Sandy Gravel to Sand and Gravel:

Deposits of gravelly sand and sandy gravel to sand and gravel were encountered below the weathered/disturbed soils in boreholes BH22-1 and BH22-2, below a sandy silt till deposit in boreholes BH22-3 and below the silty sand deposit in BH22-9 and extended to depths ranging from 1.4 to 8.1 m below existing ground surface, i.e., depth explored in BH22-9.

Silt:

A deposit of silt material with trace to some sand, trace clay and trace gravel was encountered below the silty sand deposit in borehole BH22-5 and extended to a depth of 2.8 m below existing ground surface.

Upper Sandy Silt to Silty Sand (Till):

Sandy silt to silty sand till deposits were encountered below the gravelly sand in BH22-1 and below the weathered/disturbed soils in BH22-3, BH22-7 and BH22-8 and extended to depths ranging from 1.0 to 2.4 m below existing ground surface.

Clayey Silt to Silty Clay (Till):

Below the upper sandy silt to silty sand till in boreholes BH22-1, BH22-7 and BH22-8, the weathered/disturbed soils in boreholes BH22-4, BH22-8 and BH22-10 to BH22-12, the gravelly sand in boreholes BH22-2 and BH22-3, the silt deposit in borehole BH22-5 and the silty sand deposit in borehole BH22-6, clayey silt to silty clay (till) deposits were encountered and extended to depths ranging from 6.3 to 9.1 m below existing ground surface. Boreholes BH22-1, BH22-3, BH22-4, BH22-5, BH22-6, BH22-8, and BH22-10 to BH22-12 were terminated in the clayey silt to silty (till) deposits. Cobbles/boulders were inferred within the till deposits during drilling.

Lower Sandy Silt (Till):

A lower sandy silt (till) deposit was encountered below the clayey silt to silty clay till in boreholes BH22-2 and BH22-7 and extended to depths of 9.6 and 6.7 m below existing ground surface, respectively, i.e., depth explored in the two boreholes.

3.2.4 Hydrostratigraphy

Regional stratigraphy in the area generally consists of the Halton Till overlying the Oak Ridges Moraine aquifer which overlies the Newmarket Aquitard and the Thorncliffe Aquifer. The clayey silt to silty clay till encountered during the drilling program is interpreted as the Halton Till. Based on the subsurface investigation consisting dominantly of low permeable till, no shallow overburden aquifer is present at the site. The groundwater encountered within the till is considered to be perched water within permeable seams rather than a local regional groundwater aquifer. Therefore, the proposed development is not likely to impact quality and quantity of any aquifers in the area as the below ground development is to extend within the low permeable till soils.

3.3 Hydrogeology

The hydrogeology at the study site was evaluated using the on-site monitoring wells installed by DS, local domestic wells and existing hydrogeological reports for the area.

3.3.1 Local Groundwater Use

As part of the hydrogeological study, DS completed a search of the MECP WWRs database. Based on the MECP water well records search, there are sixty-two (62) water wells within 500 meters of the Site (**Appendix D**). Thirty-two (32) wells were noted for domestic (DO) use and five (5) wells were noted for livestock (ST) use. All other wells were noted as test holes, monitoring well, not in use or unknown. Within the study area, water wells are screened within the overburden sediments or within the bedrock. The overburden aquifer in the area generally consists of sand gravel and kame deposits, while the bedrock aquifers include carbonate aquifers associated with the Niagara Escarpment or the Queenston Formation. **Figure 1** shows the MECP water well location plan.

A door-to-door water well survey was conducted on November 21st, 2022, to confirm the presence/absence of domestic wells within 500 m of the study area. Twenty-six (26) properties within the study area were canvassed. Of the properties canvassed, three (3) residents located at 3578 Old School Road, 13133 Kennedy Road, and 13121 Kennedy Road indicated that they use a domestic well on their property for water supply. Based on provided information from residents and the MECP WWR search, water well depths range approximately between 40-50 mbgs. The water level at 13133 Kennedy Road and 13121 Kennedy Road were 2.7 mbgs and 1.5 mbgs, respectively. The resident at 3756 Old School Road, 3771 Old School Road and staff from the school located at 12872 Kennedy Road indicated that they are serviced by municipal water supply. One (1) abandoned/damaged well was identified at 3431 Old School Road, and the tenant from 3771 Old School Road indicated they had a well decommissioned. No answers were received from all other canvassed properties at the time of the survey. The summary of the survey is presented in **Appendix E.** A detailed water well survey may be required from the Peel Region establishing baseline conditions (pre-construction) and conditions during and after construction, which may include continuous groundwater level monitoring and baseline groundwater quality analyses.

3.3.2 Groundwater Condition

A total of six (6) monitoring wells were used for the current groundwater assessment. All wells were screened within the clayey silt to silty clay till unit. Groundwater levels were measured on November 9th and January 13th, 2022. Groundwater was found in monitoring wells ranging from 265.3 masl to 271.6 masl, representing the groundwater elevation within the till overburden at the site. A groundwater level monitoring program for a period of one (1) year has been implemented at the site to assess seasonal groundwater fluctuations and confirm groundwater flow direction. The monitoring program consists of a data logger installed in MW22-1, MW22-4, and MW22-12 programmed to record daily water levels. Manual water level measurements will also be collected on a quarterly basis from all monitoring wells. Groundwater flow direction is inferred to be southwest towards Etobicoke Creek. The Humber River transects the northeastern quadrant of the site and Etobicoke Creek is located approximately 120 m west of the site. Both the Humber River and Etobicoke Creek ultimately discharge into Lake Ontario located 47 km southeast of the Site.

Table 3-1: Groundwater Levels in Monitoring Wells

Well ID	Ground Surface Elevation (masl)	Monitoring Well Depth (mbgs)	Date	Depth to Groundwater (mbgs)	Groundwater Elevation (masl)
MW22-1	272.2	6.1	09-Nov-22	2.1	270.1
			13-Jan-13	1.8	270.4
MW22-2	271.4	7.5	09-Nov-22	6.1	265.3
			13-Jan-13	5.9	265.5
MW22-4	268.3	6.1	09-Nov-22	1.9	266.4
			13-Jan-13	0.9	267.4
MW22-10	272.6	6.1	09-Nov-22	5.9	266.7
			13-Jan-13	4.7	267.9
MW22-11	272.5	6.5	09-Nov-22	dry	
			13-Jan-13	1.0	271.5
MW22-12	272.3	6.1	09-Nov-22	2.4	269.9
			13-Jan-13	0.7	271.6

3.3.3 Hydraulic Conductivity

Four (4) Single Well Response Tests (slug tests) were completed by DS in November 2022 in monitoring wells MW22-1 MW22-2, MW22-4 and MW22-12, to estimate hydraulic conductivity (k) for the representative geological units in which the wells were screened. Monitoring wells MW22-10 and MW22-11 had insufficient amount of water to complete the tests. The testing was completed using data loggers set to 5 seconds and placed at the bottom of the monitoring wells for 3-4 hours to accurately measure the change in the hydraulic head versus time. Hydraulic conductivity (k) values were calculated using the Bouwer and Rice method using the AquiferTest® Software. The semi-log plots for normalized drawdown versus time are provided in **Appendix B.** The k-values ranged between 1.2 X 10^{-9} to 8.3 X 10^{-8} m/s. **Table 3-2** presents the Hydraulic Conductivity (k) values for the representative geological units.

Table 3-2: Summary of Hydraulic Conductivity (k) Test Results

Well ID	Screened Interval (mbgs)	Screened Formation	k-value (m/s)	Geomean (m/s)
MW 22-1	3.-1-6.1	Clayey Silt to Silty Clay	8.3 X 10^{-8}	1.3 X 10^{-8}
MW 22-2	4.5-7.5	Clayey Silt to Silty Clay	1.8 X 10^{-8}	
MW 22-4	3.-1-6.1	Clayey Silt to Silty Clay	1.4 X 10^{-8}	
MW 22-12	3.-1-6.1	Clayey Silt to Silty Clay	1.2 X 10^{-9}	

3.3.4 Groundwater Quality

One (1) unfiltered groundwater sample from monitoring well MW22-4 was collected on November 10th, 20222, and submitted to SGS Laboratories in Lakefield, Ontario. SGS is certified by the Canadian Association of Laboratory Accreditation Inc. (CALA) and the Canadian Standard Association (CSA). The groundwater sample was analyzed and compared against the parameters listed under the Peel Region Sanitary and Storm Sewer Use By-law 53_2010 and PWQO to assess groundwater quality before any discharge to Region's sewer and surface water system. The reported analytical results indicated that TSS exceeded Peel Region's Storm Sewer Discharge By-Law criteria. All parameters met the Region's Sanitary Sewer Discharge By-Law criteria. Groundwater can be discharged into sanitary sewers without treatment. Concentrations of phosphorus and 4AAP-Phenolics exceeded the PWQO standards. The exceedances are summarized in **Table 3-3** and **Table 3-4.** The certificates of analyses are provided in **Appendix C.**

Table 3-3: Parameters in Groundwater Exceeding Peel Region Sewer Use BL-53_2010

Parameter	Unit	Peel Sanitary By-Law Criteria	Peel Region Storm By-Law Criteria	MW22-4
Total Suspended Solid (TSS)	mg/L	350	15	<u>79</u>
Bold- Exceeds Sanitary Sewer Use by Law Criteria <u>Underlined</u>- Exceeds Storm Sewer Use by Law Criteria				

Table 3-4: Parameters in Groundwater Exceeding the PWQO

Parameter	Unit	PWQO Criteria	MW22-4 Concentration
Phosphorus	mg/L	0.01	**0.162**
4AAP-Phenolics	mg/L	0.001	**0.003**
0.00- Exceeds PWQO Criteria			

4.0 PRELIMINARY WATER BALANCE ASSESSMENT

4.1 Existing Conditions

The subject Site has a total area of 360,340 m^2 and presently includes seven (7) buildings, associated with agricultural operations and a house with an approximate footprint of 1,980 m^2. The remainder of the property consists of open space (approximately 358,359 m^2) and is considered as a pervious area consisting of landscaped area, woodland and agricultural land (greenbelt).

4.2 Proposed Development

The area proposed for development includes the entire existing Site with a size of 360,340 m^2. It is proposed that the site will be re-developed with a residential subdivision with basements and a SWM Pond. For the Site Water Balance calculations in this report, post development areas were calculated based on site plan designs provided to DS. The total building, road and SWM pond area will occupy approximately 225,763 m^2 which will consider as impervious areas (driveway/walkway/parking area, building). The total post development landscaped area including parkland and the greenbelt area (pervious) will occupy approximately 134,576 m^2. **Appendix E** shows the pre- and post-development conceptual models considered for establishing pre/post-hydrologic conditions.

4.3 Water Balance Components (Thornthwaite Monthly Water Balance Model)

The Thornthwaite water balance (Thornthwaite, 1948; Mather, 1978; 1979) is an accounting type method used to analyze the allocation of water among various components of the hydrologic cycle. Inputs to the model are monthly temperature, Site latitude, and precipitation. Outputs include monthly potential and actual evapotranspiration, evaporation, water surplus, total infiltration, and total runoff. For ease of calculation, a spreadsheet model was used for the computation.

When precipitation (P) occurs, it can either runoff (R) through the surface water system, infiltrate (I) to the water table, or evaporate/evapotranspiration (ET) from the earth's surface and vegetation. The sum of R and I is termed as the water surplus (S). When long-term averages of P, R, I and ET are used, there is no net change in groundwater storage (ST). Annually, however, there is a potential for small changes in ST. The annual water budget can be stated as **P = ET + R + I + ST** and the components are discussed below.

4.3.1 Pre-development Water Balance

To predict outputs of the pre-development water balance, various inputs were entered into the Thornthwaite model including monthly precipitation and temperature, site latitude, water holding capacity values for native soils and factors of infiltration. Various inputs and outputs of the model are described in detail below. The detailed calculations are presented in **Appendix E.**

Precipitation (P)

Based on the 30-year average for the Toronto Lester B. International Airport Climate Station in Ontario, the average precipitation for the area is about 786 mm/year for the period between 1981 and 2010. Also, the average monthly temperature from this station has been used. The monthly distribution of precipitation is presented in **Table E1, Appendix E.**

Storage (St)

Groundwater storage (ST) of native soils for the existing Site was estimated using values of Water Holding Capacity (mm) of respective land use and soil types identified in Table 3.1 of the Storm Water Management (SWM) Planning & Design Manual (MOE, March 2003). The land uses, soil types and respective water holding capacities shown in Table 3 were chose to represent existing conditions and applied to March for monthly calculations.

Table 4-1 Existing Conditions – Water Holding Capacity and AET of Native Soils in Pervious Areas

Land uses / soil types	Water Holding Capacity (mm/year)	AET (mm/year)
Forest/Clay Loam	400	578
Moderately Rooted Crops/Clay Loam	200	552
Urban Lawn /Clay Loam	100	509

Using the procedures outlined in the SWM Planning & Design Manual for each of the above land uses and soil types, the annual change in storage is 0. The monthly distribution of ST is presented in **Table E-2, Appendix E.**

EVAPORATION / EVAPOTRANSPIRATION (ET)

In the pre-development scenario, it is assumed that evaporation will occur over existing impervious surfaces at approximately 15% of total precipitation. Considering a total annual precipitation of 786 mm, evaporation is estimated at 118 mm. With an impervious area totaling 5,544 m^2, a total annual volume of evaporation is estimated at 654 m^3/yr. The detailed calculations for evaporation are included in **Table E-2 Appendix E.**

Evapotranspiration in the pre-development scenario occurs over each pervious land use. Monthly Potential Evapotranspiration (PET) is estimated using monthly temperature data and is defined as a water loss from a homogeneous vegetation-covered area that never lacks water (Thornthwaite, 1948; Mather, 1978). In the Thornthwaite water balance model, PET is calculated using the Hamon equation (Hamon, 1061);

$$PET\ (HAMON) = 13.97 * D * D2 * WT$$

Where:

d = the number of days in the month
D = the mean monthly hours of daylight in units of 12 hours
Wt = a saturated water vapour density term = 4.95 * e0.627/100
T = the monthly mean temperature in degrees Celcius

Considering a total annual precipitation of 786 mm, adjusted Potential Evapotranspiration (PET) is estimated at 605 mm.

A comparison between PET and Precipitation (P) produces a soil moisture deficit which begins in June and is increases to a maximum of 146 mm in September. Actual Evapotranspiration (AET) is based on PET and changes in ST (Δ ST). Where there is not enough P to satisfy PET, a reduction in ST occurs. The total annual volume of AET across the existing site is estimated at 195,487 m^3/yr. Detailed calculations and the monthly distribution of AET is presented in **Table E-2, Appendix E**.

Precipitation Surplus (S)

Precipitation surplus is calculated as P-ET. For pervious areas, ET is considered AET and for impervious areas ET is evaporation. A surplus of 668 mm/year (85% of P) is calculated for impervious areas. For the pervious land use/soil type representing existing conditions at the site, P-AET produces a precipitation surplus of 314 mm/year (40% of P). The more detailed calculations are included in **Table E-2, Appendix E.**

Infiltration (I) and Runoff (R)

For pervious areas, precipitation surplus has two (2) components in the Thornthwaite model: a runoff component (overland flow that occurs when soil moisture capacity is exceeded) and an infiltration component. The accumulation of infiltration factors for topography, soil types and cover as prescribed in Table 3.1 of the SWM Planning & Design Manual give infiltration factors for existing conditions on the Site as shown below in **Table 4-2**.

Table 4-2 Existing Conditions – Infiltration Factor

Land uses / soil types	Topography	Soil	Cover	Total infiltration factor
Woodland /Clay Loam	0.2	0.20	0.20	0.60
Moderately Rooted Crop/Clay Loam	0.2	0.2	0.1	0.5
Urban Lawn/Clay Loam	0.2	0.2	0.1	0.5

Considering the above infiltration factors, the respective total annual volume of infiltration is estimated to be 42,276 m^3/year.

The runoff component calculated in the pre-development model is the remaining volume of precipitation surplus following infiltration. Considering the precipitation surpluses and the total infiltration volume, the total annual volume of runoff is estimated at 44,810 m^3/year. Detailed calculations and the monthly distribution of infiltration and runoff are presented in **Table E-2, Appendix E.**

4.3.2 Post-development Water Balance

Post-development conditions include impervious areas, pervious areas of urban lawn with silty loam soils. To predict outputs of the post-development water balance, the same 30-year average climate data and site latitude inputs were used. Changes in land use including landscaped areas (urban lawn) include a reduction in soil water holding capacity inputs and factors of infiltration. Various inputs and outputs of the post-development model are presented in **Table E-3, Appendix E.**

Storage (St)

Groundwater storage (ST) of native soils for the post-development site remains the same for undeveloped areas. The same water holding capacity was chosen as above to represent post-development conditions and applied to March for monthly calculations. Similar to the pre-development conditions, using the procedures outlined in the SWM Planning & Design Manual for each of the above land use, the annual change in storage is 0. The monthly distribution of ST is presented in **Table E-3, Appendix E.**

EVAPORATION / EVAPOTRANSPIRATION (ET)

In the post construction scenario, changes in land use result in totalling impervious surface area of about 225,763 m^2. For these areas it is assumed that evaporation will occur and will amount to approximately 15% of total precipitation. Considering a total annual precipitation of 786 mm, evaporation is estimated at 118 mm. As a result, a total annual volume of evaporation is estimated at 26,618 m^3/yr. The detailed calculations for evaporation are included in **Table E-3 Appendix E**.

For post-development pervious areas, monthly PET is estimated using the same inputs and calculations described in the pre-development model respective of land use and soil moisture holding capacity. In the post-development scenario, annual AET is 75,088 m^3/yr. The monthly distribution of Post-development AET and detailed calculations are presented in **Table E-3, Appendix E**.

Precipitation Surplus (S)

For post-development pervious surfaces at the site, precipitation surplus is calculated as P–AET which includes about 277 mm/yr for retained landscaped/forested areas. For Impervious surfaces at the site, surplus is P-ET where ET is estimated at 15% of P. The resulting precipitation surplus is about 668 mm/yr. The more detailed calculations are included in **Table E-3, Appendix E**

Infiltration (I) and Runoff (R)

The accumulation of infiltration factors for topography, soil types and cover and prescribed in Table 3.1 of the SWM Planning & Design Manual. The infiltration factor remains unchanged. Considering the infiltration factor of 0.6 for forest land use, 0.5 for moderately rooted crops and 0.5 for urban lawn and clay loam soil type, the annual volume of infiltration is estimated at 390 m^3/year.

The runoff component calculated in the post-development model is the remaining volume of precipitation surplus following infiltration. Considering the precipitation surpluses and the total infiltration volume, the total runoff estimated is 15,930 m^3/year. Detailed calculations and the monthly distribution of infiltration and runoff are presented in **Table E-3, Appendix E.**

4.3.3 Post-development Water Balance

Based on results of the pre-development and post-development water balance completed, the proposed development will produce a reduction in annual AET (120,399 m^3/yr), an increase in annual ET (25,964 m^3/yr), a reduction in annual infiltration (26,345 m^3/yr) and an increase in annual runoff (120,782 m^3/yr), as shown in **Table E-4, Appendix E**. The effects are mainly the result of increased impervious area, replacing pervious areas of the site.

5.0 CONSTRUCTION DEWATERING

The proposed development is to consist of a residential subdivision consisting of single-family homes with a basement and is to include a network of roads and underground utilities. Detailed site plan designs were not available to DS at the time of this investigation. The basements and servicing trenches are estimated to extend approximately 4 mbgs. The water level should be lowered 1 m below the excavation depths to maintain dry conditions within the excavations. Any excavation below the groundwater table will require dewatering of any groundwater seepage into the excavation. Based on the stratigraphy at the site, the construction is generally expected to be ended into the low permeable clayey silt to silty clay till layer. As a conservative measure, the highest calculated hydraulic conductivity (k) value of 8.3 x 10^{-8} m/s was considered to estimate dewatering flow rates. This section calculates the estimated dewatering required during the construction of the proposed single residential dwellings and site servicing trenches.

5.1 Estimation of Flow Rate- Unsealed Method (basements)

The steady-state flow equation for unsealed excavation was used to estimate the construction dewatering value of basement for a single residential dwelling.

$$Q = \frac{\pi\left(H^2 - h^2\right)}{2.3\log\left(\frac{R_0}{re}\right)} \qquad \text{Equation 3.1}$$

$$R_0 = C(H - h)\sqrt{k} \qquad \text{Equation 3.2}$$

$$r_e = \sqrt{\frac{ab}{\pi}}$$ Equation 3.3

Where,

Q- Flow rate = 3,000 L/day (3 m^3/day)

H- Initial Elevation of Water Table = 4.1 m
h- Final Elevation of Water Table = 1 m
K- Hydraulic Conductivity= 8.3 X 10^{-8} m/s
Ro- Radius of Influence = 25 m
Re- Equivalent Radius = 21.9 m
a- Length of excavation = 50 m
b- Width of excavation = 30 m
C- Dimensionless constant= 3

Additional pumping capacity may be required to maintain dry conditions within the open excavations during and following a major precipitation event. The estimated flow rate is based on the excavation dimensions and a 10 mm precipitation event in 24 hours. The total estimated dewatering that may be required from a 10 mm precipitation event is approximately **15,000 L/day (15 m^3/day).**

The total estimated daily rate for short term construction is estimated to be **21,000 L/day (21 m^3/day)**. This value incorporates a 100% safety factor and the above-mentioned storm water. The dewatering value will need to be reassessed once below grade designs become available for review.

5.2 Estimation of Flow Rate- Unsealed Method (site servicing)

The anticipated pumping rate that is needed to achieve the required drawdown for a 30 m open cut trench to a depth of 4 mbgs was estimated using the equation for water table flow from a line source to a drainage trench.

$$Q = \pi k(H^2 - h^2)Ln\,(R_o/R_e) + 2(XK(H^2 - h^2)/2L$$ Equation 3.4

Where,

Q- Flow rate = 2,000 L/day (2 m^3/day)

K – Hydraulic conductivity [m/day] = 8.3 X 10^{-8} m/s
H – Distance from static water level to the bottom of an aquifer = 4.1m
h – Depth of water in the well while pumping = 1m
r_e – equivalent radius [m] = ((a*b) / π)$_{0.5}$ where a and b excavation dimensions (2 x 30 m) = 4.37 m
R_o– Radius of the cone of depression = r_e + 3000 * (H – h) * K$_{0.5}$, (k [m/s]) = 7 m
X – Length of Dewatering (Trench Length) = 30 m
L – Width of Dewatering = R_o/2= 3.52 m

The estimated flow rate is based on the excavation dimensions and a 10 mm precipitation event in 24 hours. The total estimated dewatering that may be required from a 10 mm precipitation event is approximately **1,000 L/day (1 m^3/day).**

The total estimated daily rate for short term construction is estimated to be **5,000 L/day (5 m^3/day)**. This value incorporates a 100% safety factor and the above-mentioned storm water. The dewatering value will need to be reassessed once below grade designs become available for review.

It is expected that the initial dewatering rates will be higher to remove groundwater from within the overburden formation. The dewatering rates are expected to decrease once the target water level is achieved in the excavation footprint as groundwater will have been removed locally from storage resulting in lower seepage rates into the excavation. The maximum flow calculation is intended to provide a conservative value to account for variations in K and weather events such as precipitation and snow melt. Groundwater control through sumps may be possible in areas where groundwater levels are over 1 m below finished grade. Positive dewatering through wells or eductors should be considered in areas with saturated subsurface conditions.

5.3 Zone of Influence During Construction

The radius of influence (Ro) for the construction dewatering was calculated based on the Sichardt equation (Equation 3.2). Ro is the distance at which the drawdown resulting from pumping is negligible. The equation is empirical and was developed to provide representative flow rates using the steady-state flow dewatering equations as indicated above. Under steady-state conditions, Ro of pumping will extend until boundary flow conditions are reached and sufficient water inputs are equal to the discharge rate due to pumping. Therefore, the Sichardt equation is used to provide a representative flow rate but is not precise in determining the actual radius of influence by pumping. Based on Sichardt equation the zone of influence for a single residential dwelling and a 30 x 2m trench at the site is approximately 25 m and 7 m, respectively.

5.4 Permit Requirements

5.4.1 Environmental Activity and Sector Registry (EASR) /Permit to Take Water (PTTW) Application

An Environmental Activity Sector Registration (EASR) is required to be submitted to the Ministry of the Environment, Conservation and Parks (MECP) if the taking of groundwater and stormwater for a temporary construction project is between 50,000 L/day and 400,000 L/ day. The EASR application is an online registry and should be submitted to the MECP before any construction dewatering. A PTTW is required to be submitted to the MECP if the taking of groundwater and stormwater for a temporary construction project is more than 400,000 L/ day.

Since the expected design dewatering rate(s) for the unsealed excavation(s) are below 50,000 L/day or more a PPTW or an EASR for short-term dewatering are not required. However, should multiple excavations occur at the same time and volumes should exceed 50,000 L/day or 400,000 L/day an EASR or a PTTW will be required from the MECP. All permitting requirements will be revised based on new design details.

5.4.2 Discharge Permits (Construction Dewatering and Permanent Drainage)

A discharge permit will be required from the Peel Region if private water is to be sent to the sewer system or nearby watercourse (Humber River).

6.0 POTENTIAL IMPACTS

The following are the predicted potential impacts as a result of development:

6.1 Local Groundwater Use

Based on the water well survey results, there may be some residents who rely on domestic water supply within a 500 m radius of the site. However, impacts to residential water wells is not likely due to the low zone(s) of influence for the proposed construction and since the proposed development is not to extend within a water supply aquifer at the site.

6.2 Surface Water

The Humber River transects the northeastern quadrant of the site, with development proposed to occur approximately 400 m from the river. Therefore, temporary surface water impacts on the Humber River are not likely. However, it is recommended that a surface water quality sample be obtained from the Humber River to establish baseline conditions and that resampling occur during construction to ensure no adverse effects to the river from the proposed development. Long-term impacts may be anticipated to the Humber River as a result of increased development within the area.

6.3 Source Protection Area

The site and study area fall within the Toronto Source Protection Area.

6.4 Highly Vulnerable Aquifer

A Highly Vulnerable Aquifer (HVA) is an aquifer on which external sources have or are likely to have a significant adverse effect and includes the land above the aquifer. The site and study are not located within an HVA. No aquifer impacts are anticipated due to the proposed temporary dewatering.

6.5 Wellhead Protection Area

A Wellhead Protection Area (WHPA) is an area that is related to a municipal well system and within which it is desirable to regulate or monitor drinking water threats. WHPAs are delineated for threats to quality and quantity. The site and the study area are not located within a municipal WHPA. No WHPA impacts are anticipated due to the proposed temporary dewatering.

6.6 Intake Protection Zone

An Intake Protection Zone (IPZ) is an area related to a surface water intake and within which it is desirable to regulate or monitor drinking water threats. These areas are either set distances, delineated based on the time it would take to respond to a spill, or based on the catchment area of the intake. The site and study area are not located within an IPZ.

6.7 Point of Discharge and Groundwater Quality

Groundwater quality analysis indicated that no parameters were in exceedance of the Peel Region's Storm Sewer Discharge By-Law criteria except for TSS. All parameters met the Region's Sanitary Sewer Discharge By-Law criteria. When compared against the PWQO guideline, concentrations of phosphorus and phenolics exceeded the PWQO standards. Therefore, groundwater at the Site is not suitable for discharge into the Peel Region's storm and nearby surface water system without treatment. A settlement tank should be considered as a basic treatment to minimize total suspended solids and associated metals during construction dewatering. Discharge permits and agreements are required from the Peel Region for short-term and long-term discharge.

6.8 Settlement Due to Dewatering Activities

There is a possibility of inducing settlement to neighboring structures when lowering water levels or depressurizing an aquifer. Due to the construction ending low permeable clayey silt to silty clay till, settlement due to construction dewatering activities is not likely.

6.9 Well Decommissioning

Following the completion of construction activities, all dewatering wells, well points, eductors and monitoring wells installed at various stages of this project must be decommissioned. The installation and eventual decommissioning of the wells and the dewatering system must be carried out by a licenced water well contractor in accordance with Regulation 903 of the Ontario Water Resources Act.

7.0 MONITORING AND MITIGATION

Based on the finding of hydrogeological assessment and associated potential impacts due to development, the following monitoring and mitigation program is provided:

- A groundwater level program has been implemented at the Site on a quarterly basis to document the pre-construction groundwater and surface water conditions, as well as assess seasonal fluctuations;
- Baseline groundwater has been assessed and established before construction. However, groundwater quality can change based on several factors (land-use change, spills, etc.) and should be monitored during construction dewatering and after construction to ensure that water quality meets the guideline or regulations associated with any permits from the MECP, Peel Region and Conservation Authority;
- A surface water quality sample is recommended to be obtained from the Humber River to assess baseline conditions prior to any overland discharge;
- Once a groundwater dewatering system is set up at the Site, a daily and weekly monitoring should be implemented to assess the groundwater conditions such as water levels, measurement of discharge flow, discharge water quality and any adverse impacts as a result of dewatering;
- Following the completion of construction activities, all dewatering wells, well points, eductors and monitoring wells installed at various stages of this project shall be decommissioned. The installation

and eventual decommissioning of the wells and the dewatering system will be carried out by a licenced water well contractor in accordance with Regulation 903 of the Ontario Water Resources Act.

Should you have any questions regarding these findings, please contact the undersigned.

DS Consultants Ltd.

Prepared By:

Dorothy Santos, M.Sc.
Project Manager

Reviewed By:

Martin Gedeon

Martin Gedeon, M.Sc., P.Geo.
Senior Hydrogeologist

8.0 CONSULTANT QUALIFICATIONS

Martin Gedeon, M.Sc., P.Geo., is a Professional Geoscientist (P.Geo.) with over 26 years of experience as an environmental/hydrogeological consultant in the areas of groundwater and soil monitoring, environmental site assessments, environmental due diligence, and remediation. Martin has significant experience in physical and contaminant hydrogeology across Canada and overseas and has provided hydrogeological/environmental technical support on various projects. Martin has prepared hundreds of hydrogeological reports in support of permit applications for a private sector development application, municipal dewatering operations, and provincial infrastructure projects across the province.

Ms. Dorothy Santos, M.Sc., is project manager with DS Consultants Ltd. Dorothy holds a master's degree in Earth and Environmental Science (Hydrogeology) from the University of Waterloo and has several years of experience conducting hydrogeological investigations and environmental assessments. Dorothy has experience with conducing Phase One and Phase Two Environmental Site Assessments, hydrogeological investigations and has provided technical support for discharge permits. Dorothy has been involved with project coordination, field assessments, data interpretation and reporting.

9.0 REFERENCES

Chapman, L.J., and D.F. Putnam; The Physiography of Southern Ontario, Third Edition, Ontario Geological Survey Special Volume 2; 1984, & 2007.

Environment Canada (Climate Data)
http://climate.weather.gc.ca/historical_data/search_historic_data_e.html

Freeze, R.A. and J.A. Cherry. “Groundwater”. Prentice-Hall, Inc. Englewood Cliffs, NJ. 1979.

Ontario Regulation 153/04 made under the Environmental Protection Act, July 1, 2011.

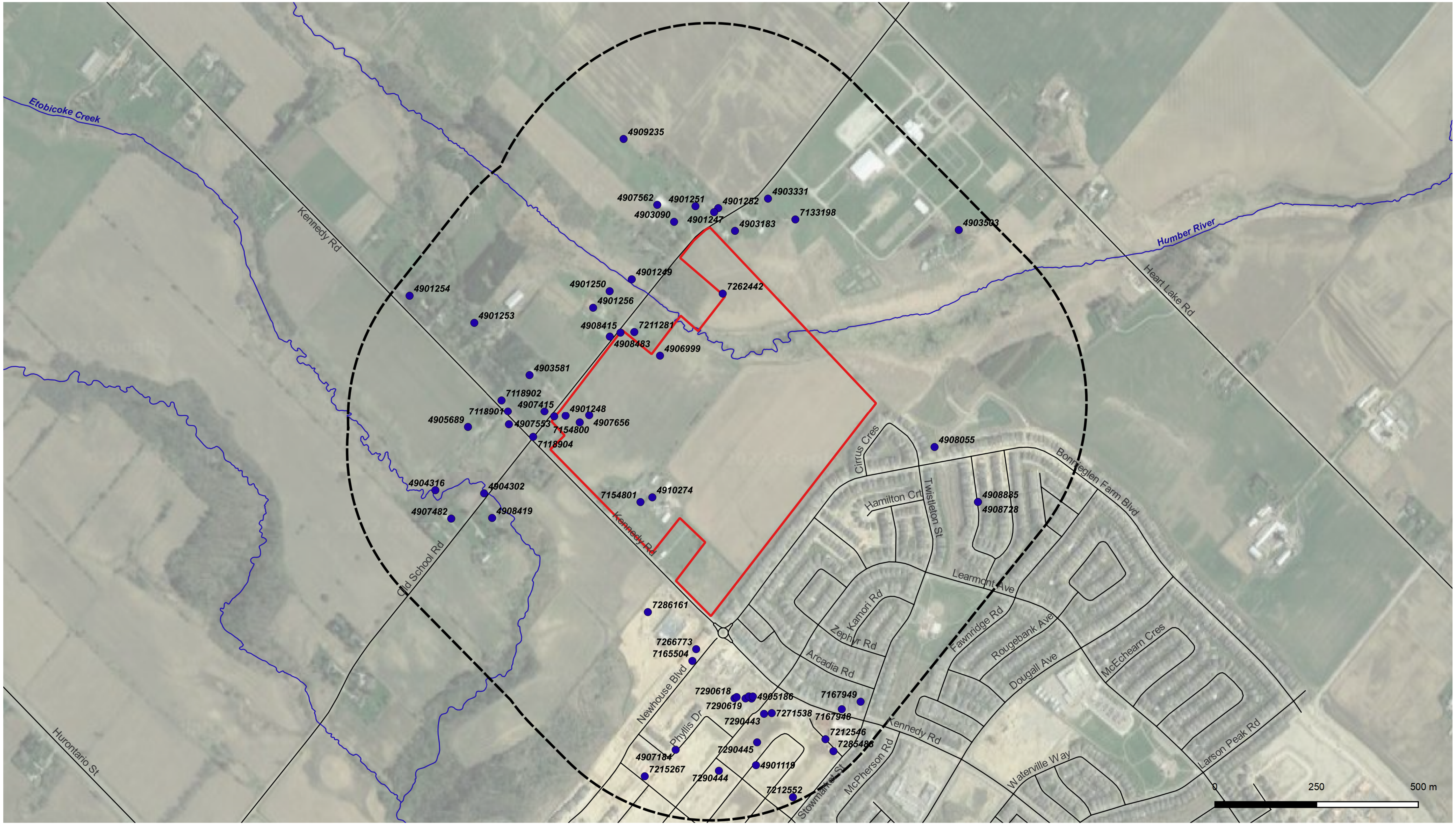
Ontario Regulation 245/11- Environmental Activity and Sector Registry.

Powers, J. Patrick, P.E. (1992); Construction Dewatering: New Methods and Applications - Second Edition, New York: John Wiley & Sons.

Stormwater Management Planning and Design Manual- MECP (2003)

The Peel Region Sewers By-law.

Figures



Legend

🟥 Russell Property Boundary

⬚ 500m Buffer

● Registered Water Well (MECP WWR)

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Project: HYDROGEOLOGICAL INVESTIGATION
12909 Kennedy Road, Caledon, ON

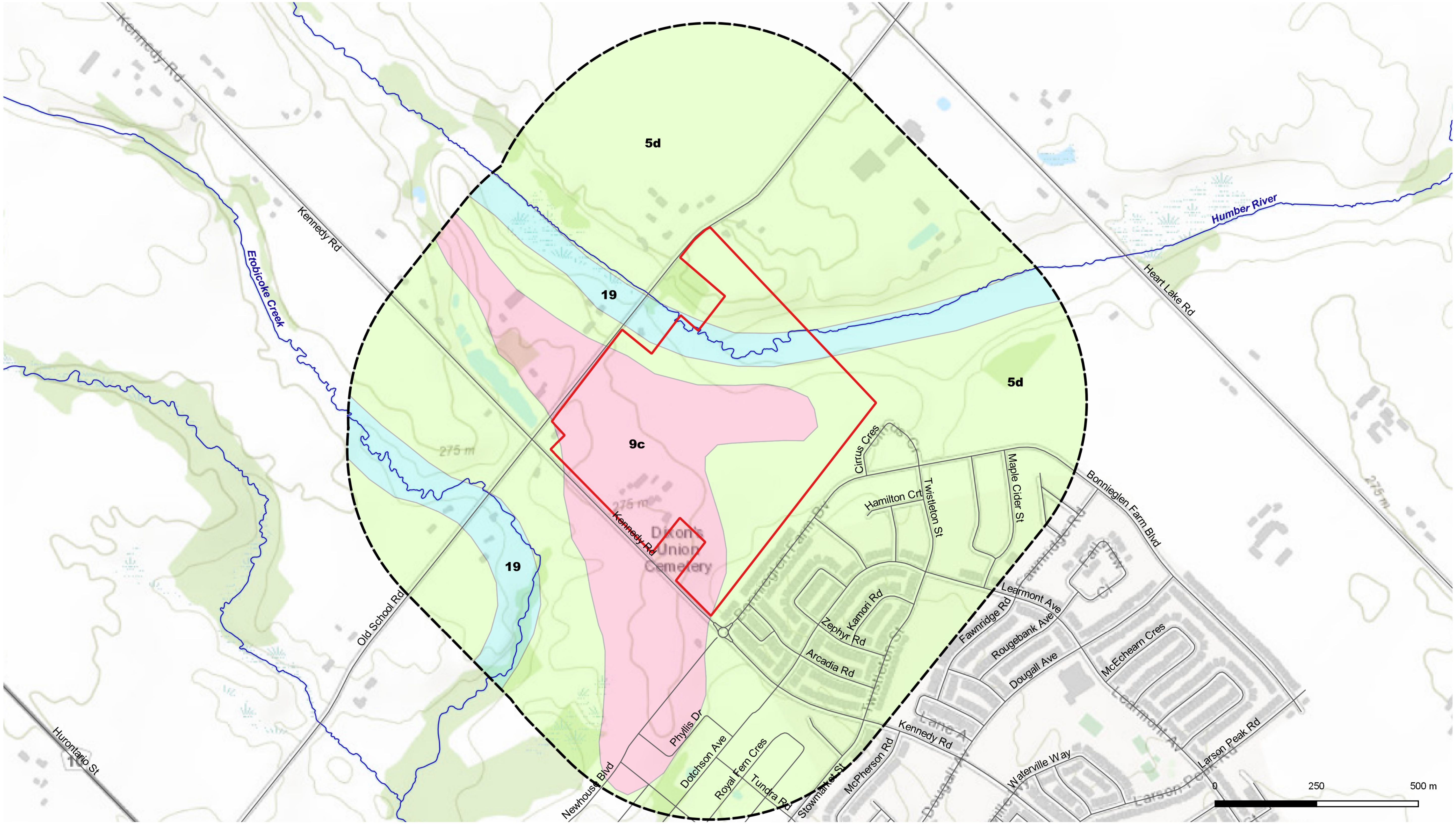
Title: **SITE LOCATION AND MECP WELL RECORDS**

N

Client:
TRENDS DEVELOPMENT INC.
c/o TREND 12909 KENNEDY
DEVELOPMENT INC.

Size: 11x17	Approved By: D.S	Drawn By: S.Y	Date: January 2023
	Scale: As Shown	Project No.: 22-371-100	Figure No.: 1
Rev. 0	Image/Map Source: *Google Satellite Image*		

C:\0Sharon\22-371-100 12909 Kennedy Road, Caledon\1-QGIS\HydroG\Figure 1 – Site Location and MECP Well Records.qgs Jan-13 09:25



Legend

🟥 Russell Property Boundary

⬚ 500m Buffer

🟦 19 - Modern Alluvium

🟩 5d - Till

🟪 9c - Coarse-textured Glacial Lake Deposits

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Title: **SURFICIAL GEOLOGY MAP**

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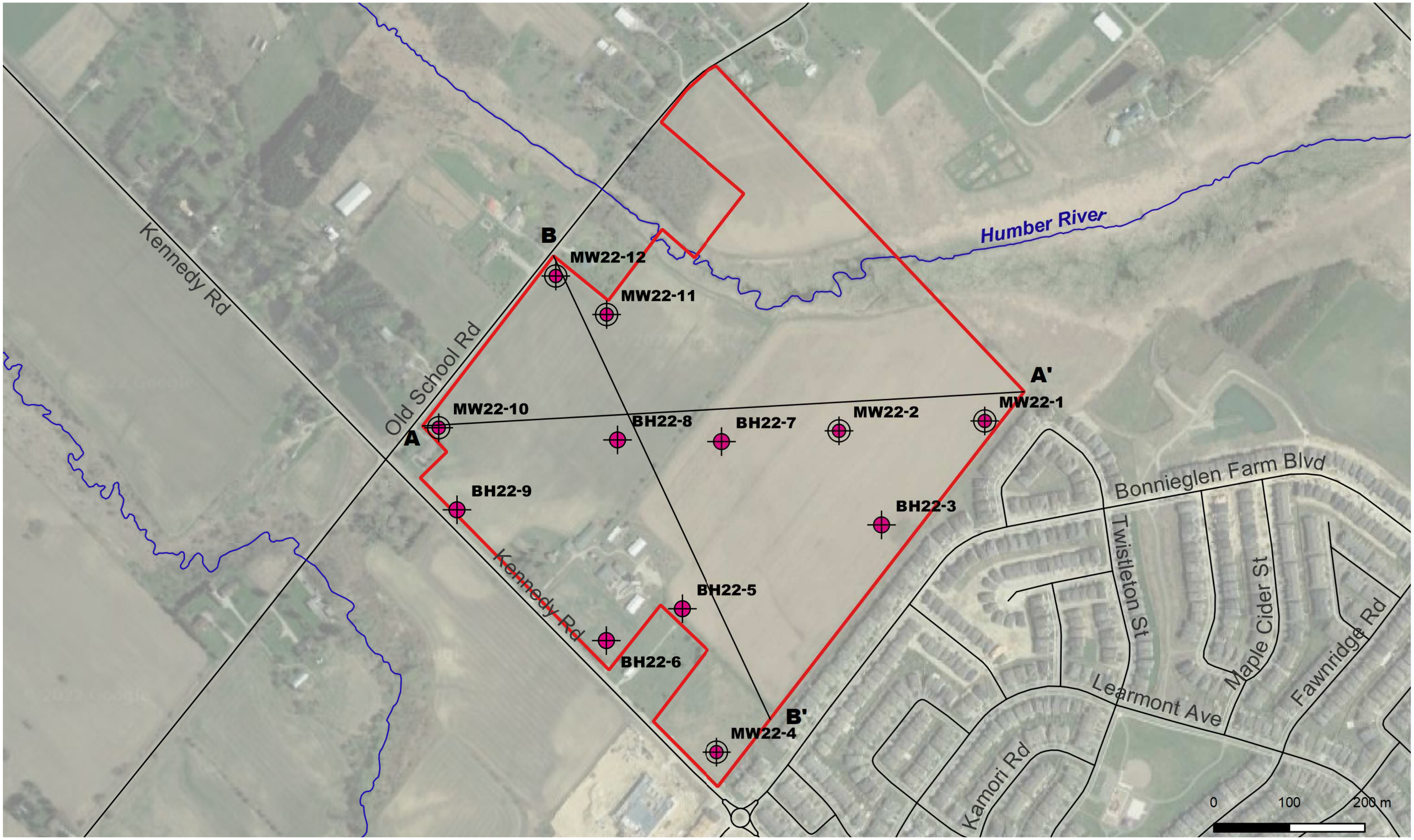
DEVELOPMENT INC.

Size: 11x17	Approved By: D.S	Drawn By: S.Y	Date: January 2023
Rev. 0	Scale: As Shown	Project No.: 22-371-100	Figure No.: 2

Image/Map Source: *Esri Topo Map & https://www.mndm.gov.on.ca/*

C:\DSharon\22-371-100 12909 Kennedy Road, Caledon\1-QGIS\HydroG\Figure 2 – Surficial Geology Map.qgs Jan-13 09:26



Legend

▭ Russell Property Boundary

⊕ Borehole

⊕ Monitoring Well

— Cross Section

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Project: HYDROGEOLOGICAL INVESTIGATION
12909 Kennedy Road, Caledon, ON

Title: **BOREHOLE AND MONITORING WELL LOCATIONS**

N

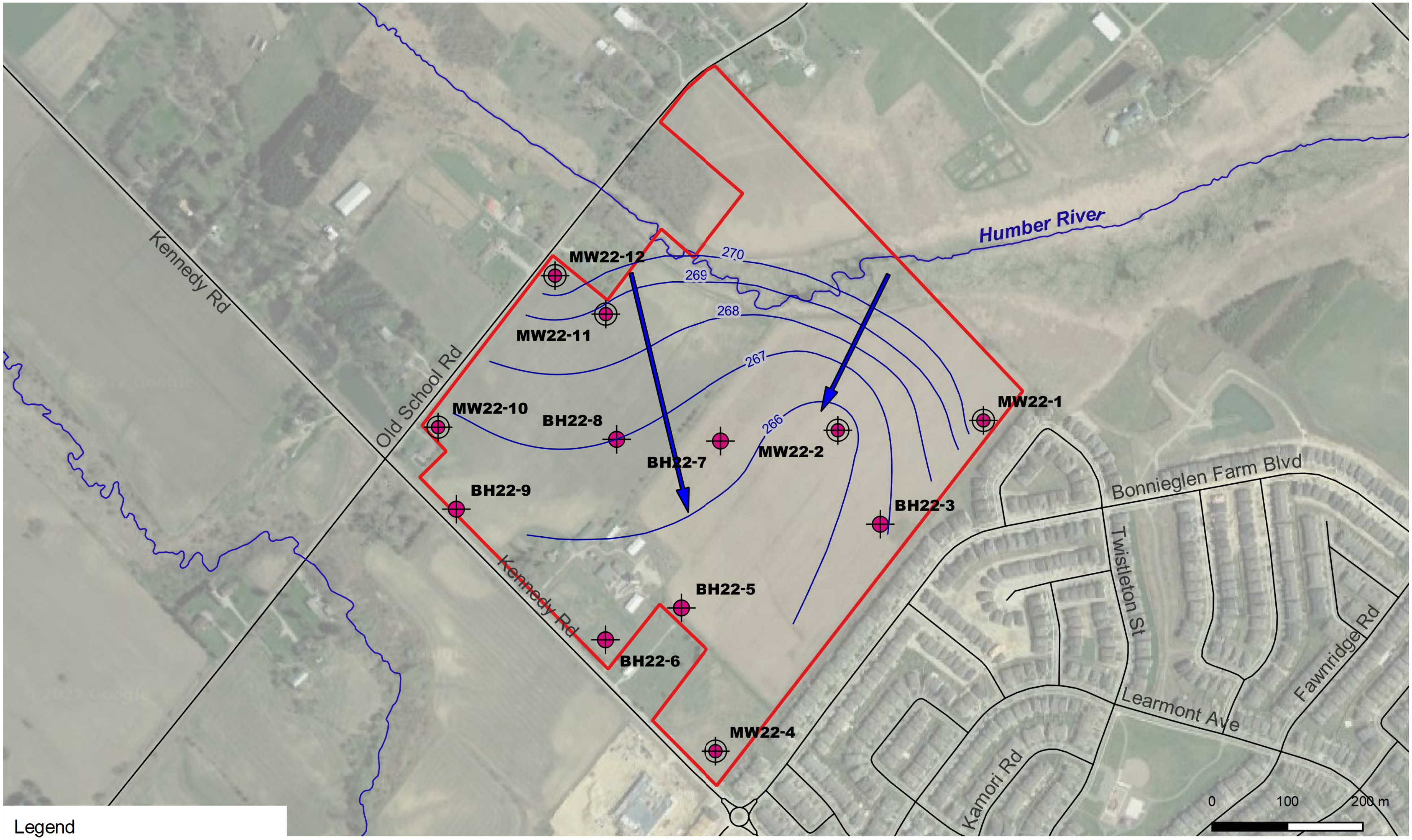
Client: TRENDS DEVELOPMENT INC.
c/o TREND 12909 KENNEDY
DEVELOPMENT INC.

Size: 8.5 x 11
Rev: 0

Approved By: D.S
Drawn By: S.Y
Date: January 2023
Scale: As Shown
Project No.: 22-371-100
Figure No.: 3

Image/Map Source: *Google Satellite Image*

D:\0DSConsultants\01 Backup January 2021\2022 PROJECTS\22-371-100 12909 Kennedy Road, Caledon\1-QGIS\HydroG\Figure 4 - Groundwater Elevation Contours and Flow Direction.qgs Jan-17



Legend

▭ Russell Property Boundary

⊕ Borehole

⊕ Monitoring Well

— Groundwater Elevation Contour (Nov 9, 2022)

➡ Groundwater Flow Direction

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Project: HYDROGEOLOGICAL INVESTIGATION
12909 Kennedy Road, Caledon, ON

Title: **GROUNDWATER ELEVATION CONTOURS AND FLOW DIRECTION**

N

Client:
TRENDS DEVELOPMENT INC.
c/o TREND 12909 KENNEDY
DEVELOPMENT INC.

Size: 8.5 x 11

Rev: 0

Approved By: D.S

Drawn By: S.Y

Date: January 2023

Scale: As Shown

Project No.: 22-371-100

Figure No.: 4

Image/Map Source: *Google Satellite Image*

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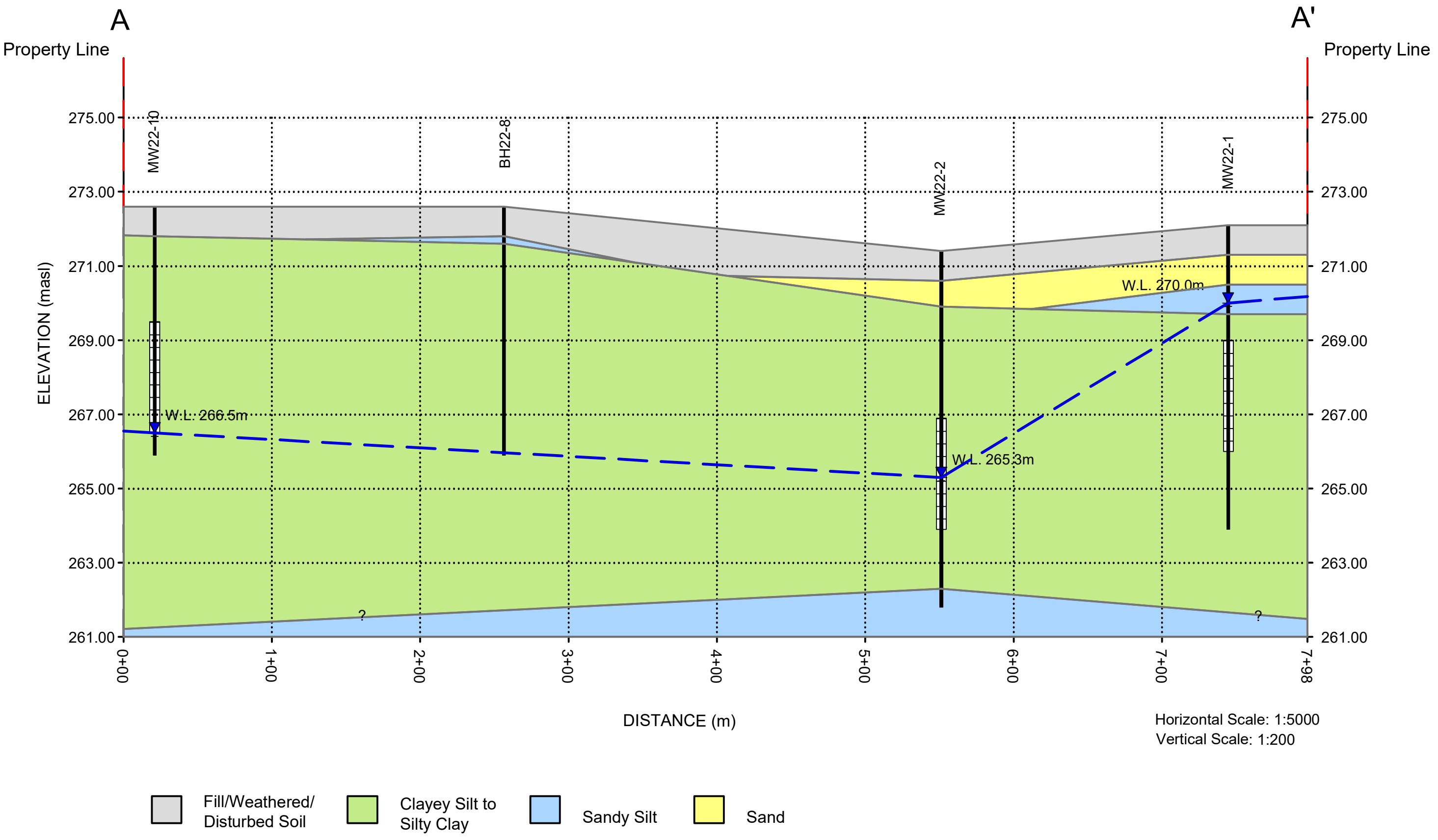
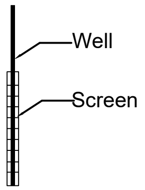


Inferred Groundwater Elevation
(09 Nov 2022)



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Project:
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12909 Kennedy Road, Caledon, ON

Title:

GEOLOGICAL CROSS SECTION A-A’

Client:
TRENDS DEVELOPMENT INC.
c/o TREND 12909 KENNEDY
DEVELOPMENT INC.

Size: 8.5 x 11	Approved By: D.S	Drawn By: S.Y	Date: January 2023
Rev.	Scale: As Shown	Project No: 22-371-100	Figure No. 5A

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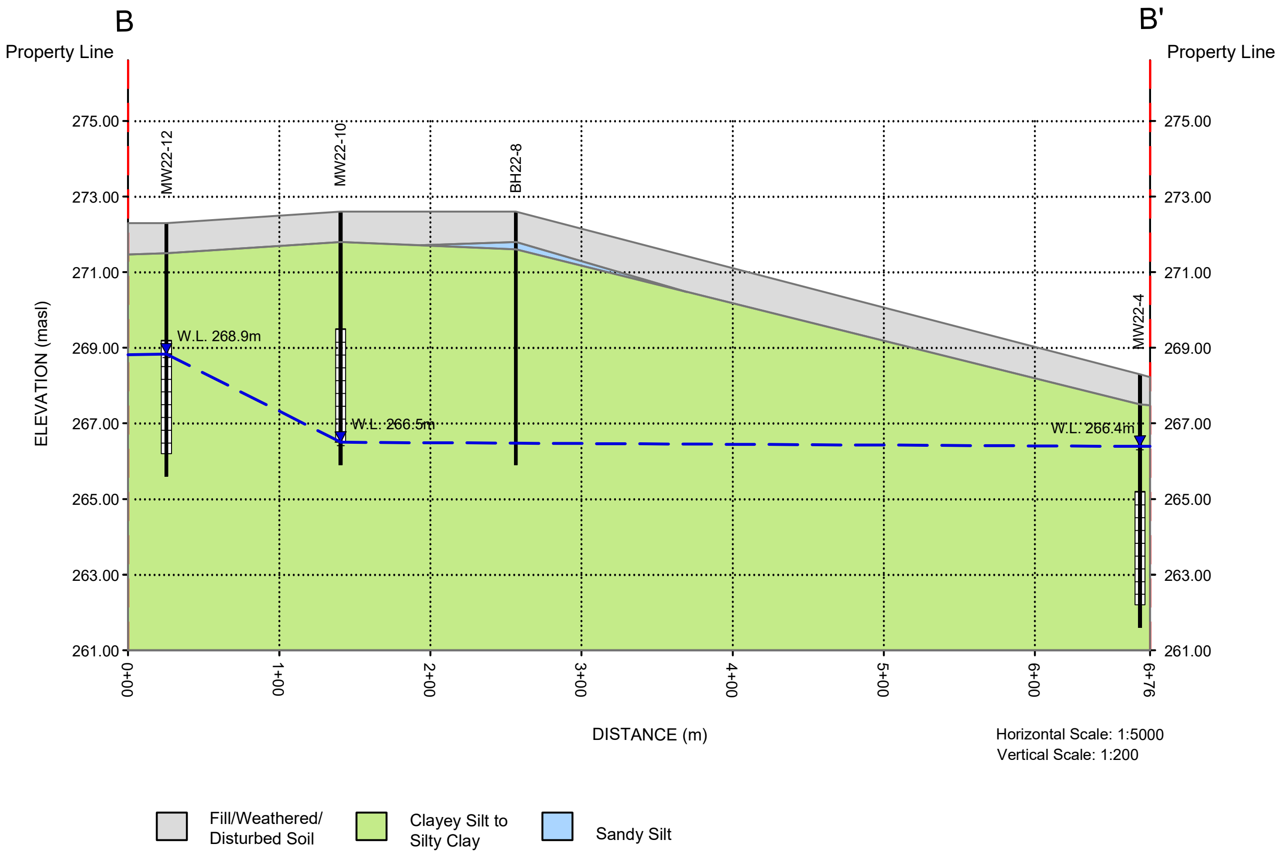
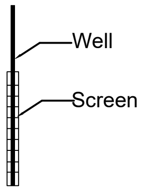


— — — — Inferred Groundwater Elevation
(09 Nov 2022)



DS CONSULTANTS LTD.
6221 Highway 7, UNIT 16
Vaughan, Ontario L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

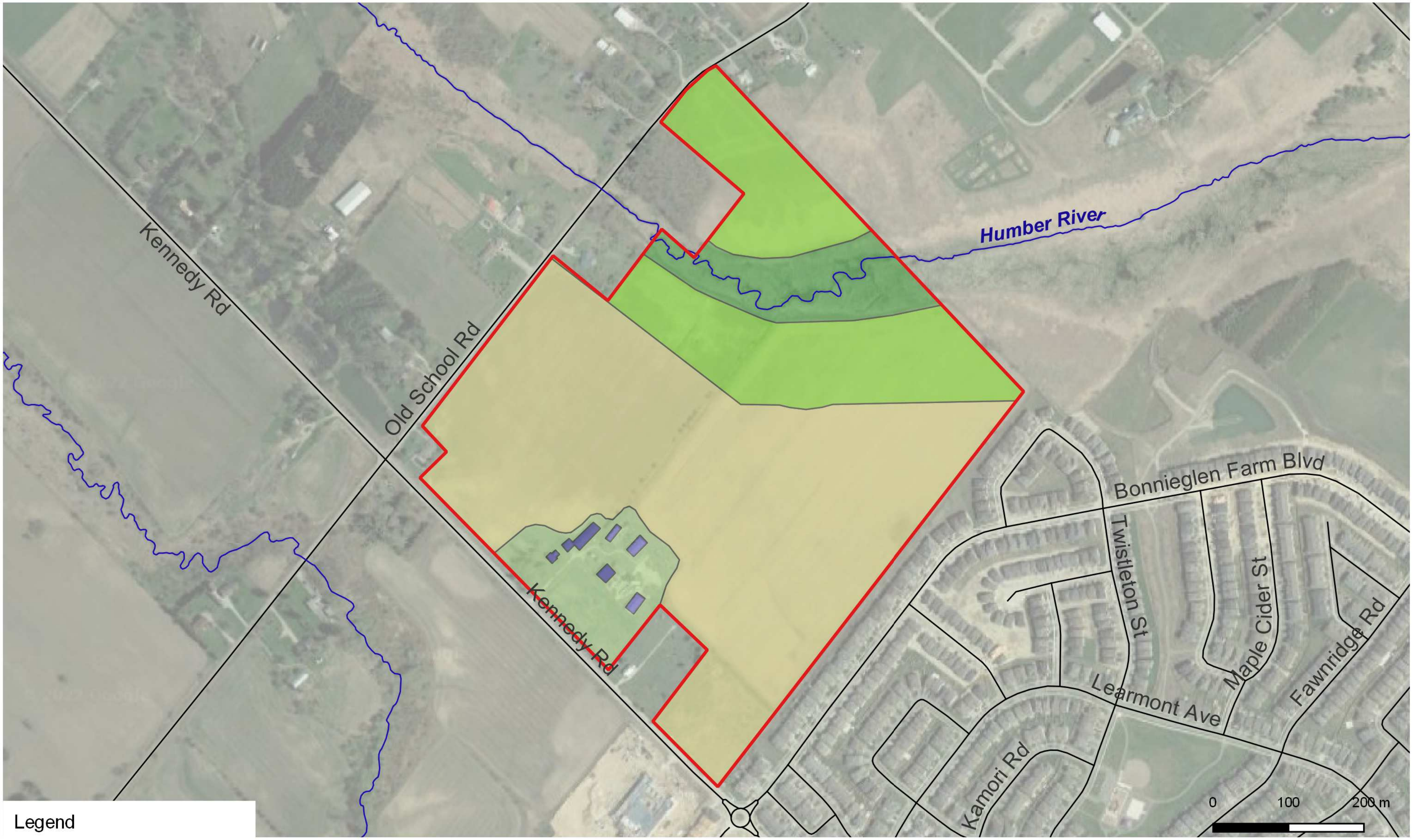
Project: HYDROGEOLOGICAL INVESTIGATION
12909 Kennedy Road, Caledon, ON

Title:

GEOLOGICAL CROSS SECTION B-B’

Client:
TRENDS DEVELOPMENT INC.
c/o TREND 12909 KENNEDY
DEVELOPMENT INC.

Size: 8.5 x 11	Approved By: D.S	Drawn By: S.Y	Date: January 2023
Rev.	Scale: As Shown	Project No: 22-371-100	Figure No. **5B**



Legend

- 🟥 Russell Property Boundary
- 🟨 Agricultural
- 🟪 Building
- 🟩 Landscape Area
- 🟩 Greenbelt
- 🟩 Forest

DS CONSULTANTS LTD.
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Vaughan, Ontario L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

Client:
TRENDS DEVELOPMENT INC.
c/o TREND 12909 KENNEDY
DEVELOPMENT INC.

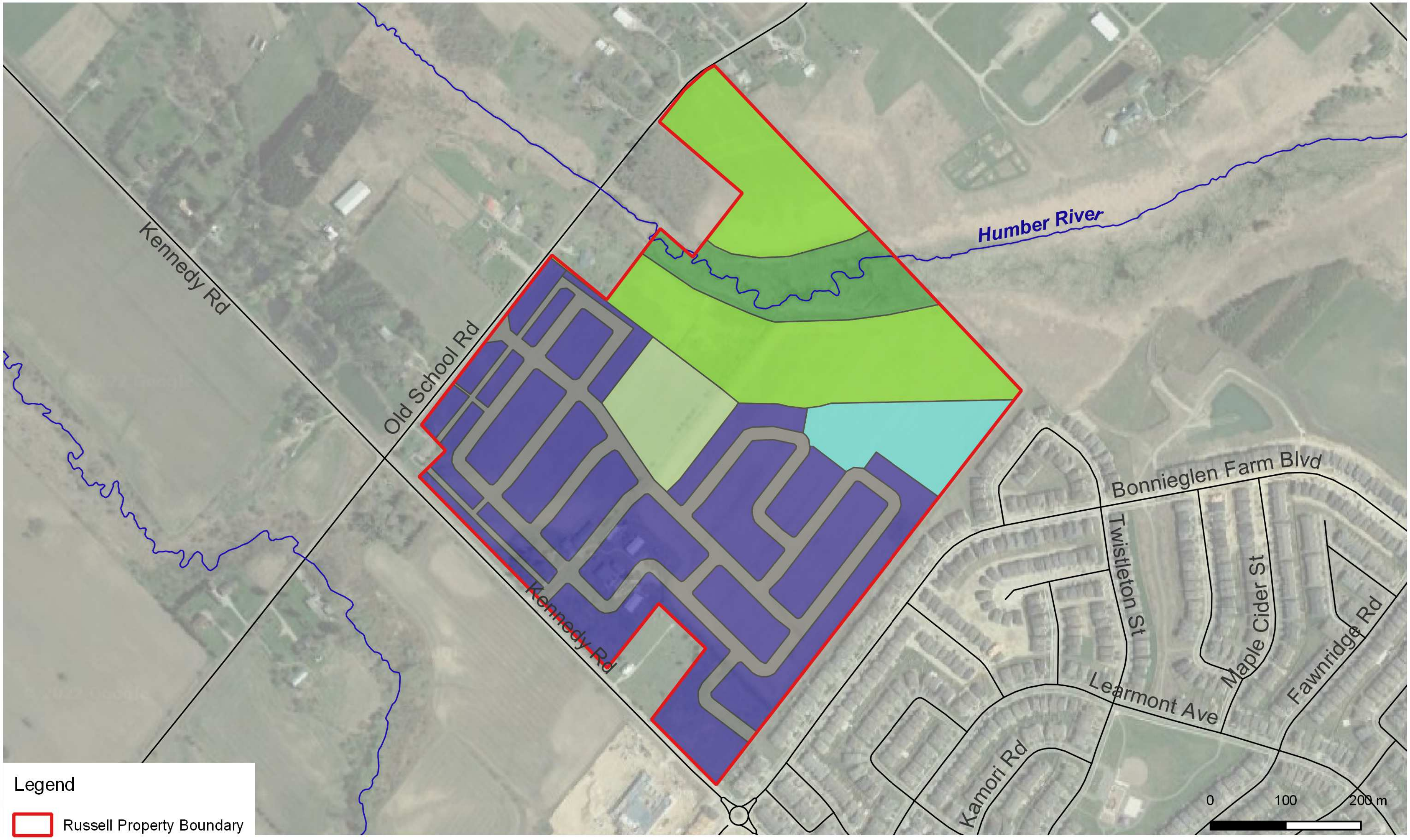
Project: HYDROGEOLOGICAL INVESTIGATION
12909 Kennedy Road, Caledon, ON

Title: **PRE-DEVELOPMENT LAND USE**

Size: 8.5 x 11	Approved By: D.S	Drawn By: S.Y	Date: January 2023
Rev: 0	Scale: As Shown	Project No.: 22-371-100	Figure No.: 6A

Image/Map Source: *Google Satellite Image*

C:\0Sharon\22-371-100 12909 Kennedy Road, Caledon\1-QGIS\HydroG\Figure 6B – Post-Development Landuse.qgs Jan-13 09:33



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6221 Highway 7, UNIT 16
Vaughan, Ontario L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

Project: HYDROGEOLOGICAL INVESTIGATION
12909 Kennedy Road, Caledon, ON

Title: **POST-DEVELOPMENT LAND USE**

Client: TRENDS DEVELOPMENT INC.
c/o TREND 12909 KENNEDY
DEVELOPMENT INC.

Size: 8.5 x 11
Rev: 0

Approved By: D.S
Drawn By: S.Y
Date: January 2023
Scale: As Shown
Project No.: 22-371-100
Figure No.: **6B**

Image/Map Source: *Google Satellite Image*

Appendix A

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH22-1

1 OF 1

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846306.45 E 594064.95

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-27-2022

REF. NO.: 22-371-100
ENCL NO.: 2

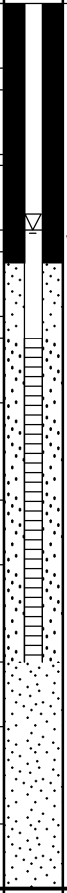
SOIL PROFILE

(m) ELEV DEPTH	DESCRIPTION
272.1 0.0	**TOPSOIL:** 200mm
271.9 0.2	**WEATHERED/DISTURBED SOIL:** sandy silt, trace clay, trace rootlets, trace gravel, brown, moist, loose
271.3 0.8	**GRAVELLY SAND:** trace silt, angular pieces of gravel, brown, moist, compact
270.5 1.6	**SANDY SILT TILL:** trace clay, trace gravel, brown, moist, compact
269.7 2.4	**CLAYEY SILT TO SILTY CLAY TILL:** some sand to sandy, trace gravel, grey, moist, very stiff
263.9 8.2	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Nov. 4, 2022 2.1

SAMPLES

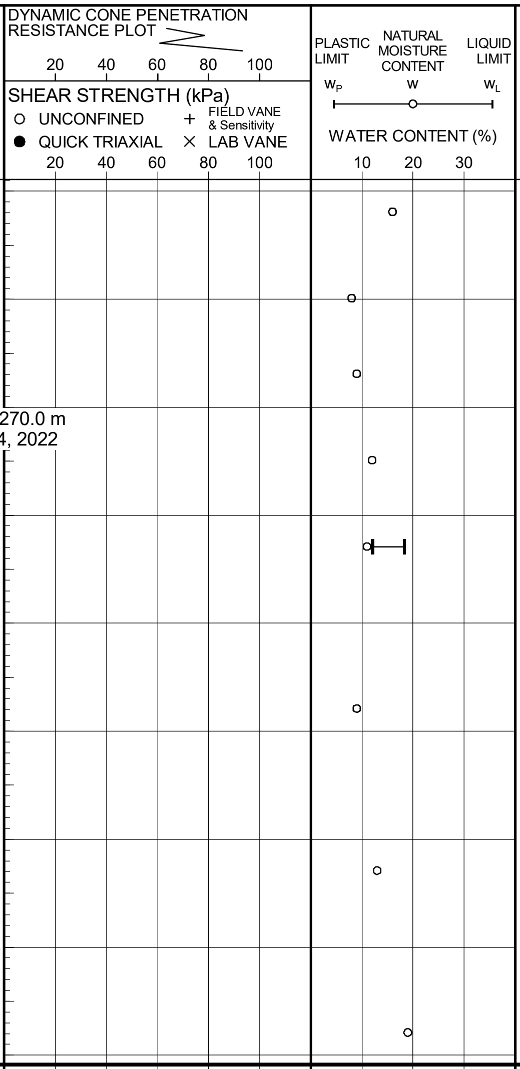
NUMBER	TYPE	"N" BLOWS/0.3 m	GR	SA	SI	CL
1	SS	7				
2	SS	14				
3	SS	16				
4	SS	29				
5	SS	27	8	35	40	17
6	SS	24				
7	SS	21				
8	SS	16				

GROUND WATER CONDITIONS



W. L. 270.0 m
Nov 04, 2022

ELEVATION: 272, 271, 270, 269, 268, 267, 266, 265, 264



POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GROUNDWATER ELEVATIONS
Measurement 1st ∇ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ 8 =3% Strain at Failure

DS SOIL LOG-2021-FINAL 22-371-100 GEO COPY.GPJ DS.GDT 23-1-11

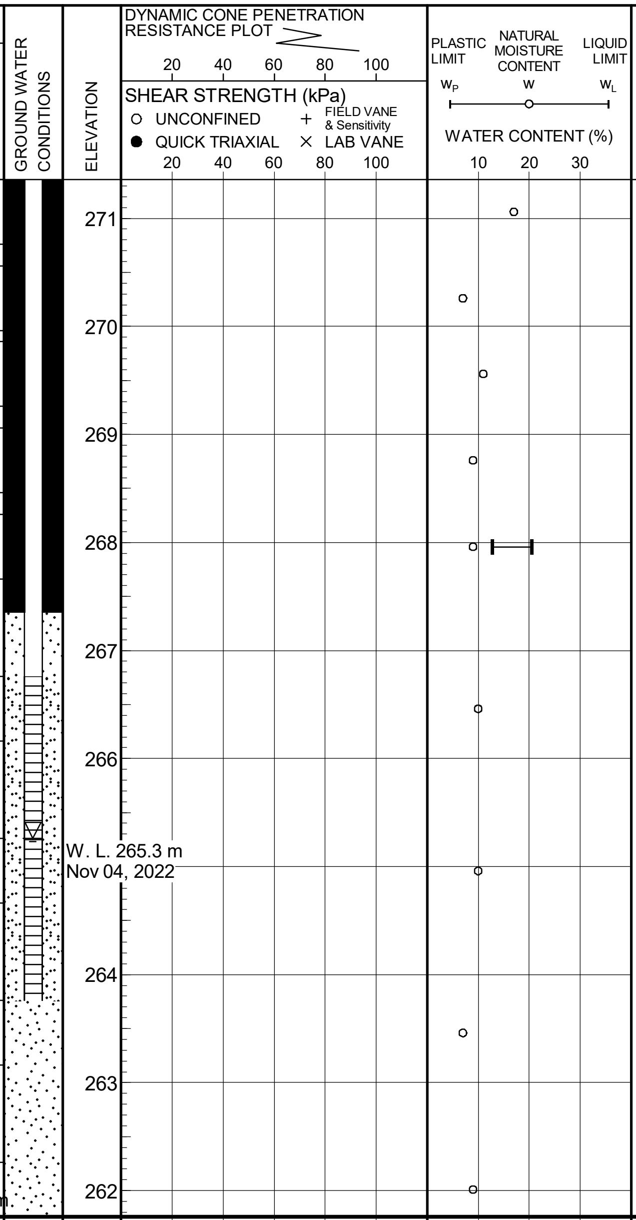
LOG OF BOREHOLE BH22-2

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846290.7 E 593872.09

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-27-2022

REF. NO.: 22-371-100
ENCL NO.: 3

ELEV (m) / DEPTH	DESCRIPTION	SAMPLE NUMBER	TYPE	"N" BLOWS/0.3 m	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
271.4						
0.0	**TOPSOIL:** 300mm	1	SS	5	271	
271.1 0.3	**WEATHERED/DISTURBED SOIL:** sandy silt, trace clay, trace organics, trace rootlets, brown, moist, loose					
270.6 0.8	**GRAVELLY SAND:** trace silt, brown, moist, compact	2	SS	17	270	
269.9 1.5	**CLAYEY SILT TO SILTY CLAY TILL:** some sand to sandy, trace gravel, brown, moist, stiff to hard	3	SS	18		
	grey below 2.3m	4	SS	43	269	
		5	SS	27	268	5 33 41 21
		6	SS	32	267 266	
	with sandy silt to silt pockets @6.1m	7	SS	37	265	
		8	SS	45	264 263	
262.3 9.1	**SANDY SILT TILL:** trace clay, trace gravel, grey, wet, very dense	9	SS	50/ 130mm	262	
261.8 9.6	**END OF BOREHOLE:**					



Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date: Water Level(mbgl):
Nov. 4, 2022 6.1

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
$+^3, \times^3$: Numbers refer to Sensitivity
○ ³=3% Strain at Failure

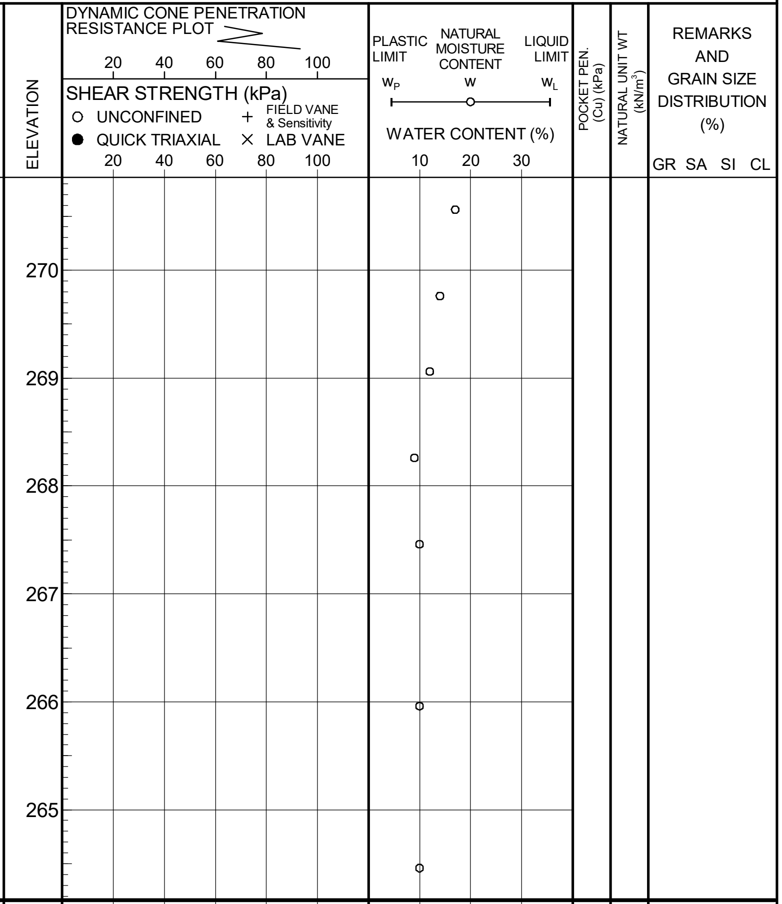
LOG OF BOREHOLE BH22-3

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846159.17 E 593933.78

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-27-2022

REF. NO.: 22-371-100
ENCL NO.: 4

(m) ELEV DEPTH	SOIL PROFILE DESCRIPTION	SAMPLES NUMBER	TYPE	"N" BLOWS / 0.3 m	GROUND WATER CONDITIONS	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
270.9						
0.0	**TOPSOIL:** 350mm	1	SS	7		
270.5 0.4	**WEATHERED/DISTURBED SOIL:** sandy silt, trace clay, trace organics, trace rootlets, brown, moist, loose					
270.1 0.8	**SANDY SILT TO SILTY SAND TILL:** trace clay, trace gravel, brown, moist, compact	2	SS	15		
269.5 1.4	**GRAVELLY SAND:** trace silt, brown, moist, compact					
269.2 1.7	**CLAYEY SILT TO SILTY CLAY TILL:** some sand to sandy, trace gravel, occasional cobble, brown, moist, stiff to hard grey below 2.3m	3	SS	13		
		4	SS	32		
		5	SS	28		
		6	SS	31		
		7	SS	32		
264.2 6.7	**END OF BOREHOLE:** Notes: 1) Auger grinding @ 4.6m due to possible cobble/boulder. 2) No water observed in borehole upon completion of drilling.					



GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES $+^3, \times^3$: Numbers refer to Sensitivity ○ ^{8}=3% Strain at Failure

LOG OF BOREHOLE BH22-4

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4845863.99 E 593715.76

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-28-2022

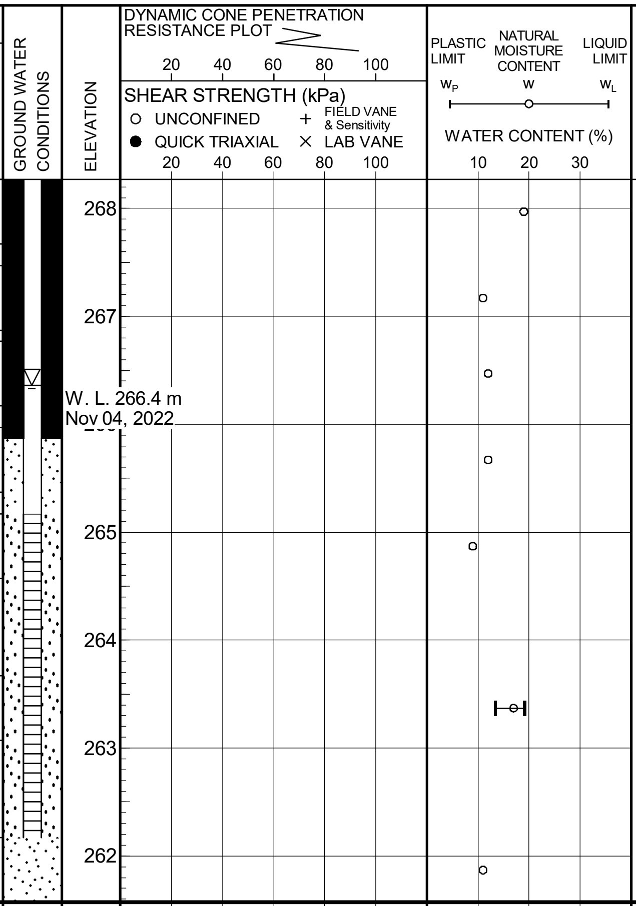
REF. NO.: 22-371-100
ENCL NO.: 5

SOIL PROFILE

(m) ELEV / DEPTH	DESCRIPTION
268.3 / 0.0	**TOPSOIL:** 250mm
268.0 / 0.3	**WEATHERED/DISTURBED SOIL:** clayey silt, some sand, trace organics, trace rootlets, brown, moist, firm
267.5 / 0.8	**CLAYEY SILT TILL:** some sand to sandy, trace gravel, brown, moist, very stiff grey below 2.3m
265.4 / 2.9	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, grey, moist, stiff to very stiff Wet Silt Layer at 5.0m
261.6 / 6.7	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Nov. 4, 2022 1.91

SAMPLES

NUMBER	TYPE	"N" BLOWS / 0.3 m	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
1	SS	6	
2	SS	22	
3	SS	17	
4	SS	28	
5	SS	24	
6	SS	16	3 23 55 19
7	SS	14	



POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m^3)

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
$+^3$, $\times^3$: Numbers refer to Sensitivity
○ ^{8}=3% Strain at Failure

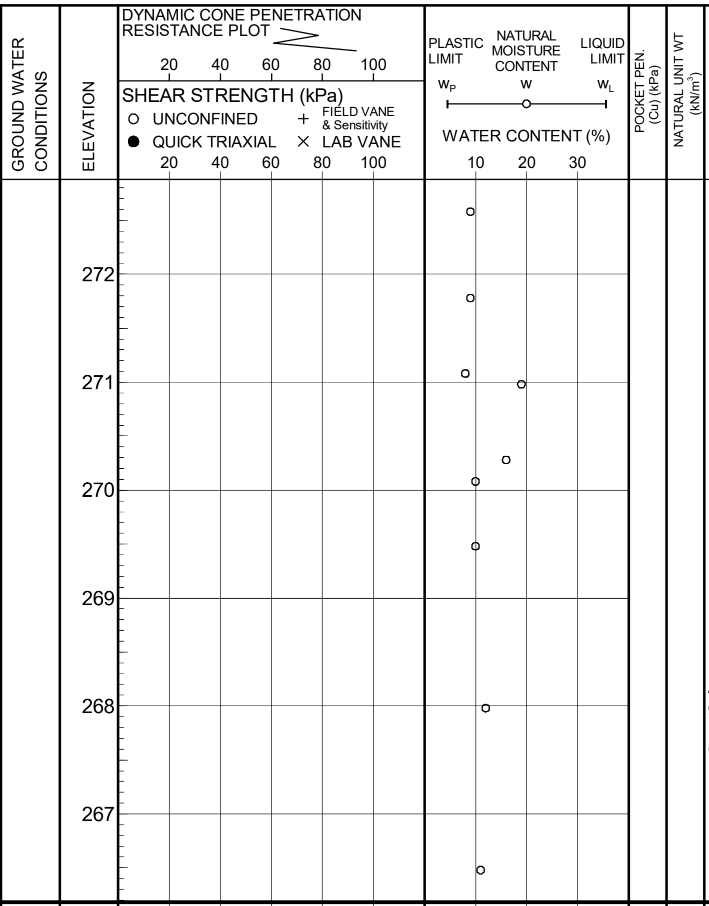
LOG OF BOREHOLE BH22-5

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846054.38 E 593671.47

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-27-2022

REF. NO.: 22-371-100
ENCL NO.: 6

SOIL PROFILE		SAMPLES			REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS / 0.3 m	GR SA SI CL
272.9					
272.7 0.0	**TOPSOIL:** 230mm				
0.2	**WEATHERED/DISTURBED SOIL:** sandy silt to silty sand, trace clay, trace organics, trace rootlets, brown, moist, loose	1	SS	6	
271.9 1.0	**SILTY SAND:** trace clay, trace gravel, brown, moist, loose to compact	2	SS	8	
271.2 1.7	**SILT:** trace to some sand, trace clay, trace gravel, brown, wet, compact grey, fine sand pockets@2.3m	3	SS	16	
		4	SS	24	
270.1 2.8	**CLAYEY SILT TO SILTY CLAY TILL:** some sand, trace gravel, occasional cobble, grey, moist, very stiff	5	SS	18	
		6	SS	19	Auger grinding, possible cobble/boulder
		7	SS	18	
266.2 6.7	**END OF BOREHOLE:** Notes: 1) Water encountered at 1.7 m depth during drilling.				



GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
$+^3, \times^3$: Numbers refer to Sensitivity
○ ^{8}=3% Strain at Failure

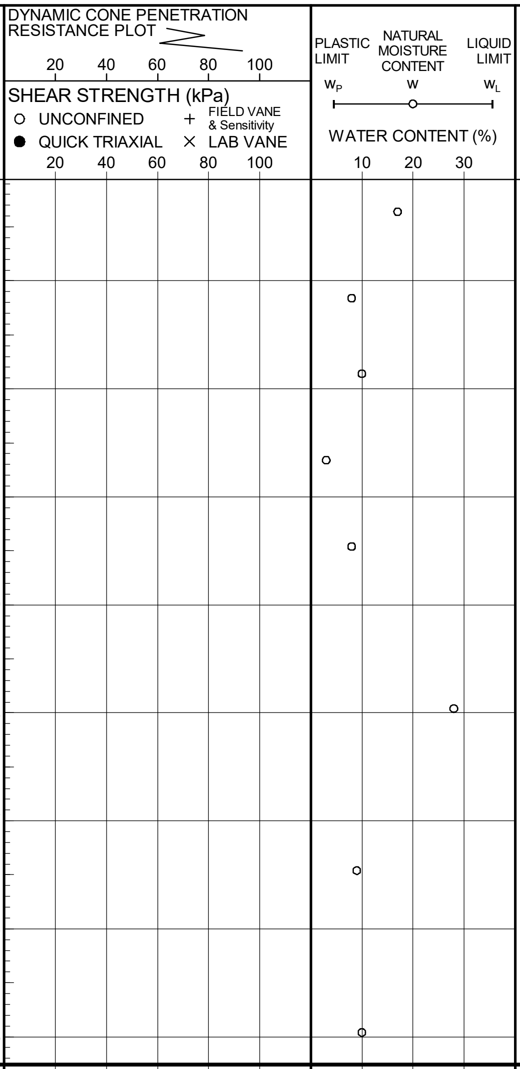
LOG OF BOREHOLE BH22-6

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846011.11 E 593571.54

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-28-2022

REF. NO.: 22-371-100
ENCL NO.: 7

SOIL PROFILE		SAMPLES								
(m) ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
272.9 0.0	**TOPSOIL:** 330mm	1	SS	5						
272.6 0.3	**WEATHERED/DISTURBED SOIL:** silty sand, trace clay, trace organics, trace rootlets, brown to orange brown, moist, very loose to loose	2	SS	0		272				
271.4 1.5	**SILTY SAND:** trace clay, brown, moist, loose to compact	3	SS	9		271				
		4	SS	14		270				
		5	SS	14		269				
	saturated at 4.6m	6	SS	8		268				
						267				
266.8 6.1	**CLAYEY SILT TO SILTY CLAY TILL:** some sand, trace gravel, occasional cobbles, grey, moist, hard	7	SS	30		266				
		8	SS	34		265				
264.7 8.2	**END OF BOREHOLE:** 1) Water encountered at 4.6 m depth during drilling.									



GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+³, ×³: Numbers refer to Sensitivity
○ ⁸=3% Strain at Failure

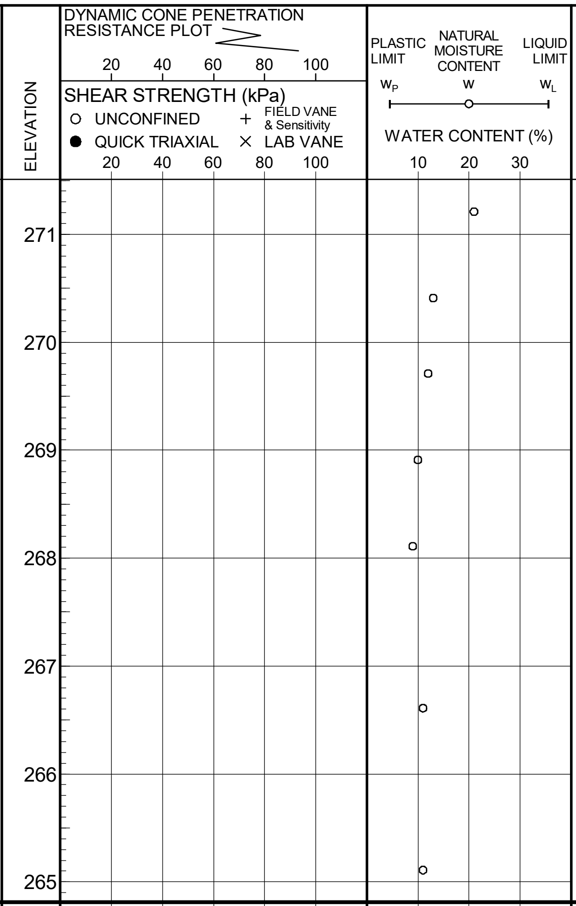
LOG OF BOREHOLE BH22-7

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846267 E 593724.46

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-27-2022

REF. NO.: 22-371-100
ENCL NO.: 8

(m) ELEV DEPTH	SOIL PROFILE DESCRIPTION	SAMPLE NUMBER	TYPE	"N" BLOWS 0.3 m	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
271.5 0.0	**TOPSOIL:** 430mm	1	SS	9	
271.1 0.4	**WEATHERED/DISTURBED SOIL:** sandy silt, trace clay, trace rootlets, brown, moist, loose				
270.7 0.8	**SILTY SAND TO SANDY SILT TILL:** trace clay, trace gravel, brown, moist, loose	2	SS	6	
270.3 1.2	**CLAYEY SILT TO SILTY CLAY TILL:** some sand, occasional sand pockets, occasional cobbles, brown, moist, very stiff to hard grey below 2.3m	3	SS	22	
		4	SS	33	
		5	SS	25	Auger grinding @3.0m due to cobble/boulder
		6	SS	21	
265.2 6.3	**SANDY SILT TILL:** some clay to clayey, trace gravel, grey, moist, compact	7	SS	26	
264.8 6.7	**END OF BOREHOLE:** Notes: 1) No water observed in borehole upon completion of drilling.				



POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m^3)

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES $+^3, \times^3$: Numbers refer to Sensitivity ○ ^{8}=3% Strain at Failure

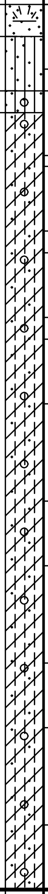
LOG OF BOREHOLE BH22-8

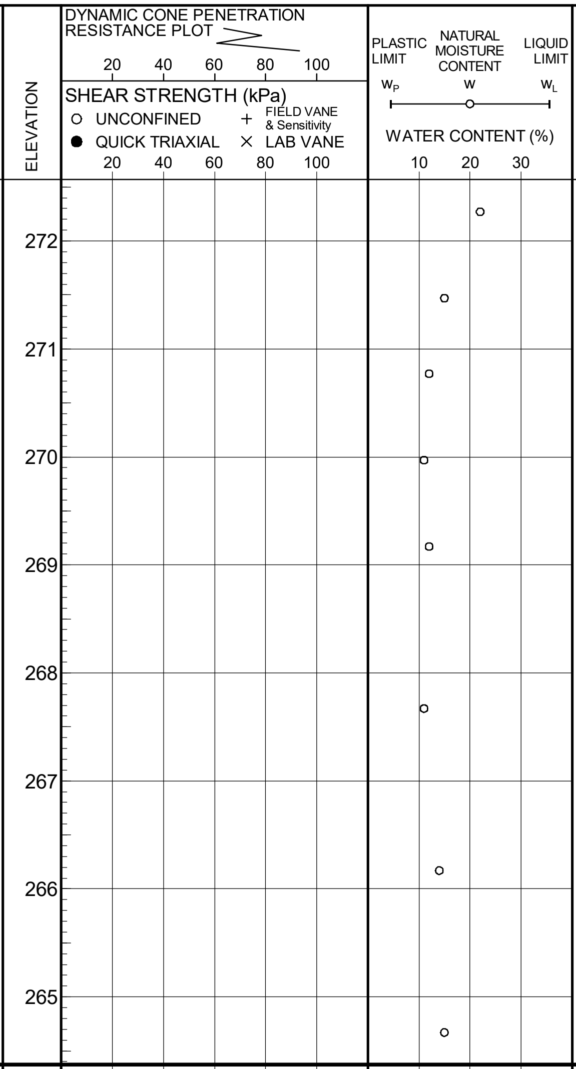
PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846277.26 E 593579.21

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-27-2022

REF. NO.: 22-371-100
ENCL NO.: 9

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS / 0.3 m	GROUND WATER CONDITIONS
272.6					
0.0	**TOPSOIL:** 300mm	1	SS	5	
272.3 0.3	**WEATHERED DISTURBED SOIL:** sandy silt, trace clay, trace rootlets, trace gravel, brown, moist, loose				
271.8 0.8	**SILTY SAND TO SANDY SILT TILL:** trace clay, trace gravel, brown, moist, compact	2	SS	15	
271.6 1.0	**CLAYEY SILT TO SILTY CLAY TILL:** some sand, trace gravel, brown, moist, stiff to very stiff	3	SS	14	
		4	SS	17	
	grey below 2.9m	5	SS	11	
		6	SS	11	
		7	SS	12	
		8	SS	18	
264.4 8.2	**END OF BOREHOLE:** Notes: 1) No water observed in borehole upon completion of drilling.				





POCKET PEN. (Cu) (kPa) | NATURAL UNIT WT (kN/m³) | REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
$+^3, \times^3$: Numbers refer to Sensitivity
○ ^{8}=3% Strain at Failure

LOG OF BOREHOLE BH22-9

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846189.91 E 593373.22

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-28-2022

REF. NO.: 22-371-100
ENCL NO.: 10

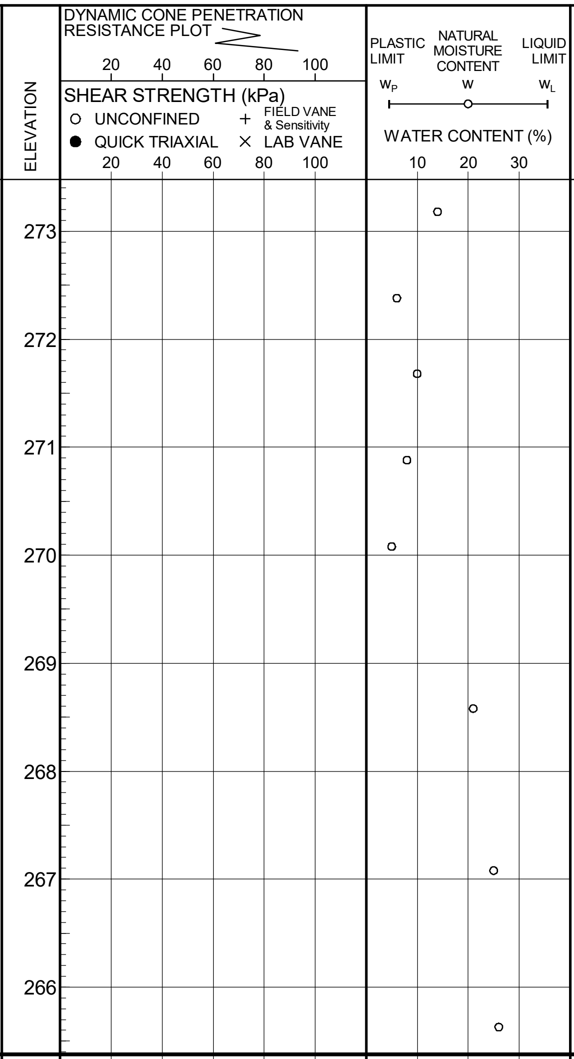
SOIL PROFILE

(m) ELEV / DEPTH	DESCRIPTION
273.5	
0.0	**TOPSOIL:** 250mm
273.2 0.3	**WEATHERED/DISTURBED SOIL:** silty sand, trace clay, trace organics, trace rootlets, brown, moist, loose
272.7 0.8	**SILTY SAND:** trace clay, brown, moist, loose to compact wet below 4.6m
265.7 7.8	**SANDY GRAVEL TO SAND AND GRAVEL:** trace silt, brown, wet, very dense
265.4 8.1	**END OF BOREHOLE:** Notes: 1) Water encountered at 4.6 m depth during drilling.

SAMPLES

NUMBER	TYPE	"N" BLOWS / 0.3 m	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR	SA	SI	CL
1	SS	5				
2	SS	12				
3	SS	9	0	60	37	3
4	SS	14				
5	SS	18				
6	SS	21				
7	SS	10				
8	SS	50/ 130mm				

GROUND WATER CONDITIONS
ELEVATION
POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)



GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

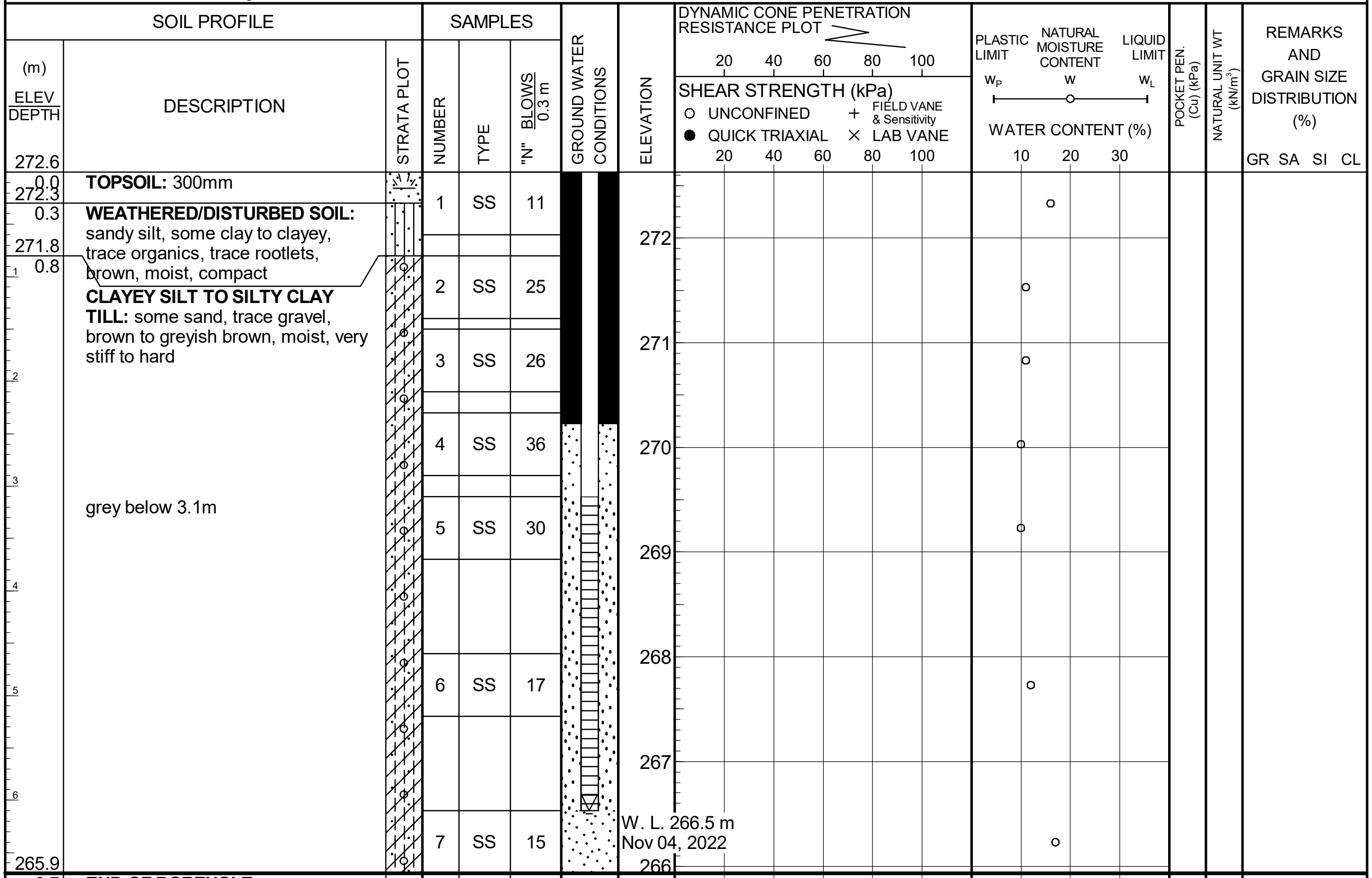
GRAPH NOTES
+³, ×³: Numbers refer to Sensitivity
○ ⁸=3% Strain at Failure

LOG OF BOREHOLE BH22-10

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846287.34 E 593341.04

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-28-2022

REF. NO.: 22-371-100
ENCL NO.: 11



(m) ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3 m
272.6				
0.0	**TOPSOIL:** 300mm	1	SS	11
272.3 0.3	**WEATHERED/DISTURBED SOIL:** sandy silt, some clay to clayey, trace organics, trace rootlets, brown, moist, compact			
271.8 0.8	**CLAYEY SILT TO SILTY CLAY TILL:** some sand, trace gravel, brown to greyish brown, moist, very stiff to hard	2	SS	25
		3	SS	26
		4	SS	36
	grey below 3.1m	5	SS	30
		6	SS	17
265.9		7	SS	15
6.7	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Nov. 4, 2022 6.1			

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
$+^3, \times^3$: Numbers refer to Sensitivity
○ ^{8}=3% Strain at Failure

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH22-11

1 OF 1

PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846440.01 E 593561.37

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-28-2022

REF. NO.: 22-371-100
ENCL NO.: 12

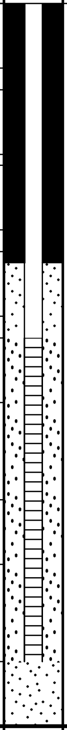
SOIL PROFILE

(m) ELEV DEPTH	DESCRIPTION
272.5 0.0	**TOPSOIL:** 250mm
272.2 0.3	**WEATHERED/DISTURBED SOIL:** sandy silt, trace clay, trace organics, trace rootlets, brown, moist, loose
271.7 0.8	**CLAYEY SILT TO SILTY CLAY TILL:** some sand, trace gravel, brown, moist, very stiff to hard greyish brown@3.1m grey below 4.6m
265.8 6.7	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Nov. 4, 2022 dry

SAMPLES

NUMBER	TYPE	"N" BLOWS/0.3 m
1	SS	4
2	SS	17
3	SS	21
4	SS	22
5	SS	34
6	SS	25
7	SS	18

GROUND WATER CONDITIONS



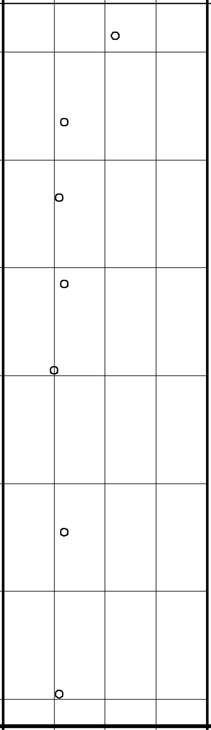
ELEVATION: 272, 271, 270, 269, 268, 267, 266

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT W_P — NATURAL MOISTURE CONTENT W — LIQUID LIMIT W_L

WATER CONTENT (%)



POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m^3)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES + 3 , × 3 : Numbers refer to Sensitivity ○ 8 =3% Strain at Failure

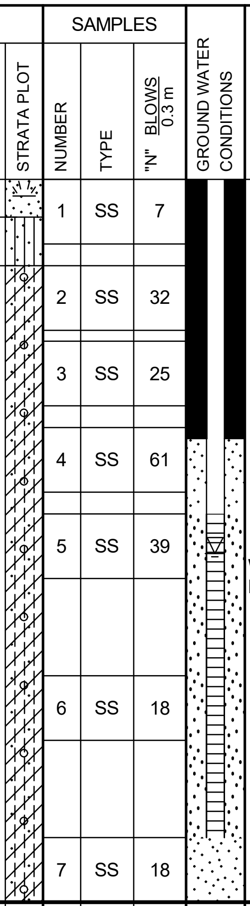
LOG OF BOREHOLE BH22-12

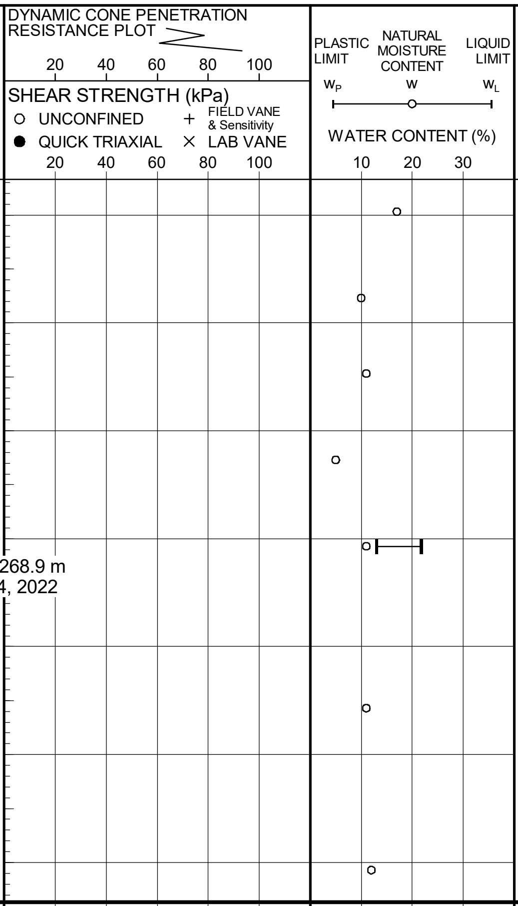
PROJECT: Geotechnical Investigation
CLIENT: Trend Developments Inc. & Trend 12909 Kennedy Developments Inc.
PROJECT LOCATION: 12909 Kennedy Rd., Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4846489.9 E 593493.3

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Oct-28-2022

REF. NO.: 22-371-100
ENCL NO.: 13

(m) ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3 m	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
272.3						
0.0	**TOPSOIL:** 350mm	1	SS	7	272	
272.0 0.4	**WEATHERED/DISTURBED SOIL:** sandy silt, trace to some clay, trace organics, trace rootlets, brown, moist, loose					
271.5 0.8	**CLAYEY SILT TO SILTY CLAY TILL:** some sand, trace gravel, brown, moist, very stiff to hard	2	SS	32	271	
		3	SS	25		
	cobble/boulder@2.3m	4	SS	61	270	
	sandy, grey below 3.1m	5	SS	39	269	6 32 40 22
					268	
		6	SS	18	267	
		7	SS	18	266	
265.6 6.7	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Nov. 4, 2022 3.47					





POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m^3)

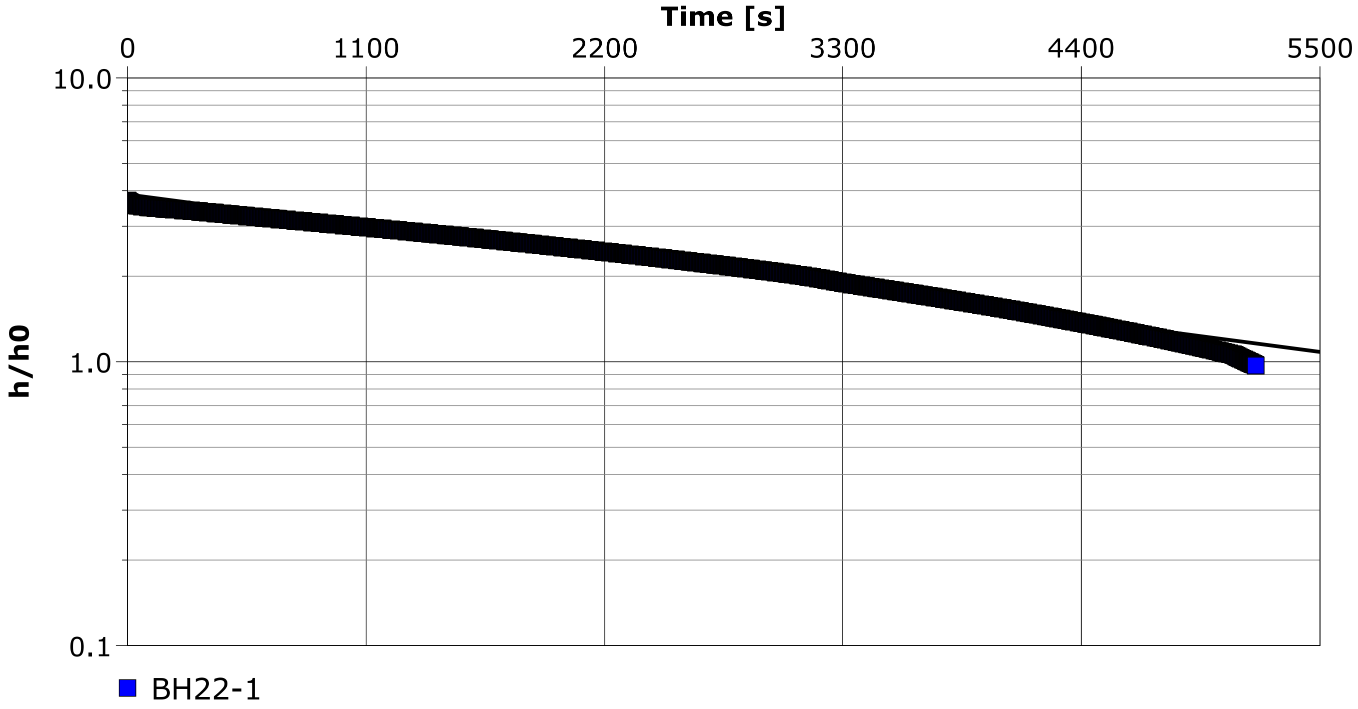
GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
$+^3, \times^3$: Numbers refer to Sensitivity
○ ^{8}=3% Strain at Failure

Appendix B

	Slug Test Analysis Report
	Project: 12909 Kennedy Road
	Number: 22-371-100
	Client: Trends Development Inc.

Location: Caledon, ON	Slug Test: BH22-1	Test Well: BH22-1
Test Conducted by: HS		Test Date: 11/11/2022
Analysis Performed by: DS	BH22-1	Analysis Date: 11/17/2022
Aquifer Thickness: 9.34 m		

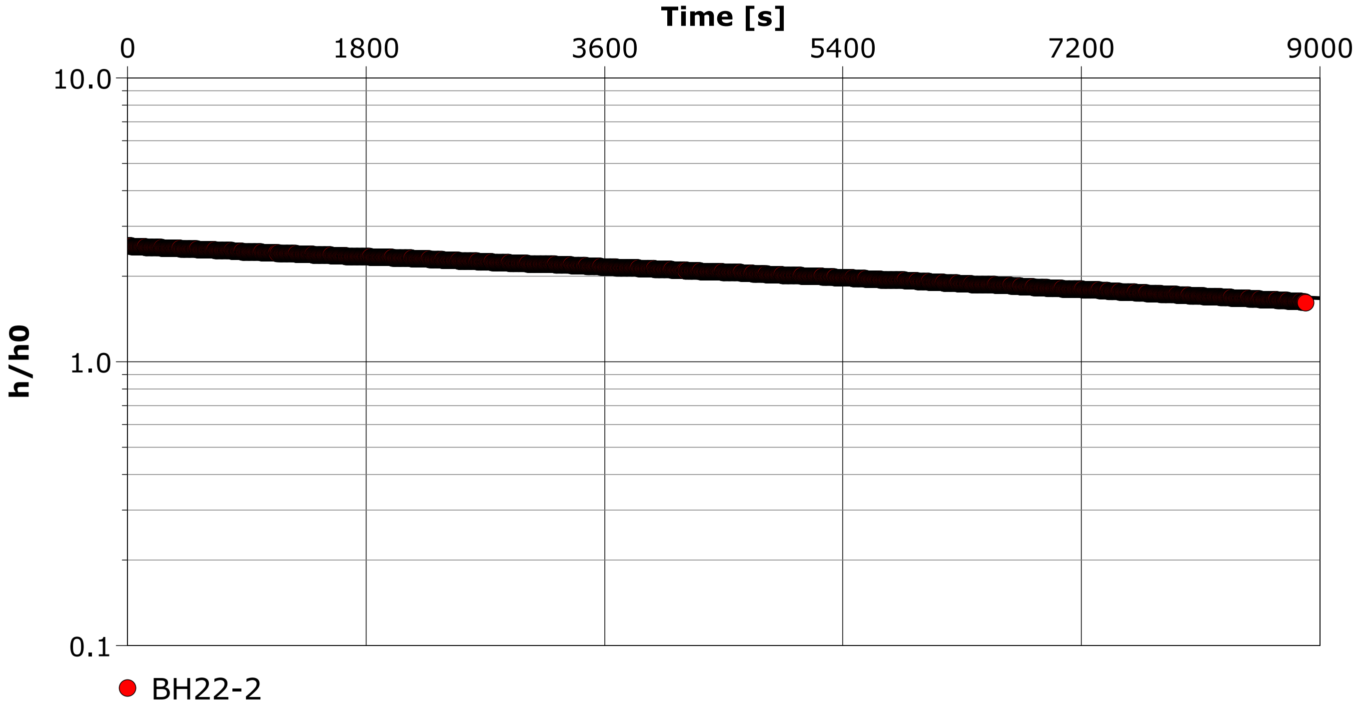


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH22-1	8.25×10^{-8}	

	Slug Test Analysis Report
	Project: 12909 Kennedy Road
	Number: 22-371-100
	Client: Trends Development Inc.

Location: Caledon, ON	Slug Test: BH22-2	Test Well: BH22-2
Test Conducted by: HS		Test Date: 11/11/2022
Analysis Performed by: DS	BH22-2	Analysis Date: 11/15/2022
Aquifer Thickness: 10.00 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH22-2	1.77×10^{-8}	

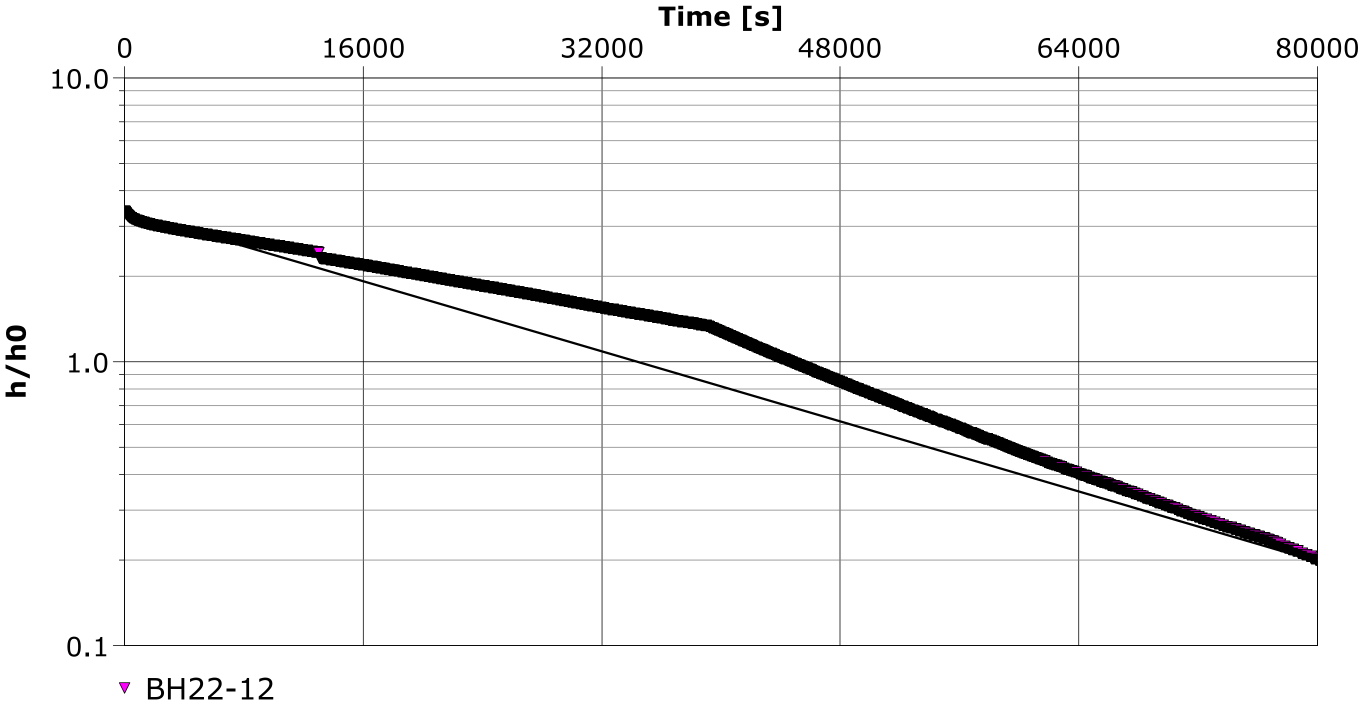
Slug Test Analysis Report

Project: 12909 Kennedy Road

Number: 22-371-100

Client: Trends Development Inc.

Location: Caledon, ON	Slug Test: BH22-4	Test Well: BH22-12
Test Conducted by: HS		Test Date: 11/11/2022
Analysis Performed by: DS	BH22-4	Analysis Date: 11/17/2022
Aquifer Thickness: 10.00 m		

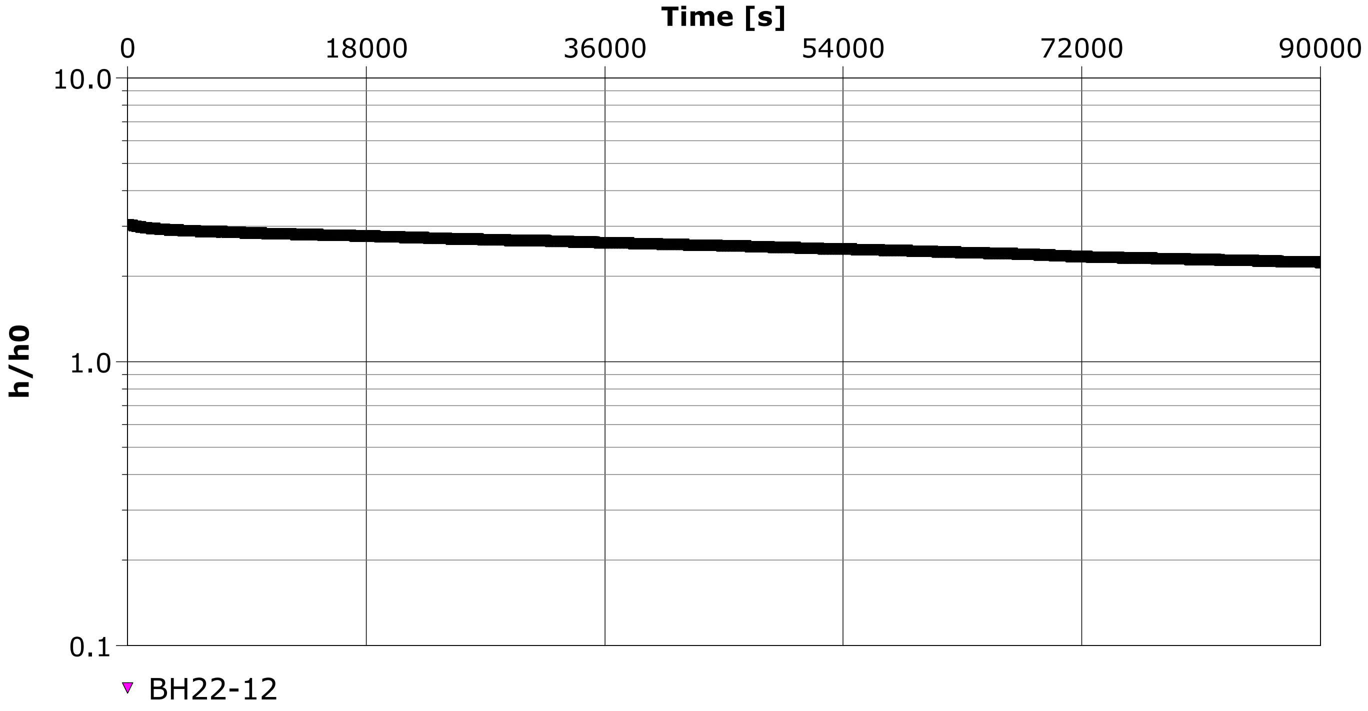


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]
BH22-12	1.38×10^{-8}

	Slug Test Analysis Report
	Project: 12909 Kennedy Road
	Number: 22-371-100
	Client: Trends Development Inc.

Location: Caledon, ON	Slug Test: BH22-12	Test Well: BH22-12
Test Conducted by: HS		Test Date: 11/11/2022
Analysis Performed by: DS	BH22-12	Analysis Date: 11/17/2022
Aquifer Thickness: 10.00 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]
BH22-12	1.17×10^{-9}

Appendix C

FINAL REPORT

CA40150-NOV22 R1

22-371-100, 12909 Kennedy Rd, C.aledon L7C 2H1

Prepared for

DS Consultants

FINAL REPORT

First Page

CLIENT DETAILS

Client	DS Consultants
Address	6221 Highway 7 Unit 16 Vaughan, Ontario L4H 0K8. Canada
Contact	Dorothy Santos
Telephone	905-329-2735
Facsimile	905-264-2685
Email	dorothy.santos@dsconsultants.ca
Project	22-371-100, 12909 Kennedy Rd, C.aledon L7C 2H1
Order Number	
Samples	Ground Water (1)

LABORATORY DETAILS

Project Specialist	Maarit Wolfe, Hon.B.Sc
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-652-2000
Facsimile	705-652-6365
Email	Maarit.Wolfe@sgs.com
SGS Reference	CA40150-NOV22
Received	11/10/2022
Approved	11/22/2022
Report Number	CA40150-NOV22 R1
Date Reported	11/22/2022

COMMENTS

RL - SGS Reporting Limit

Temperature of Sample upon Receipt: 9 degrees C

Cooling Agent Present: Yes

Custody Seal Present: Yes

Chain of Custody Number: 029837

SIGNATORIES

Maarit Wolfe, Hon.B.Sc

TABLE OF CONTENTS

MATRIX: WATER

L1 = SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010

L2 = SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010

Sample Number 8
Sample Name MW 22-4
Sample Matrix Ground Water
Sample Date 10/11/2022

Parameter	Units	RL	L1	L2	Result
General Chemistry					
Biochemical Oxygen Demand (BOD5)	mg/L	2	300	15	< 4↑
Total Suspended Solids	mg/L	2	350	15	79
Total Kjeldahl Nitrogen	as N mg/L	0.5	100	1	< 0.5
Metals and Inorganics					
Fluoride	mg/L	0.06	10		0.20
Cyanide (total)	mg/L	0.01	2	0.02	< 0.01
Sulphate	mg/L	2	1500		33
Aluminum (total)	mg/L	0.001	50		0.471
Antimony (total)	mg/L	0.0009	5		< 0.0009
Arsenic (total)	mg/L	0.0002	1	0.02	0.0023
Cadmium (total)	mg/L	0.000003	0.7	0.008	0.000009
Chromium (total)	mg/L	0.00008	5	0.08	0.00092
Copper (total)	mg/L	0.0002	3	0.05	0.0010
Cobalt (total)	mg/L	0.000004	5		0.000312
Lead (total)	mg/L	0.00009	3	0.12	0.00027
Manganese (total)	mg/L	0.00001	5	0.05	0.0210
Molybdenum (total)	mg/L	0.00004	5		0.00303
Nickel (total)	mg/L	0.0001	3	0.08	0.0012
Phosphorus (total)	mg/L	0.003	10	0.4	0.026
Selenium (total)	mg/L	0.00004	1	0.02	0.00009
Silver (total)	mg/L	0.00005	5	0.12	< 0.00005
Tin (total)	mg/L	0.00006	5		0.00316

MATRIX: WATER

L1 = SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010

L2 = SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010

Sample Number 8

Sample Name MW 22-4

Sample Matrix Ground Water

Sample Date 10/11/2022

Parameter	Units	RL	L1	L2	Result
Metals and Inorganics (continued)					
Titanium (total)	mg/L	0.00005	5		0.0118
Zinc (total)	mg/L	0.002	3	0.04	0.002
Microbiology					
E. Coli	cfu/100mL	0		200	0
Nonylphenol and Ethoxylates					
Nonylphenol	mg/L	0.001	0.02		0.001
Nonylphenol Ethoxylates	mg/L	0.01	0.2		< 0.01
Nonylphenol diethoxylate	mg/L	0.01			< 0.01
Nonylphenol monoethoxylate	mg/L	0.01			< 0.01
Oil and Grease					
Oil & Grease (total)	mg/L	2			< 2
Oil & Grease (animal/vegetable)	mg/L	4	150		< 4
Oil & Grease (mineral/synthetic)	mg/L	4	15		< 4

FINAL REPORT

Client: DS Consultants
Project: 22-371-100, 12909 Kennedy Rd, C.aledon L7C 2H1
Project Manager: Dorothy Santos
Samplers: Chaitanya

MATRIX: WATER

L1 = SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010

L2 = SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010

Sample Number 8
Sample Name MW 22-4
Sample Matrix Ground Water
Sample Date 10/11/2022

Parameter	Units	RL	L1	L2	Result
Other (ORP)					
pH	No unit	0.05	10	9	7.87
Mercury (total)	mg/L	0.00001	0.01	0.0004	< 0.00001
PCBs					
Polychlorinated Biphenyls (PCBs) - Total	mg/L	0.0001	0.001	0.0004	< 0.0001
Phenols					
4AAP-Phenolics	mg/L	0.002	1	0.008	< 0.002
SVOCs					
di-n-Butyl Phthalate	mg/L	0.002	0.08	0.015	< 0.002
Bis(2-ethylhexyl)phthalate	mg/L	0.002	0.012	0.0088	< 0.002
VOCs					
Chloroform	mg/L	0.0005	0.04	0.002	< 0.0005
1,2-Dichlorobenzene	mg/L	0.0005	0.05	0.0056	< 0.0005
1,4-Dichlorobenzene	mg/L	0.0005	0.08	0.0068	< 0.0005
cis-1,2-Dichloroethene	mg/L	0.0005	4	0.0056	< 0.0005
trans-1,3-Dichloropropene	mg/L	0.0005	0.14	0.0056	< 0.0005
Methylene Chloride	mg/L	0.0005	2	0.0052	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	0.0005	1.4	0.017	< 0.0005
Methyl ethyl ketone	mg/L	0.02	8		< 0.02
Styrene	mg/L	0.0005	0.2		< 0.0005
Tetrachloroethylene (perchloroethylene)	mg/L	0.0005	1	0.0044	< 0.0005
Trichloroethylene	mg/L	0.0005	0.4	0.008	< 0.0005

MATRIX: WATER

L1 = SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010

L2 = SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010

Sample Number 8

Sample Name MW 22-4

Sample Matrix Ground Water

Sample Date 10/11/2022

Parameter	Units	RL	L1	L2	Result
VOCs - BTEX					
Benzene	mg/L	0.0005	0.01	0.002	< 0.0005
Ethylbenzene	mg/L	0.0005	0.16	0.002	< 0.0005
Toluene	mg/L	0.0005	0.27	0.002	< 0.0005
Xylene (total)	mg/L	0.0005	1.4	0.0044	< 0.0005
m-p-xylene	mg/L	0.0005			< 0.0005
o-xylene	mg/L	0.0005			< 0.0005

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	SANSEW / WATER / - - Peel Table 1 - Sanitary Sewer Discharge - BL_53_2010 L1	SANSEW / WATER / - - Peel Table 2 - Storm Sewer Discharge - BL_53_2010 L2
MW 22-4					
Total Suspended Solids	SM 2540D	mg/L	79		15

FINAL REPORT

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 375.4 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphate	DIO5090-NOV22	mg/L	2	<2	1	20	111	80	120	108	75	125

Biochemical Oxygen Demand

Method: SM 5210 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0021-NOV22	mg/L	2	< 2	1	30	103	70	130	114	70	130

Cyanide by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Cyanide (total)	SKA0126-NOV22	mg/L	0.01	<0.01	ND	10	94	90	110	92	75	125

QC SUMMARY

Fluoride by Specific Ion Electrode

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-014

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fluoride	EWL0308-NOV22	mg/L	0.06	<0.06	ND	10	95	90	110	84	75	125

Mercury by CVAAS

Method: EPA 7471A/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0027-NOV22	mg/L	0.00001	< 0.00001	ND	20	92	80	120	125	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0111-NOV22	mg/L	0.00005	<0.00005	ND	20	100	90	110	104	70	130
Aluminum (total)	EMS0111-NOV22	mg/L	0.001	<0.001	17	20	99	90	110	113	70	130
Arsenic (total)	EMS0111-NOV22	mg/L	0.0002	<0.0002	6	20	100	90	110	125	70	130
Cadmium (total)	EMS0111-NOV22	mg/L	0.000003	<0.000003	1	20	98	90	110	108	70	130
Cobalt (total)	EMS0111-NOV22	mg/L	0.000004	<0.000004	16	20	98	90	110	103	70	130
Chromium (total)	EMS0111-NOV22	mg/L	0.00008	<0.00008	10	20	105	90	110	112	70	130
Copper (total)	EMS0111-NOV22	mg/L	0.0002	<0.0002	11	20	99	90	110	102	70	130
Manganese (total)	EMS0111-NOV22	mg/L	0.00001	<0.00001	13	20	101	90	110	104	70	130
Molybdenum (total)	EMS0111-NOV22	mg/L	0.00004	<0.00004	11	20	96	90	110	96	70	130
Nickel (total)	EMS0111-NOV22	mg/L	0.0001	<0.0001	13	20	100	90	110	93	70	130
Lead (total)	EMS0111-NOV22	mg/L	0.00009	<0.00001	3	20	99	90	110	124	70	130
Phosphorus (total)	EMS0111-NOV22	mg/L	0.003	<0.003	14	20	107	90	110	NV	70	130
Antimony (total)	EMS0111-NOV22	mg/L	0.0009	<0.0009	ND	20	101	90	110	82	70	130
Selenium (total)	EMS0111-NOV22	mg/L	0.00004	<0.00004	0	20	100	90	110	103	70	130
Tin (total)	EMS0111-NOV22	mg/L	0.00006	<0.00006	13	20	93	90	110	NV	70	130
Titanium (total)	EMS0111-NOV22	mg/L	0.00005	<0.00005	18	20	105	90	110	NV	70	130
Zinc (total)	EMS0111-NOV22	mg/L	0.002	<0.002	10	20	99	90	110	114	70	130

QC SUMMARY

Microbiology

Method: SM 9222D | Internal ref.: ME-CA-[ENV]MIC-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
E. Coli	BAC9205-NOV22	cfu/100mL	-	ACCEPTED	ACCEPTED							

Nonylphenol and Ethoxylates

Method: ASTM D7065-06 | Internal ref.: ME-CA-[ENV]GC-LAK-AN-015

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nonylphenol diethoxylate	GCM0306-NOV22	mg/L	0.01	<0.01			93	55	120			
Nonylphenol Ethoxylates	GCM0306-NOV22	mg/L	0.01	< 0.01								
Nonylphenol monoethoxylate	GCM0306-NOV22	mg/L	0.01	<0.01			92	55	120			
Nonylphenol	GCM0306-NOV22	mg/L	0.001	<0.001			94	55	120			

QC SUMMARY

Oil & Grease

Method: MOE E3401 | Internal ref.: ME-CA-[ENV]GC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (total)	GCM0244-NOV22	mg/L	2	<2	NSS	20	104	75	125			

Oil & Grease-AV/MS

Method: MOE E3401/SM 5520F | Internal ref.: ME-CA-[ENV]GC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (animal/vegetable)	GCM0244-NOV22	mg/L	4	< 4	NSS	20	NA	70	130			
Oil & Grease (mineral/synthetic)	GCM0244-NOV22	mg/L	4	< 4	NSS	20	NA	70	130			

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0294-NOV22	No unit	0.05	NA	0		100			NA		

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0140-NOV22	mg/L	0.002	<0.002	ND	10	97	80	120	102	75	125

Polychlorinated Biphenyls

Method: MOE E3400/EPA 8082A | Internal ref.: ME-CA-[ENV]GC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Polychlorinated Biphenyls (PCBs) - Total	GCM0305-NOV22	mg/L	0.0001	<0.0001	NSS	30	105	60	140	NSS	60	140

QC SUMMARY

Semi-Volatile Organics

Method: EPA 3510C/8270D | Internal ref.: ME-CA-[ENV]GC-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Bis(2-ethylhexyl)phthalate	GCM0251-NOV22	mg/L	0.002	< 0.002	NSS	30	111	50	140	NSS	50	140
di-n-Butyl Phthalate	GCM0251-NOV22	mg/L	0.002	< 0.002	NSS	30	105	50	140	NSS	50	140

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0398-NOV22	mg/L	2	< 2	1	10	99	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0179-NOV22	as N mg/L	0.5	<0.5	2	10	99	90	110	101	75	125

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,2,2-Tetrachloroethane	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	102	60	130	97	50	140
1,2-Dichlorobenzene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	105	60	130	99	50	140
1,4-Dichlorobenzene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	102	60	130	98	50	140
Benzene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	106	60	130	102	50	140
Chloroform	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	104	60	130	100	50	140
cis-1,2-Dichloroethene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	104	60	130	102	50	140
Ethylbenzene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	109	60	130	104	50	140
m-p-xylene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	107	60	130	102	50	140
Methyl ethyl ketone	GCM0295-NOV22	mg/L	0.02	<0.02	ND	30	102	50	140	99	50	140
Methylene Chloride	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	103	60	130	98	50	140
o-xylene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	108	60	130	103	50	140
Styrene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	108	60	130	102	50	140
Tetrachloroethylene (perchloroethylene)	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	104	60	130	99	50	140
Toluene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	106	60	130	101	50	140
trans-1,3-Dichloropropene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	105	60	130	99	50	140
Trichloroethylene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	102	60	130	99	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.
Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

SGS Canada Inc. statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.

This report supersedes all previous versions.

-- End of Analytical Report --

SGS

Request for Laboratory Services and CHAIN OF CUSTODY

Industries & Environment - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

No: 029837
Page 1 of 1

Laboratory Information Section - Lab use only

Received By: Nicole Brigant
Received Date: Nov / 10 / 22 (mm/dd/yy)
Received Time: 16 : 30 (hr : min)

Received By (signature):
Custody Seal Present: Yes ☑ No ☐
Custody Seal Intact: Yes ☑ No ☐

Cooling Agent Present: Yes ☑ No ☐ Type: Ice
Temperature Upon Receipt (°C) 9, 9, 9
LAB LIMS #: CA40150-NOV22

REPORT INFORMATION

Company: DS Consultants Ltd.
Contact: Dorthy Santos
Address: 6221 Hwy 7, Unit-16, Vaughan, ON
Phone: 905-329-2735
Fax:
Email: dorthy.santos@dsconsultants.ca

INVOICE INFORMATION

☑ (same as Report Information)
Company:
Contact: Accounting
Address:
Phone:
Email:

Quotation #:
P.O. #:
Project #: 22 371-100
Site Location/ID: 12909 Kennedy Rd, Caledon, ON L7C 2H1

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)

TAT's are quoted in business days (exclude statutory holidays & weekends).
Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date:

*NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

☐ O.Reg 153/04 ☐ O.Reg 406/19

☐ Table 1 ☐ Res/Park Soil Texture:
☐ Table 2 ☐ Ind/Com ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ Medium/Fine
☐ Table ______ Appx. ______
Soil Volume ☐ <350m3 ☐ >350m3

Other Regulations:
☐ Reg 347/558 (3 Day min TAT)
☑ PWQO ☐ MMER
☐ CCME ☐ Other:
☐ MISA
☐ ODWS Not Reportable *See note

Sewer By-Law:
☑ Sanitary
☑ Storm
Municipality: Peel

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

						M & I				SVOC		PCB	PHC		VOC		Pest	Other (please specify)						SPLP	TCLP	
	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	Metals & Inorganics incl CrVI, CN, Hg pH, (B(HWS), EC, SAR-soil) (Cl, Na-water)	Full Metals Suite ICP metals plus B(HWS-soil only) Hg, CrVI	ICP Metals only Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Pb, Mo, Ni, Se, Ag, Tl, U, V, Zn	PAHs only	SVOCs all incl PAHs, ABNs, CPs	PCBs Total ☐ Aroclor ☐	F1-F4 + BTEX	F1-F4 only no BTEX	VOCs all incl BTEX	BTEX only	Pesticides Organochlorine or specify other	Peel Sanitary / Storm Sewer Use	PWQO			Sewer Use: Specify pkg:	Water Characterization Pkg General ☐ Extended ☐	Specify tests ☐ Metals ☐ VOC ☐ 1,4-Dioxane ☐ OCP ☐ ABN	Specify tests ☐ M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit.	COMMENTS:
1	MW 22-4	Nov 10th, 22	pm	17	GW	N												✓	✓							Non-filtered sample
2																										
3																										
4																										
5																										
6																										
7																										
8																										
9																										
10																										
11																										
12																										

Observations/Comments/Special Instructions

Sampled By (NAME): Chaitanya Signature: Chaitanya Date: 11 / 10 / 22 (mm/dd/yy) Pink Copy - Client
Relinquished by (NAME): Chaitanya Signature: Chaitanya Date: 11 / 10 / 22 (mm/dd/yy) Yellow & White Copy - SGS

Revision #: 1.6
Date of Issue: 02 May 2022

Note: Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. {2} Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). {3} Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm. (Printed copies are available upon request.) Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

FINAL REPORT

CA40150-NOV22 R1

22-371-100, 12909 Kennedy Rd, C.aledon L7C 2H1

Prepared for

DS Consultants

FINAL REPORT

First Page

CLIENT DETAILS

Client	DS Consultants
Address	6221 Highway 7 Unit 16 Vaughan, Ontario L4H 0K8. Canada
Contact	Dorothy Santos
Telephone	905-329-2735
Facsimile	905-264-2685
Email	dorothy.santos@dsconsultants.ca
Project	22-371-100, 12909 Kennedy Rd, C.aledon L7C 2H1
Order Number	
Samples	Ground Water (1)

LABORATORY DETAILS

Project Specialist	Maarit Wolfe, Hon.B.Sc
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-652-2000
Facsimile	705-652-6365
Email	Maarit.Wolfe@sgs.com
SGS Reference	CA40150-NOV22
Received	11/10/2022
Approved	11/22/2022
Report Number	CA40150-NOV22 R1
Date Reported	01/03/2023

COMMENTS

RL - SGS Reporting Limit

Temperature of Sample upon Receipt: 9 degrees C

Cooling Agent Present: Yes

Custody Seal Present: Yes

Chain of Custody Number: 029837

SIGNATORIES

Maarit Wolfe, Hon.B.Sc

LMWolfe

TABLE OF CONTENTS

MATRIX: WATER

L1 = PWQO_L / WATER / - - Table 2 - General - July 1999 PIBS 3303E

Sample Number 8

Sample Name MW 22-4

Sample Matrix Ground Water

Sample Date 10/11/2022

General Chemistry

Parameter	Units	RL	L1	Result
Biochemical Oxygen Demand (BOD5)	mg/L	2		< 4↑
Total Suspended Solids	mg/L	2		79
Total Kjeldahl Nitrogen	as N mg/L	0.5		< 0.5

Metals and Inorganics

Parameter	Units	RL	L1	Result
Fluoride	mg/L	0.06		0.20
Cyanide (total)	mg/L	0.01		< 0.01
Sulphate	mg/L	2		33
Aluminum (total)	mg/L	0.001		0.471
Antimony (total)	mg/L	0.0009	0.02	< 0.0009
Arsenic (total)	mg/L	0.0002	0.005	0.0023
Cadmium (total)	mg/L	0.000003	0.0001	0.000009
Chromium (total)	mg/L	0.00008	0.1	0.00092
Copper (total)	mg/L	0.0002	0.001	0.0010
Cobalt (total)	mg/L	0.000004	0.0009	0.000312
Lead (total)	mg/L	0.00009	0.005	0.00027
Manganese (total)	mg/L	0.00001		0.0210
Molybdenum (total)	mg/L	0.00004	0.04	0.00303
Nickel (total)	mg/L	0.0001	0.025	0.0012
Phosphorus (total)	mg/L	0.003	0.01	0.026
Selenium (total)	mg/L	0.00004	0.1	0.00009
Silver (total)	mg/L	0.00005	0.0001	< 0.00005
Tin (total)	mg/L	0.00006		0.00316

MATRIX: WATER

L1 = PWQO_L / WATER / - - Table 2 - General - July 1999 PIBS 3303E

Sample Number 8

Sample Name MW 22-4

Sample Matrix Ground Water

Sample Date 10/11/2022

Parameter	Units	RL	L1	Result
Metals and Inorganics (continued)				
Titanium (total)	mg/L	0.00005		0.0118
Zinc (total)	mg/L	0.002	0.02	0.002
Microbiology				
E. Coli	cfu/100mL	0	100	0
Nonylphenol and Ethoxylates				
Nonylphenol	mg/L	0.001		0.001
Nonylphenol Ethoxylates	mg/L	0.01		< 0.01
Nonylphenol diethoxylate	mg/L	0.01		< 0.01
Nonylphenol monoethoxylate	mg/L	0.01		< 0.01
Oil and Grease				
Oil & Grease (total)	mg/L	2		< 2
Oil & Grease (animal/vegetable)	mg/L	4		< 4
Oil & Grease (mineral/synthetic)	mg/L	4		< 4

MATRIX: WATER

L1 = PWQO_L / WATER / - - Table 2 - General - July 1999 PIBS 3303E

Sample Number 8
Sample Name MW 22-4
Sample Matrix Ground Water
Sample Date 10/11/2022

Parameter	Units	RL	L1	Result
Other (ORP)				
pH	No unit	0.05	8.6	7.87
Mercury (total)	mg/L	0.00001	0.0002	< 0.00001
PCBs				
Polychlorinated Biphenyls (PCBs) - Total	mg/L	0.0001		< 0.0001
Phenols				
4AAP-Phenolics	mg/L	0.002	0.001	< 0.002
SVOCs				
di-n-Butyl Phthalate	mg/L	0.002		< 0.002
Bis(2-ethylhexyl)phthalate	mg/L	0.002		< 0.002
VOCs				
Chloroform	mg/L	0.0005		< 0.0005
1,2-Dichlorobenzene	mg/L	0.0005		< 0.0005
1,4-Dichlorobenzene	mg/L	0.0005		< 0.0005
cis-1,2-Dichloroethene	mg/L	0.0005		< 0.0005
trans-1,3-Dichloropropene	mg/L	0.0005		< 0.0005
Methylene Chloride	mg/L	0.0005	0.1	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	0.0005	0.07	< 0.0005
Methyl ethyl ketone	mg/L	0.02		< 0.02
Styrene	mg/L	0.0005		< 0.0005
Tetrachloroethylene (perchloroethylene)	mg/L	0.0005	0.05	< 0.0005
Trichloroethylene	mg/L	0.0005	0.02	< 0.0005

MATRIX: WATER

L1 = PWQO_L / WATER / - - Table 2 - General - July 1999 PIBS 3303E

Sample Number 8

Sample Name MW 22-4

Sample Matrix Ground Water

Sample Date 10/11/2022

Parameter	Units	RL	L1	Result
VOCs - BTEX				
Benzene	mg/L	0.0005	0.1	< 0.0005
Ethylbenzene	mg/L	0.0005	0.008	< 0.0005
Toluene	mg/L	0.0005	0.0008	< 0.0005
Xylene (total)	mg/L	0.0005		< 0.0005
m-p-xylene	mg/L	0.0005	0.002	< 0.0005
o-xylene	mg/L	0.0005	0.04	< 0.0005

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	PWQO_L / WATER / - - Table 2 - General - July 1999 PIBS 3303E L1
MW 22-4				
Phosphorus	SM 3030/EPA 200.8	mg/L	0.026	0.01
4AAP-Phenolics	SM 5530B-D	mg/L	< 0.002	0.001

FINAL REPORT

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 375.4 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphate	DIO5090-NOV22	mg/L	2	<2	1	20	111	80	120	108	75	125

Biochemical Oxygen Demand

Method: SM 5210 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0021-NOV22	mg/L	2	< 2	1	30	103	70	130	114	70	130

Cyanide by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Cyanide (total)	SKA0126-NOV22	mg/L	0.01	<0.01	ND	10	94	90	110	92	75	125

QC SUMMARY

Fluoride by Specific Ion Electrode

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-014

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fluoride	EWL0308-NOV22	mg/L	0.06	<0.06	ND	10	95	90	110	84	75	125

Mercury by CVAAS

Method: EPA 7471A/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0027-NOV22	mg/L	0.00001	< 0.00001	ND	20	92	80	120	125	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0111-NOV22	mg/L	0.00005	<0.00005	ND	20	100	90	110	104	70	130
Aluminum (total)	EMS0111-NOV22	mg/L	0.001	<0.001	17	20	99	90	110	113	70	130
Arsenic (total)	EMS0111-NOV22	mg/L	0.0002	<0.0002	6	20	100	90	110	125	70	130
Cadmium (total)	EMS0111-NOV22	mg/L	0.000003	<0.000003	1	20	98	90	110	108	70	130
Cobalt (total)	EMS0111-NOV22	mg/L	0.000004	<0.000004	16	20	98	90	110	103	70	130
Chromium (total)	EMS0111-NOV22	mg/L	0.00008	<0.00008	10	20	105	90	110	112	70	130
Copper (total)	EMS0111-NOV22	mg/L	0.0002	<0.0002	11	20	99	90	110	102	70	130
Manganese (total)	EMS0111-NOV22	mg/L	0.00001	<0.00001	13	20	101	90	110	104	70	130
Molybdenum (total)	EMS0111-NOV22	mg/L	0.00004	<0.00004	11	20	96	90	110	96	70	130
Nickel (total)	EMS0111-NOV22	mg/L	0.0001	<0.0001	13	20	100	90	110	93	70	130
Lead (total)	EMS0111-NOV22	mg/L	0.00009	<0.00001	3	20	99	90	110	124	70	130
Phosphorus (total)	EMS0111-NOV22	mg/L	0.003	<0.003	14	20	107	90	110	NV	70	130
Antimony (total)	EMS0111-NOV22	mg/L	0.0009	<0.0009	ND	20	101	90	110	82	70	130
Selenium (total)	EMS0111-NOV22	mg/L	0.00004	<0.00004	0	20	100	90	110	103	70	130
Tin (total)	EMS0111-NOV22	mg/L	0.00006	<0.00006	13	20	93	90	110	NV	70	130
Titanium (total)	EMS0111-NOV22	mg/L	0.00005	<0.00005	18	20	105	90	110	NV	70	130
Zinc (total)	EMS0111-NOV22	mg/L	0.002	<0.002	10	20	99	90	110	114	70	130

FINAL REPORT

QC SUMMARY

Microbiology

Method: SM 9222D | Internal ref.: ME-CA-[ENV]MIC-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
E. Coli	BAC9205-NOV22	cfu/100mL	-	ACCEPTED	ACCEPTED							

Nonylphenol and Ethoxylates

Method: ASTM D7065-06 | Internal ref.: ME-CA-[ENV]GC-LAK-AN-015

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nonylphenol diethoxylate	GCM0306-NOV22	mg/L	0.01	<0.01			93	55	120			
Nonylphenol Ethoxylates	GCM0306-NOV22	mg/L	0.01	< 0.01								
Nonylphenol monoethoxylate	GCM0306-NOV22	mg/L	0.01	<0.01			92	55	120			
Nonylphenol	GCM0306-NOV22	mg/L	0.001	<0.001			94	55	120			

QC SUMMARY

Oil & Grease

Method: MOE E3401 | Internal ref.: ME-CA-[ENV]GC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (total)	GCM0244-NOV22	mg/L	2	<2	NSS	20	104	75	125			

Oil & Grease-AV/MS

Method: MOE E3401/SM 5520F | Internal ref.: ME-CA-[ENV]GC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (animal/vegetable)	GCM0244-NOV22	mg/L	4	< 4	NSS	20	NA	70	130			
Oil & Grease (mineral/synthetic)	GCM0244-NOV22	mg/L	4	< 4	NSS	20	NA	70	130			

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0294-NOV22	No unit	0.05	NA	0		100			NA		

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0140-NOV22	mg/L	0.002	<0.002	ND	10	97	80	120	102	75	125

Polychlorinated Biphenyls

Method: MOE E3400/EPA 8082A | Internal ref.: ME-CA-[ENV]GC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Polychlorinated Biphenyls (PCBs) - Total	GCM0305-NOV22	mg/L	0.0001	<0.0001	NSS	30	105	60	140	NSS	60	140

QC SUMMARY

Semi-Volatile Organics

Method: EPA 3510C/8270D | Internal ref.: ME-CA-[ENV]GC-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Bis(2-ethylhexyl)phthalate	GCM0251-NOV22	mg/L	0.002	< 0.002	NSS	30	111	50	140	NSS	50	140
di-n-Butyl Phthalate	GCM0251-NOV22	mg/L	0.002	< 0.002	NSS	30	105	50	140	NSS	50	140

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0398-NOV22	mg/L	2	< 2	1	10	99	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0179-NOV22	as N mg/L	0.5	<0.5	2	10	99	90	110	101	75	125

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,2,2-Tetrachloroethane	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	102	60	130	97	50	140
1,2-Dichlorobenzene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	105	60	130	99	50	140
1,4-Dichlorobenzene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	102	60	130	98	50	140
Benzene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	106	60	130	102	50	140
Chloroform	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	104	60	130	100	50	140
cis-1,2-Dichloroethene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	104	60	130	102	50	140
Ethylbenzene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	109	60	130	104	50	140
m-p-xylene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	107	60	130	102	50	140
Methyl ethyl ketone	GCM0295-NOV22	mg/L	0.02	<0.02	ND	30	102	50	140	99	50	140
Methylene Chloride	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	103	60	130	98	50	140
o-xylene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	108	60	130	103	50	140
Styrene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	108	60	130	102	50	140
Tetrachloroethylene (perchloroethylene)	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	104	60	130	99	50	140
Toluene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	106	60	130	101	50	140
trans-1,3-Dichloropropene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	105	60	130	99	50	140
Trichloroethylene	GCM0295-NOV22	mg/L	0.0005	<0.0005	ND	30	102	60	130	99	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.

Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.

"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

SGS Canada Inc. statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.

This report supersedes all previous versions.

-- End of Analytical Report --

SGS

Request for Laboratory Services and CHAIN OF CUSTODY

Industries & Environment - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

No: 029837
Page 1 of 1

Laboratory Information Section - Lab use only

Received By: Nicole Brigoni
Received By (signature): NB
Received Date: Nov / 10 / 22 (mm/dd/yy)
Received Time: 16 : 30 (hr : min)
Custody Seal Present: Yes ☑ No ☐
Custody Seal Intact: Yes ☑ No ☐
Cooling Agent Present: Yes ☑ No ☐ Type: Ice
Temperature Upon Receipt (°C) 9, 9, 9
LAB LIMS #: CA40150-NOV22

REPORT INFORMATION

Company: DS Consultants Ltd.
Contact: Dorthy Santos
Address: 6221 Hwy 7, Unit-16, Vaughan, ON
Phone: 905-329-2735
Fax:
Email: dorthy.santos@dsconsultants.ca

INVOICE INFORMATION

☑ (same as Report Information)
Company:
Contact: Accounting
Address:
Phone:
Email:

Quotation #:
P.O. #:
Project #: 22 371-100
Site Location/ID: 12909 Kennedy Rd, Caledon, ON L7C 2H1

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)

TAT's are quoted in business days (exclude statutory holidays & weekends). Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date:

***NOTE**: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

☐ O.Reg 153/04 ☐ O.Reg 406/19
☐ Table 1 ☐ Res/Park Soil Texture:
☐ Table 2 ☐ Ind/Com ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ Medium/Fine
☐ Table ____ Appx. ____
Soil Volume ☐ <350m3 ☐ >350m3

Other Regulations:
☐ Reg 347/558 (3 Day min TAT)
☑ PWQO ☐ MMER
☐ CCME ☐ Other:
☐ MISA
☐ ODWS Not Reportable *See note

Sewer By-Law:
☑ Sanitary
☑ Storm
Municipality: Peel

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

							M & I				SVOC		PCB	PHC		VOC		Pest	Other (please specify)						SPLP	TCLP	
	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	Metals & Inorganics incl CrVI, CN, Hg pH,(B(HWS),EC,SAR-soil) (Cl, Na-water)	Full Metals Suite ICP metals plus B(HWS-soil only) Hg, CrVI	ICP Metals only Sb,As,Ba,Be,B,Cd, Cr,Co,Cu,Pb,Mo,Ni,Se,Ag,Tl,U,V,Zn	PAHs only	SVOCs all incl PAHs, ABNs, CPs	PCBs Total ☐ Aroclor ☐	F1-F4 + BTEX	F1-F4 only no BTEX	VOCs all incl BTEX	BTEX only	Pesticides Organochlorine or specify other	Peel Sanitary/Storm Sewer Use	PWQO			Sewer Use: Specify pkg:	Water Characterization Pkg General ☐ Extended ☐	Specify tests ☐ Metals ☐ VOC ☐ 1,4-Dioxane ☐ OCP ☐ ABN	Specify tests ☐ M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit.	COMMENTS:	
1	MW 22-4	Nov 10th, 22	PM	17	GW	N												✓	✓							Non-filtered sample	
2																											
3																											
4																											
5																											
6																											
7																											
8																											
9																											
10																											
11																											
12																											

Observations/Comments/Special Instructions

Sampled By (NAME): Chaitanya Signature: Chaitanya Date: 11 / 10 / 22 (mm/dd/yy) Pink Copy - Client
Relinquished by (NAME): Chaitanya Signature: Chaitanya Date: 11 / 10 / 22 (mm/dd/yy) Yellow & White Copy - SGS

Revision #: 1.6
Date of Issue: 02 May 2022

Appendix D

MECP Water Well Record Search (500 m) - 12909 Kennedy Road, Caledon, ON

TOWNSHIP	UTM	E	N	DATE CNTR	CASING	WATER	PUMP TEST	WELL USE	SCREEN	WELL	WELL TAG	FORMATION
CALEDON TOWN (CHINGU	17 W	594004	4845521	2013/11 7472	2.04			MO	0020 10	7212546	(Z182844) A158951	BRWN MSND GRVL PCKD 0005 GREY CLAY SILT PCKD 0030
CALEDON TOWN (CHINGU HS E 02 023	17 W	593614	4846783	1968/05 4813	5	FR 0170	40/45/10/4:0	ST DO		4903090		BLCK LOAM 0004 BRWN CLAY 0023 BLUE CLAY 0087 SILT 0170 GRVL 0180
CALEDON TOWN (CHINGU	17 W	594089	4845614	2011/06 6875				NU		7167949	(Z117944) A	
CALEDON TOWN (CHINGU HS E 02 023	17 W	593460	4846500	1999/09 2576	1	FR 0167	20//1/1:30	DO	0164 3	4908483		BRWN SAND 0002 BRWN CLAY 0008 GREY CLAY 0143 GREY CLAY GRVL 0161 GREY SILT GRVL 0170 GREY LMSN SHLE 0218
CALEDON TOWN (CHINGU	17 W	593926	4845378	2013/11 7472						7212552	(Z182847) A	
CALEDON TOWN (CHINGU HS E 02 023	17 W	593584	4846455	1988/12 3513	6	0060 FR 01	18/150/4/4:0	DO		4906999		BRWN LOAM 0001 BRWN CLAY SAND 0010 BLUE CLAY SAND LYRD 0060 BLUE FGVL SNDY 0065 BLUE CLAY STNS SLTY 0160 BLUE SHLE 0175
CALEDON TOWN (CHINGU	17 W	593275	4846251	2008/11 1663	2	FR 0012	5///:	MO	0022 10	7118904	(Z94055) A075114	BRWN SAND GRVL FILL 0006 GREY CLAY GRVL 0012 GREY CLAY SAND GRVL 0018 BRWN FSND SILT 0024 GREY CLAY 0024 BRWN SAND SILT 0032 GREY CLAY 0033
CALEDON TOWN (CHINGU HS E 02 023	17 L	593487	4846984	2003/08 6865	6	FR 0162	57/88/8/1:0	DO	0159 3	4909235		BRWN LOAM 0001 BRWN CLAY 0003 BRWN CLAY GRVL TILL 0074 GREY HPAN 0085 GREY CLAY TILL 0147 GREY GRVL CLAY 0162
CALEDON TOWN (CHINGU	17 W	594043	4845595	2011/06 6875				NU		7167948	(Z117942) A	
CALEDON TOWN (CHINGU HS E 02 023	17 W	593722	4846818	1967/06 4813	5	FR 0153	30/144/4/3:0	DO	0155 4	4901252		BRWN CLAY 0030 SILT 0088 BLUE CLAY 0130 SILT 0153 MSND 0159
CALEDON TOWN (CHINGU	17 W	593871	4845583	2015/08 7215						7271538	(C29381) A184521 P	
CALEDON TOWN (CHINGU	17 W	593806	4845618	2016/08 6607	2			MO	0007 10	7290619	(Z229203) A202717	BRWN SAND GRVL FILL 0006 BRWN SAND SILT SOFT 0012 GREY SILT SAND DNSE 0017
CALEDON TOWN (CHINGU	17 W	593779	4845618	2016/08 6607	2			MO	0010 10	7290618	(Z229204) A202721	BRWN SAND GRVL FILL 0006 BRWN SAND SILT SOFT 0012 GREY SILT SAND DNSE 0020
CALEDON TOWN (CHINGU	17 W	593563	4845826	2016/12 7215						7286161	(C35191) A223828 P	
CALEDON TOWN (CHINGU	17 W	594024	4845492	2016/10 7437	2	27			0030 5	7285488	(Z239295) A209694	BRWN CLAY GRVL WBRG 0005 GREY CLAY GRVL WBRG 0010 BRWN SILT GRVL WBRG 0035 GREY SILT CLYY WBRG
CALEDON TOWN (CHINGU	17 W	593736	4846609	2016/02 7464						7262442	(C31023) A197001 P	
CALEDON TOWN (CHINGU	17 W	593561	4845424	2013/09 7247	2	UT 0005		MT	0030 5	7215267	(Z176655) A152926	BRWN SAND SILT 0010 GREY SILT SAND 0015 GREY SILT CLAY 0027 GREY SAND SILT DNSE 0032 GREY SILT CLAY DNSE 0035
CALEDON TOWN (CHINGU	17 W	593821	4845618	2016/08 6607	2			MO	0010 10	7290653	(Z299202) A202722	BRWN SAND GRVL FILL 0006 BRWN SAND SILT SOFT 0012 GREY SILT SAND DNSE 0020
CALEDON TOWN (CHINGU HS E 01 021	17 W	593743	4845440	7147	1.97	UT 0007			0005 10	7290444	(Z254977) A	
CALEDON TOWN (CHINGU HS E 01 021	17 W	593836	4845511	7147	5	UT 0002			0002 3	7290445	(Z254978) A	
CALEDON TOWN (CHINGU HS E 01 021	17 W	593636	4845490	1989/06 4919	30	UK 0020	20/40/10/1:0	DO		4907184		BRWN LOAM HARD 0001 BRWN CLAY SAND PCKD 0050 RED CLAY HARD 0060
CALEDON TOWN (CHINGU HS E 01 021	17 W	593683	4845737	6409						7266773	(Z232584) A158864 A	
CALEDON TOWN (CHINGU HS E 01 021	17 W	593814	4845623	1969/06 1307	30	FR 0027	///:	DO		4903248		BRWN LOAM 0010 GREY CLAY 0025 CSND 0027
CALEDON TOWN (CHINGU HS E 01 021	17 W	593852	4845581	7147	1.97	UT 0009			0003 8	7290443	(Z254983) A	
CALEDON TOWN (CHINGU HS E 01 021	17 W	593784	4845621	1958/03 3514	4 4	FR 0120	80/80/4/4:0	DO		4901118		LOAM CLAY 0010 BLUE CLAY STNS 0080 GRVL 0086 RED SHLE 0120
CALEDON TOWN (CHINGU HS E 01 021	17 W	593834	4845455	1967/10 1325	30	FR 0036	25/38/1/0:30	ST DO		4901119		LOAM 0002 BRWN CLAY 0006 GREY CLAY 0010 BLUE CLAY 0022 BLDR MSND 0024 HPAN 0036 MSND 0037 BLUE CLAY 0040
CALEDON TOWN (CHINGU HS E 01 021	17 W	593674	4845708	2011/04 4645	36			DO		7165504		
CALEDON TOWN (CHINGU HS E 01 021	17 W	593824	4845623	1977/06 4919	30 30	0020 UK 0(	20/50//0:30	DO		4905186		BRWN LOAM HARD 0001 BRWN CLAY HARD 0010 GREY CLAY HARD 0030 GREY SAND SOFT 0040 GREY CLAY HARD 0058
CALEDON TOWN (CHINGU HS E 01 022	17 W	593156	4846111	1973/07 3637	30	0012 FR 0(	7/19/7/1:0	DO		4904302		BRWN LOAM 0001 BRWN SAND 0003 GREY CLAY SNDS 0024 GREY SAND CLAY 0034
CALEDON TOWN (CHINGU HS E 01 022	17 W	593177	4846051	1998/08 6282	8 6	FR 0090	11/25/10/4:0	DO		4908419		BLCK LOAM 0001 BRWN CLAY SAND 0013 GREY CLAY GRVL 0046 GREY FSND GRVL CLAY 0077 RED CLAY GRVL 0089 BLUE MGVL 0093
CALEDON TOWN (CHINGU HS E 01 023	17 W	593114	4846273	1980/09 3513	5	FR 0108	22/35/10/4:0	DO		4905689		PRDG 0020 BRWN SAND 0028 GREY SAND CLAY LYRD 0060 GREY GRVL CLAY LYRD 0080 GREY GRVL HARD VERY 0108 RED GRVL LTCL 0110
CALEDON TOWN (CHINGU HS E 01 023	17 W	593076	4846048	1990/09 2918	6	FR 0082	31/52/8/9:0	DO		4907482		BRWN SAND STNS 0021 BRWN CLAY SAND 0079 BRWN GRVL SAND 0082
CALEDON TOWN (CHINGU HS E 01 023	17 W	593036	4846117	1973/12 4919	36 30	UK 0016	20/39/0/1:0	DO		4904316		BRWN LOAM 0001 BRWN SAND 0020 GREY CLAY 0042
CALEDON TOWN (CHINGU HS E 01 023	17 W	593215	4846281	2008/11 1663	2	UT 0012	1///:	MO	0016 10	7118903	(Z94054) A075113	BRWN SAND GRVL FILL 0006 BRWN FSND GRVL 0007 BRWN LOAM 0008 BRWN FSND GRVL 0012 GREY FSND SILT 0018 GREY FSND CLAY GRVL 0028
CALEDON TOWN (CHINGU HS E 02 021	17 L	594371	4846107	2001/11 7143	8 6	FR 0141	66/108/3/8:0	DO	0139 4	4908885		BRWN LOAM 0002 BLCK CLAY 0010 BRWN CLAY GRVL MSND 0040 BRWN SAND 0045 GREY SAND 0056 GREY CLAY SAND GRVL 0120 GREN CLAY SAND HARD 0141 GREY CSND CGVL 0145
CALEDON TOWN (CHINGU HS E 02 021	17 L	594371	4846107	2000/05 3132	6 6	FR 0170	49/89/10/6:	DO		4908728		BRWN CLAY STNS DNSE 0012 BLUE CLAY STNS DNSE 0057 BLUE CLAY STNS SAND 0110 BLUE SILT LOOS 0135 BLUE CLAY STNS DNSE 0175
CALEDON TOWN (CHINGU HS E 02 022	17 W	593389	4846288	2010/11 7407	11.8		28///:	DO		7154800	(Z50908) A100864	
CALEDON TOWN (CHINGU HS E 02 022	17 W	593712	4846808	1967/06 1612	6					4901247		LOAM 0001 BLUE CLAY 0060 GRVL 0061 CLAY MSND 0093
CALEDON TOWN (CHINGU HS E 02 022	17 W	593354	4846304	1967/05 4102	30	FR 0025	//4/:	DO		4901248		BRWN CLAY 0005 BLUE CLAY 0025 FSND 0027
CALEDON TOWN (CHINGU HS E 02 022	17 W	593486	4846510	1998/07 6782	8 6	FR 0170	63/140/2/14:30	DO		4908415		BRWN CLAY FGVL 0023 GREY CLAY MSND LYRD 0123 GREY FGVL CLAY 0170 GREY LMSN 0170
CALEDON TOWN (CHINGU HS E 02 022	17 W	593570	4846107	2006/07 4011	0.34		25///:			4910274	(Z49731) A	
CALEDON TOWN (CHINGU HS E 02 022	17 W	593541	4846095	2010/11 7407	11.8		88///:	DO		7154801	(Z50907) A100863	

CALEDON TOWN (CHINGU HS E 02 022	17 W	593912	4846793	2009/08 6809	2 2			MT		7133198	(M04964) A084309	BRWN SAND STNS 0012 GREY TILL SLTY 0017 GREY CLAY SILT 0030
CALEDON TOWN (CHINGU HS E 02 022	17 W	593520	4846512	2013/10 7147	5.9	FR 0010				7211281	(Z180492) A	
CALEDON TOWN (CHINGU HS E 02 022	17 W	593764	4846763	1969/07 4919	30	FR 0054	15//1/1:0	DO		4903183		BRWN LOAM 0004 GREY CLAY STNS 0056 GREY QSND CLAY 0057
CALEDON TOWN (CHINGU HS E 02 022	17 W	593302	4846314	1990/08 4919	30	UK 0040	20/40/10/1:0	DO		4907415		BRWN SAND HARD 0001 BRWN CLAY HARD 0020 GREY CLAY SAND LOOS 0060
CALEDON TOWN (CHINGU HS E 02 022	17 W	593844	4846843	1969/09 4919	30	FR 0053	40//0/24:0	DO		4903331		BRWN CLAY STNS 0012 BLUE CLAY 0052 GREY CLAY QSND GRVL 0053
CALEDON TOWN (CHINGU HS E 02 022	17 W	594314	4846773	1970/11 3612	30	FR 0045	27/43/3/1:0	ST		4903503		BRWN LOAM 0002 BRWN CLAY STNS 0040 GREY CLAY MSND 0045 GREY GRVL MSND 0050
CALEDON TOWN (CHINGU HS E 02 022	17 W	594262	4846240	1995/08 3903						4908055		BRWN CLAY STNS SNDY 0016 BRWN CLAY STNS LYRD 0052 GREY GRVL SILT LYRD 0059 GREY CLAY STNS HARD 0067 GREY GRVL SAND HARD 0078 GREY CLAY STNS SNDY 0082 BRWN FSND SILT LYRD 0097 GREY CLAY STNS HARD 0099 GREY SAND CLN LOOS 0102 GREY SAND SILT PCKD 0122 GREY
CALEDON TOWN (CHINGU HS E 02 022	17 W	593412	4846306	1992/03 4919	30	UK 0020	15/25/10/1:0	DO		4907656		BRWN LOAM HARD 0001 BRWN CLAY HARD 0020 GREY CLAY SAND PCKD 0051
CALEDON TOWN (CHINGU HS E 02 022	17 W	593326	4846302	1991/06 4919	30	UK 0060	20/40/10/1:0	DO		4907553		BRWN LOAM HARD 0001 BRWN CLAY HARD 0020 GREY CLAY HARD 0060 GREY SAND LOOS 0080
CALEDON TOWN (CHINGU HS E 02 023	17 W	593458	4846611	1958/09 1325	30	FR 0040	30///:	ST DO		4901250		BRWN CLAY 0015 BLUE CLAY 0040
CALEDON TOWN (CHINGU HS E 02 023	17 W	593264	4846403	1970/12 3637	30	FR 0032	20/30//:	DO		4903581		BRWN LOAM 0001 BRWN MSND 0004 GREY CLAY 0032 BLCK CSND 0033
CALEDON TOWN (CHINGU HS E 02 023	17 W	593572	4846824	1991/07 2918	6 6	FR 0165	2/54/5/18:30	DO		4907562		BRWN SAND 0024 GREY CLAY SNDS 0038 GREY CLAY 0049 GREY CLAY SAND 0087 GREY SILT 0102 GREY SAND 0154 GREY SILT CLAY GRVL 0162 GREY SAND GRVL 0165 GREY SHLE 0170
CALEDON TOWN (CHINGU HS E 02 023	17 W	592966	4846593	1967/05 3903	30	FR 0029	17//3/:	DO		4901254		BRWN CLAY 0015 BLUE CLAY 0029 MSND 0030
CALEDON TOWN (CHINGU HS E 02 023	17 W	593212	4846313	2008/11 1663	6	UT 0016	4/22/6/8:0	TH	0016 10	7118901	(Z94052) A075115	BRWN SAND GRVL FILL 0003 BLCK LOAM GRVL SAND 0006 GREY CLAY GRVL 0007 BRWN LOAM 0008 BRWN FSND GRVL CLAY 0012 BRWN FSND 0026 GREY CLAY SILT 0028
CALEDON TOWN (CHINGU HS E 02 023	17 W	593126	4846529	1967/05 3903	30	FR 0014	//3/:	DO		4901253		BRWN CLAY 0008 BLUE CLAY 0014 MSND 0015
CALEDON TOWN (CHINGU HS E 02 023	17 W	593196	4846340	2008/11 1663	2	UT 0008	4///:	MT	0016 10	7118902	(Z94053) A075112	BRWN SAND GRVL FILL 0003 BRWN SAND GRVL 0008 BRWN FSND GRVL CLAY 0012 GREY FSND 0018 GREY FSND CLAY SILT 0024 GREY CLAY SILT 0028
CALEDON TOWN (CHINGU HS E 02 023	17 W	593666	4846822	1967/05 1612	5	FR 0172	27/42/5/2:0	ST DO		4901251		LOAM 0001 BLUE CLAY STNS 0148 MSND GRVL 0172 GRVL 0182
CALEDON TOWN (CHINGU HS E 02 023	17 W	593418	4846570	1967/12 5001	30	FR 0035	33//2/:	DO		4901256		BLCK LOAM 0002 LOAM CLAY 0015 BLUE CLAY 0035 GREY MSND STNS 0041
CALEDON TOWN (CHINGU HS E 02 023	17 W	593512	4846641	1950/01 4620	6		5///:	NU		4901249		LOAM CLAY 0004 FSND 0014 CLAY MSND 0026 CLAY GRVL 0048 FSND CLAY 0053 GREY CLAY 0081

Appendix E

Door-to-Door Water Well Survey (500 m) 12909 Kennedy Road, Caledon, ON

Surveyed Address	Water Well Identified	Comments
Old School Road		
3441	N	No Response
3521	N	No Response
3538	N	No Response
3598	N	Denied Participation
3608	Y	Dug well, inaccessible
3611	N	No Response
3708	N	Inaccessble, gated property
3726	N	Tenant does have information
3736	N	No Response
3756	N	Property serviced by municipal water supply
3751	N	Tenant does have information
3402	N	Tenant does have information
3412	N	No Response
3431	Y	Well abandoned/damaged
3762	N	No Response
3771	Y	decomissed well identified. Municipaly water supply
Heart Lake Road		
12864	N	No Response
12942	N	No Response
Kennedy Road		
13133	Y	Water level- 2.7 mbgs, Depth- 110 mbgs
13121	Y	Water level- 1.5 mbgs, Depth- 100 mbgs
12909	Y	No Response
12872	N	School is on municipal water supply
13089	N	No Response
13159	N	Tenant does have information
12728	N	Residential subdivion
12976	N	No Response

Appendix F

TABLE E-1

CLIMATE NORMALS 1981-2010 (Toronto Lester B. International Airport WWTP Climate Station)

Water Balance - 12909 Kennedy Road, Caledon, ON

	Thornthwaite (1948)					
Month	**Mean Temperature (°C)**	**Heat Index**	**Unadjusted Potential Evapotranspiration (mm)**	**Daylight Correction Value**	**Adjusted Potential Evapotranspiration (mm)**	**Total Precipitation (mm)**
January	-5.5	0.0	0.0	0.78	0.0	51.8
February	-4.5	0.0	0.0	0.88	0.0	47.7
March	0.1	0.0	0.2	0.99	0.2	49.8
April	7.1	1.7	30.4	1.12	34.1	68.5
May	13.1	4.3	60.7	1.22	74.1	74.3
June	18.6	7.3	90.2	1.28	115.4	71.5
July	21.5	9.1	106.2	1.25	132.7	75.7
August	20.6	8.5	101.2	1.16	117.4	78.1
September	16.2	5.9	77.2	1.04	80.2	74.5
October	9.5	2.6	42.3	0.92	38.9	61.1
November	3.7	0.6	14.6	0.81	11.8	75.1
December	-2.2	0.0	0.0	0.75	0.0	57.9
TOTALS		**40.1**	**522.9**		**604.8**	**786.0**

Notes: Daylight Correction values obtained from Instruction and Tables For Computing Potential Evapotranspiration and The Water Balance (Thornthwaite & Mather, 1957)

TABLE E-2

Pre-development Water Balance

Water Balance - 12909 Kennedy Road, Caledon, ON

Catchments and Hydrologic Components			Month												Total
			March	April	May	June	July	August	September	October	November	December	January	February	
		PET - Adjusted Potential Evapotranspiration (mm)	0.25	34.09	74.08	115.41	132.71	117.35	80.24	38.88	11.82	0.00	0.00	0.00	**604.83**
		P - Total Precipitation (mm)	49.80	68.50	74.30	71.50	75.70	78.10	74.50	61.10	75.10	57.90	51.80	47.70	**786.00**
		P-PET (mm)	49.55	34.41	0.22	-43.91	-57.01	-39.25	-5.74	22.22	63.28	57.90	51.80	47.70	-
		Soil Moisture Deficit (mm)	0.00	0.00	0.00	-43.91	-100.92	-140.17	-145.91	-123.69	-60.42	-2.52	0.00	0.00	-
Site	Forest	**Soil Moisture Storage (mm)**	400.00	400.00	400.00	356.09	299.08	259.83	254.09	276.31	339.58	397.48	400.00	400.00	-
		Actual Potential Evapotranspiration (mm)	0.25	34.09	74.08	113.00	122.39	105.53	78.19	38.88	11.82	0.00	0.00	0.00	**578.22**
		P-AET (mm)	49.55	34.41	0.22	-41.50	-46.69	-27.43	-3.69	22.22	63.28	57.90	51.80	47.70	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-41.50	-88.19	-115.61	-119.30	-97.08	-33.80	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	41.50	46.69	27.43	3.69	-22.22	-63.28	-33.80	0.00	0.00	-
		Precipitation Surplus (mm)	49.55	34.41	0.22	0.00	0.00	0.00	0.00	0.00	0.00	24.10	51.80	47.70	**207.78**
		MECP Infiltration Factor	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	-
		Run-Off Coefficient	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	-
		Infiltration (mm)	29.73	20.65	0.13	0.00	0.00	0.00	0.00	0.00	0.00	14.46	31.08	28.62	**124.67**
		Run-Off (mm)	19.82	13.77	0.09	0.00	0.00	0.00	0.00	0.00	0.00	9.64	20.72	19.08	**83.11**
		Catchment Area (m^2) = 28153.40	**Monthly Volumes**												
		Total AET (m^3)	6.93	959.64	2085.61	3181.27	3445.63	2970.89	2201.27	1094.70	332.79	0.00	0.00	0.00	**16278.73**
		Total Evaporation (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Infiltration (m^3)	837.06	581.32	3.71	0.00	0.00	0.00	0.00	0.00	0.00	407.05	875.01	805.75	**3509.90**
		Total Runoff (m^3)	558.04	387.55	2.47	0.00	0.00	0.00	0.00	0.00	0.00	271.37	583.34	537.17	**2339.94**
	Moderlatley Rooted Crops	**Soil Moisture Storage (mm)**	200.00	200.00	200.00	156.09	99.08	59.83	54.09	76.31	139.58	197.48	200.00	200.00	-
		Actual Potential Evapotranspiration (mm)	0.25	34.09	74.08	110.59	112.07	93.70	76.14	38.88	11.82	0.00	0.00	0.00	**551.60**
		P-AET (mm)	49.55	34.41	0.22	-39.09	-36.37	-15.60	-1.64	22.22	63.28	57.90	51.80	47.70	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-39.09	-75.46	-91.05	-92.69	-70.47	-7.19	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	39.09	36.37	15.60	1.64	-22.22	-63.28	-7.19	0.00	0.00	-
		Precipitation Surplus (mm)	49.55	34.41	0.22	0.00	0.00	0.00	0.00	0.00	0.00	50.71	51.80	47.70	**234.40**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	24.78	17.21	0.11	0.00	0.00	0.00	0.00	0.00	0.00	25.35	25.90	23.85	**117.20**
		Run-Off (mm)	24.78	17.21	0.11	0.00	0.00	0.00	0.00	0.00	0.00	25.35	25.90	23.85	**117.20**
		Catchment Area (m^2) = 303812.60	**Monthly Volumes**												
		Total AET (m^3)	74.81	10355.82	22506.50	33598.03	34047.54	28465.85	23130.81	11813.23	3591.28	0.00	0.00	0.00	**167583.86**
		Total Evaporation (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		Total Infiltration (m^3)	7527.53	5227.67	33.39	0.00	0.00	0.00	0.00	0.00	0.00	7703.16	7868.75	7245.93	**35606.42**
		Total Runoff (m^3)	7527.53	5227.67	33.39	0.00	0.00	0.00	0.00	0.00	0.00	7703.16	7868.75	7245.93	**35606.42**
	lanscaped	**Soil Moisture Storage (mm)**	100.00	100.00	100.00	56.09	0.00	0.00	0.00	22.22	85.50	100.00	100.00	100.00	-
		Actual Potential Evapotranspiration (mm)	0.25	34.09	74.08	105.77	91.69	78.10	74.50	38.88	11.82	0.00	0.00	0.00	**509.17**
		P-AET (mm)	49.55	34.41	0.22	-34.27	-15.99	0.00	0.00	22.22	63.28	57.90	51.80	47.70	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-34.27	-50.26	-50.26	-50.26	-28.04	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	34.27	15.99	0.00	0.00	-22.22	-28.04	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	49.55	34.41	0.22	0.00	0.00	0.00	0.00	0.00	35.24	57.90	51.80	47.70	**276.83**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	24.78	17.21	0.11	0.00	0.00	0.00	0.00	0.00	17.62	28.95	25.90	23.85	**138.41**
		Run-Off (mm)	24.78	17.21	0.11	0.00	0.00	0.00	0.00	0.00	17.62	28.95	25.90	23.85	**138.41**
		Catchment Area* (m^2) = 22830.09	**Monthly Volumes**												
	Existing Impervious Area	**Precipitation (mm)**	49.80	68.50	74.30	71.50	75.70	78.10	74.50	61.10	75.10	57.90	51.80	47.70	**786.00**
		Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	7.47	10.28	11.15	10.73	11.36	11.72	11.18	9.17	11.27	8.69	7.77	7.16	**117.90**
		Run-Off (mm)	42.33	58.23	63.16	60.78	64.35	66.39	63.33	51.94	63.84	49.22	44.03	40.55	**668.10**
		Catchment Area (m^2) = 5543.61	**Monthly Volumes**												
		Total AET (m^3)	5.62	778.19	1691.26	2414.70	2093.26	1783.03	1700.84	887.71	269.87	0.00	0.00	0.00	**11624.47**
		Total Evaporation (m^3)	41.41	56.96	61.78	59.46	62.95	64.94	61.95	50.81	62.45	48.15	43.07	39.66	**653.59**
		Total Infiltration (m^3)	565.66	392.84	2.51	0.00	0.00	0.00	0.00	0.00	402.26	660.93	591.30	544.50	**3159.99**
		Total Runoff (m^3)	800.32	715.61	352.62	336.91	356.70	368.01	351.05	287.91	756.13	933.76	835.38	769.26	**6863.67**
	Site Total Monthly Volumes														
		Total AET (m^3)	87.36	12093.65	26283.37	39194.00	39586.42	33219.77	27032.92	13795.63	4193.94	0.00	0.00	0.00	**195487.07**
		Total Evaporation (m^3)	41.41	56.96	61.78	59.46	62.95	64.94	61.95	50.81	62.45	48.15	43.07	39.66	**653.59**
		Total Infiltration (m^3)	8930.25	6201.83	39.61	0.00	0.00	0.00	0.00	0.00	402.26	8771.14	9335.05	8596.18	**42276.31**
		Total Runoff (m^3)	8885.89	6330.83	388.48	336.91	356.70	368.01	351.05	287.91	756.13	8908.28	9287.47	8552.36	**44810.03**

TABLE E-3

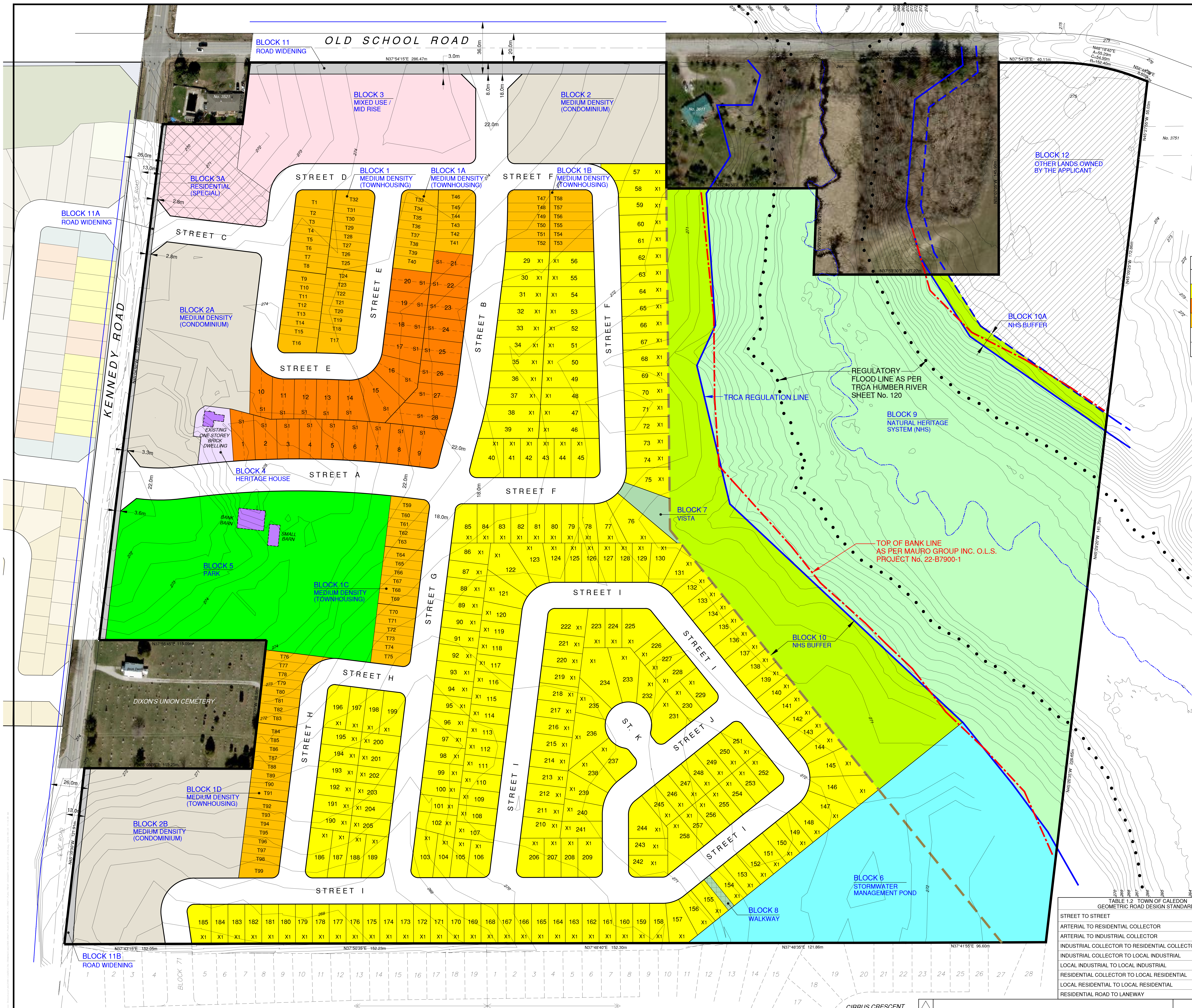
Post-development Water Balance

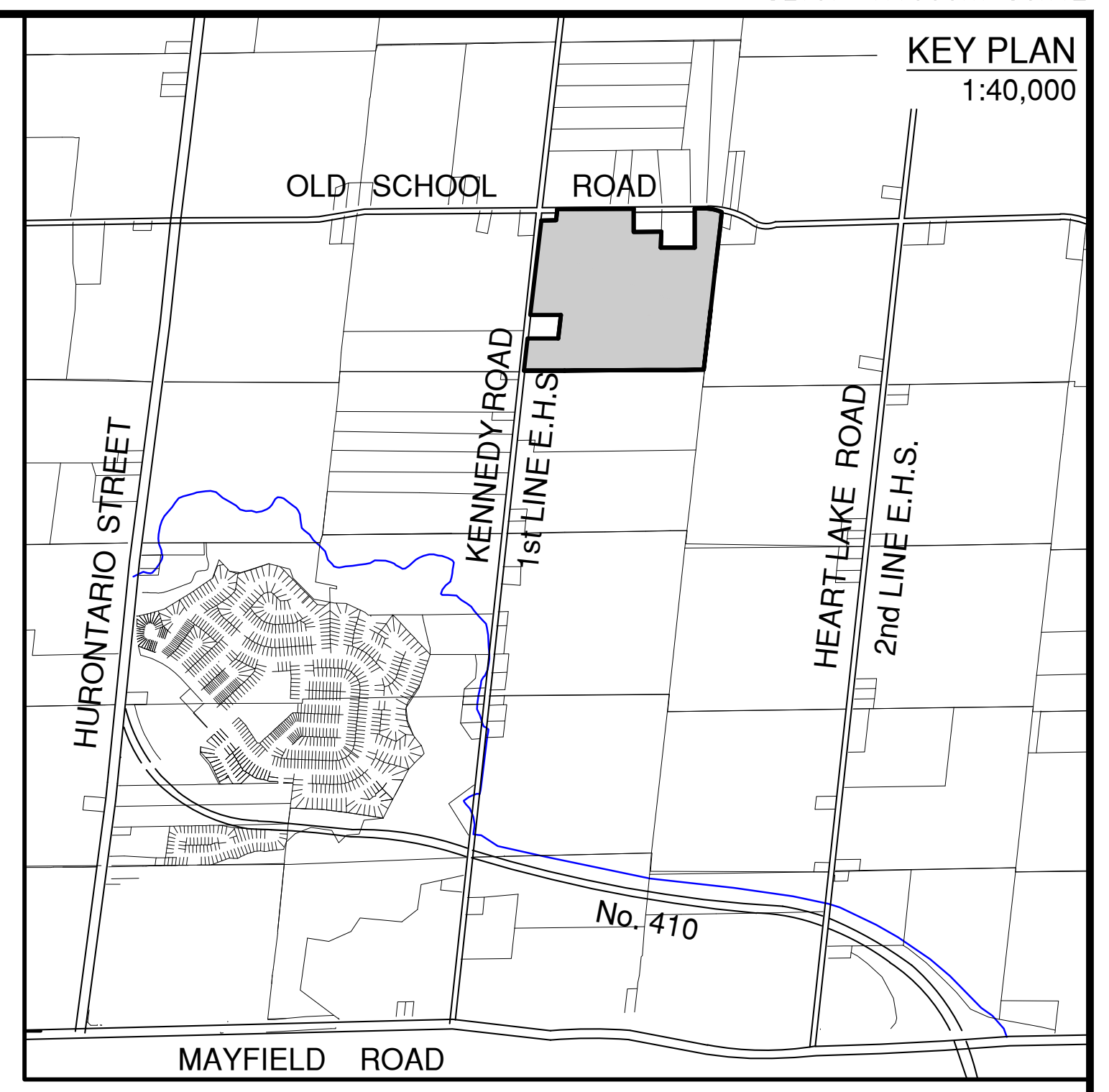
Water Balance - 12909 Kennedy Road, Caledon, ON

Catchments and Hydrologic Components			Month												Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			0.25	34.09	74.08	115.41	132.71	117.35	80.24	38.88	11.82	0.00	0.00	0.00	**604.83**
P - Total Precipitation (mm)			49.80	68.50	74.30	71.50	75.70	78.10	74.50	61.10	75.10	57.90	51.80	47.70	**786.00**
P-PET (mm)			49.55	34.41	0.22	-43.91	-57.01	-39.25	-5.74	22.22	63.28	57.90	51.80	47.70	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-43.91	-100.92	-140.17	-145.91	-123.69	-60.42	-2.52	0.00	0.00	-
Site	Forest	**Soil Moisture Storage (mm)**	400.00	400.00	400.00	356.09	299.08	259.83	254.09	276.31	339.58	397.48	400.00	400.00	-
		Actual Potential Evapotranspiration (mm)	0.25	34.09	74.08	113.00	122.39	105.53	78.19	38.88	11.82	0.00	0.00	0.00	**578.22**
		P-AET (mm)	49.55	34.41	0.22	-41.50	-46.69	-27.43	-3.69	22.22	63.28	57.90	51.80	47.70	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-41.50	-88.19	-115.61	-119.30	-97.08	-33.80	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	41.50	46.69	27.43	3.69	-22.22	-63.28	-33.80	0.00	0.00	-
		Precipitation Surplus (mm)	49.55	34.41	0.22	0.00	0.00	0.00	0.00	0.00	0.00	24.10	51.80	47.70	**207.78**
		MECP Infiltration Factor	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	-
		Run-Off Coefficient	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	-
		Infiltration (mm)	29.73	20.65	0.13	0.00	0.00	0.00	0.00	0.00	0.00	14.46	31.08	28.62	**124.67**
		Run-Off (mm)	19.82	13.77	0.09	0.00	0.00	0.00	0.00	0.00	0.00	9.64	20.72	19.08	**83.11**
		Catchment Area (m^2) = 28153.40	**Monthly Volumes**												
	Total AET (m^3)		6.93	959.64	2085.61	3181.27	3445.63	2970.89	2201.27	1094.70	332.79	0.00	0.00	0.00	**16278.73**
	Total Evaporation (m^3)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Total Infiltration (m^3)		837.06	581.32	3.71	0.00	0.00	0.00	0.00	0.00	0.00	407.05	875.01	805.75	**3509.90**
	Total Runoff (m^3)		558.04	387.55	2.47	0.00	0.00	0.00	0.00	0.00	0.00	271.37	583.34	537.17	**2339.94**
	pasture & shrub	**Soil Moisture Storage (mm)**	250.00	250.00	250.00	206.09	149.08	109.83	104.09	126.31	189.58	247.48	250.00	250.00	-
		Actual Potential Evapotranspiration (mm)	0.25	34.09	74.08	111.55	116.20	98.43	76.96	38.88	11.82	0.00	0.00	0.00	**562.25**
		P-AET (mm)	49.55	34.41	0.22	-40.05	-40.50	-20.33	-2.46	22.22	63.28	57.90	51.80	47.70	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-40.05	-80.55	-100.87	-103.33	-81.11	-17.84	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	40.05	40.50	20.33	2.46	-22.22	-63.28	-17.84	0.00	0.00	-
		Precipitation Surplus (mm)	49.55	34.41	0.22	0.00	0.00	0.00	0.00	0.00	0.00	40.06	51.80	47.70	**223.75**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	24.78	17.21	0.11	0.00	0.00	0.00	0.00	0.00	0.00	20.03	25.90	23.85	**111.88**
		Run-Off (mm)	24.78	17.21	0.11	0.00	0.00	0.00	0.00	0.00	0.00	20.03	25.90	23.85	**111.88**
		Catchment Area (m^2) = 87072.80	**Monthly Volumes**												
	Total AET (m^3)		21.44	2967.98	6450.37	9713.14	10117.47	8570.34	6700.81	3385.68	1029.26	0.00	0.00	0.00	**48956.49**
	Total Evaporation (m^3)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Total Infiltration (m^3)		2157.39	1498.25	9.57	0.00	0.00	0.00	0.00	0.00	0.00	1744.28	2255.19	2076.69	**9741.36**
	Total Infiltration (m^3)		2157.39	1498.25	9.57	0.00	0.00	0.00	0.00	0.00	0.00	1744.28	2255.19	2076.69	**9741.36**
	Parkland	**Soil Moisture Storage (mm)**	100.00	100.00	100.00	56.09	0.00	0.00	0.00	22.22	85.50	100.00	100.00	100.00	-
		Actual Potential Evapotranspiration (mm)	0.25	34.09	74.08	105.77	91.69	78.10	74.50	38.88	11.82	0.00	0.00	0.00	**509.17**
		P-AET (mm)	49.55	34.41	0.22	-34.27	-15.99	0.00	0.00	22.22	63.28	57.90	51.80	47.70	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-34.27	-50.26	-50.26	-50.26	-28.04	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	34.27	15.99	0.00	0.00	-22.22	-28.04	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	49.55	34.41	0.22	0.00	0.00	0.00	0.00	0.00	35.24	57.90	51.80	47.70	**276.83**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	24.78	17.21	0.11	0.00	0.00	0.00	0.00	0.00	17.62	28.95	25.90	23.85	**138.41**
		Run-Off (mm)	24.78	17.21	0.11	0.00	0.00	0.00	0.00	0.00	17.62	28.95	25.90	23.85	**138.41**
		Catchment Area* (m^2) = 19350.00	**Monthly Volumes**												
	Impervious Area	**Precipitation (mm)**	49.80	68.50	74.30	71.50	75.70	78.10	74.50	61.10	75.10	57.90	51.80	47.70	**786.00**
		Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	7.47	10.28	11.15	10.73	11.36	11.72	11.18	9.17	11.27	8.69	7.77	7.16	**117.90**
		Run-Off (mm)	42.33	58.23	63.16	60.78	64.35	66.39	63.33	51.94	63.84	49.22	44.03	40.55	**668.10**
		Catchment Area (m^2) = 225763.46	**Monthly Volumes**												
	Total AET (m^3)		4.76	659.57	1433.45	2046.62	1774.17	1511.24	1441.58	752.39	228.73	0.00	0.00	0.00	**9852.50**
	Total Evaporation (m^3)		1686.45	2319.72	2516.13	2421.31	2563.54	2644.82	2522.91	2069.12	2543.23	1960.76	1754.18	1615.34	**26617.51**
	Total Infiltration (m^3)		479.43	332.95	2.13	0.00	0.00	0.00	0.00	0.00	340.94	560.18	501.17	461.50	**2678.30**
	Total Runoff (m^3)		10036.00	13478.03	14260.22	13720.77	14526.75	14987.31	14296.47	11725.03	14752.55	11671.13	10441.53	9615.08	**153510.87**
	Site Total Monthly Volumes														
	Total AET (m^3)		33.14	4587.19	9969.43	14941.03	15337.27	13052.47	10343.65	5232.76	1590.79	0.00	0.00	0.00	**75087.73**
	Total Evaporation (m^3)		1686.45	2319.72	2516.13	2421.31	2563.54	2644.82	2522.91	2069.12	2543.23	1960.76	1754.18	1615.34	**26617.51**
	Total Infiltration (m^3)		3473.89	2412.53	15.41	0.00	0.00	0.00	0.00	0.00	340.94	2711.51	3631.36	3343.93	**15929.57**
	Total Runoff (m^3)		12751.44	15363.83	14272.26	13720.77	14526.75	14987.31	14296.47	11725.03	14752.55	13686.78	13280.05	12228.93	**165592.17**

DRAWINGS

SETUP 1:1000m 30x42




KEY PLAN
1:40,000

LOT SCHEDULE & DENSITY INFORMATION

DESCRIPTION	TYPE	MINIMUM FRONTAGE	MINIMUM DEPTH	NUMBER OF LOTS	NUMBER OF UNITS	LOT/UNIT AREA	LOT / UNIT DENSITY
SINGLE DETACHED	X1	11.6m (38')	27.0m (88.6')	230	230	8.35ha. 20.63Ac.	27.5upnha. (11.1upnAc.)
SEMI-DEATCHED	S1	15.2m (50')	27.0m (88.6')	28	56	1.28ha. 3.16Ac.	43.8upnha. (17.7upnAc.)
TOWNHOUSING	T	6.1m (20')	27.0m (88.6')	-	99	1.87ha. 4.62Ac.	52.9upnha. (21.4upnAc.)
TOTAL				258	385	11.5ha. 28.4Ac.	33.5upnha. (13.6upnAc.)

LAND USE	BLOCK / LOT	AREA	
RESIDENTIAL (SINGLE DETACHED)	LOTS 29-258	8.35 ha.	20.63 Ac.
RESIDENTIAL (SEMI-DETACHED)	LOTS 1-28	1.28 ha.	3.16 Ac.
MEDIUM DENSITY (TOWNHOUSING)	BLOCKS 1-1D (T1-T99)	1.87 ha.	4.62 Ac.
MEDIUM DENSITY (CONDOMINIUM)	BLOCKS 2-2B	2.80 ha.	6.92 Ac.
MIXED USE / MID RISE	BLOCK 3	1.02 ha.	2.52 Ac.
RESIDENTIAL (SPECIAL)	BLOCK 3A	0.40 ha.	1.00 Ac.
HERITAGE HOUSE	BLOCK 4	0.09 ha.	0.22 Ac.
PARK	BLOCK 5	1.92 ha.	4.74 Ac.
STORMWATER MANAGEMENT POND	BLOCK 6	2.12 ha.	5.24 Ac.
VISTA	BLOCK 7	0.06 ha.	0.15 Ac.
WALKWAY	BLOCK 8	0.01 ha.	0.02 Ac.
NHS (NATURAL HERITAGE SYSTEM)	BLOCK 9	6.68 ha.	16.49 Ac.
NHS BUFFER	BLOCKS 10-10A	2.14 ha.	5.29 Ac.
ROADS	STREETS 'A' - 'K'	5.70 ha.	14.08 Ac.
ROAD WIDENING	BLOCKS 11-11B	0.40 ha.	1.00 Ac.
OTHER LANDS OWNED BY APPLICANT	BLOCK 12	2.03 ha.	5.02 Ac.
TOTAL		36.87 ha.	91.11 Ac.

ADDITIONAL INFORMATION:

AS REQUIRED UNDER SECTION 51(17) OF THE PLANNING CT (R.S.O. 1990 C.P.13)

A) AS SHOWN ON DRAFT PLAN.
B) AS SHOWN ON DRAFT AND KEY PLAN.
C) AS SHOWN ON KEY PLANS.
D) AS SHOWN IN LAND USE SCHEDULE.
E) AS SHOWN ON DRAFT PLAN.
F) AS SHOWN ON DRAFT PLAN.
G) AS SHOWN ON DRAFT AND KEY PLANS.
H) MUNICIPAL SERVICES TO BE PROVIDED.
I) SOIL IS CLAYEY SILT.
J) AS SHOWN ON DRAFT PLAN.
K) MUNICIPAL SERVICES TO BE PROVIDED.
L) NONE.

OWNER'S AUTHORIZATION:

THE UNDERSIGNED, BEING THE OWNER OF THE SUBJECT LANDS HEREBY AUTHORIZE CANDEVCON GROUP INC TO ACT ON OUR BEHALF AS AGENTS AND TO PREPARE AND SUBMIT A DRAFT PLAN OF SUBDIVISION FOR APPROVAL.

DATE

NAME OF SIGNATORY
TREND KENNEDY DEVELOPMENT

SURVEYOR'S CERTIFICATE:

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJOINING PROPERTIES ARE CORRECTLY SHOWN ON THIS PLAN

DATE

GANESH SUNDAR B.Eng.
ONTARIO LAND SURVEYORS
MAURO GROUP INC
2 HOLLAND DRIVE, UNIT 5, BOLTON ONTARIO
www.youngsurveying.ca Tel. (905)951-6000

TABLE 1.2 TOWN OF CALEDON
GEOMETRIC ROAD DESIGN STANDARDS

STREET TO STREET	MIN. INTER. CURVE RADII
ARTERIAL TO RESIDENTIAL COLLECTOR	12.0m
ARTERIAL TO INDUSTRIAL COLLECTOR	15.0m
INDUSTRIAL COLLECTOR TO RESIDENTIAL COLLECTOR	15.0m
INDUSTRIAL COLLECTOR TO LOCAL INDUSTRIAL	15.0m
LOCAL INDUSTRIAL TO LOCAL INDUSTRIAL	15.0m
RESIDENTIAL COLLECTOR TO LOCAL RESIDENTIAL	10.0m
LOCAL RESIDENTIAL TO LOCAL RESIDENTIAL	10.0m
RESIDENTIAL ROAD TO LANEWAY	10.0m

NO.	DESCRIPTION	DATE	BY
△			
△			
△			
△			

REVISIONS

DRAFT PLAN OF SUBDIVISION

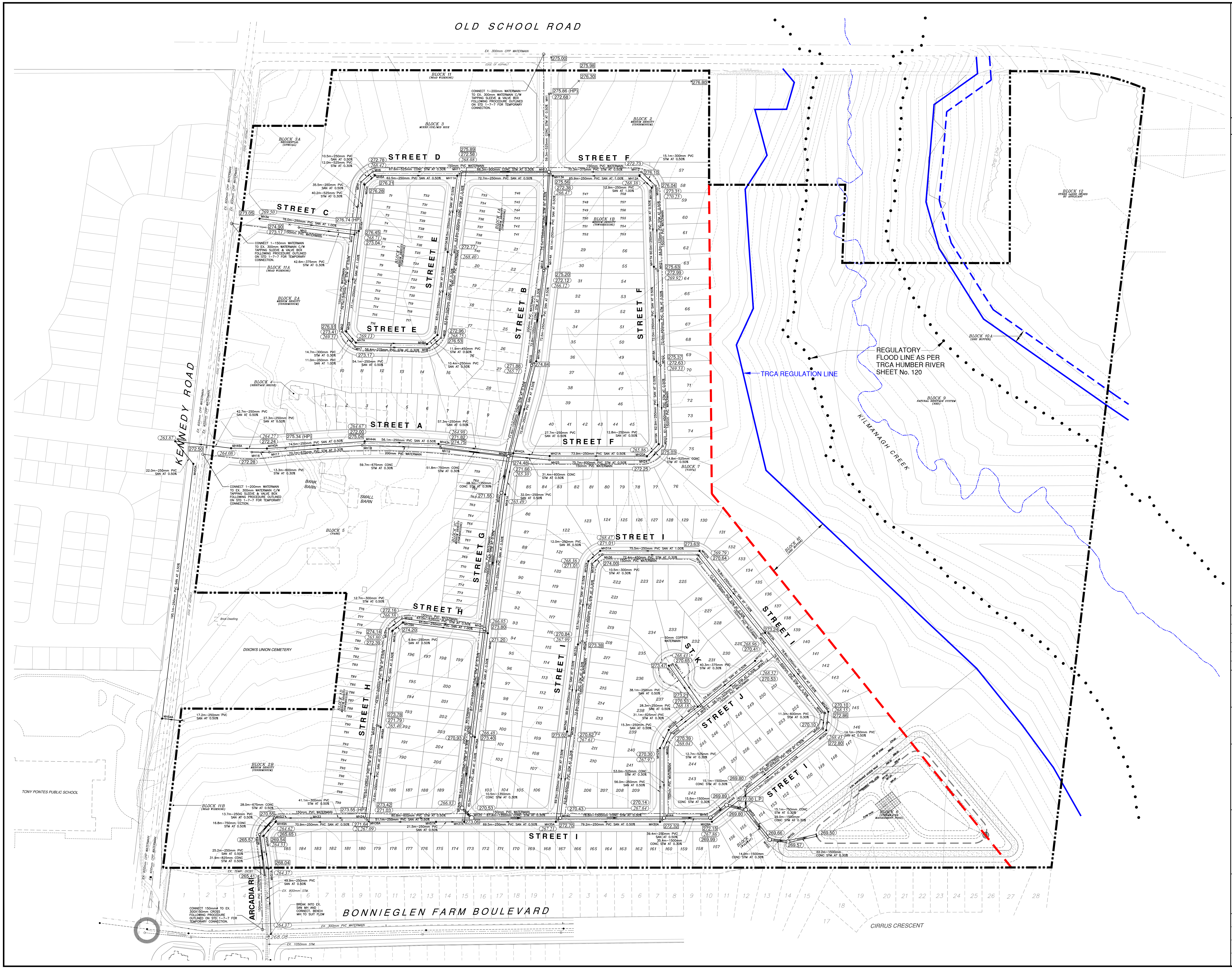
12909 KENNEDY ROAD
PART OF LOT 22, CONCESSION 2
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL
FILE NUMBERS - OZS---------- AND 21T----------

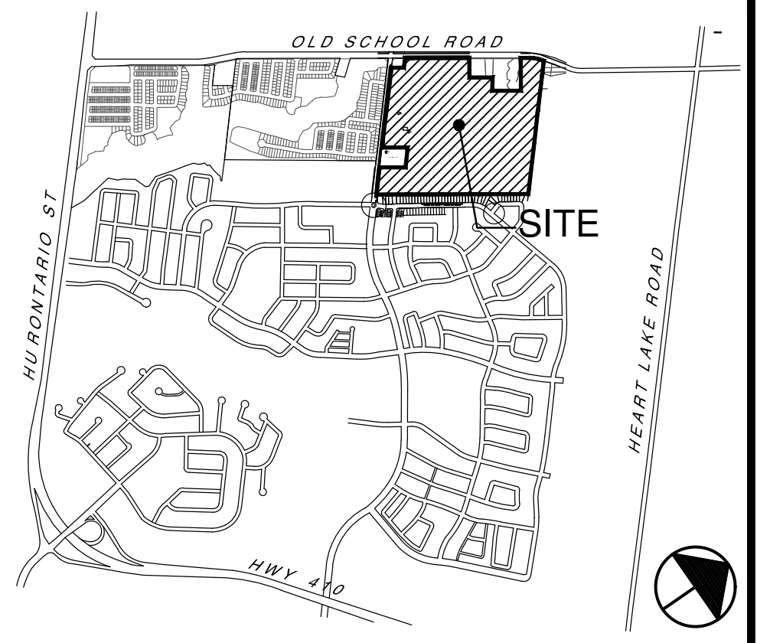
TREND KENNEDY DEVELOPMENT RESIDENTIAL SUBDIVISION

CANDEVCON GROUP INC.
CONSULTING ENGINEERS AND PLANNERS

TEL. (905) 794-0600
FAX (905) 794-0611

SCALE: 1:1000 0m 10 20 30 40
DWG. No. PL-1 △
DATE: AUG., 23rd 2024
PROJECT No. W22068





KEY PLAN
N.T.S.

LEGEND:

▬ ▪ ▪ ▬	LIMIT OF SUBDIVISION
— — —	EXISTING PROPERTY LINE
➤○	PROPOSED STORM SEWER
— ➤ —	EXISTING STORM SEWER
▷●	PROPOSED SAN SEWER
— ➤ —	EXISTING SAN SEWER
—‐‐—	PROPOSED WATERMAIN
— · · —	EXISTING WATERMAIN
x206.14	EXIST. GRADE
214.97	PROPOSED ROAD GRADE
(197.90)	PROPOSED SAN SEWER OBVERT
(203.21)	PROPOSED STORM SEWER OBVERT
‹200.26›	PROPOSED FDC SEWER OBVERT

REFERENCE DRAWINGS:

1. REFER TO DRAFT PLAN (PL–1) PREPARED BY CANDEVCON GROUP INC. FOR SUBDIVISION LAYOUT
2. REFER TO DRAWINGS ST–1 FOR INFORMATION ON STORM DRAINAGE
3. REFER TO DRAWINGS SA–1 FOR INFORMATION ON SANITARY DRAINAGE

NO.	DESCRIPTION	DATE	BY
1			

REVISIONS

CANDEVCON GROUP INC.
CONSULTING ENGINEERS AND PLANNERS
9358 GOREWAY DRIVE
BRAMPTON ON. L6P-0M7
TEL (905) 794-0600
FAX (905) 794-0611

TOWN OF CALEDON

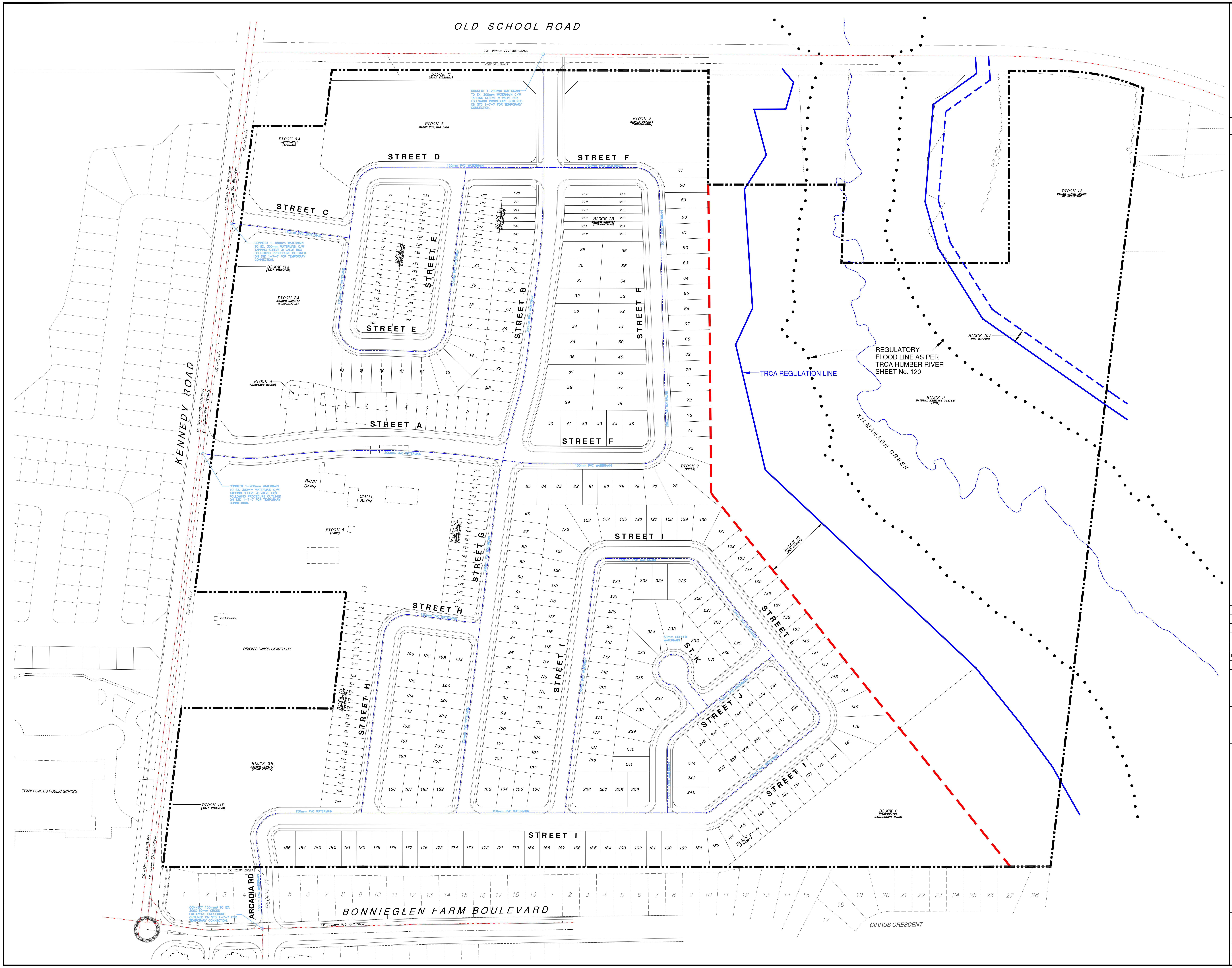
S. D. LANG
SEPT 23, 2024

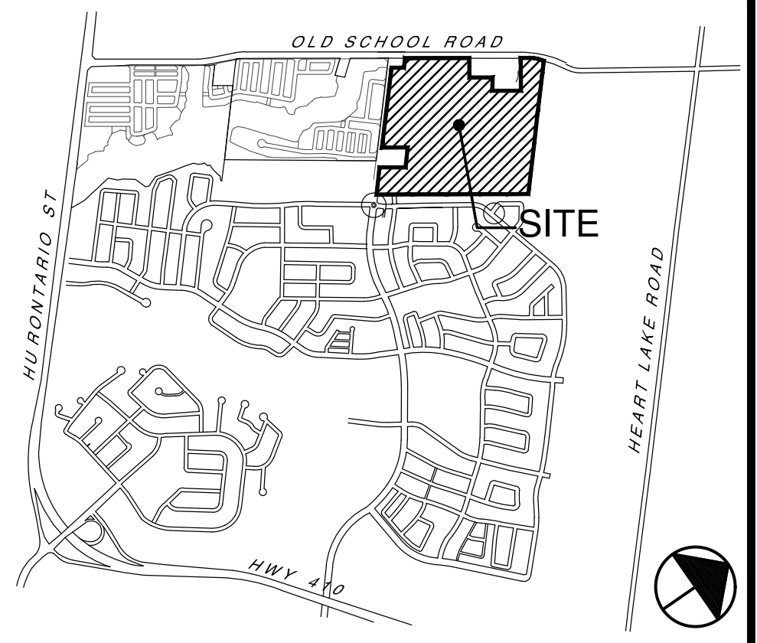
TRENDKENNEDY DEVELOPMENT
RESIDENTIAL SUBDIVISION
12909 KENNEDY ROAD
PART OF LOT 22, CONCESSION 2
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

SHEET TITLE:

PRELIMINARY SERVICING PLAN

DRAWN BY: E.M.	PROJECT No. W22068
CHECKED BY: S.L	DRAWING No. PS-1
SCALE: 1:1000	
DATE: APRIL., 5th 2024	





KEY PLAN
N.T.S.

LEGEND:

▬ · · ▬ · · ▬	LIMIT OF SUBDIVISION
— — — — —	EXISTING PROPERTY LINE
— - - — - - —	PROPOSED WATERMAIN
— · · — · · —	EXISTING WATERMAIN

REFERENCE DRAWINGS:

1. REFER TO DRAFT PLAN (PL–1) PREPARED BY CANDEVCON GROUP INC. FOR SUBDIVISION LAYOUT

NO.	DESCRIPTION	DATE	BY
1			

REVISIONS

CANDEVCON GROUP INC.
CONSULTING ENGINEERS AND PLANNERS
9358 GOREWAY DRIVE
BRAMPTON ON. L6P-0M7
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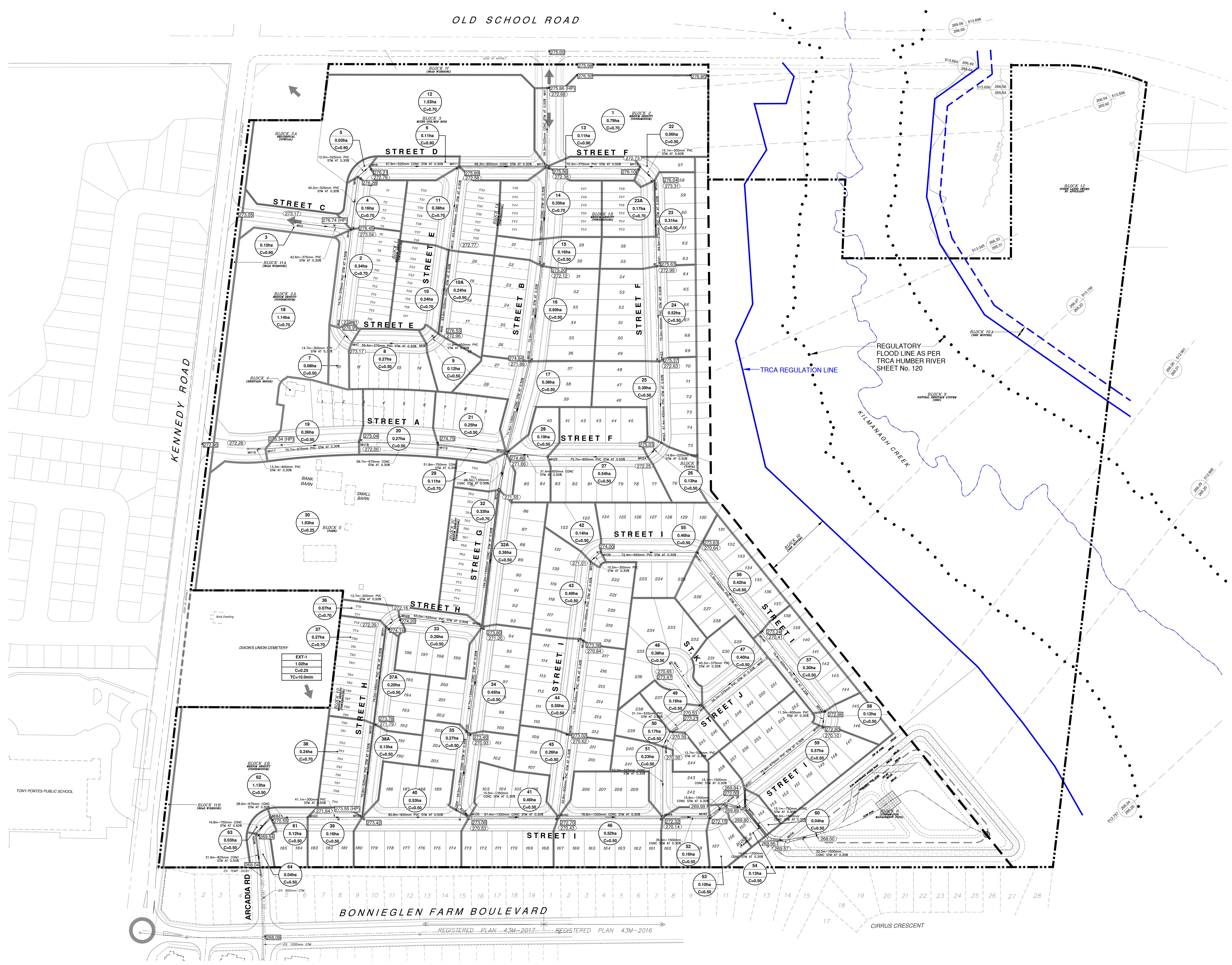
TOWN OF CALEDON

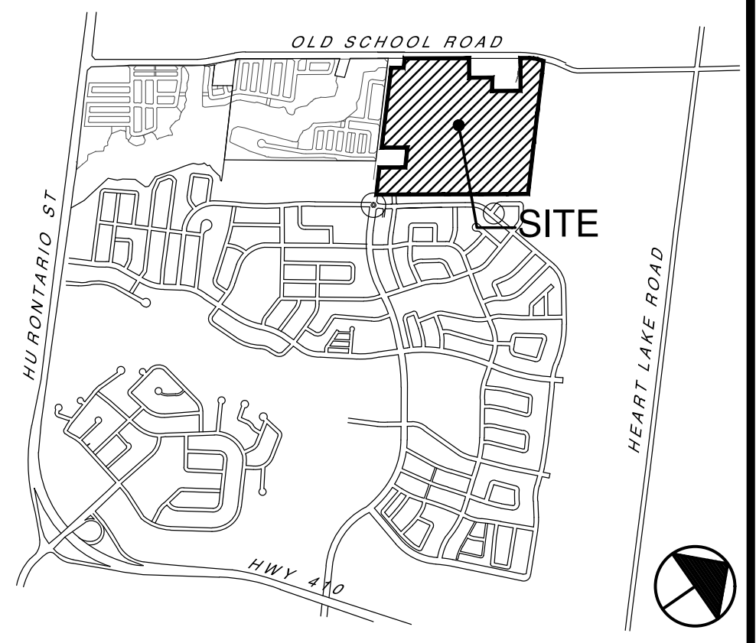
S. D. LANG
SEPT 23, 2024

TREND KENNEDY DEVELOPMENT
RESIDENTIAL SUBDIVISION
12909 KENNEDY ROAD
PART OF LOT 22, CONCESSION 2
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

SHEET TITLE:
WATER
DISTRIBUTION PLAN

DRAWN BY: E.M.
PROJECT No. W22068
CHECKED BY: S.L
DRAWING No. WM-1
SCALE: 1:1000
DATE: APRIL., 5th 2024





KEY PLAN
N.T.S.

LEGEND:

▬ ▪ ▪ ▬	LIMIT OF SUBDIVISION
— — —	EXISTING PROPERTY LINE
——➤○——	PROPOSED STORM SEWER
— — ➤ — —	EXISTING STORM SEWER
x206.14	EXIST. GRADE
214.97	PROPOSED ROAD GRADE
(203.21)	PROPOSED STORM SEWER OBVERT
▬▬▬	STORM DRAINAGE AREA BOUNDARY
➡	OVERLAND FLOW ROUTE
1	DENOTES DRAINAGE NODE
0.83ha	DENOTES AREA IN HECTARES
C=0.70	DENOTES DRAINAGE COEFFICIENT
EXT-1	DENOTES EXTERNAL DRAINAGE NODE
0.97ha	DENOTES AREA IN HECTARES
C=0.49	DENOTES RUNOFF COEFFICIENT
TC=12.1min	DENOTES TIME OF CONCENTRATION
● ● ● ● ●	REGULATORY FLOOD LINE AS PER TRCA HUMBER RIVER SHEET No. 120
▬▬▬	TRCA REGULATION LINE

REFERENCE DRAWINGS:

1. REFER TO DRAFT PLAN (PL–1) PREPARED BY CANDEVCON GROUP INC. FOR SUBDIVISION LAYOUT
2. REFER TO DRAWINGS PS–1 FOR INFORMATION ON STORM & SANITARY
3. REFER TO DWG EXT–ST1 FOR EXTERNAL STORM DRAINAGE AREA PLAN

NO.	DESCRIPTION	DATE	BY
1			

REVISIONS

CANDEVCON GROUP INC.
CONSULTING ENGINEERS AND PLANNERS
9358 GOREWAY DRIVE
BRAMPTON ON. L6P-0M7
TEL (905) 794-0600
FAX (905) 794-0611

TOWN OF CALEDON

S D. LANG
SEPT 23, 2024

TRENDY KENNEDY DEVELOPMENT

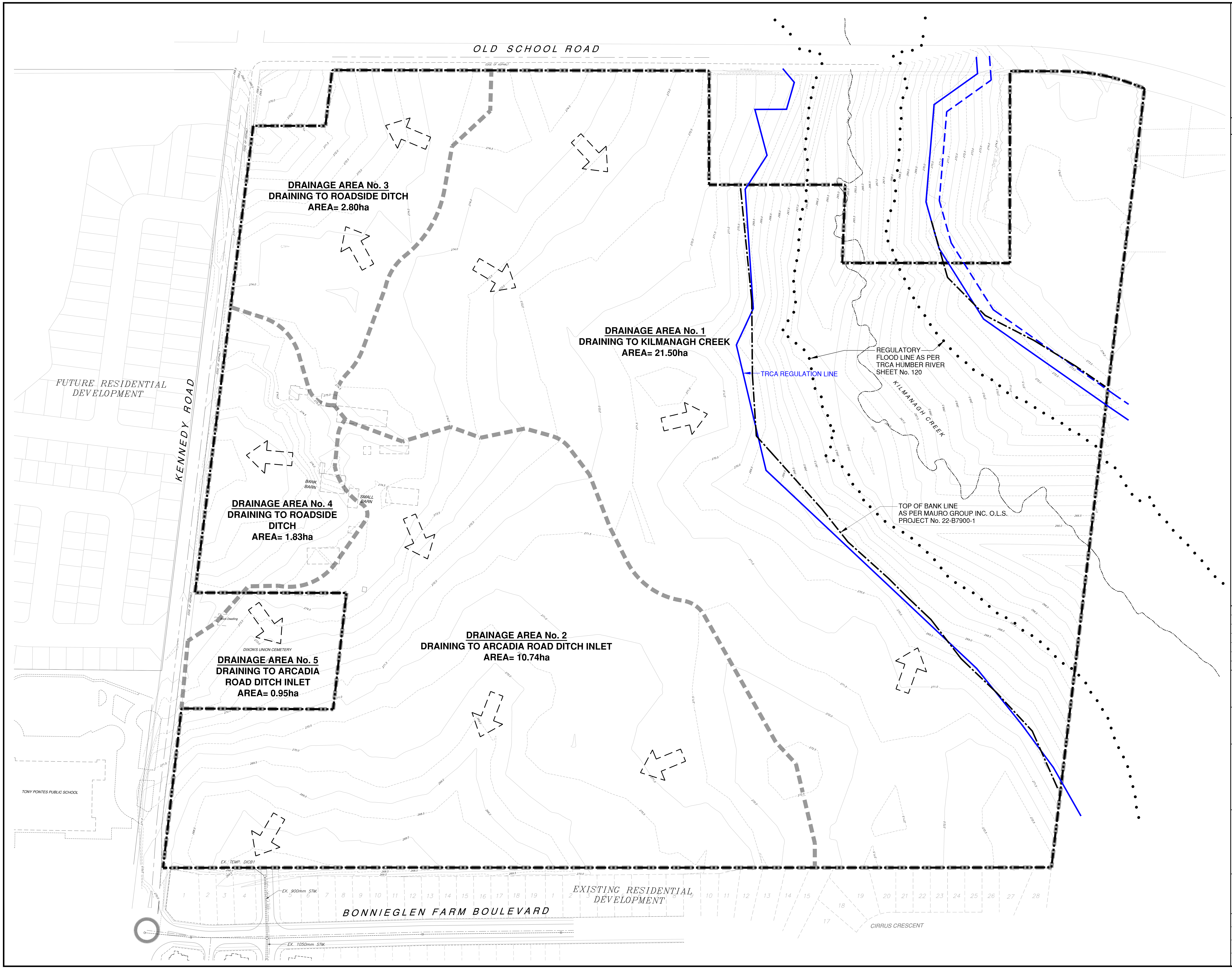
TREND KENNEDY DEVELOPMENT RESIDENTIAL SUBDIVISION
12909 KENNEDY ROAD
PART OF LOT 22, CONCESSION 2

TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

SHEET TITLE:

STORM DRAINAGE AREA PLAN

DRAWN BY: E.M.
PROJECT No. W22068
CHECKED BY: S.L
DRAWING No. ST-1
SCALE: 1:1000
DATE: APRIL., 5th 2024



KEY PLAN
N.T.S.

LEGEND:

- LIMIT OF SUBDIVISION
- EXISTING PROPERTY LINE
- EXISTING STORM SEWER
- PRE DEVELOPMENT DRAINAGE AREA BOUNDARY
- EXISTING DRAINAGE FLOW ROUTE

REFERENCE DRAWINGS:

1. REFER TO DRAFT PLAN (PL–1) PREPARED BY CANDEVCON GROUP INC. FOR SUBDIVISION LAYOUT
2. REFER TO DRAWINGS PS–1 FOR INFORMATION ON STORM & SANITARY
3. REFER TO DWG EXT–ST1 FOR EXTERNAL STORM DRAINAGE AREA PLAN

NO.	DESCRIPTION	DATE	BY
1			

REVISIONS

CANDEVCON GROUP INC.
CONSULTING ENGINEERS AND PLANNERS
9358 GOREWAY DRIVE
BRAMPTON ON. L6P-0M7
TEL (905) 794-0600
FAX (905) 794-0611

TOWN OF CALEDON

S D. LANG
SEPT 23, 2024

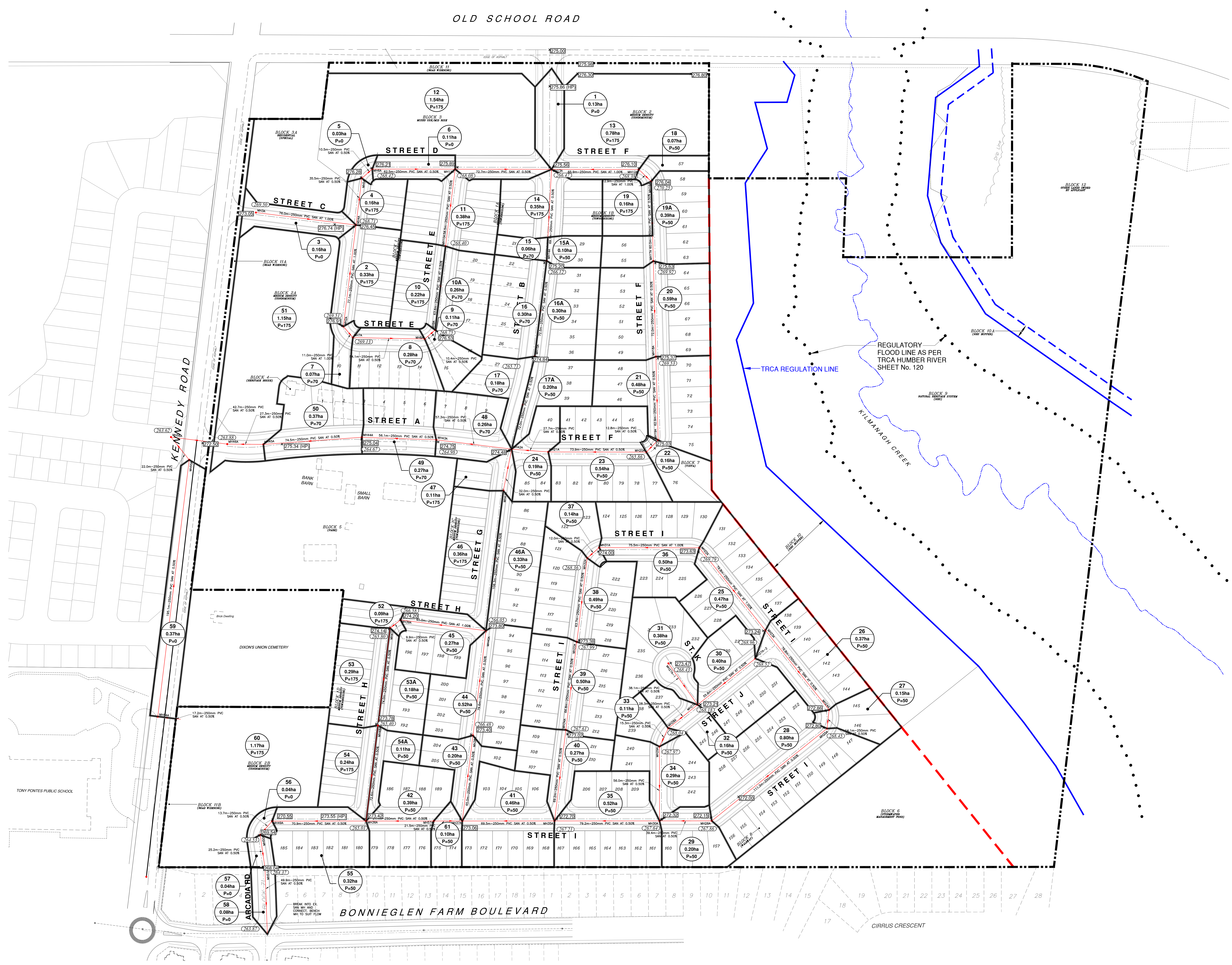
TREND KENNEDY DEVELOPMENT
RESIDENTIAL SUBDIVISION
12909 KENNEDY ROAD
PART OF LOT 22, CONCESSION 2

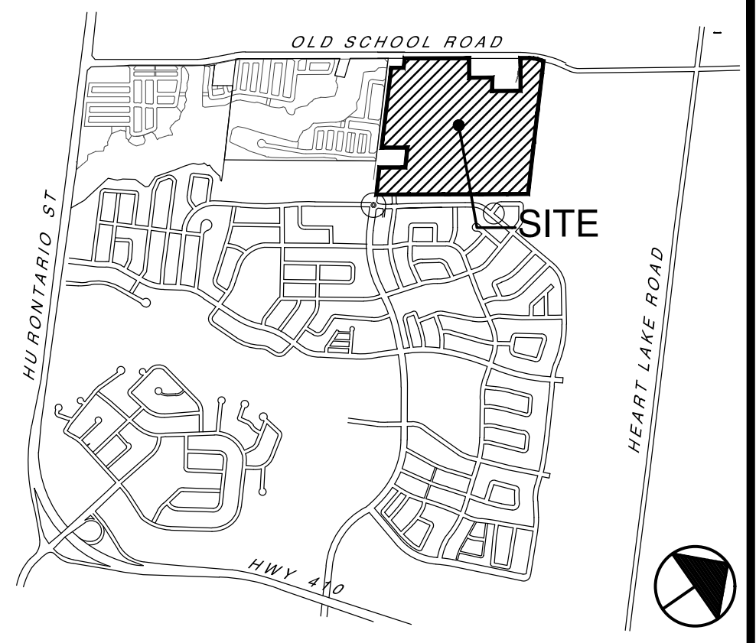
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

SHEET TITLE:

PRE DEVELOPMENT STORM DRAINAGE AREA PLAN

DRAWN BY: E.M.
PROJECT No. W22068
CHECKED BY: S.L
DRAWING No. PRE-STMDR
SCALE: 1:1000
DATE: APRIL., 5th 2024





KEY PLAN
N.T.S.

LEGEND:

▬ ▪ ▪ ▬	LIMIT OF SUBDIVISION
— — — —	EXISTING PROPERTY LINE
—▷—●—	PROPOSED SAN SEWER
— ➤ —	EXISTING SAN SEWER
x206.14	EXIST. GRADE
214.97	PROPOSED ROAD GRADE
(269.93)	PROPOSED SAN SEWER OBVERT
▬	DRAINAGE AREA BOUNDARY
1	DENOTES AREA NUMBER
0.13ha	DENOTES AREA IN HECTARES
P=0	DENOTES POPULATION PER HECTARE

REFERENCE DRAWINGS:

1. REFER TO DRAFT PLAN (PL–1) PREPARED BY CANDEVCON GROUP INC. FOR SUBDIVISION LAYOUT
2. REFER TO DRAWINGS PS–1 FOR INFORMATION ON STORM & SANITARY
3. REFER TO DWG EXT–SA1 FOR EXTERNAL SANITARY DRAINAGE AREA PLAN

NO.	DESCRIPTION	DATE	BY
1			

REVISIONS

CANDEVCON GROUP INC.
CONSULTING ENGINEERS AND PLANNERS
9358 GOREWAY DRIVE
BRAMPTON ON. L6P-0M7
TEL (905) 794-0600
FAX (905) 794-0611

TOWN OF CALEDON

REGISTERED PROFESSIONAL ENGINEER
S. D. LANG
SEPT 23, 2024
PROVINCE OF ONTARIO

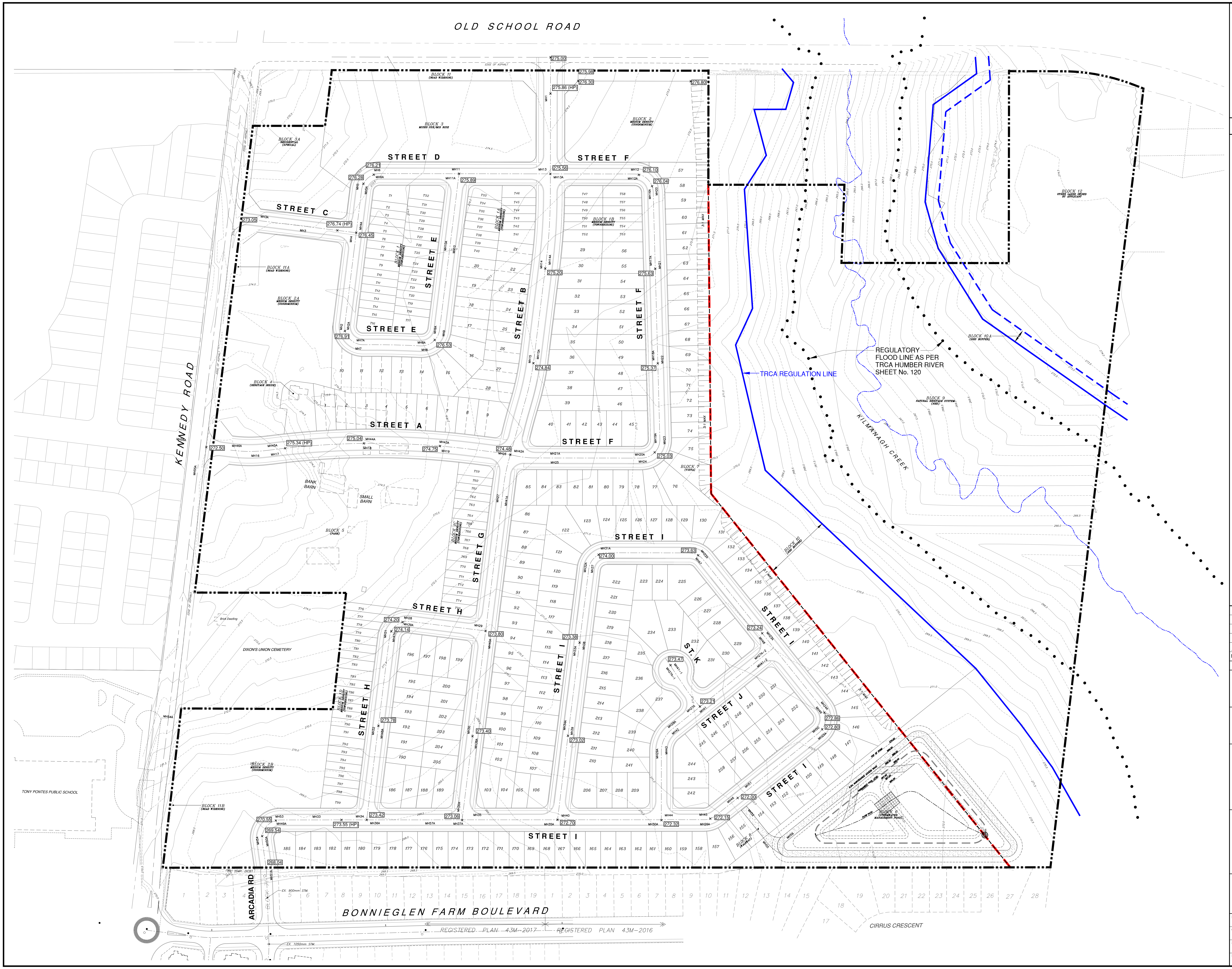
TREND KENNEDY DEVELOPMENT
RESIDENTIAL SUBDIVISION
12909 KENNEDY ROAD
PART OF LOT 22, CONCESSION 2

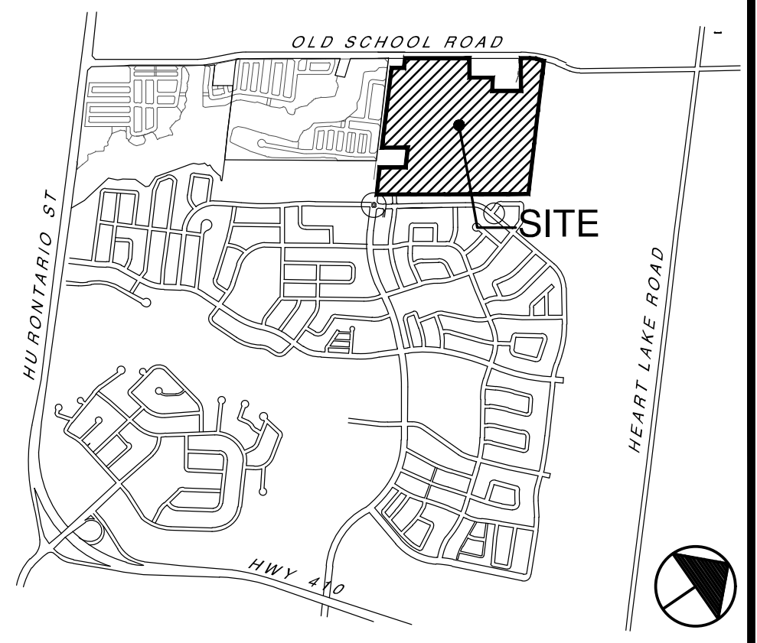
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

SHEET TITLE:

SANITARY DRAINAGE AREA PLAN

DRAWN BY: E.M.
PROJECT No. W22068
CHECKED BY: S.L
DRAWING No. SA-1
SCALE: 1:1000
DATE: APRIL., 5th 2024





KEY PLAN
N.T.S.

LEGEND:

▬ ▪ ▪ ▬ ▪ ▪ ▬	LIMIT OF SUBDIVISION
— — — — —	EXISTING PROPERTY LINE
○	PROPOSED STORM MANHOLE
●	PROPOSED SAN MANHOLE
x 206.14	EXIST. GRADE
214.97	PROPOSED ROAD GRADE

REFERENCE DRAWINGS:

1. REFER TO DRAFT PLAN (PL–1) PREPARED BY CANDEVCON GROUP INC. FOR SUBDIVISION LAYOUT
2. REFER TO DRAWINGS PS–1 FOR INFORMATION ON STORM & SANITARY
3. REFER TO DRAWINGS CS–1 FOR CROSS SECTION DETAIL

NO.	DESCRIPTION	DATE	BY
1			

REVISIONS

CANDEVCON GROUP INC.
CONSULTING ENGINEERS AND PLANNERS
9358 GOREWAY DRIVE
BRAMPTON ON. L6P-0M7
TEL (905) 794-0600
FAX (905) 794-0611

TOWN OF CALEDON

S D. LANG
SEPT 23, 2024

TREND KENNEDY DEVELOPMENT RESIDENTIAL SUBDIVISION

12909 KENNEDY ROAD
PART OF LOT 22, CONCESSION 2

TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

SHEET TITLE:

PRELIMINARY GRADING PLAN

DRAWN BY: E.M.	PROJECT No. W22068
CHECKED BY: S.L	DRAWING No. PG-1
SCALE: 1:1000	
DATE: APRIL., 5th 2024	