FUNCTIONAL SERVICING REPORT

HILLSBURGH HEIGHTS INC

PROPOSED RESIDENTIAL SUBDIVISION

5916 Trafalgar Road
Hillsburgh Urban Area

Town of Erin

County of Wellington

February 15, 2023 (3rd submission)

CANDEVCON LIMITED
CONSULTING ENGINEERS & PLANNERS

TEL (905) 794-0600 FAX (905) 794-0611

PROJECT NO. W21081

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1. INTRODUCTION

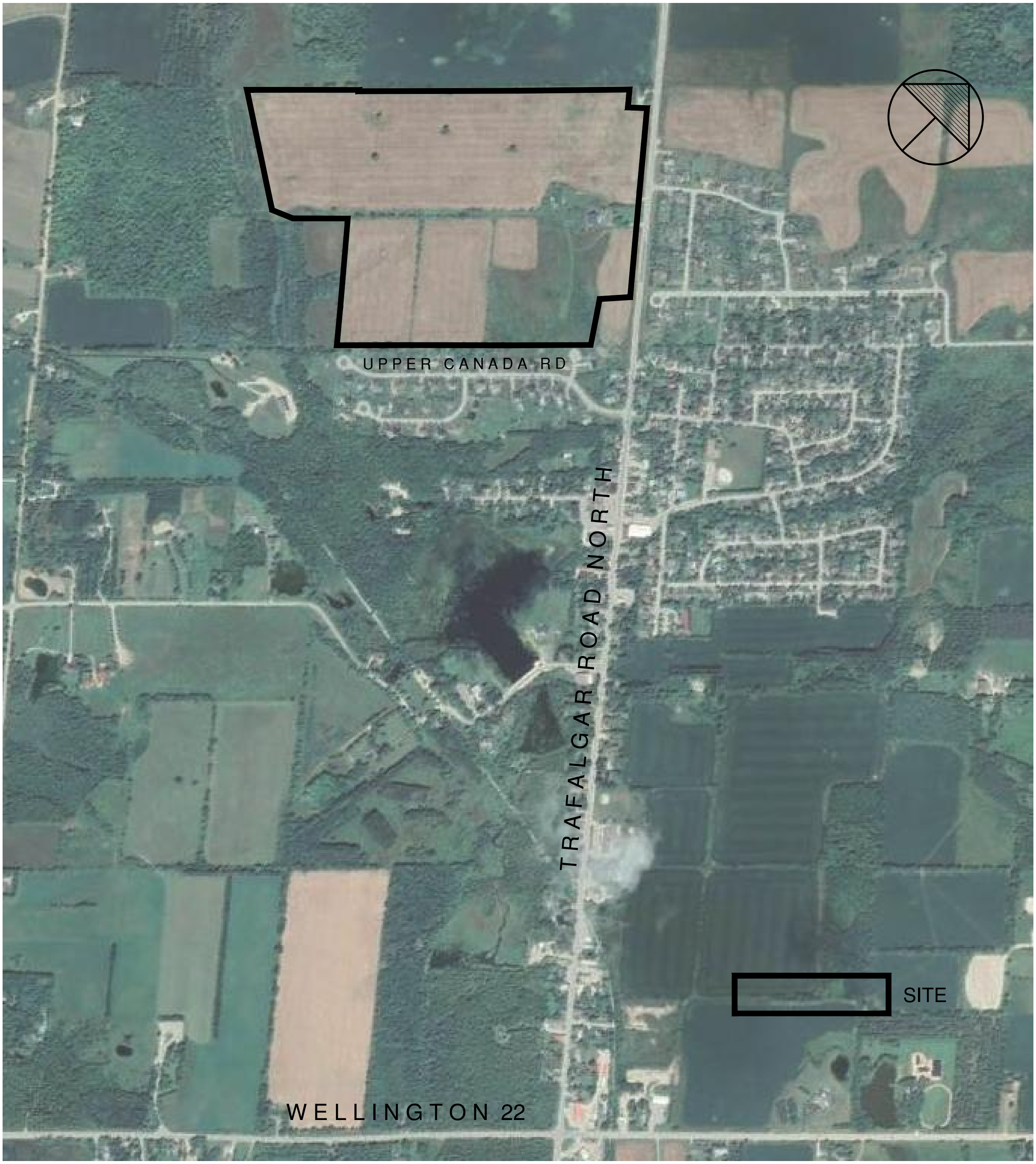
This Study has been prepared as a technical document in support of the Draft Plan application for Hillsburg Heights Inc and addresses sanitary, storm and water servicing and stormwater management.

The proposed subdivision is located at 5916 Trafalgar Road North in the former Village of Hillsburg, Town of Erin, as shown on Figure 1.

The subdivision, as illustrated on the Draft Plan (copy attached) comprises an area of 40.4 ha and includes:

- One Hundred Ninety Five (195) Single Detached Residential Units;
- One Hundred Seventy Four (174) Residential Townhouse Units;
- One (1) School Block;
- Two (2) SWM Pond Blocks;
- One (1) Park Block;
- One (1) Future Residential Block
- One (1) Future Commercial Block
- One (1) Vista Block
- One (1) Walkway Block
- One (1) Heritage House Block

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



HILLSBURGH HEIGHTS INC.
RESIDENTIAL SUBDIVISION
5616 TRAFALGAR ROAD NORTH
PART 1 OF PLAN 61R-9590
PART OF LOT 26, CONCESSION 7
HILLSBURGH URBAN AREA
TOWN OF ERIN

LOCATION PLAN

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
TEL. (905) 794-0600 FAX (905) 794-0611

DATE	OCT. 1st, 2021	JOB No	W21081
DRAWN	E.A.M	SKETCH No.	1.0
SCALE	N.T.S		

2. BACKGROUND TECHNICAL STUDIES

The subject subdivision is located in the former Village of Hillsburgh in the Town of Erin. In the past seven years the Town has conducted a number of studies to review sanitary and water servicing within the Town, and the recommendations of the studies are outlined below.

2.1 Town of Erin Servicing and Settlement Master Plan[1]

The Town of Erin commissioned a Servicing and Settlement Master Plan (SSMP) that was completed by B. M. Ross in 2014. The study reviewed both water and sanitary servicing requirements to meet future population forecasts to the year 2035. The key recommendations of the Master Plan were:

- The Town of Erin move forward with the remaining phases of the Class EA process to develop an undertaking to provide a sanitary sewage collection system for the settlement areas of Hillsburgh and Erin based on the servicing scenarios reviewed in the report.
- That the Town of Erin initiates the process of seeking out senior government funding assistance for this undertaking. The SSMP can be used as a supporting document to build a case that this undertaking would provide considerable economic, health, and environmental benefits to the Town. It is necessary to be ready to take advantage of any new funding programs that are introduced by the government.
- That the Town undertakes water servicing upgrades as defined in this report, so that appropriate facilities are in place when required to service future growth.
- That the Town review and amend its Official Plan as needed to implement the SSMP and allocate growth within its urban boundaries. Similarly, the County of Wellington should revise its Official Plan to reflect the Town's capacity to provide wastewater service, and adjust population forecasts accordingly.

- That the Town should apply stormwater management policies, as discussed in this report, to manage new growth areas and to address deficiencies with

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[1] Town of Erin Servicing and Settlement Master Plan Final Report, B. M. Ross, August 12, 2014,

existing stormwater management.

2.2 Town of Erin, Urban Centre Wastewater Servicing Class Environmental Assessment[2]

The town of Erin commissioned a Class Environmental Assessment to review sanitary sewer servicing options by Ainley and Associates which was approved by the MECP in August, 2019. The recommendations of the report were:

- construct a sanitary collection system within the Villages of Hillsburg and Erin
- construct a sanitary treatment plant with tertiary treatment to treat effluent from both Hillsburg and Erin.

The town has initiated the design of the sewage treatment plant and collection system with the goal of having the infrastructure in place by 2023.

2.3 Town of Erin Urban Centre Water Servicing Schedule B Class Environmental Assessment[3]

The Town of Erin commissioned a Class Environmental Assessment by Triton Engineering to review water supply options completed in 2020. The study was approved by the MECP on August 31, 2020. The Class EA study reviewed both current and future water needs and recommended the following:

- install two additional supply wells
- construct watermains to interconnect both Erin and Hillsburgh

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[2] Town of Erin, Urban Centre Wastewater Servicing Class Environmental Assessment, Ainley, October 2019

[3] Town of Erin Urban Centre Water Servicing Schedule B Class Environmental Assessment, triton Engineering Services Limited, February 28, 2020

2.4 5916 Trafalgar Road North, Environmental Impact Assessment[4]

A part of the planning process an Environmental Impact Assessment Study was conducted for the site. The Study did not identify any environmentally sensitive land uses on the site.

The recommendations can be summarized as follows

- all works shall be contained within the property boundaries
- Sediment and erosion controls be in place prior to any earth works

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[4] 5916 Trafalgar Road North Environmental Impact Study, Birks Natural heritage Consultants, File 02-016-2021, November 1, 2021

3. EXISTING CONDITIONS

3.1 General

As part of the Planning process for the subject subdivision the following Studies were completed:

- Preliminary Geotechnical Investigation[5]
- Preliminary Hydrogeological Investigation[6]

3.2 Topography, Drainage and Natural Features

The terrain of the subject subdivision is rolling. The west half of the site drains to an existing low area to the west. The east half drains south to an existing storm sewer system and SWM pond located on McMurchy Lane. The west side drains to an existing wet land to the west.

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[5] Report to Cedar City Developments, Preliminary Geotechnical Investigation for Proposed Residential Development, 5916 Trafalgar Road North, Town of Erin (Hillsburgh), October 2020, Soil Engineers Limited, Reference Number 2009-S020

[6] Hydrogeological Investigation, Proposed Briarwood Hillsburgh Development, 5916 Trafalgar Road North, town of Erin, Ontario, November 17 2021, 2021, HLV2K Engineering Limited, Project Number 2100428AH

3.3 Physiography and Geotechnical Conditions

The preliminary Geotechnical Investigation (copy of report including in Appendix "C") indicated that the surficial soils beneath the of 250-300mm thick topsoil layer consists of Sandy Silt/Silty Sand till ranging in depths of 2 to 6m over a sand layer to the extent of the borehole depths.

The Hydrogeological Investigation (copy of report included in Appendix "D") indicated groundwater levels are in excess of 7.8m below grade.

4. SANITARY AND WATER SERVICING

4.1 Sanitary

4.1.1 Existing Sanitary Sewers

The village of Hillsburgh is presently served with septic systems to treat sewage. There is no municipal sewage collection system

4.1.2 Proposed Sanitary Sewer System

As noted in section 2.2, the Town is proposing to install a sanitary collection system in the Village of Hillsburgh. The sanitary sewers will be designed in accordance with the Town of Erin 2022 Engineering Design Manual.

The town intends to extend a sanitary sewer on Trafalgar Road to the intersection of Upper Canada Drive. It is proposed to outlet the proposed sanitary sewers servicing the subdivision via a sanitary sewer to be constructed within McMurchy Lane and Upper Canada Drive to connect to the proposed sanitary sewer at the intersection of Trafalgar Road and Upper Canada Drive. The sewers within Upper Canada Drive shall be sized to accommodate the lands upstream on Upper Canada Drive .

The preliminary design of the sanitary sewer is shown on Drawing SA-1 and the Sanitary Sewer Design Sheets are included in Appendix “A”.

4.2 Water

4.2.1 Existing and Planned Watermains

The existing watermain system in the vicinity of the subject subdivision is shown on Drawing PS-1 and comprises a 150mm watermain on Upper Canada Drive and a 150mm watermain located at the intersection of Upper Canada Drive and Trafalgar Road North

4.2.2 Proposed Watermain System

The proposed watermain system is shown on Drawing PS-1 and Drawing WM-1 and comprises of a 150and 200mm watermain throughout the subdivision and the extension of the existing 150mm watermain at Upper Canada Drive and Trafalgar North on Trafalgar Road north to Street A.

Connection points to the Town system will be at the intersection of Streets E and A with Trafalgar Road North and at the western limit of Upper Canada Drive.

5. STORM DRAINAGE AND STORMWATER MANAGEMENT

5.1 General

As shown on drawing PS-1 storm water will drain to two SWM ponds located within the proposed subdivision.

5.2 Storm Drainage System

5.2.1 Design Criteria

The proposed storm system design will comply with the Town of Erin Standards which is described as follows:

Minor system; 1/5 year local sewers
1/10 high-value commercial development, downtown and Trunk collectors

Based on the above storm sewers within the subdivision will be designed to the 1/5 year storm

5.2.2 Proposed Storm Sewer System

The proposed storm sewer system is shown on Drawing PS-1 and STM-1. as outlined in Section 5.1 the storm sewers will outlet to SWM Ponds 1 and 2. The overland flow will be conveyed within the road rights of way (subject to a maximum ponding depth of 0.3m).

5.3 Stormwater Management

The subject site is located within the watershed of Credit River. The stormwater management criteria for this development have been set based on requirements and discussion with the Town of Erin and Credit Valley Conservation. The requirements include:

- Stormwater quantity controls are required for the site to control post-development flows from the site to the pre-development conditions from the 5-year to the 100-year storm.
- Stormwater quality control is to be provided for the developing area for an Enhanced Protection level.

As outlined in Section 5.2.2, storm drainage from the subject subdivision will drain to ponds 1 and 2. In accordance with the CVC SWM Criteria, MOE SWM Manual and the Town of Erin design standards, stormwater management within the subject lands must be practiced as follows;

Table I

Stormwater Management Requirements

Parameter	Requirement	Source
Quality Control	Provide Enhanced Level (Level 1) water quality treatment in the SWM Pond, using the guidelines in the MOE SWM Design Manual Provide at least 40m^3 of active storage in the SWM Pond for every hectare of the drainage area to the SWM Pond	CVC SWM Criteria (Section 5.2: Quality Control Criteria, p. 24-25) MOE SWM Manual (Section 3.3.2: Water Quality Sizing Criteria, p. 3-10)
Erosion Control	Design the SWM Pond so that the 25 mm storm event discharges over a period of approximately 48 hours.	CVC SWM Criteria (Section 4.2: Erosion Control Criteria, p. 21-22) MOE SWM Manual (Section 3.3.2: Water Quality Sizing Criteria, p. 3-10)
Quantity Control	2 to 100-year Storm Control Post-to Pre-Release Rates	CVC SWM Criteria Town of Erin

5.3.2 Minor System Design

As per the Town's engineering design criteria, the proposed development will be serviced with a minor storm sewer system designed to convey a 5-year storm event. The rainfall intensity values (I) are calculated per the Town of Erin IDF Equation Constants provided in the Town of Erin design standards (Table 13). Based on this data, the rainfall intensity for the 5 and 100-year rainfall events is provided as follows:

Table II

Town of Erin IDF Equations Constants

Return period	**2-Yr**	**5- Yr**	**10- Yr**	**25- Yr**	**50- Yr**	**100- Yr**
A	566	744	869	1011	1126	1248
B	1.77	1.76	1.79	1.75	1.76	1.83
C	0.730	0.729	0.730	0.728	0.729	0.732

The peak flows are calculated using the following formula:

$Q = 2.778\ ACI / 1000$

WHERE:

Q = 5-Year Peak Flows (m^3/s)

A= Area in hectares (ha)

C= Runoff Coefficient

I= Rainfall Intensity (mm/hr)

The IDF curve data and storm sewer design sheet is included in Appendix "E." A schematic design of a minor system is illustrated on Drawing PS,-1 and catchment areas are depicted on Drawing Storm Drainage Area Plan (SD-1).

5.3.3 Grading

Preliminary grading (roads) is also illustrated on Drawing PS-1, as well as overland flow routes. The proposed grading is based on providing cover to the sewer system according to Town of Erin Standards and providing an overland flow route to the SWM ponds. The lands to the north will be diverted to the east and west around the subject lands

5.3.4 Existing Drainage

Based on the topographic survey, the existing site land use is primarily agriculture with some grassed areas. The Pre-development area plan (EX-DR-1) provides an overview of the subject site's existing drainage conditions, catchment boundaries of the subject site and contributing external areas.

The existing storm sewers located on McMurchy Lane south were designed to capture external flows from the subject site during the construction of the Strittmatter Subdivision[9]. The excerpts from the stormwater management report[10] for the Strittmatter subdivision are provided in Appendix "F."

The existing drainage area parameters are summarized in Table III below and are based on the CVC standard parameters.

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[9] Stormwater Management Report and Design Drawings, Proposed Striimatter Subdivision, Village of Hillsbugh, Town of Erin, July 2000, Prepared by Burnside Development Services, R.J. Burnside & Associates Limited, RJB File : S-405.

TABLE III
Existing Drainage Parameters

Catchment ID	***Discharge Point***	***Catchment Area (Ha)***	***Land Type***
Area-1, 2, 3 & External Drainage from North	*Existing low points west of the proposed development*	*30.14*	*Farm/Grassed*
Area-4 & External from Drainage North	*Existing 450mm sewers on McMurchy Lane*	*22.96*	*Farm/Grassed*

Note: External Drainage from North is not included in Pre and Post Modelling. External drainage from the north will be conveyed to a low point via swales during the detailed design stage.

5.3.5 Requirements for Design of Stormwater Management Facilities

5.3.5.1 Stormwater Management Pond No. 1 (East)

The proposed stormwater management pond 1 is located on the southeast corner of the property. It will accommodate post-development drainage from an area of 19.44 Ha. The pond will outlet to an existing 450mm dia storm sewer located on McMurchy Lane. The flows from the pond will be controlled to the discharge targets established in Strittmatter SWM Report[1].

TABLE IV
Release Rate Targets for SWM Pond 1 (East)

Storm Event	**Allowable Release Rate (m^3/s)**
5-year	0.06
100-Year	0.16

Based on the drainage area and release rates identified in Table II, an iterative process was used to calculate the pond's effective stage-storage-discharge relationship, determining the control structure sizing. The ponds have been adequately sized for 5 and 100-year events. Table V below provides an overview of the stage-discharge-storage relationship of the stormwater management facility. Related outflow calculations are included in Appendix "E."

TABLE V
SWM POND 1 RATING CURVE

		Pond Stage-Storage-Discharge Relationship									
			Extended Detention for Erosion Control						**Flood Control**		
			25mm Erosion Control			**5-Year Control**			**100-Year Control**		
Pond No.	**Pond Area (ha)**	**P.P. Volume Provided (m^3)**	**Release Rate (L/s)**	**Pond W.L (m)**	**Storage Volume (m^3)**	**Release Rate (L/s)**	**Pond W.L (m)**	**Storage Volume (m^3)**	**Release Rate (L/s)**	**Pond W.L (m)**	**Storage Volume (m^3)**
1	19.44	12,362	40	454.45	3,970	60	455.34	13,086	160	456.00	21,269

VO model was used to determine storm flow calculations and required stormwater quantity control volumes based on required release rates. Table VI below provides an overview of the modelling results for the pond operation for 5 and 100-year storm events.

TABLE VI
STORMWATER MANAGEMENT POND 1 (East)
SUMMARY OF VO MODEL RESULTS

Pond 1		
Total Drainage Area to SWM Pond =		19.44 Ha
Permanent Pool Storage **Required** for Enhanced Protection Level (80% TSS Removal)		4,666 m^3
Permanent Pool Storage **Provided**		12,362 m^3
Description	**Design Storm***	
	5-Year	**100-Year**
Peak Flow (m^3/s)	5.083	8.976
Outflow (m^3/s)	0.060	0.154
Pond W.L. (m)	455.34	456.00
Max. Storage Used (m^3)	13,054	20,811
Storage at Pond W.L (m^3)	13,086	21,269

** Based on VO Results appended in Appendix "E."*

** 24-Hour SCS Type II Design storm is used for Hydrologic Modeling for Town of Erin IDF Curve parameters;*

IDF curve (5-Year):

A= 744

B = 1.76

C = 0.729 used in: INTENSITY = A / (t_d x B) ^C

IDF curve (100-Year):

A= 1248

B = 1.83

C = 0.732 used in: INTENSITY = A / (t_d x B) ^C

- **Stormwater Management Pond 2**

  The proposed stormwater management pond 2 is located at the western limit of the property and will outlet overland to an existing wetland located to the south. The SWM Pond will accommodate drainage from approximately 20.19 ha. The SWM pond design criteria are to control post-development peak flows to the pre-development levels. The outlet for pond 2 will outlet to proposed plunge pool before it outlets to the lands to the west. The purpose of the plunge pool is to help dissipate flows over a wider area to prevent erosion

  The pre-development flows were modelled using Visual Otthymo for the Town of Erin IDF data. The values obtained were used to generate SCS Type II Distribution Hyetograph for 2 to 100-year storm events.

TABLE VII
PRE-DEVELOPMENT FLOWS

Drainage Area =	**21.63 Ha**	**DESIGN STORM**				
Storm Event	**2-Year (L/s)**	**5-Year (L/s)**	**10-Year (L/s)**	**25-Year (L/s)**	**50-Year (L/s)**	**100-Year (L/s)**
Target Flows*	925	1595	2089	2793	3309	3783

**Refer to Pre-Development Release Rate in Appendix E*

*** External Drainage from North is not included in Pre and Post VO Modelling. External drainage from the north will be conveyed to a low point via swales along the north boundary of the subdivision during the detailed design stage.*

Based on the drainage area and release rate targets identified in Table V, an iterative process was used to calculate the pond's effective stage-storage-discharge relationship, determining the control structure sizing. The ponds have been adequately sized for all storms up to and including 100-year events. Table VI below provides an overview of the stage-discharge-storage relationship of the stormwater management facility. Related outflow calculations are included in Appendix "E."

TABLE VIII
SWM POND 2 (West) RATING CURVE

Total Drainage Area to SWM Pond			20.19 Ha
Permanent Pool Storage **Required** for Enhanced Protection Level (80% TSS Removal)			4,642 m^3
Permanent Pool Storage **Provided**			7,704 m^3
25mm Erosion Control Volume Required (RV Depth = 18.32mm)			3,698 m^3
Storm Event	**Release Rate from Control Structure (m^3/s)**	**Pond Elevation (m)**	**Storage (m^3)**
25mm	0.040	458.90	3,899
2-Year	0.356	459.22	6,274
5-Year	0.779	459.43	7,914
10-Year	1.273	459.56	8,963
25-Year	1.605	459.75	10,540
50-Year	1.782	459.87	11,564
100-Year	1.956	456.00	12,783

VO model was used to determine storm flow calculations and required stormwater quantity control volumes based on required release rates. Table VII below provides an overview of the modelling results for the pond operation for 2 to 100-year storm events (SCS Type II, 24Hour, 10mins).

TABLE IX
STORMWATER MANAGEMENT POND 2 (West)
SUMMARY OF VO MODEL RESULTS

Description	Design Storm*					
2-Year	**2-Year**	**5-Year**	**10-Year**	**25-Year**	**50-Year**	**100-Year**
Target Flow (m^3/s)	*0.925*	*1.595*	*2.089*	*2.793*	*3.309*	*3.783*
VO Peak Flow (m^3/s)	3.491	4.835	6.020	7.249	8.103	8.859
Outflow (m^3/s)	0.342	0.746	1.188	1.549	1.744	1.896
Pond W.L. (m)	459.22	459.43	459.56	459.75	459.87	456.00
Max. Storage Used (m^3)	6,030	7,798	8,840	10,349	11,408	12,426
Storage at Pond W.L (m^3)	6,274	7,914	8,963	10,540	11,564	12,783

** Based on VO Results appended in Appendix "E."*

Related control structure and outflow calculations are included in Appendix "E." For Pond 1 and 2, an orifice plate will be used to provide Erosion Control, and rectangular broad crested weir/orifice controls are proposed to achieve 2-year up to 100-year flow targets.

The following summarizes the outlet controls:

- **SWM Pond No. 1 (East)**
  - 25mm Erosion Control: 156mm diameter orifice plate.
  - 2 to 100 Year Release: a combination of 156mm diameter orifice plate and 0.25m wide x 0.13m high weir.

- **SWM Pond No. 2 (West)**
  - 25mm Erosion Control: 160mm diameter orifice plate.
  - 2 to 100 Year Release: a combination of 160mm diameter orifice plate and 1.30m wide x 0.60m high weir.
  - A 30m wide emergency spillway is sized to safely convey the uncontrolled 100-year peak flow (8.859m3/s). The crest elevation of the emergency spillway is set at an elevation of 460.00m.

Preliminary design details of the proposed Stormwater Management Pond No. 1 and 2 are illustrated on Drawing SD-1 (Storm Drainage Area Plan), considering the proposed sewer inverts and preliminary grading. It is noted that the configurations of the ponds and related structures will be finalized as part of the final Engineering Design of the facilities.

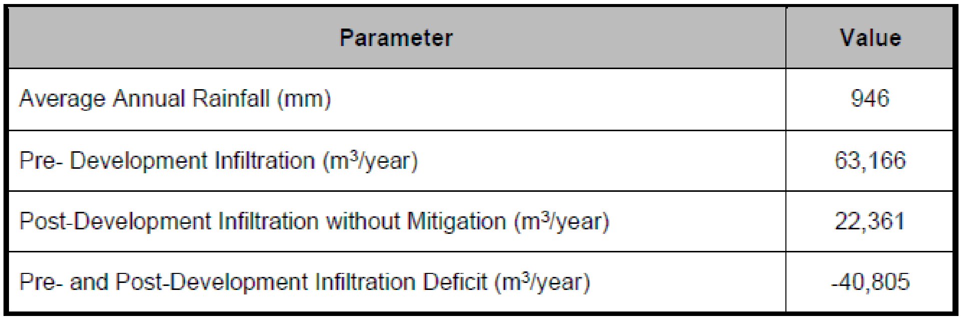
5.4 Water Balance

Since the post-development condition will increase the imperviousness of the site the pre and post infiltration volumes were calculated to assess the infiltration deficit and the proposed mitigation measures were evaluated to demonstrate that the pre-development infiltration can be mated in the post-development condition.

The site climatic conditions were calculated using the Thornthwaite and Mather (1957) method utilizing meteorological data obtained from Environmental Canada's historical weather data for Fergus Shand Dam weather station. Monthly precipitation averages were obtained over the period of 1981 to 2010.

Based on the noted climate and soil conditions of the Subject Site it is expected that the increase in impervious areas will result in a groundwater infiltration deficit following development. The Water Balance calculations are provided in Water Balance Report prepared[11]. As stated in the water balance report, the proposed development without mitigation would result in an infiltration deficit of 40,805m^3/year.

Table 2: Post -Construction Water Balance Summary



Parameter	Value
Average Annual Rainfall (mm)	946
Pre- Development Infiltration (m^3/year)	63,166
Post-Development Infiltration without Mitigation (m^3/year)	22,361
Pre- and Post-Development Infiltration Deficit (m^3/year)	-40,805

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[11] Water Balance Assessment, Proposed Briarwood Hillsburgh Development, 5916 Trafalgar Road North, Town of Erin, Ontario, prepared by HLV2K Engineering Limited dated January 30th 2023.

To balance this infiltration deficit, infiltration/soakaway trenches are proposed at the rear of the lots as shown on Drawing IT-1 whereby the runoff from the roofs and rear yards will drain to the infiltration/soakaway trenches. A total length of 1000m (1.5m x 1.5m) is required to balance the infiltration deficit whereas a length of 1400m is provided. Refer to Appendix E for Infiltration Trench Sizing Calculations.

6 WELL HEAD PROTECTION

There is an existing well located on the east side of Trafalgar Road near the intersection of Trafalgar Road and Street A. The CTC Source Protection District has prepared an Approved Source Protection Plan and have identified a well head protection area for the well as shown on map 1.6 (copy attached as figure 3) from the above noted Plan.

The closest proposed Storm Water Management facility and sanitary sewers are show on the attached plan. Based on the plan the closest Storm Water Management facility is not located within the zone of influence for the well and no further protective measures are required. It is also noted that the proposed sanitary sewers are also outside the zone of influence.

Therefore no special construction methods will be required o construct the ponds or the sanitary sewers.

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[6]*.*

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.

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

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:

- 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.

APPENDIX “A”

Sanitary Sewer Design Sheets

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
9358 GOREWAY DRIVE *TEL (905) 794-0600*
BRAMPTON ON. L6P-0M7 *FAX (905) 794-0611*

Subdivision:	**Hillsburgh Heights**	**Town of Hillsburgh**	**Project No.: W21081**
File No.:		**SANITARY DRAINAGE**	**Date: 2023-02-15**
Consultant:	**Candevcon Limited**		**Prepared By: SDL**
Drainage Area Plan:	**SA-1**		**Checked By: JSL**

Town of Erin DESIGN CRITERIA

equivalent populations	population
Single Family (per unit)	3
Townhouse (per unit)	2.8
school (per ha)	60
commercial (per ha)	100

Average Day Flow: 290 Lpcd
Peaking Factor: 1+14/(4+(P)^0.5) P = Pop. in 1000's
Infiltration: 0.29 l/s/ha

Manning's Co-eff.: 0.013

max flow (m/s) 3
min flow (m/s). 0.6

LOCATION																POPULATION				FLOWS		
STREET	AREA ID	MAINTANANCE HOLES		RESIDENTIAL			commercial (ha)	school (ha)	TOTAL POP	ACCUM. POP.	PEAK FACTOR	AREA (ha)	ACCUM. AREA (ha)	PK. DAY FLOW (L/s)	INFILT. (L/s)	***TOTAL FLOW* (L/s)**	SIZE (mm)	SLOPE (%)	**CAPACITY** (L/s)	VELOCITY		DESIGN FLOW / FULL FLOW %
		upstream	downstream	area	single family units	Townhouse units														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
	1	MH1A	MH2A	0.39	5				15	15	3.40	0.39	0.39	0.171	0.113	**0.284**	200	2.50%	**51.9**	**1.65**	0.09	1
	2	MH2A	MH3A	0.22	2				6	21	3.38	0.22	0.61	0.238	0.177	**0.415**	200	4.50%	**69.7**	**2.22**	0.12	1
	3	MH3A	MH6A	0.94	14				42	63	3.29	0.94	1.55	0.696	0.450	**1.146**	200	4.50%	**69.7**	**2.22**	0.25	2
	4	MH5A	MH6A	0.46		10			28	28	3.36	0.46	0.46	0.316	0.133	**0.449**	200	2.00%	**46.5**	**1.48**	0.08	1
	5	MH6A	MH8A	0.46	6				18	109	3.23	0.46	2.47	1.183	0.716	**1.899**	200	4.50%	**69.7**	**2.22**	0.37	3
	6	MH7A	MH8A	0.78		20			56	56	3.30	0.78	0.78	0.621	0.226	**0.847**	200	4.50%	**69.7**	**2.22**	0.25	2
	7	MH8A	MH9A	0.36	4				12	177	3.17	0.36	3.61	1.881	1.047	**2.928**	200	1.30%	**37.5**	**1.19**	0.43	8
	8	MH9A	MH10A	0.09	1				3	180	3.16	0.09	3.70	1.912	1.073	**2.985**	200	0.50%	**23.2**	**0.74**	0.35	13
	9	MH10A	MH19A	0.67		15			42	222	3.13	0.67	4.37	2.333	1.267	**3.600**	200	0.50%	**23.2**	**0.74**	0.39	16
	10	MH1A	MH4A	0.25	2				6	6	3.43	0.25	0.25	0.069	0.073	**0.142**	200	2.00%	**46.5**	**1.48**	0.08	1
	11	MH4A	MH5A	0.92	13				39	45	3.32	0.92	1.17	0.502	0.339	**0.841**	200	2.20%	**48.7**	**1.55**	0.17	2
	EXT1	EXT1	MH11A	2.05					82	82			0.00									
	12	MH5A	MH11A	0.57	2	10			34	79	3.27	0.57	1.74	0.867	0.505	**1.372**	200	0.50%	**23.2**	**0.74**	0.23	6
	13	MH11A	MH12A	0.08					0	161	3.18	0.08	6.19	1.719	1.795	**3.514**	200	3.20%	**58.8**	**1.87**	0.57	6
	14	MH12A	MH15A						0	161	3.18	0.00	6.19	1.719	1.795	**3.514**	200	3.20%	**58.8**	**1.87**	0.57	6
	15	MH13A	MH14A	0.35		7			20	20	3.38	0.35	0.35	0.222	0.102	**0.324**	200	3.00%	**56.9**	**1.81**	0.10	1
	16	MH14A	MH15A	0.32		6			17	36	3.34	0.32	0.67	0.408	0.194	**0.602**	200	3.00%	**56.9**	**1.81**	0.20	2
	17	MH7A	MH15A	0.79		20			56	56	3.30	0.79	0.79	0.621	0.229	**0.850**	200	4.50%	**69.7**	**2.22**	0.25	2
	18	MH15A	MH18A	0.15					0	253	3.11	0.15	7.80	2.644	2.262	**4.906**	200	3.00%	**56.9**	**1.81**	0.70	9
	19	MH16A	MH17A	0.45		9			25	25	3.37	0.45	0.45	0.285	0.131	**0.415**	200	1.00%	**32.8**	**1.05**	0.12	2
	20	MH17A	MH18A	0.17		3			8	34	3.35	0.17	0.62	0.377	0.180	**0.557**	200	3.20%	**58.8**	**1.87**	0.10	1
	21	MH18A	MH19A	0.24		5			14	301	3.08	0.24	8.66	3.110	2.511	**5.621**	200	3.20%	**58.8**	**1.87**	0.77	10
	22	MH19A	MH20A	0.29		6			17	540	2.96	0.29	8.95	5.357	2.596	**7.953**	200	0.50%	**23.2**	**0.74**	0.64	35
	23	MH20A	MH21A	0.29		6			17	557	2.95	0.29	9.24	5.511	2.680	**8.191**	200	0.50%	**23.2**	**0.74**	0.64	36
	24	MH29A	MH21A	0.41	5				15	15	3.40	0.41	0.41	0.171	0.119	**0.290**	200	6.60%	**84.4**	**2.69**	0.15	1
	25	MH21A	MH22A	0.37	5				15	587	2.94	0.37	10.02	5.784	2.906	**8.690**	200	1.80%	**44.1**	**1.40**	0.88	20
	26	MH22A	MH23A	0.33	4				12	599	2.93	0.33	10.35	5.892	3.002	**8.894**	200	0.50%	**23.2**	**0.74**	0.67	39
	27	MH23A	MH24A	0.12	1				3	602	2.93	0.12	10.47	5.920	3.036	**8.956**	200	0.50%	**23.2**	**0.74**	0.67	39
	28	MH24A	MH25A	0.35	3				9	611	2.93	0.35	10.82	6.001	3.138	**9.139**	200	0.50%	**23.2**	**0.74**	0.67	40
	29	MH25A	MH26A	0.38	2				6	617	2.93	0.38	11.20	6.055	3.248	**9.303**	200	0.50%	**23.2**	**0.74**	0.68	41
	30	MH26A	MH27	0.97	11				33	650	2.91	0.97	12.17	6.352	3.529	**9.881**	200	0.50%	**23.2**	**0.74**	0.70	43
	32	MH27	MH30	0.90	10				30	680	2.90	0.90	13.07	6.619	3.790	**10.410**	200	0.50%	**23.2**	**0.74**	0.71	45
	34	MH17A	MH28A	0.50	4	6			29	29	3.36	0.50	0.50	0.325	0.145	**0.470**	200	1.80%	**44.1**	**1.40**	0.16	2
	33	MH28A	MH29A	0.49	4	6			29	58	3.30	0.49	0.99	0.638	0.287	**0.925**	200	1.80%	**44.1**	**1.40**	0.24	3
	34	MH29A	MH30A	0.43	5				15	73	3.28	0.43	1.42	0.799	0.412	**1.211**	200	1.80%	**44.1**	**1.40**	0.24	3

LOCATION															**POPULATION**					**FLOWS**		
STREET	AREA ID	MAINTANANCE HOLES		RESIDENTIAL			commercial (ha)	school (ha)	TOTAL POP	ACCUM. POP.	PEAK FACTOR	AREA (ha)	ACCUM. AREA (ha)	PK. DAY FLOW (L/s)	INFILT. (L/s)	***TOTAL FLOW* (L/s)**	SIZE (mm)	SLOPE (%)	**CAPACITY** (L/s)	**VELOCITY**		DESIGN FLOW / FULL FLOW %
		upstream	downstream	area	single family units	Townhouse units														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
	35	MH30A	MH32A	0.47	4				12	764	2.87	0.47	14.96	7.367	4.338	**11.706**	200	0.50%	**23.2**	**0.74**	0.75	51
	36	MH16A	MH31A	0.87	13				39	39	3.34	0.87	0.87	0.437	0.252	**0.689**	200	2.90%	**55.9**	**1.78**	0.20	2
	37	MH31A	MH32A	0.91	13				39	78	3.27	0.91	1.78	0.857	0.516	**1.373**	200	2.90%	**55.9**	**1.78**	0.30	3
	39	**MH32A**	**MH56A**	**0.48**	**4**				**12**	**854**	**2.84**	**0.48**	**17.22**	**8.151**	**4.994**	**13.145**	**200**	**0.50%**	**23.2**	**0.74**	**0.79**	**57**

LOCATION															POPULATION					FLOWS		
STREET	AREA ID	MAINTANANCE HOLES		RESIDENTIAL			commercial (ha)	school (ha)	TOTAL POP	ACCUM. POP.	PEAK FACTOR	AREA (ha)	ACCUM. AREA (ha)	PK. DAY FLOW (L/s)	INFILT. (L/s)	***TOTAL FLOW (L/s)***	SIZE (mm)	SLOPE (%)	**CAPACITY** (L/s)	**VELOCITY**		DESIGN FLOW / FULL FLOW %
		upstream	downstream	area	single family units	Townhouse units														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
	40	MH36A	MH37A	0.18					0	0	3.50	0.18	0.18	0.000	0.052	**0.052**	200	1.80%	**44.1**	**1.40**	0.08	1
	41	MH37A	MH38A	0.11					0	0	3.50	0.11	0.29	0.000	0.084	**0.084**	200	1.80%	**44.1**	**1.40**	0.08	1
	42	MH38A	MH41A	0.09					0	0	3.50	0.09	0.38	0.000	0.110	**0.110**	200	1.80%	**44.1**	**1.40**	0.08	1
	43	MH39	MH40	0.49	4				12	12	3.41	0.49	0.49	0.137	0.142	**0.279**	200	1.00%	**32.8**	**1.05**	0.06	1
	EXT2	EXT2	MH40	4.20					168	168	3.17	4.20	4.20	1.790	1.218	**3.008**						
	44	MH40	MH41A	0.29	2				6	186	3.16	0.29	4.98	1.972	1.444	**3.417**	200	0.80%	**29.4**	**0.94**	0.42	12
	45	MH13A	MH34A	0.47	5				15	15	3.40	0.47	0.47	0.171	0.136	**0.307**	200	2.00%	**46.5**	**1.48**	0.08	1
	46	MH34A	MH35A	2.63	3			2.33	149	164	3.18	4.96	5.43	1.747	1.575	**3.322**	200	2.00%	**46.5**	**1.48**	0.53	8
	47	MH35A	MH41A	0.07					0	164	3.18	0.07	5.50	1.747	1.595	**3.342**	200	2.00%	**46.5**	**1.48**	0.53	8
3	48	MH41A	MH44A	0.66	8				24	374	3.04	0.66	11.52	3.809	3.341	**7.150**	200	3.00%	**56.9**	**1.81**	0.85	13
	49	MH43A	MH44A	0.49	1				3	3	3.45	0.49	0.49	0.035	0.142	**0.177**	200	3.10%	**57.8**	**1.84**	0.10	1
	50	MH42A	MH44A	0.07					0	0	3.50	0.07	0.07	0.000	0.020	**0.020**	200	1.40%	**38.9**	**1.24**	0.07	1
	51	MH44A	MH45A	0.44		11			31	408	3.02	0.44	12.52	4.129	3.631	**7.760**	200	2.50%	**51.9**	**1.65**	0.84	15
	52	MH45A	MH50A	0.49		12			34	441	3.00	0.49	13.01	4.445	3.773	**8.218**	200	2.50%	**51.9**	**1.65**	0.88	16
	53	MH43A	MH46A	0.12	1				3	3	3.45	0.12	0.12	0.035	0.035	**0.070**	200	3.70%	**63.2**	**2.01**	0.11	1
	54	MH46A	MH47A	0.59	4	7			32	35	3.34	0.59	0.71	0.388	0.206	**0.594**	200	4.20%	**67.3**	**2.14**	0.12	1
	55	MH47A	MH49A	0.47	3	5			23	58	3.30	0.47	1.18	0.638	0.342	**0.981**	200	4.20%	**67.3**	**2.14**	0.24	2
	56	MH48A	MH49A	0.28	3				9	9	3.42	0.28	0.28	0.103	0.081	**0.184**	200	4.20%	**67.3**	**2.14**	0.12	1
	57	MH49A	MH50A	0.27	2				6	73	3.28	0.27	1.73	0.799	0.502	**1.301**	200	5.00%	**73.4**	**2.34**	0.26	2
	58	MH50A	MH54A	0.17	0				0	514	2.97	0.17	14.91	5.119	4.324	**9.443**	200	1.10%	**34.5**	**1.10**	0.84	28
	59	MH42A	MH52A	0.29	4				12	12	3.41	0.29	0.29	0.137	0.084	**0.221**	200	1.40%	**38.9**	**1.24**	0.07	1
	60	MH16A	MH51A	0.14	1				3	3	3.45	0.14	0.14	0.035	0.041	**0.075**	200	1.00%	**32.8**	**1.05**	0.06	1
	61	MH51A	MH52A	0.29	4				12	15	3.40	0.29	0.43	0.171	0.125	**0.296**	200	3.00%	**56.9**	**1.81**	0.10	1
	62	MH52A	MH53A	0.31	1	4			15	42	3.33	0.31	1.03	0.469	0.299	**0.768**	200	7.80%	**91.7**	**2.92**	0.16	1
	63	MH53A	MH54A	0.55	5	6			33	75	3.28	0.55	1.58	0.825	0.458	**1.283**	200	7.80%	**91.7**	**2.92**	0.33	2
	64	MH54	MH56A	0.64	7				21	610	2.93	0.64	17.13	5.994	4.968	**10.961**	200	1.10%	**34.5**	**1.10**	0.90	32
	65	MH56A	MH58A	0.04					0	1464	2.69	0.04	34.39	13.204	9.973	**23.178**	200	2.00%	**46.5**	**1.48**	1.48	50
	66	MH58A	MH59A	0.08					0	1464	2.69	0.08	34.47	13.204	9.996	**23.201**	200	2.00%	**46.5**	**1.48**	1.48	50
	67	MH59A	MH60A	0.01					0	1464	2.69	0.01	34.48	13.204	9.999	**23.204**	200	2.00%	**46.5**	**1.48**	1.48	50
									1464			34.48										

LOCATION															POPULATION					FLOWS		
STREET	AREA ID	MAINTANANCE HOLES		RESIDENTIAL			commercial (ha)	school (ha)	TOTAL POP	ACCUM. POP.	PEAK FACTOR	AREA (ha)	ACCUM. AREA (ha)	PK. DAY FLOW (L/s)	INFILT. (L/s)	***TOTAL FLOW (L/s)***	SIZE (mm)	SLOPE (%)	**CAPACITY** (L/s)	**VELOCITY**		DESIGN FLOW / FULL FLOW %
		upstream	downstream	area	single family units	Townhouse units														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

174.00 2.33

176.33

APPENDIX “B”

Storm Sewer Design Sheets

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
9358 GOREWAY DRIVE
BRAMPTON ON. L6P-0M7
TEL (905) 794-0600
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Subdivision:	**HILLSBURGH HEIGHTS**	**TOWN OF HILLSBURGH**	**FILE NUMBER**	**W21081**
File No.:		**STORM DRAINAGE**	**DATE**	**February 15, 2023**
Consultant:	**Candevcon Limited**		**PREPARED BY**	**SDL**
Drainage Area Plan:	**STM 1**			

GORE ROAD TRIBUTARY

Park	0.25
Single/semi	0.50
Multiple/inst	0.75
Industrial	0.90
Roads	0.90

For 5-yr storm I_5 = 744/((tc*1.76)^.729)
For 10-yr storm I_{10} = 869/((tc*1.79)^.730)
For 100-yr storm I_{100} = 1248/((tc*1.83)^.732)

Core System	Area No.	Up-stream	Down-stream	Contributing Area (ha)			Breakdown of Areas				Area x Storm Coef.				C	Total	Cummulative	Time (min)		I_5	I_{10}	FLOW Q= 2.78AC I/1000	PIPE						
		Node	Node	In Area	Control	Total	0.25	0.50	0.75	0.90	0.25	0.50	0.75	0.90		A x C	AxC	In Area	Total			Q_{Design}	Length (m)	Size (mm)	Grade (%)	**Capacity (m^3/sec)**	Velocity (m/s)	Time (min)	% Full
POND 1	EXT2	EXT2	MH37	2.45	0.00	2.45	0.00		2.45		0	0.00	1.84	0.00	0.75	1.84	1.838	10.00	10.00	92.0		**0.470**							
	SP1-1	MH37	MH38	0.18	2.45	2.63				0.18	0	0.00	0.00	0.16	0.90	0.16	2.000	10.00	10.16	90.9		**0.505**	26.8	600	1.6	**0.776**	2.75	0.16	65
	SP1-2	MH38	MH39	0.11	2.63	2.74				0.11	0	0.00	0.00	0.10	0.90	0.10	2.099	10.16	10.50	88.7		**0.518**	55.7	600	1.6	**0.776**	2.75	0.34	67
	SP1-3	MH39	MH42	0.09	2.74	2.83				0.09	0	0.00	0.00	0.08	0.90	0.08	2.180	10.50	10.83	86.8		**0.526**	57.2	600	1.8	**0.823**	2.91	0.33	64
	SP1-4	MH40	MH41	0.49	0.00	0.49		0.49			0	0.25	0.00	0.00	0.50	0.25	0.245	10.00	10.51	88.7		**0.060**	56.6	300	1.8	**0.130**	1.84	0.51	47
	SP1-5	MH41	MH42	2.10	0.49	2.59		0.11	1.99		0	0.06	1.49	0.00	0.74	1.55	1.793	10.51	10.97	86.0		**0.428**	72.5	525	1.8	**0.577**	2.67	0.45	74
	SP1-6	MH13	MH35	0.47	0.00	0.47		0.47			0	0.24	0.00	0.00	0.50	0.24	0.235	10.00	10.73	87.4		**0.057**	84.5	300	2	**0.137**	1.93	0.73	42
	SP1-7	MH35	MH42	2.71	0.47	3.18		0.18	2.53		0	0.09	1.90	0.00	0.73	1.99	2.223	10.73	11.11	85.2		**0.526**	70.9	600	2	**0.868**	3.07	0.38	61
	SP1-8	MH42	MH45	0.64	8.60	9.24		0.64			0	0.32	0.00	0.00	0.50	0.32	6.515	11.11	11.37	83.7		**1.517**	67.6	750	3	**1.927**	4.36	0.26	79
	SP1-9	MH44	MH45	0.49	0.00	0.49		0.49			0	0.25	0.00	0.00	0.50	0.25	0.245	10.00	10.48	88.9		**0.061**	80	375	3.1	**0.309**	2.80	0.48	20
	SP1-10	MH43	MH45	0.07	0.00	0.07				0.07	0	0.00	0.00	0.06	0.90	0.06	0.063	10.00	10.43	89.2		**0.016**	41.4	300	1.4	**0.114**	1.62	0.43	14
	SP1-11	MH45	MH46	0.44	9.80	10.24			0.44		0	0.00	0.33	0.00	0.75	0.33	7.153	11.37	11.61	82.5		**1.640**	61.6	825	2.5	**2.269**	4.25	0.24	72
	SP1-12	MH46	MH51	0.49	10.24	10.73			0.49		0	0.00	0.37	0.00	0.75	0.37	7.520	11.61	11.85	81.2		**1.698**	61.6	825	2.5	**2.269**	4.25	0.24	75
	SP1-13	MH44	MH47	0.12	0.00	0.12		0.12			0	0.06	0.00	0.00	0.50	0.06	0.060	10.00	10.12	91.2		**0.015**	18.3	300	3.7	**0.186**	2.63	0.12	8
	SP1-14	MH47	MH48	0.59	0.12	0.71		0.3	0.29		0	0.15	0.22	0.00	0.62	0.37	0.428	10.12	10.46	89.0		**0.106**	57.1	300	4.2	**0.198**	2.80	0.34	53
	SP1-15	MH48	MH50	0.47	0.71	1.18		0.32	0.15		0	0.16	0.11	0.00	0.58	0.27	0.700	10.46	10.74	87.3		**0.170**	55.3	375	4.2	**0.359**	3.25	0.28	47
	SP1-16	MH49	MH50	0.26	0.00	0.26		0.26			0	0.13	0.00	0.00	0.50	0.13	0.130	10.00	10.20	90.6		**0.033**	34.8	300	4.3	**0.200**	2.84	0.20	16
	SP1-17	MH50	MH51	0.27	1.44	1.71		0.27			0	0.14	0.00	0.00	0.50	0.14	0.965	10.74	11.13	85.1		**0.228**	93	450	5	**0.637**	4.01	0.39	36
	SP1-18	MH51	MH56	0.16	12.44	12.60				0.16	0	0.00	0.00	0.14	0.90	0.14	8.629	11.13	11.54	82.8		**1.987**	82.3	1050	1.1	**2.863**	3.31	0.41	69
	SP1-19	MH43	MH54	0.28	0.00	0.28		0.28			0	0.14	0.00	0.00	0.50	0.14	0.140	10.00	10.21	90.6		**0.035**	47.3	300	7.8	**0.270**	3.82	0.21	13
	SP1-20	MH16	MH53	0.14	0.00	0.14		0.14			0	0.07	0.00	0.00	0.50	0.07	0.070	10.00	10.18	90.8		**0.018**	40.2	300	7.8	**0.270**	3.82	0.18	7
	SP1-21	MH53	MH54	0.29	0.14	0.43		0.29			0	0.15	0.00	0.00	0.50	0.15	0.215	10.18	10.50	88.7		**0.053**	52.3	300	3.8	**0.188**	2.67	0.33	28
	SP1-22	MH54	MH55	0.31	0.71	1.02		0.15	0.16		0	0.08	0.12	0.00	0.63	0.20	0.550	10.50	10.80	86.9		**0.133**	48	300	3.8	**0.188**	2.67	0.30	71
	SP1-23	MH55	MH56	0.55	1.02	1.57		0.36	0.19		0	0.18	0.14	0.00	0.59	0.32	0.873	10.80	11.18	84.8		**0.206**	70.8	375	3.8	**0.342**	3.09	0.38	60
	SP1-24	MH56	MH57	0.31	14.17	14.48		0.31			0	0.16	0.00	0.00	0.50	0.16	9.657	11.54	11.79	81.6		**2.189**	49.9	1050	1.1	**2.863**	3.31	0.25	76
	SP1-25	MH57	MH62	0.30	14.48	14.78		0.3			0	0.15	0.00	0.00	0.50	0.15	9.807	11.79	12.05	80.3		**2.188**	51.7	1050	1.1	**2.863**	3.31	0.26	76
	SP1-26	MH16	MH58	0.50	0.00	0.50		0.5			0	0.25	0.00	0.00	0.50	0.25	0.250	10.00	10.63	88.0		**0.061**	63	300	1.5	**0.118**	1.68	0.63	52

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Subdivision: **HILLSBURGH HEIGHTS**
File No.:
Consultant: **Candevcon Limited**
Drainage Area Plan: **STM 1**

TOWN OF HILLSBURGH
STORM DRAINAGE

FILE NUMBER **W21081**
DATE **February 15, 2023**
PREPARED BY **SDL**

GORE ROAD TRIBUTARY

Park	0.25
Single/semi	0.50
Multiple/inst	0.75
Industrial	0.90
Roads	0.90

For 5-yr storm I_5 = 744/((tc*1.76)^.729)
For 10-yr storm I_{10} = 869/((tc*1.79)^.730)
For 100-yr storm I_{100} = 1248/((tc*1.83)^.732)

Core System	Area No.	Up-stream	Down-stream	Contributing Area (ha)			Breakdown of Areas				Area x Storm Coef.				C	Total	Cummulative	Time (min)		I_5	I_{10}	**FLOW** Q= 2.78AC I/1000	PIPE						
		Node	Node	In Area	Control	Total	0.25	0.50	0.75	0.90	0.25	0.50	0.75	0.90		A x C	AxC	In Area	Total			**Q_{Design}**	Length (m)	Size (mm)	Grade (%)	**Capacity (m^3/sec)**	Velocity (m/s)	Time (min)	% Full
	SP1-27	MH58	MH59	0.81	0.50	1.31		0.81			0	0.41	0.00	0.00	0.50	0.41	0.655	10.63	11.40	83.6		**0.152**	90	375	1.5	**0.215**	1.94	0.77	71
	SP1-28	MH59	MH60	0.47	1.31	1.78		0.47			0	0.24	0.00	0.00	0.50	0.24	0.890	11.40	11.88	81.1		**0.201**	63	450	1.5	**0.349**	2.20	0.48	58
	SP1-29	MH21	MH60	0.23	0.00	0.23		0.23			0	0.12	0.00	0.00	0.50	0.12	0.115	10.00	10.20	90.6		**0.029**	43.7	300	7	**0.256**	3.62	0.20	11
	SP1-30	MH60	MH62	0.50	2.01	2.51		0.5			0	0.25	0.00	0.00	0.50	0.25	1.255	11.88	12.27	79.2		**0.276**	104.3	450	6	**0.698**	4.39	0.40	40
	SP1-31	MH62	POND	0.00	17.29	17.29					0	0.00	0.00	0.00	0.64	0.00	11.062	12.27	12.27	79.2		**2.436**	23.9	1050	2	**3.860**	4.46	0.09	63
				17.29			0.00	7.99	8.69	0.61	17.29					11.06													

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Subdivision: **HILLSBURGH HEIGHTS**
File No.:
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Drainage Area Plan: **STM 1**

TOWN OF HILLSBURGH
STORM DRAINAGE

FILE NUMBER **W21081**
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Core System	Area No.	Up-stream	Down-stream	Contributing Area (ha)			Breakdown of Areas				Area x Storm Coef.				C	Total	Cummulative	Time (min)		I_5	I_{10}	**FLOW** Q= 2.78AC I/1000	PIPE						
		Node	Node	In Area	Control	Total	0.25	0.50	0.75	0.90	0.25	0.50	0.75	0.90		A x C	AxC	In Area	Total			Q_{Design}	Length (m)	Size (mm)	Grade (%)	**Capacity (m^3/sec)**	Velocity (m/s)	Time (min)	% Full
	SP2-1	MH1	MH2	0.39	0.00	0.39		0.39			0	0.20	0.00	0.00	0.50	0.20	0.20	10.00	10.51	88.7		**0.048**	66.1	300	2.5	**0.153**	2.16	0.51	31
	SP2-2	MH2	MH3	0.30	0.39	0.69		0.3			0	0.15	0.00	0.00	0.50	0.15	0.35	10.51	10.59	88.2		**0.085**	14.8	300	4.5	**0.205**	2.90	0.08	41
	SP2-3	MH3	MH6	0.86	0.69	1.55		0.86			0	0.43	0.00	0.00	0.50	0.43	0.78	10.59	11.11	85.2		**0.184**	103.6	375	4.5	**0.372**	3.37	0.51	49
	SP2-4	MH1	MH4	0.25	0.00	0.25		0.25			0	0.13	0.00	0.00	0.50	0.13	0.13	11.11	11.23	84.5		**0.029**	14.8	300	2	**0.137**	1.93	0.13	21
	SP2-5	MH4	MH5	0.93	0.25	1.18		0.93			0	0.47	0.00	0.00	0.50	0.47	0.59	11.23	12.00	80.5		**0.132**	102.7	375	2	**0.248**	2.25	0.76	53
	SP2-6	MH5	MH6	0.45	1.18	1.63			0.45		0	0.00	0.34	0.00	0.75	0.34	0.93	12.00	13.03	75.8		**0.195**	87.3	525	0.5	**0.304**	1.40	1.04	64
	SP2-7	MH6	MH8	0.47	3.18	3.65		0.47			0	0.24	0.00	0.00	0.50	0.24	1.94	13.03	13.44	74.1		**0.399**	91.9	450	4.5	**0.605**	3.80	0.40	66
	SP2-8	MH7	MH8	0.81	0.00	0.81			0.81		0	0.00	0.61	0.00	0.75	0.61	0.61	13.44	13.96	72.1		**0.122**	92.9	300	4.7	**0.210**	2.97	0.52	58
	SP2-9	MH8	MH9	0.36	4.46	4.82		0.36			0	0.18	0.00	0.00	0.50	0.18	2.73	13.96	14.47	70.2		**0.532**	76.9	600	1.3	**0.700**	2.48	0.52	76
	SP2-10	MH9	MH10	0.09	4.82	4.91		0.09			0	0.05	0.00	0.00	0.50	0.05	2.77	14.47	14.58	69.8		**0.538**	16.2	600	1.3	**0.700**	2.48	0.11	77
	SP2-11	MH10	MH19	0.64	4.91	5.55			0.64		0	0.00	0.48	0.00	0.75	0.48	3.25	14.58	15.69	66.2		**0.598**	118	750	0.5	**0.787**	1.78	1.10	76
	SP2-12	MH5	MH11	0.57	0.00	0.57			0.57		0	0.00	0.43	0.00	0.75	0.43	0.43	15.69	17.05	62.3		**0.074**	91.6	375	0.5	**0.124**	1.12	1.36	60
	EXT1	EXT1	MH11	2.05	0.00	2.05			2.05		0	0.00	1.54	0.00	0.75	1.54	1.54												
	SP2-13	MH11	MH12	0.09	2.62	2.71				0.09	0	0.00	0.00	0.08	0.90	0.08	2.05	10.00	10.23	90.4		**0.514**	36.7	600	1.5	**0.752**	2.66	0.23	68
	SP2-14	MH12	MH15	0.09	2.71	2.80				0.09	0	0.00	0.00	0.08	0.90	0.08	2.13	10.23	10.57	88.3		**0.522**	55	600	1.5	**0.752**	2.66	0.34	69
	SP2-15	MH13	MH14	2.16	0.00	2.16	1.81		0.35		0.453	0.00	0.26	0.00	0.33	0.72	0.72	10.57	10.88	86.5		**0.172**	63.7	375	4.7	**0.380**	3.44	0.31	45
	SP2-16	MH14	MH15	0.33	2.16	2.49			0.33		0	0.00	0.25	0.00	0.75	0.25	0.96	10.88	11.19	84.7		**0.227**	63.7	375	4.7	**0.380**	3.44	0.31	60
	SP2-17	MH7	MH15	0.75	0.00	0.75			0.75		0	0.00	0.56	0.00	0.75	0.56	0.56	11.19	12.12	79.9		**0.125**	88.9	375	1	**0.175**	1.59	0.93	71
	SP2-18	MH15	MH18	0.15	6.04	6.19				0.15	0	0.00	0.00	0.14	0.90	0.14	3.79	12.12	12.56	77.9		**0.820**	88.9	750	1.8	**1.493**	3.38	0.44	55
	SP2-19	MH16	MH17	0.44	0.00	0.44			0.44		0	0.00	0.33	0.00	0.75	0.33	0.33	12.56	13.63	73.4		**0.067**	87.5	300	1	**0.097**	1.37	1.07	70
	SP2-20	MH17	MH18	0.18	0.44	0.62			0.18		0	0.00	0.14	0.00	0.75	0.14	0.47	13.63	13.83	72.6		**0.094**	42.4	300	6.4	**0.245**	3.46	0.20	38
	SP2-21	MH18	MH19	0.26	6.81	7.07			0.26		0	0.00	0.20	0.00	0.75	0.20	4.45	13.83	14.03	71.9		**0.888**	51	750	3	**1.927**	4.36	0.19	46
	SP2-22	MH19	MH34	0.24	12.62	12.86		0.24			0	0.12	0.00	0.00	0.50	0.12	7.82	14.03	14.42	70.4		**1.530**	52.8	1050	0.5	**1.930**	2.23	0.39	79
	SP2-23	MH21	MH22	0.23	0.00	0.23		0.23			0	0.12	0.00	0.00	0.50	0.12	0.12	14.42	14.73	69.3		**0.022**	43.7	300	2.9	**0.165**	2.33	0.31	13
	SP2-24	MH22	MH23	0.54	0.23	0.77		0.54			0	0.27	0.00	0.00	0.50	0.27	0.39	14.73	15.17	67.9		**0.073**	61.4	300	2.9	**0.165**	2.33	0.44	44
	SP2-25	MH23	MH24	0.88	0.77	1.65		0.88			0	0.44	0.00	0.00	0.50	0.44	0.83	15.17	15.94	65.5		**0.150**	90	450	1.2	**0.312**	1.96	0.76	48
	SP2-26	MH24	MH25	0.27	1.65	1.92		0.27			0	0.14	0.00	0.00	0.50	0.14	0.96	15.94	16.46	63.9		**0.171**	61.4	450	1.2	**0.312**	1.96	0.52	55
	SP2-27	MH25	MH26	0.38	1.92	2.30		0.38			0	0.19	0.00	0.00	0.50	0.19	1.15	16.46	16.60	63.6		**0.203**	16.2	450	1.2	**0.312**	1.96	0.14	65
	SP2-28	MH26	MH27	0.36	2.30	2.66		0.36			0	0.18	0.00	0.00	0.50	0.18	1.33	16.60	17.20	61.9		**0.229**	71.4	450	1.2	**0.312**	1.96	0.61	73
	SP2-29	MH27	MH28	0.12	2.66	2.78		0.12			0	0.06	0.00	0.00	0.50	0.06	1.39	17.20	17.33	61.6		**0.238**	14.8	450	1.2	**0.312**	1.96	0.13	76
	SP2-30	MH28	MH29	0.33	2.78	3.11		0.33			0	0.17	0.00	0.00	0.50	0.17	1.56	17.33	18.08	59.7		**0.258**	62.2	600	0.4	**0.388**	1.37	0.75	66

Printed 26 September 2017

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Subdivision:	**HILLSBURGH HEIGHTS**	**TOWN OF HILLSBURGH**		**FILE NUMBER**	**W21081**
File No.:		**STORM DRAINAGE**		**DATE**	**February 15, 2023**
Consultant:	**Candevcon Limited**			**PREPARED BY**	**SDL**
Drainage Area Plan:	**STM 1**				

GORE ROAD TRIBUTARY

Park	0.25
Single/semi	0.50
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For 5-yr storm I_5 = 744/((tc*1.76)^.729)
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Core System	Area No.	Up- stream	Down- stream	Contributing Area (ha)			Breakdown of Areas				Area x Storm Coef.				C	Total	Cummulative	Time (min)		I_5	I_{10}	**FLOW** Q= 2.78AC I/1000	PIPE						
		Node	Node	In Area	Control	Total	0.25	0.50	0.75	0.90	0.25	0.50	0.75	0.90		A x C	AxC	In Area	Total			**Q_{Design}**	Length (m)	Size (mm)	Grade (%)	**Capacity (m^3/sec)**	Velocity (m/s)	Time (min)	% Full
	SP2-31	MH29	MH32	0.36	3.11	3.47		0.36			0	0.18	0.00	0.00	0.50	0.18	1.74	18.08	18.80	58.0		**0.280**	59.2	600	0.4	**0.388**	1.37	0.72	72
	SP2-32	MH17	MH30	0.51	0.00	0.51		0.34	0.17		0	0.17	0.13	0.00	0.58	0.30	0.30	18.80	19.25	57.1		**0.047**	63.4	300	3	**0.167**	2.37	0.45	28
	SP2-33	MH30	MH31	0.49	0.51	1.00		0.32	0.17		0	0.16	0.13	0.00	0.59	0.29	0.59	19.25	19.65	56.2		**0.091**	58	300	3	**0.167**	2.37	0.41	55
	SP2-34	MH22	MH31	0.44	0.00	0.44		0.44			0	0.22	0.00	0.00	0.50	0.22	0.22	19.65	20.69	54.1		**0.033**	93.4	300	1.2	**0.106**	1.50	1.04	31
	SP2-35	MH31	MH32	0.41	1.44	1.85		0.41			0	0.21	0.00	0.00	0.50	0.21	1.01	20.69	21.20	53.2		**0.149**	93.4	300	5	**0.216**	3.06	0.51	69
	SP2-36	MH32	MH34	0.35	5.32	5.67			0.35		0	0.00	0.26	0.00	0.75	0.26	3.01	21.20	22.00	51.7		**0.433**	76.7	750	0.4	**0.704**	1.59	0.80	61
		MH34	OUT		18.53						0	0.00	0.00	0.00	0.58	0.00	10.82	22.00	22.14	51.5		**1.551**	22.2	1050	0.8	**2.441**	2.82	0.13	64

APPENDIX “C”

Preliminary Geotechnical Investigation Report

Soil Engineers Ltd.
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GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE
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A REPORT TO
CEDAR CITY DEVELOPMENTS

PRELIMINARY GEOTECHNICAL INVESTIGATION FOR

PROPOSED DEVELOPMENT

5916 TRAFALGAR ROAD NORTH

TOWN OF ERIN (HILLSBURGH)

REFERENCE NO. 2009-S020

OCTOBER 2020

DISTRIBUTION

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TABLE OF CONTENTS

TABLES

ENCLOSURES

1.0 INTRODUCTION

In accordance with an email authorization dated September 2, 2020, from Mr. Steven Silverberg, President of Cedar City Developments, a geotechnical investigation was carried out at 5916 Trafalgar Road North in the Town of Erin (Hillsburgh).

The purpose of the investigation was to reveal the subsurface conditions and determine the engineering properties of the disclosed soils for a future development. Detailed design of the development is not available; the geotechnical findings and preliminary recommendations for development are presented in this report.

2.0 SITE AND PROJECT DESCRIPTION

The Town of Erin is located in a physiographical region known as Hillsburgh Sandhills where the topography is rough with flat-bottomed swampy valleys running through sandy knolls. Lacustrine sands, silts and clays, reworked till, and glaciolacustrine sediments were deposited on drift and ground moraines which had been partly eroded by the past glaciation.

The subject property at 5916 Trafalgar Road North in the Town of Erin (Hillsburgh) is approximately 47 hectares in area. It is located on the west side of Trafalgar Road North, approximately 650 m south of Sideroad 27. At the time of the investigation, the property was mostly a farm field, with farm buildings fronting Trafalgar Road North. The existing site gradient is undulating, having a difference in elevation of more than 20 m across the property.

Detailed design of the proposed development is not available at the time or report preparation. It is understood that it will likely be a mixed use residential subdivision development with municipal services and roadways.

3.0 FIELD WORK

The field work, consisting of twelve (12) sampled boreholes extending to depths ranging from 6.2 to 6.6 m from the prevailing ground surface, was performed on September 22 and 23, 2020, at the locations shown on the Borehole Location Plan, Drawing No. 1.

The boreholes were advanced at intervals to the sampling depths by a track-mounted, continuous-flight power-auger machine equipped for soil sampling. Standard Penetration Tests, using the procedures described on the enclosed "List of Abbreviations and Terms", were performed at the sampling depths. The test results are recorded as the Standard Penetration

Resistance (or 'N' values) of the subsoil. The relative density of the non-cohesive strata and the consistency of the cohesive strata are inferred from the 'N' values. Split-spoon samples were recovered for soil classification and laboratory testing.

The ground elevation at each borehole location was obtained using a hand-held Global Navigation Satellite System (GNSS) equipment.

4.0 SUBSURFACE CONDITIONS

The investigation has disclosed that beneath a topsoil veneer, with a layer of earth fill and topsoil fill at one location, the site is generally underlain by strata of sandy silt till, silty sand till and sand. In place, a localized deposit of silt was also encountered.

Detailed descriptions of the subsurface conditions are presented on the Borehole Logs, comprising Figures 1 to 12, inclusive. The revealed stratigraphy is plotted in the Subsurface Profiles, Drawing Nos. 2 and 3. The engineering properties of the disclosed soils are discussed herein.

4.1 **Topsoil** (All Boreholes)

Boreholes were drilled in the farm field or open areas. The revealed topsoil ranges from 25 to 33 cm in thickness. Due to active farming activities, thicker topsoil layers can be anticipated in places, especially in low-lying areas. Diligent control of the stripping operation will be required to prevent overstripping for the development.

The topsoil is dark brown in colour, with appreciable amounts of roots and humus. It is considered to be void of engineering value and must be removed for development.

Due to its humus content, the topsoil will produce volatile gases and may generate an offensive odour under anaerobic conditions. It must not be buried within the building envelope or deeper than 1.2 m below the finished grade so it will not have an adverse impact on the environmental well-being of the developed area.

4.2 **Earth Fill and Topsoil Fill** (Borehole 6)

A layer of earth fill and topsoil fill was contacted in Borehole 6, extending to a depth of 3.0 m from grade. The earth fill consists of silty sand with organic inclusions while the topsoil fill is sandy in texture, with appreciable topsoil content.

The water content values of the earth fill samples are 9% and 12%; while the water content values for the topsoil fill are 11%, 13% and 19%, indicating damp to very moist conditions. The high water content value of 19% indicates the presence of topsoil in the fill.

The obtained 'N' values range from 4 to 11 blows per 30 cm of penetration. This indicates that the fill was non uniform in compaction.

The existing earth fill is not suitable for supporting structures. It must be subexcavated, sorted free of organics and deleterious material, inspected, and properly compacted. If it is impractical to sort the fill, then it must be wasted. The topsoil fill encountered on site should be further assessed to determine its suitability for reuse.

One must be aware that the samples retrieved from boreholes may not be truly representative of the geotechnical and environmental quality of the fill, and do not indicate whether the topsoil beneath the earth fill was completely stripped. This should be further assessed by laboratory testing and/or test pits.

4.3 **Sandy Silt Till and Silty Sand Till** (All Boreholes, except Boreholes 6 and 7)

The sandy silt till and silty sand till predominate the soil stratigraphy at the site. They consist of a random mixture of particle sizes ranging from clay to gravel, with either sand or silt being the dominant fractions. Hard resistance to augering was encountered occasionally, inferring the occurrence of cobbles and boulders in the till mantle. Grain size analyses were performed on 4 representative samples and the results are plotted on Figures 13 and 14.

The natural water content values of the till samples were determined; the results are plotted on the Borehole Logs. The obtained values range from 3% to 15%, with a median of 7%. This indicates that the tills are in a dry to very moist condition.

The obtained 'N' values range from 3 to more than 100, with a median of 39 blows per 30 cm of penetration. These values show that the relative density is very loose to very dense, being generally dense. The loose tills generally occur in the weathered zone near the ground surface, extending to a depth of 0.8 to 1.8 m from grade.
The engineering properties of the till deposit are listed below:

- High frost susceptibility and moderately low water erodibility.
- Relatively low to low permeability, with an estimated coefficient of permeability of 10^{-5} to 10^{-6} cm/sec, an estimated percolation rate of 30 to 50 min/cm and runoff coefficients of:

Slope	
0% - 2%	0.11 to 0.15
2% - 6%	0.16 to 0.20
6% +	0.23 to 0.28

- The shear strength is primarily derived from internal friction and is augmented by cementation.
- The till deposit will generally be stable in relatively steep cuts; however, under prolonged exposure, localized sheet collapse may occur.
- Fair pavement-supportive material, with an estimated California Bearing Ratio (CBR) value of 8%.
- Moderately low corrosivity to buried metal, with an estimated electrical resistivity of 5000 ohm·cm.

4.4 **Sand** (All Boreholes, except Borehole 1)

The sand deposit was interstratified with the till deposit in 11 of the 12 boreholes. It is fine to medium grained, with a variable amount of silt. The sand is laminated with silt seams, showing a lacustrine deposit. Grain size analyses were performed on 3 representative samples and the results are plotted on Figure 15.

The obtained 'N' values range from 2 to over 100, with a median of 35 blows per 30 cm of penetration, indicating the sand is very loose to very dense, being generally dense in relative density. The natural water content of the sand samples was determined to range from 1% to 17%, with a median of 4%., indicating a dry to wet, generally damp condition.

The deduced engineering properties of the sand deposit are given below:

- Moderate to low frost susceptibility.
- High water erodibility.
- Pervious, with an estimated coefficient of permeability of 10^{-2} to 10^{-3} cm/sec, a percolation rate of 5 to 10 min/cm, and runoff coefficients of:

Slope	
0% - 2%	0.04
2% - 6%	0.09
2% - 6%	0.13

- The shear strength is derived from internal friction and is directly dependent on soil density.
- In excavation, the sand will slough in a relatively steep slope. It will run with water seepage and boil under a piezometric head of 0.3 m.

- A fair pavement-supportive structure, with an estimated CBR value of 10%.
- Low corrosivity to buried metal, with an estimated electrical resistivity of 6500 ohm·cm.

4.5 **Silt** (Boreholes 1 and 2)

The silt stratum was contacted beneath the topsoil in the southwest sector of the property. It is very fine grained, with sand and clay seams and layers.

The natural water content of the soil samples was determined; the values range from 8% to 16%, with a median of 13%, indicating moist to very moist conditions.

The obtained 'N' values range from 6 to 27, with a median of 8 blows per 30 cm of penetration, indicating the deposit is loose to compact, being generally loose in relative density. The loose silt is the result of weathering near the ground surface, which extends up to a depth of 1.8 m from grade.

The engineering properties relating to the project are given below:

- High frost susceptibility, with high soil-adfreezing potential.
- High water erodibility; it is susceptible to migration through small openings under seepage pressure.
- Relatively low permeability, with an estimated coefficient of permeability of 10^{-5} cm/sec, a percolation rate of 30 to 40 min/cm and the runoff coefficients of:

Slope	
0% - 2%	0.11
2% - 6%	0.16
6% +	0.23

- The shear strength is derived from internal friction, which is density dependent.
- In excavation, the silt will slough and run slowly with seepage bleeding from the cut face. It will boil with a piezometric head of 0.4 m.
- Poor pavement-supportive material, with an estimated CBR value of 3%.
- Moderate corrosivity to buried metal, with an estimated electrical resistivity of 4500 ohm·cm.

4.6 **Compaction Characteristics of the Revealed Soils**

The obtainable degree of compaction is primarily dependent on the soil moisture and, to a lesser extent, on the type of compactor used and the effort applied. As a general guide, the typical water content values of the revealed soils for Standard Proctor compaction are presented in Table 1.

Table 1 - Estimated Water Content for Compaction of On-Site Material

Soil Type	Determined Natural Water Content (%)	Water Content (%) for Standard Proctor Compaction	
		100% (optimum)	Range for 95% or +
Existing Earth Fill	9 and 12	12 to 15	8 to 18
Silt/Sand	1 to 17 (median 4 and 13)	11 and 12	6 to 15
Silt Till/Sand Till	3 to 15 (median 7)	12	8 to 15

The above values show that part of the in situ soils are either too dry or too wet and will require aeration or wetting for a 95% or + Standard Proctor compaction. The wet materials must be aerated by spreading them thinly on the ground in dry and warm weather, prior to structural compaction. Alternatively, the wet sand and silt can be mixed with the drier tills.

Weathered soils and earth fill should be screened, segregated the organics and deleterious material before reuse as structural backfill. The earth fill must be sorted free of topsoil and deleterious materials prior to reuse as structural fill. If it is impractical to sort the fill, then it must be wasted. The topsoil fill must be further assessed to determine its suitability for reuse.

When compacting the very dense till on the dry side of the optimum, the compactive energy will frequently bridge over the chunks in the soils and be transmitted laterally into the soil mantle. Therefore, the lifts of these soils must be limited to 20 cm or less (before compaction). The presence of boulders will prevent transmission of the compactive energy into the underlying material to be compacted. If an appreciable amount of boulders is mixed with the material, it must either be sorted or must not be used for structural backfill.

If the compaction of the soils is carried out with the water content within the range for 95% Standard Proctor dry density but on the wet side of the optimum, the surface of the compacted soil mantle will roll under the dynamic compactive load. This is unsuitable for road construction since each component of the pavement structure is to be placed under dynamic conditions which will induce the rolling action of the subgrade surface and cause structural failure of the new pavement. The foundations or bedding of the sewer and slab-on-grade, on the other hand, will be placed on a subgrade which will not be subjected to impact loads. Therefore, the structurally compacted soil mantle with the water content on the wet side or dry side of the optimum will provide an adequate subgrade for the construction.

One should be aware that 90%± Standard Proctor compaction of the wet organic sand and silt is achievable. Further densification is prevented by the pore pressure induced by the compactive effort; however, large random voids will have been expelled, and with time the pore pressure will dissipate and the percentage of compaction will increase. There are many cases on record where after a few weeks to months of rest, the density of the compacted mantle has increased to over 95% of its maximum Standard Proctor dry density.

5.0 GROUNDWATER CONDITIONS

All boreholes remained dry and open upon completion of drilling. Minor seepage was encountered in the sand deposit in Borehole 9 at a depth of 6.0 m from grade. The groundwater level will fluctuate with seasons.

In excavation, where groundwater seepage is encountered, the yield is expected to be small to some in the till and appreciable and maybe persistent in the sand and silt.

6.0 DISCUSSION AND RECOMMENDATIONS

This investigation has disclosed that beneath a topsoil veneer, with a layer of earth fill and topsoil fill at Borehole 6, the site is underlain by strata of sandy silt till, silty sand till and sand, very loose to very dense, generally dense in relative density. A localized deposit of loose to compact silt was contacted near the ground surface. The very loose to loose condition in the revealed soil stratigraphy is the result of weathering near the ground surface, which extends up to a depth of 0.8 to 1.8 m from grade.

All boreholes remained dry and open upon completion of the borehole drilling. Minor seepage was contacted in Borehole 9 at a depth of 6.0 m from grade. The groundwater level will fluctuate with the seasons.

The future development at the property will likely be a mixed use residential subdivision development with municipal services and roadways. The geotechnical findings warranting special consideration for the proposed project are presented below:

1. The existing site gradient is undulating. The site will have to be regraded for the proposed development. Prior to site grading with cut and fill, the topsoil veneer

should be completely removed. The earth fill and topsoil fill should be excavated, examined, sorted free of topsoil and deleterious material before reuse for filling. If it is impractical to sort the fill, then it must be wasted.

2. After demolition of the existing structures and foundations, the debris must be removed and disposed off-site.
3. In areas where earth fill is required to raise the site, it is generally more economical to place an engineered fill for normal footing, underground services and pavement construction.
4. The proposed structures can be constructed on conventional footings founded in the engineered fill or sound natural soils.
5. The footing subgrade must be inspected by either a geotechnical engineer, or a geotechnical technician under the supervision of a geotechnical engineer to assess its suitability for bearing the foundations.
6. Additional boreholes may be required to elaborate the subsoil and groundwater conditions once the design for the proposed development is finalized.

The recommendations appropriate for the design of the development are presented herein. One must be aware that the subsurface conditions may vary between boreholes. Should subsurface variances become apparent during construction, a geotechnical engineer must be consulted.

6.1 Site Preparation

The existing site gradient is undulating. The site will have to be regraded for the proposed development.

Prior to site grading with cut and fill, the existing topsoil should be completely removed. The earth fill and topsoil fill should be excavated, examined, sorted free of topsoil and deleterious material before reuse for filling, otherwise they have to be removed.

The existing structures and foundations must be demolished and the debris must be removed and disposed off-site. The backfill must be free of topsoil or deleterious material, placed and compacted to engineered fill specifications.

The existing earth fill, topsoil fill, disturbed soils and weathered soils must be sub-excavated, sorted free of topsoil and organics or further assessed for suitability of engineered fill uses.

The requirements for the engineered fill are presented below:

1. After removal of topsoil, earth fill, topsoil fill and unsuitable material, the native soil subgrade must be inspected and proof-rolled prior to any fill placement.
2. Inorganic soils must be used for the fill, and they must be uniformly compacted in lifts 20 cm thick to 98% or + of the maximum Standard Proctor dry density up to the proposed finished grade. The soil moisture must be properly controlled near the optimum. If the foundations are to be built soon after the fill placement, the densification process for the engineered fill must be increased to 100% of the maximum Standard Proctor compaction.
3. If the engineered fill is compacted with the moisture content on the wet side of the optimum, the underground services and pavement construction should not begin until the pore pressure within the fill mantle has completely dissipated. This must be further assessed at the time of the engineered fill construction.
4. If imported fill is to be used, it should be inorganic soils, free of any deleterious material with environmental issue (contamination). Any potential imported earth fill from off-site must be reviewed for geotechnical and environmental quality by the appropriate personnel as authorized by the developer or agency, before it is hauled to the site.
5. The engineered fill must not be placed during the period from late November to early April when freezing ambient temperatures occur either persistently or intermittently. This is to ensure that the fill is free of frozen soils, ice and snow.
6. The fill operation must be fully supervised and monitored by a technician under the direction of a geotechnical engineer.
7. If the engineered fill is to be left over the winter months, adequate earth cover, or equivalent, must be provided for protection against frost action.
8. The engineered fill envelope and finished elevations must be clearly and accurately defined in the field, and they must be precisely documented.
9. Foundations founded on engineered fill must be reinforced by at least two 15-mm steel reinforcing bars in the footings and in the upper section of the foundation walls, or be designed by a structural engineer, to properly distribute the stress induced by the abrupt differential settlement (about 15 mm) between the natural soil and engineered fill.
10. Any excavation carried out in certified engineered fill must be reported to the geotechnical consultant who supervised the fill placement in order to document the locations of excavation and/or to supervise reinstatement of the excavated areas to engineered fill status. If construction on the engineered fill does not commence within a period of 2 years from the date of certification, the condition of the engineered fill must be assessed for re-certification.
11. The footing and underground services subgrade must be inspected by the geotechnical consulting firm that supervised the engineered fill placement. This is to ensure that the

foundations and service pipes are placed within the engineered fill envelope, and the integrity of the fill has not been compromised by interim construction, environmental degradation and/or disturbance by the footing excavation.

6.2 Foundation

The proposed structures can be supported on conventional spread and strip footings, founded on the undisturbed native soil or engineered fill. The recommended soil bearing pressures for the design of conventional footings are provided below:

- Maximum Soil Bearing Pressure at Serviceability Limit State (SLS) = 150 kPa
- Factored Ultimate Bearing Pressure at Ultimate Limit State (ULS) = 240 kPa

The total and differential settlements of structures designing for the bearing pressure at SLS are estimated within 25 mm and 20 mm, respectively.

Foundations exposed to weathering or in unheated areas should have at least 1.5 m of earth cover for protection against frost action. In heated areas, the earth cover can be reduced to 1.2 m.

During construction, the subgrade soils of foundations should be inspected by the geotechnical engineer to ensure that the conditions are compatible with the design of the foundations.

If water seepage is encountered in excavation, the foundation must be poured immediately after subgrade inspection or the subgrade should be protected by a concrete mud-slab immediately after exposure. This will prevent construction disturbance and costly rectification of the bearing subsoil.

The building foundation should meet the requirements specified in the latest Ontario Building Code and the structures should be designed to resist an earthquake force using Site Classification ‘D’ (stiff soil).

6.3 Basement Structures

All boreholes remained dry upon completion of the fieldwork. In conventional basement construction, the basement structures should be provided with perimeter drainage system (Drawing No. 4), connecting into a positive outlet or sewer system. The subdrains should be encased in a fabric filter to protect them against blockage by silting. If the basement structure is within 1.0 m above the high groundwater regime, underfloor subdrain should be placed in the slab bedding, with a 6 mil vapour barrier above the obvert of the subdrain to prevent upfiltrating moisture from dampening the floor slab.

Both the perimeter and underfloor subdrain systems should be drained into the municipal storm sewer system by gravity or into a sump pit where the water can be removed by pumping. In addition, the external grading should be designed to drain the surface runoff away from the building structures.

The soil parameters stated in Section 6.8 can be used to evaluate the earth pressure on the foundation walls. The exterior must be graded to direct runoff away from the structures.

The basement floor slab should be constructed on a granular base, 20 cm thick, consisting of 20-mm clear limestone, or equivalent. The subgrade for the slab-on-grade floor should consist of sound natural soils or properly compacted inorganic earth fill, compacted to 98% of the maximum Standard Proctor dry density.

A Modulus of Subgrade Reaction of 35 MPa/m can be used for the design of the floor slab.

6.4 Underground Services

The underground services should be founded on sound natural soil or properly compacted inorganic earth fill. Where incompetent or weathered soil is encountered, it should be subexcavated and replaced with the bedding material, compacted to at least 95% Standard Proctor dry density.

A Class ‘B’ bedding is recommended for the underground services construction. It should consist of compacted 20-mm Crusher-Run Limestone, or equivalent, as approved by a geotechnical engineer. Where the subgrade consists of saturated soil, with continuous seepage of groundwater, a Class ‘A’ concrete bedding is recommended.

The sewer joints into the manholes and catch basins must be leak-proof to prevent the migration of fines through the joints. Openings to subdrains and catch basins should be shielded with a fabric filter to prevent blockage by silting.

In order to prevent pipe floatation when the sewer trench is deluged with water derived from infiltrated precipitation, a soil cover of at least two times the diameter of the pipe should be in place at all times after completion of the pipe installation.

The subgrade of the underground services may consist of soils which are considered to have moderately high electrical corrosivity to ductile iron pipes and metal fittings; therefore, the underground services should be protected against soil corrosion. For estimation for the anode weight requirements, the electrical resistivities of the disclosed soils can be used. The proposed anode weight must meet the minimum requirements as specified by the Town of Erin and/or Wellington County Standard.

6.5 Backfilling in Trenches and Excavated Areas

The backfill in service trenches should be compacted to at least 95% of its maximum Standard Proctor Dry Density (SPDD). Below concrete floor subgrade and in the zone within 1.0 m below the pavement, the material should be compacted with the water content 2% to 3% drier than the optimum; compacted to 98% of the respective SPDD.

Selected on site inorganic soils are suitable for use as trench backfill. The till should be sorted free of large cobbles and boulders (over 15 cm in size). In addition, some of the in situ soils are either too wet or too dry for 95% or + Standard Proctor compaction and will require aeration, wetting or proper mixing prior to its use as structural backfill.

In normal construction practice, the problem areas of pavement settlement largely occur adjacent to manholes, catch basins, services crossings, foundation walls and columns, it is recommended that a sand backfill should be used.

The narrow trenches for services crossings should be cut at 1 vertical:2 horizontal so that the backfill in the trenches can be effectively compacted. Otherwise, soil arching in the trenches will prevent achievement of the proper compaction. In confined areas where the desired slope cannot be achieved or the operation of a proper kneading-type roller cannot be facilitated, imported sand fill, which can be appropriately compacted by using a smaller vibratory compactor, must be used. The interface of the native soils and the sand backfill will have to be flooded for a period of several days.

One must be aware of the possible consequences during trench backfilling and exercise caution as described below:

- To backfill a deep trench, one must be aware that future settlement is to be expected, unless the sides is flattened to 1 vertical:2 horizontal, and the lifts of the fill and its moisture content are stringently controlled; i.e., lifts should be no more than 20 cm (or less if the backfilling conditions dictate) and uniformly compacted to achieve at least 95% SPDD, with the moisture content on the wet side of the optimum.

- It is often difficult to achieve uniform compaction of the backfill in the lower vertical section of a trench which is an open cut or is stabilized by a trench box, particularly in the sector close to the trench walls or the sides of the box. These sectors must be backfilled with sand and the compaction must be carried out diligently prior to the placement of the backfill above this sector, i.e., in the upper sloped trench section. This measure is necessary in order to prevent consolidation of inadvertent voids and loose backfill which will compromise the compaction of the backfill in the upper section.
- In areas where groundwater movement is expected in the pipe bedding or trench backfill mantle, anti-seepage collars (OPSS 802.095) should be provided.
- When construction is carried out in freezing weather, frozen soil layers may inadvertently be mixed with the structural trench backfill. Should the in situ soils have a water content on the dry side of the optimum, it would be impossible to wet the soils due to the freezing condition, rendering difficulties in obtaining uniform and proper compaction. Furthermore, the freezing condition will prevent wetting of the backfill or when it is required, such as when the trench box is removed. The above will invariably cause backfill settlement in the next few years.
- In areas where the underground services construction is carried out during winter months, prolonged exposure of the trench walls will result in frost heave within the soil mantle of the walls. This may result in some settlement as the frost recedes, and repair costs will be incurred prior to final surfacing of the new pavement.

6.6 Slab-On-Grade, Garages and Driveways

The on-site soils are mostly frost susceptible and the ground will be subject to frost heaving during cold weather. The pavement and sidewalk in open areas, thus, should be designed to tolerate the ground movement.

In areas where ground movement due to frost heave cannot be tolerated, the slab-on-grade, pavement, barrier free ramps and/or sidewalk can be constructed on a free-draining granular base of 0.3 to 1.2 m thick, depending on the degree of tolerance for settlement. These measures, with proper drainage, will prevent water from accumulating in the granular base.

Alternatively, they can be insulated with 50-mm Styrofoam, or its thermal equivalent.

The slab-on-grade in open areas should be designed to tolerate frost heave, and the grading around the slab-on-grade must be such that it directs runoff away from the surface.

6.7 Pavement Design

The pavement design for local and collector roads is presented in Table 2.

Table 2 - Pavement Design

Course	Thickness (mm)	OPS Specifications
Asphalt Surface	40	HL-3
Asphalt Binder		HL-8
Local Road	50	
Collector Road	65	
Granular Base	150	OPSS Granular 'A' or equivalent
Granular Sub-base		OPSS Granular 'B' or equivalent
Local Road	300	
Collector Road	400	

In preparation of pavement subgrade, all topsoil and compressible material should be removed. The final subgrade must be proof-rolled using a heavy roller or loaded dump truck. Any soft spot as identified must be rectified by subexcavation and replacing with selected dry inorganic material. The subgrade within 1.0 m below the underside of the granular sub-base must be compacted to at least 98% SPDD, with the water content at 2% to 3% drier than its optimum.

All the granular bases should be compacted in 150 to 200 mm lifts to 100% SPDD.

The pavement subgrade will suffer a strength regression if water is allowed to saturate the mantle. The following measures should, therefore, be incorporated in the construction procedures and road design:

- The subgrade should be properly crowned and smooth-rolled to allow interim precipitation to be properly drained.
- Lot areas adjacent to the roads should be properly graded to prevent ponding of large amounts of water. Otherwise, the water will seep into the subgrade mantle and induce a regression of the subgrade strength, with costly consequences for the pavement construction.
- Fabric filter-encased curb subdrains connecting to a positive outlet of catch basin, will be required on both sides of the roadway.

6.8 Soil Parameters

The recommended soil parameters for the project design are given in Table 3.

Table 3 - Soil Parameters

Unit Weight and Bulk Factor	**Unit Weight** γ **(kN/m^3)**		**Estimated Bulk Factor**	
	Bulk	**Submerged**	**Loose**	**Compacted**
Sandy Silt Till and Silty Sand Till	22.5	12.5	1.30	1.05
Earth Fill, Weathered Soil, Silt and Sand	20.5	11.5	1.25	0.98
Lateral Earth Pressure Coefficients		**Active** K_a	**At Rest** K_o	**Passive** K_p
Compacted Earth Fill		0.40	0.55	2.50
Native Till, Sand or Silt		0.30	0.45	3.30
Coefficients of Friction				
Between Concrete and Granular Base				0.50
Between Concrete and Sound Natural Soils				0.35
Maximum Allowable Soil Pressure (SLS) For Thrust Block Design				
Engineered Fill and Sound Natural Soils				75 kPa

6.9 Excavation

Excavation should be carried out in accordance with Ontario Regulation 213/91. The types of soils are classified in Table 4.

Table 4 - Classification of Soils for Excavation

Material	Type
Sound Till	1 to 2
Earth Fill, Weathered Soils, Sand or Silt in drained condition	3
Saturated Soils	4

Groundwater derived from infiltrated surface water or precipitation may be encountered in excavation. Any groundwater seepage in shallow excavation can be controlled by normal pumping from sumps. In excavation extending into the saturated silt or sand, if encountered, the possibility of flowing sides and bottom boiling dictates that the ground be pre-drained or depressurized by pumping from closely spaced sump-wells or well points.

7.0 LIMITATIONS OF REPORT

This report was prepared by Soil Engineers Ltd. for the account of Cedar City Developments and for review by the designated consultants, contractors, financial institutions, and government agencies. The material in the report reflects the judgment of Kelvin Hung, P.Eng., and Bernard Lee, P.Eng., in light of the information available to it at the time of preparation.

Prospective contractors may be asked to assess the subsurface conditions for soil cuts and dewatering by digging test pits to the intended depth of trench excavation. These test pits should be allowed to remain open for a period of at least 4 hours to assess the trenching conditions and to assess the proper dewatering scheme for the planned excavations.

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LIST OF ABBREVIATIONS AND DESCRIPTION OF TERMS

The abbreviations and terms commonly employed on the borehole logs and figures, and in the text of the report, are as follows:

SAMPLE TYPES

AS	Auger sample
CS	Chunk sample
DO	Drive open (split spoon)
DS	Denison type sample
FS	Foil sample
RC	Rock core (with size and percentage recovery)
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

PENETRATION RESISTANCE

Dynamic Cone Penetration Resistance:

A continuous profile showing the number of blows for each foot of penetration of a 2-inch diameter, 90° point cone driven by a 140-pound hammer falling 30 inches.

Plotted as '—●—'

Standard Penetration Resistance or 'N' Value:

The number of blows of a 140-pound hammer falling 30 inches required to advance a 2-inch O.D. drive open sampler one foot into undisturbed soil.

Plotted as '○'

WH	Sampler advanced by static weight
PH	Sampler advanced by hydraulic pressure
PM	Sampler advanced by manual pressure
NP	No penetration

SOIL DESCRIPTION

Cohesionless Soils:

'N' (blows/ft)	Relative Density
0 to 4	very loose
4 to 10	loose
10 to 30	compact
30 to 50	dense
over 50	very dense

Cohesive Soils:

Undrained Shear Strength (ksf)	'N' (blows/ft)	Consistency
less than 0.25	0 to 2	very soft
0.25 to 0.50	2 to 4	soft
0.50 to 1.0	4 to 8	firm
1.0 to 2.0	8 to 16	stiff
2.0 to 4.0	16 to 32	very stiff
over 4.0	over 32	hard

Method of Determination of Undrained Shear Strength of Cohesive Soils:

x 0.0	Field vane test in borehole; the number denotes the sensitivity to remoulding
△	Laboratory vane test
☐	Compression test in laboratory

For a saturated cohesive soil, the undrained shear strength is taken as one half of the undrained compressive strength

METRIC CONVERSION FACTORS

1 ft = 0.3048 metres
1lb = 0.454 kg
1 inch = 25.4 mm
1ksf = 47.88 kPa

Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE

JOB NO.: 2009-S020

LOG OF BOREHOLE NO.: 1

FIGURE NO.: 1

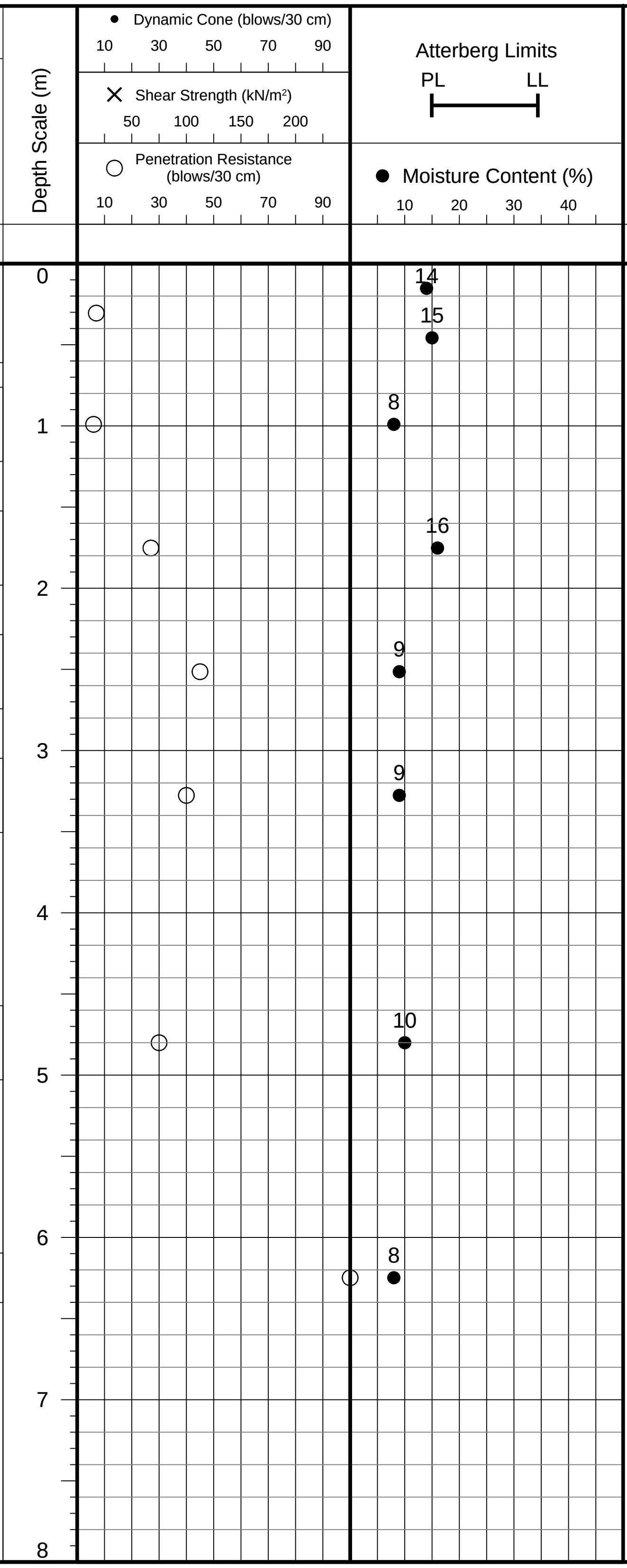
PROJECT DESCRIPTION: Proposed Development

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin (Hillsburgh)

DRILLING DATE: September 23, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	SAMPLES Type	SAMPLES N-Value
465.0 0.0	Ground Surface **30 cm TOPSOIL**	1A	DO	7
	Brown, loose to compact	1B		
	SILT	2	AS	6
	a trace of clay a trace to some sand occ. sand layer weathered	3	DO	27
462.7 2.3	Brown, compact to very dense sand pockets	4	DO	45
		5	DO	40
	SILTY SAND/SILTY SAND TILL a trace of clay a trace of gravel to gravelly occ. clay seams and layers, cobbles, boulders and rock fragments	6	DO	30
	rock fragments	7	DO	50/15
458.6 6.4	**END OF BOREHOLE**			



WATER LEVEL

Dry and open upon completion of the field work

Soil Engineers Ltd.

JOB NO.: 2009-S020

LOG OF BOREHOLE NO.: 10

FIGURE NO.: 10

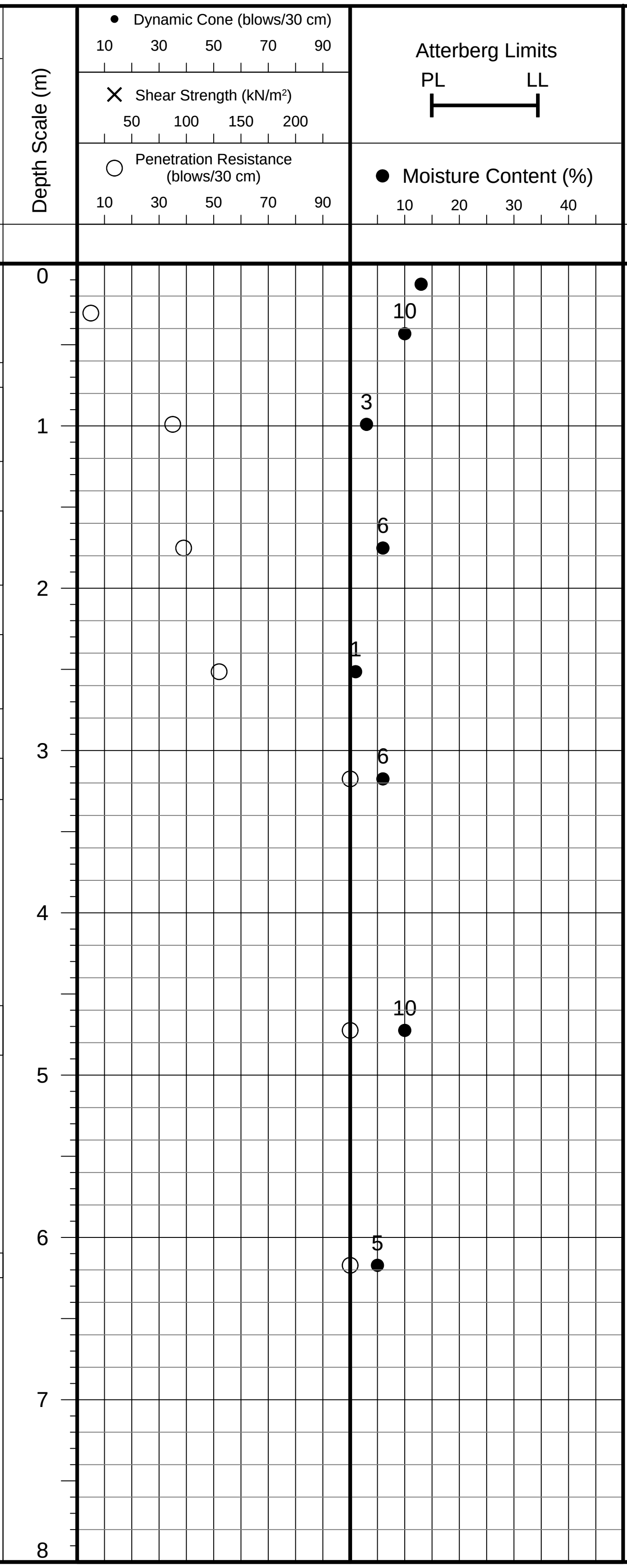
PROJECT DESCRIPTION: Proposed Development

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin (Hillsburgh)

DRILLING DATE: September 23, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES		
		Number	Type	N-Value
466.4	Ground Surface			
0.0	**25 cm TOPSOIL**	1A	DO	5
	Brown, loose to dense	1B		
	weathered			
	SILTY SAND/SILTY SAND TILL	2	DO	35
	a trace of clay a trace of gravel to gravelly occ. clay seams and layers, cobbles and boulders	3	DO	39
464.1 2.3	Brown, very dense **SAND** fine to medium grained a trace of silt	4	DO	52
	rock			
463.4 3.0	Brown, very dense fragments	5	DO	50/10
	SILTY SAND/SILTY SAND TILL			
	a trace of clay a trace of gravel to gravelly occ. clay seams and layers, cobbles and boulders boulder	6	DO	50/15
		7	DO	50/15
460.2 6.2	**END OF BOREHOLE**			



WATER LEVEL

Dry and open upon completion of the field work

JOB NO.: 2009-S020

LOG OF BOREHOLE NO.: 11

FIGURE NO.: 11

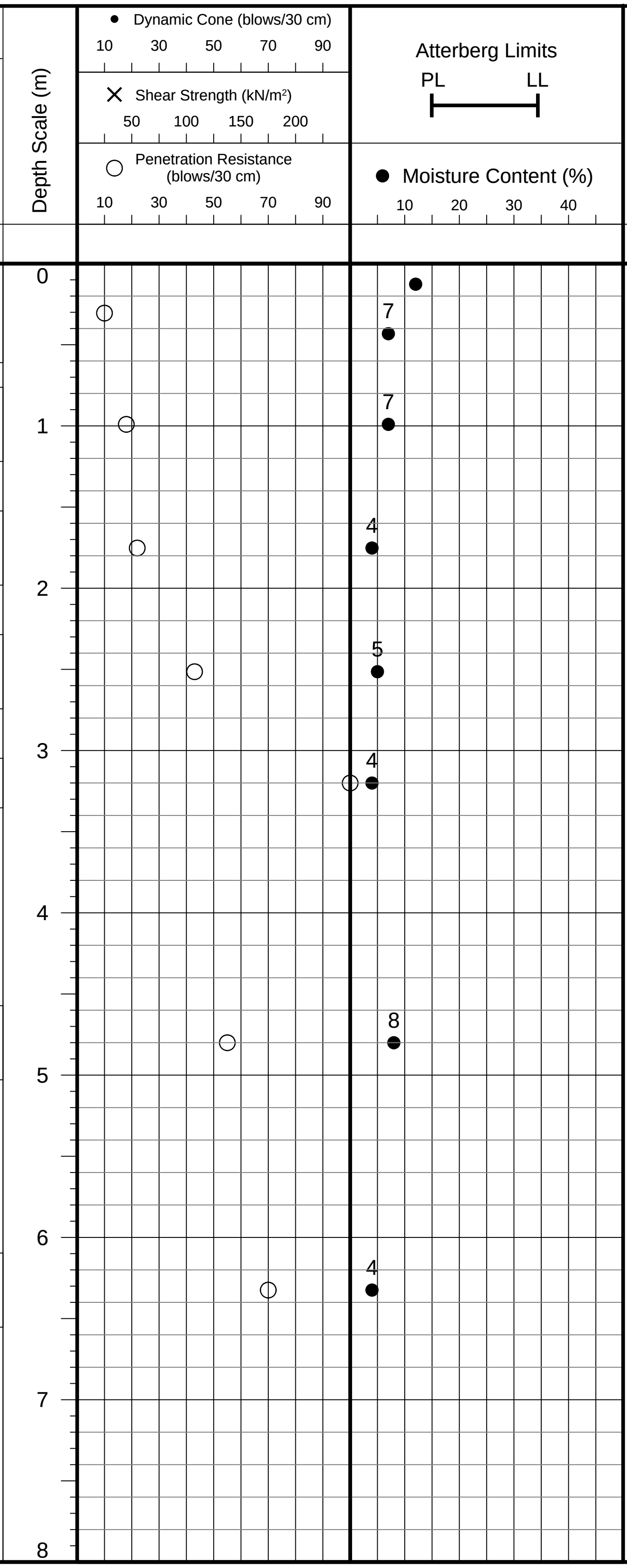
PROJECT DESCRIPTION: Proposed Development

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin (Hillsburgh)

DRILLING DATE: September 23, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	SAMPLES Type	SAMPLES N-Value	Moisture Content (%)	WATER LEVEL
465.2	Ground Surface					
0.0	**25 cm TOPSOIL**	1A	DO	10		Dry and open upon completion of the field work
	Brown, compact to very dense	1B			7	
	weathered					
		2	DO	18	7	
		3	DO	22	4	
	SILTY SAND/SILTY SAND TILL					
	rock fragments	4	DO	43	5	
	rock fragments	5	DO	50/15	4	
	a trace of clay a trace of gravel to gravelly occ. clay seams and layers, cobbles and boulders					
		6	DO	55	8	
459.1 6.1	Brown, very dense **SAND** fine to medium grained some silt, a trace of gravel	7	DO	70	4	
458.6 6.6	**END OF BOREHOLE**					



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JOB NO.: 2009-S020

LOG OF BOREHOLE NO.: 12

FIGURE NO.: 12

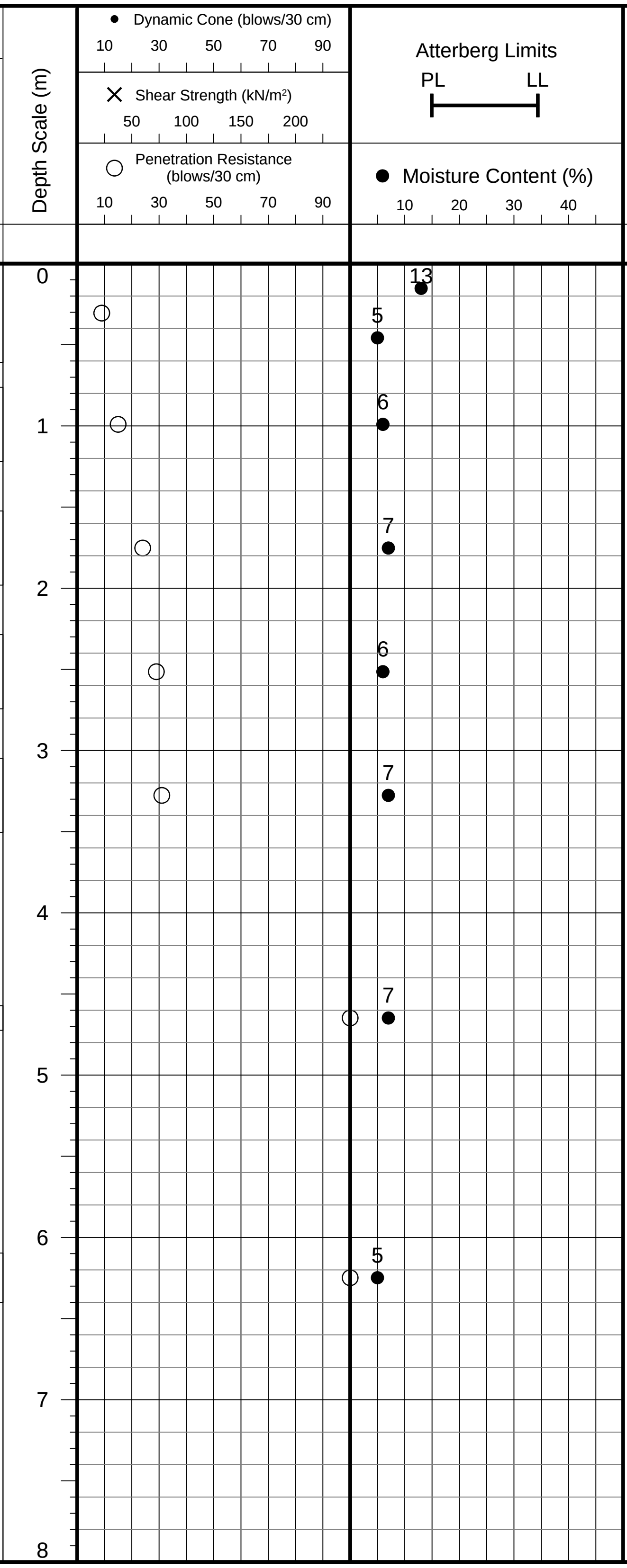
PROJECT DESCRIPTION: Proposed Development

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin (Hillsburgh)

DRILLING DATE: September 23, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	SAMPLES Type	SAMPLES N-Value	WATER LEVEL
460.7	Ground Surface				
0.0	**30 cm TOPSOIL**	1A	DO	9	Dry and open upon completion of the field work
	Brown, loose to very dense weathered **SILTY SAND/SILTY SAND TILL** a trace of clay a trace of gravel to gravelly occ. clay seams and layers, cobbles and boulders	1B			
		2	DO	15	
		3	DO	24	
		4	DO	29	
		5	DO	31	
		6	DO	50/15	
454.6 6.1	Brown, very dense **SAND** fine to medium grained a trace of silt	7	DO	50/15	
454.3 6.4	**END OF BOREHOLE**				



Soil Engineers Ltd.

JOB NO.: 2009-S020

LOG OF BOREHOLE NO.: 2

FIGURE NO.: 2

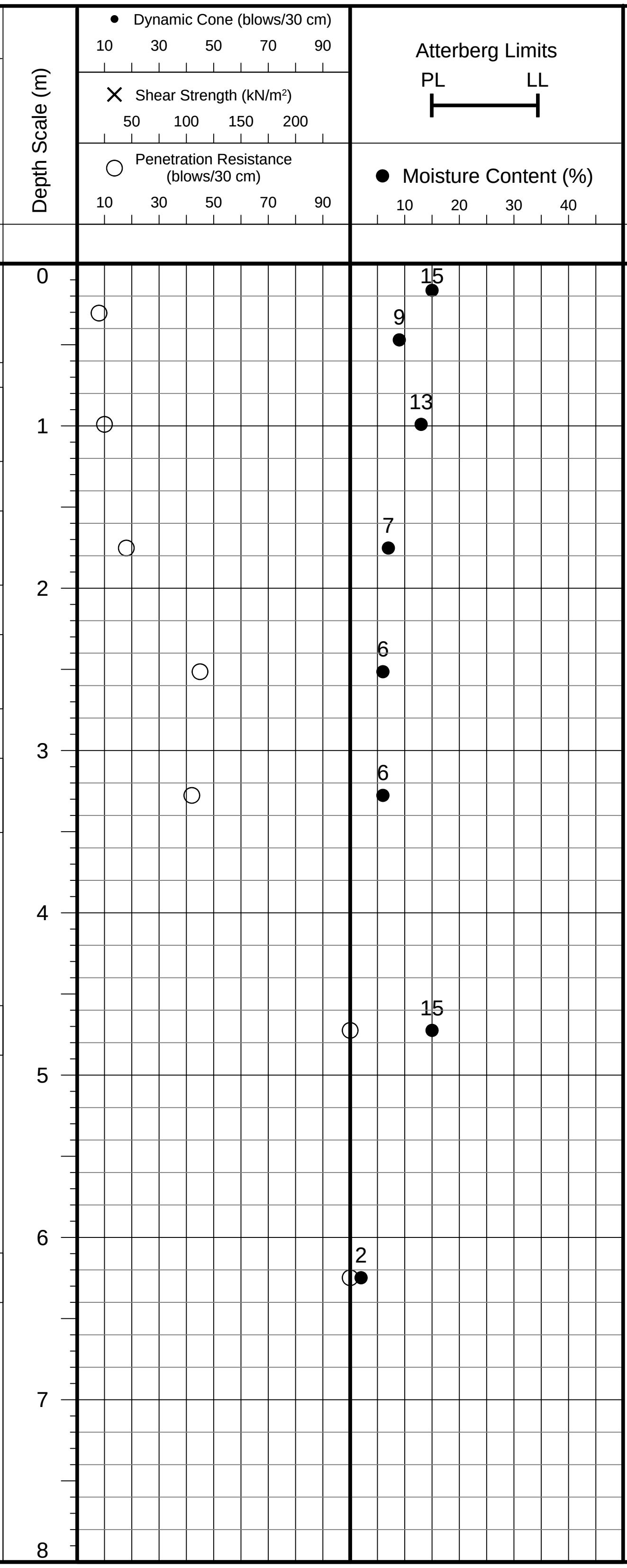
PROJECT DESCRIPTION: Proposed Development

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin (Hillsburgh)

DRILLING DATE: September 23, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	SAMPLES Type	SAMPLES N-Value	WATER LEVEL
462.0 0.0	Ground Surface **33 cm TOPSOIL**	1A	DO	8	Dry and open upon completion of the field work
	Brown, loose to compact, weathered **SILT** traces to some sand and clay occ. clay layer	1B			
		2	DO	10	
460.5 1.5	Brown, compact to very dense weathered	3	DO	18	
	rock fragments	4	DO	45	
	SILTY SAND/SILTY SAND TILL rock fragments	5	DO	42	
	a trace of clay a trace of gravel to gravelly occ. clay seams and layers, cobbles, boulders and rock fragments	6	DO	50/15	
455.9 6.1	Brown, very dense **SAND** fine to medium grained, a trace of silt	7	DO	50/15	
455.6 6.4	**END OF BOREHOLE**				



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JOB NO.: 2009-S020

LOG OF BOREHOLE NO.: 3

FIGURE NO.: 3

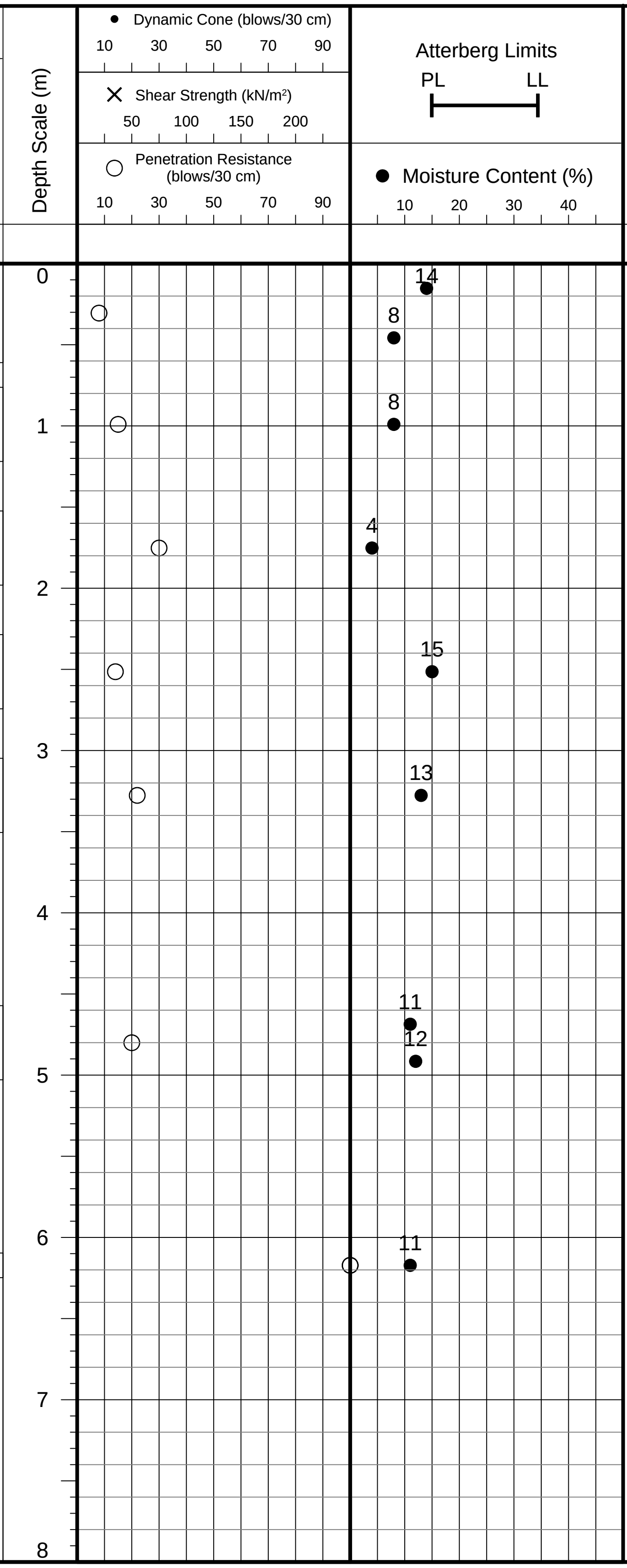
PROJECT DESCRIPTION: Proposed Development

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin (Hillsburgh)

DRILLING DATE: September 22, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	SAMPLES Type	SAMPLES N-Value
472.0	Ground Surface			
0.0	**30 cm TOPSOIL**	1A	DO	8
	Brown, loose, weathered **SAND** fine to medium grained a trace to some silt	1B		
471.2 0.8	Brown, compact to dense **SILTY SAND/SILTY SAND TILL** weathered a trace of clay a trace of gravel to gravelly occ. clay seams and layers, cobbles and boulders	2	DO	15
		3	DO	30
469.7 2.3	Brown, compact **SAND** fine to mediuim grained a trace to some silt occ. silt layers	4	DO	14
		5	DO	22
467.4 4.6	Brown, compact to very dense **SILTY SAND/SILTY SAND TILL** a trace of clay a trace of gravel to gravelly occ. clay seams and layers, cobbles and boulders	6A	DO	20
		6B		
		7	DO	50/15
465.8 6.2	**END OF BOREHOLE**			



WATER LEVEL: Dry and open upon completion of the field work

Soil Engineers Ltd.

JOB NO.: 2009-S020

LOG OF BOREHOLE NO.: 4

FIGURE NO.: 4

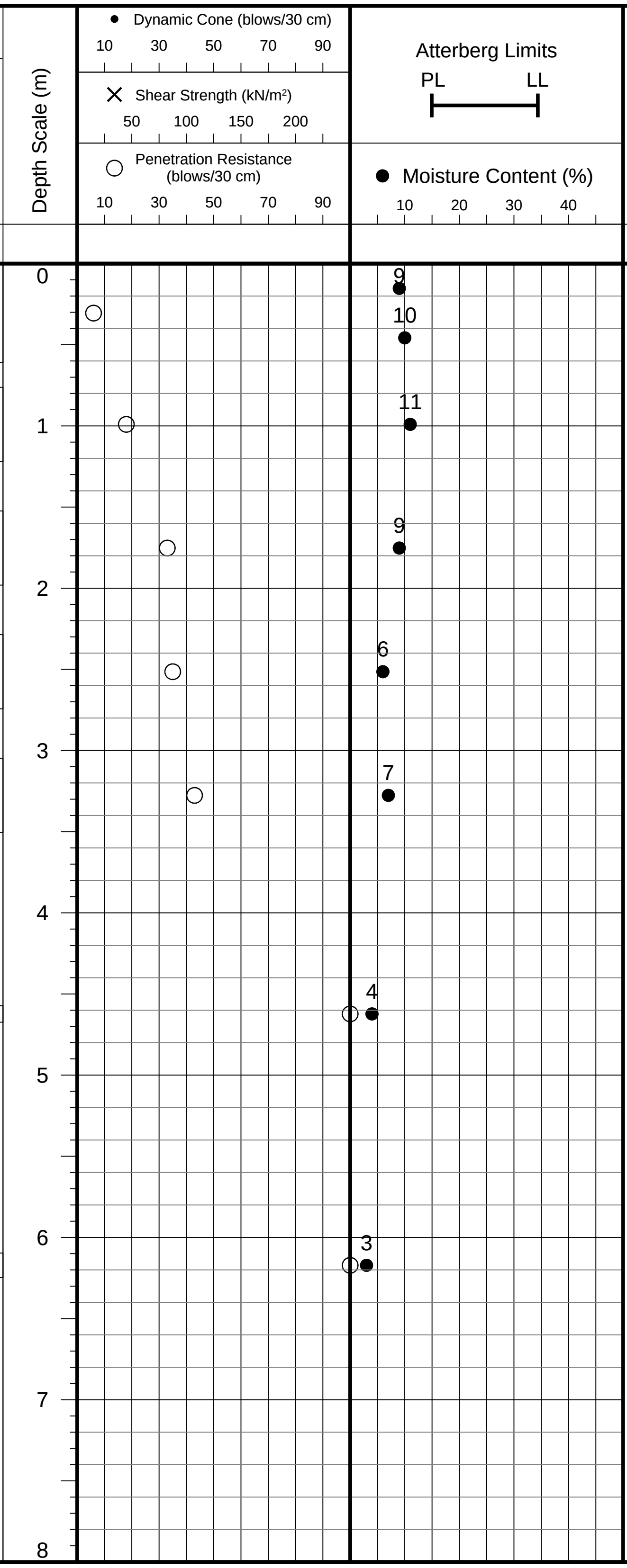
PROJECT DESCRIPTION: Proposed Development

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin (Hillsburgh)

DRILLING DATE: September 22, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	SAMPLES Type	SAMPLES N-Value	WATER LEVEL
469.6	Ground Surface				
0.0	**30 cm TOPSOIL**	1A 1B	DO	6	Dry and open upon completion of the field work
	Brown, loose to dense weathered clay layers **SILTY SAND/SILTY SAND TILL** a trace of clay a trace of gravel to gravelly occ. clay seams and layers, cobbles and boulders	2 3	DO DO	18 33	
467.2 2.4	Brown, dense **SAND** fine to medium grained a trace to some silt	4 5	DO DO	35 43	
466.2 3.4	Brown, very dense **SILTY SAND/SILTY SAND TILL** rock fragments a trace of clay a trace of gravel to gravelly occ. clay seams and layers, cobbles, boulders and rock fragments	6 7	DO DO	50/10 55/15	
463.4 6.2	**END OF BOREHOLE**				



Soil Engineers Ltd.

JOB NO.: 2009-S020

LOG OF BOREHOLE NO.: 5

FIGURE NO.: 5

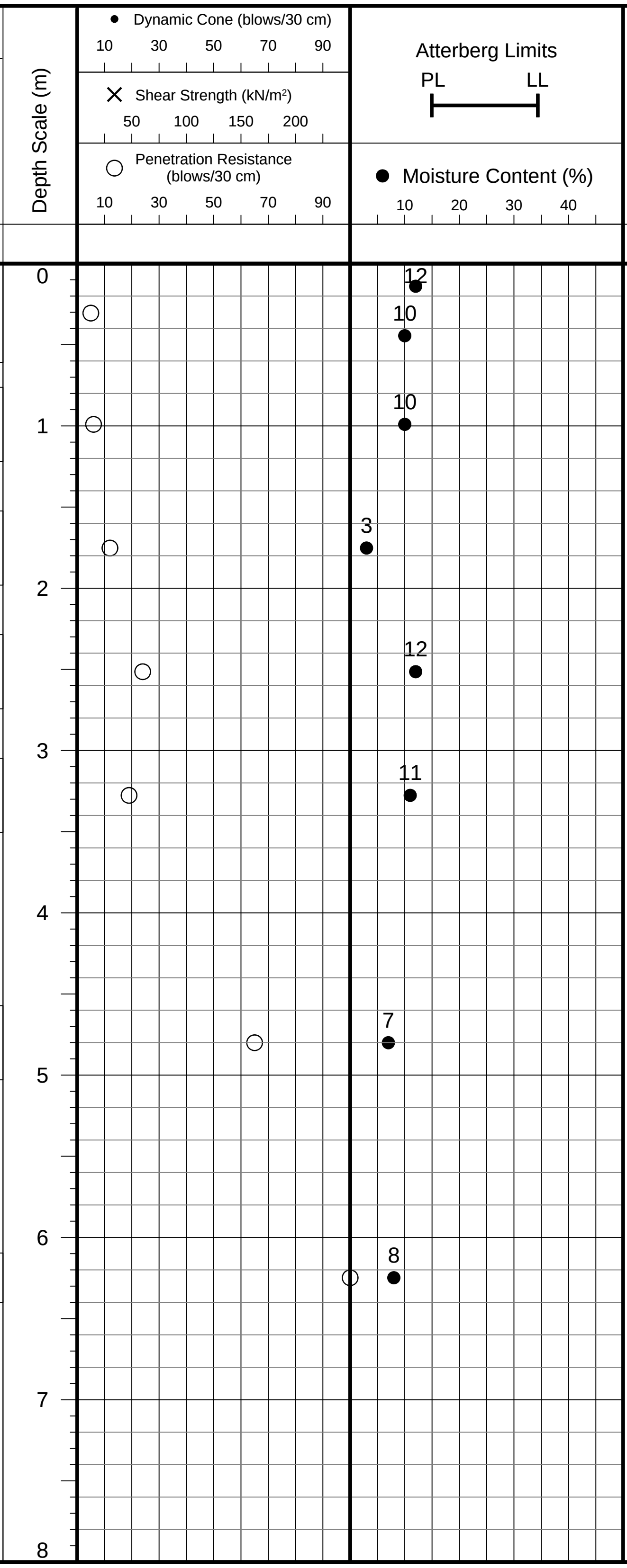
PROJECT DESCRIPTION: Proposed Development

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin (Hillsburgh)

DRILLING DATE: September 22, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	SAMPLES Type	SAMPLES N-Value	Moisture Content (%)	WATER LEVEL
476.0	Ground Surface					
0.0	**28 cm TOPSOIL**	1A	DO	5	12	Dry and open upon completion of the field work
	Brown, loose, weathered **SILTY SAND/SILTY SAND TILL** a trace of clay a trace of gravel to gravelly occ. clay seams and layers, cobbles and boulders	1B			10	
		2	DO	6	10	
474.5 1.5	Brown, compact **SAND** fine to medium grained a trace to some silt silt layers	3	DO	12	3	
		4	DO	24	12	
473.0 3.0	Brown, compact to very dense **SILTY SAND/SILTY SAND TILL** a trace of clay a trace of gravel to gravelly occ. clay seams and layers, cobbles and boulders	5	DO	19	11	
		6	DO	65	7	
		7	DO	50/15	8	
469.6 6.4	**END OF BOREHOLE**					



Soil Engineers Ltd.

JOB NO.: 2009-S020

LOG OF BOREHOLE NO.: 6

FIGURE NO.: 6

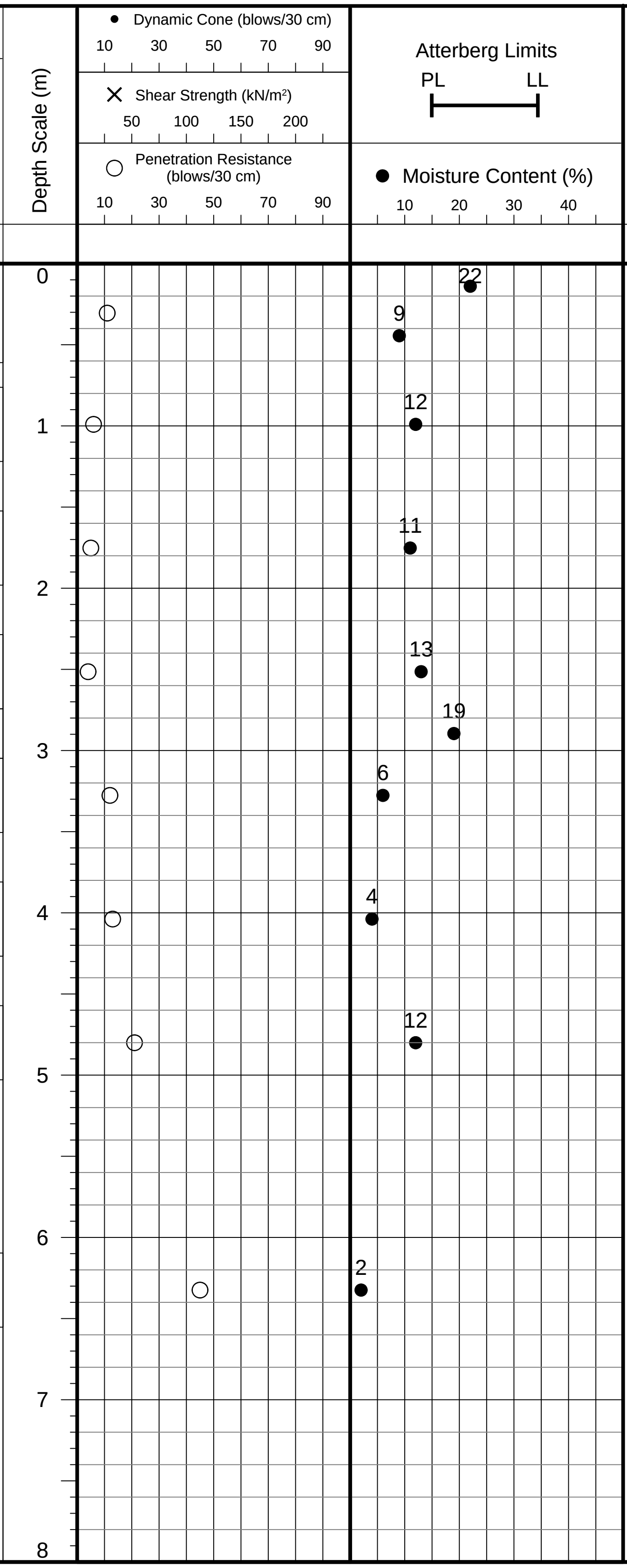
PROJECT DESCRIPTION: Proposed Development

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin (Hillsburgh)

DRILLING DATE: September 22, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
462.4	Ground Surface			
0.0	**28 cm TOPSOIL**	1A	DO	11
	Brown **EARTH FILL** **(Silty Sand)** with organic inclusions	1B		
		2	DO	6
460.9 1.5	Dark brown **TOPSOIL FILL** sandy	3	DO	5
		4	DO	4
		5	AS	-
459.4 3.0	Brown, compact to dense silty sand till layer **SAND** fine to medium grained a trace of silt	6	DO	12
		7	DO	13
		8	DO	21
		9	DO	45
455.8 6.6	**END OF BOREHOLE**			



WATER LEVEL

Dry and open upon completion of the field work

JOB NO.: 2009-S020

LOG OF BOREHOLE NO.: 7

FIGURE NO.: 7

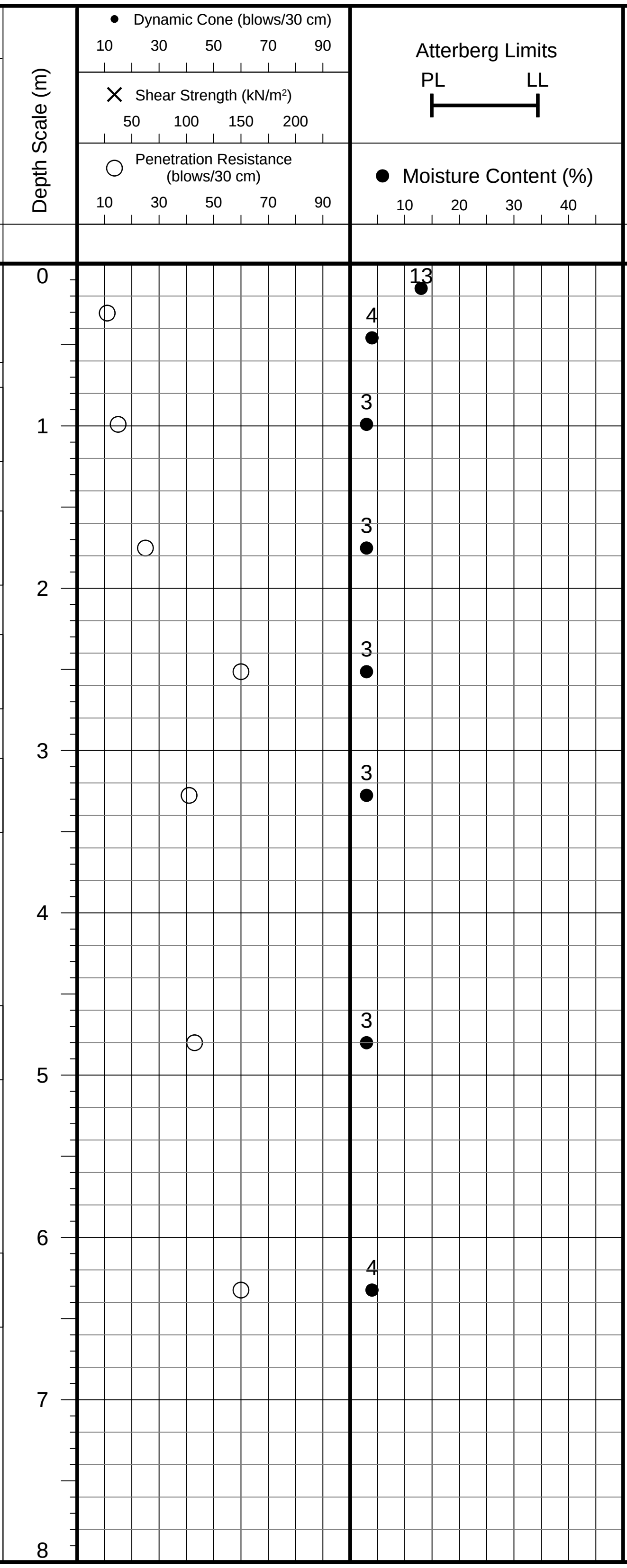
PROJECT DESCRIPTION: Proposed Development

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin (Hillsburgh)

DRILLING DATE: September 22, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES		
		Number	Type	N-Value
477.9	Ground Surface			
0.0	**30 cm TOPSOIL**	1A	DO	11
	rock fragments			
	Brown, compact to very dense	1B		
	weathered silty sand till layer	2	DO	15
		3	DO	25
	SAND	4	DO	60
		5	DO	41
	fine to medium grained a trace of silt occ. gravel			
		6	DO	43
		7	DO	60
471.3 6.6	**END OF BOREHOLE**			



WATER LEVEL

Dry and open upon completion of the field work

Soil Engineers Ltd.

JOB NO.: 2009-S020

LOG OF BOREHOLE NO.: 8

FIGURE NO.: 8

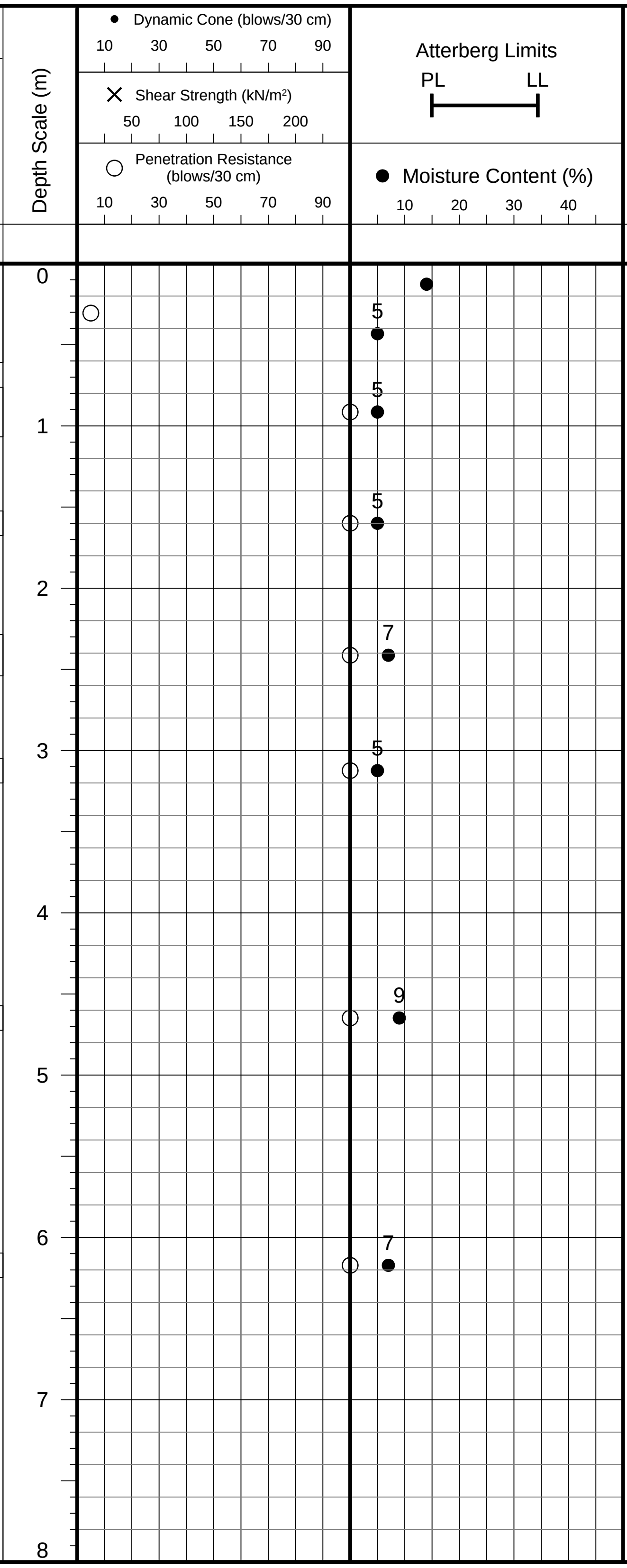
PROJECT DESCRIPTION: Proposed Development

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin (Hillsburgh)

DRILLING DATE: September 22, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	SAMPLES Type	SAMPLES N-Value
464.4	Ground Surface			
0.0	**25 cm TOPSOIL**	1A	DO	5
	Brown, loose, weathered **SAND** fine to medium grained a trace to some silt	1B		
463.6 0.8	Brown, very dense boulder	2	DO	50/15
	rock fragments	3	DO	50/15
	SILTY SAND/SILTY SAND TILL rock fragments	4	DO	50/10
	a trace of clay a trace of gravel to gravelly occ. sand seams and layers, cobbles and boulders	5	DO	60/15
	silt layers	6	DO	50/15
		7	DO	50/15
458.2 6.2	**END OF BOREHOLE**			



WATER LEVEL

Dry and open upon completion of the field work

Soil Engineers Ltd.

JOB NO.: 2009-S020

LOG OF BOREHOLE NO.: 9

FIGURE NO.: 9

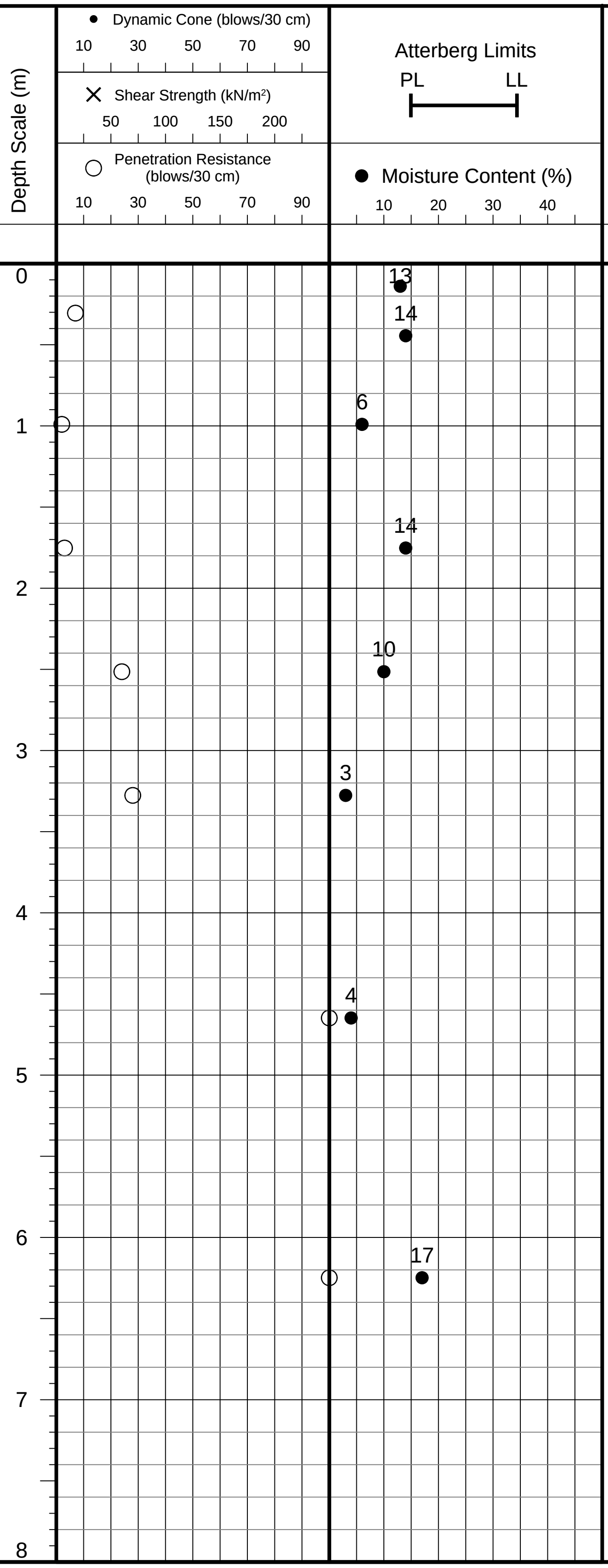
PROJECT DESCRIPTION: Proposed Development

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin (Hillsburgh)

DRILLING DATE: September 23, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	WATER LEVEL
469.6	Ground Surface				
0.0	**28 cm TOPSOIL**	1A	DO	7	Dry and open upon completion of the field work
	Brown, very loose to loose, weathered **SAND** fine to medium grained a trace to some silt	1B			
		2	DO	2	
468.1 1.5	Brown, very loose to compact **SILTY SAND/SILTY SAND TILL** weathered a trace of clay a trace of gravel to gravelly occ. sand seams and layers, cobbles and boulders	3	DO	3	
		4	DO	24	
466.6 3.0	Brown, compact to very dense **SAND** gravelly/rock fragments fine to medium grained a trace to some silt a trace to some gravel silt and clay layers	5	DO	28	
		6	DO	50/15	
		7	DO	60/15	
463.2 6.4	**END OF BOREHOLE**				



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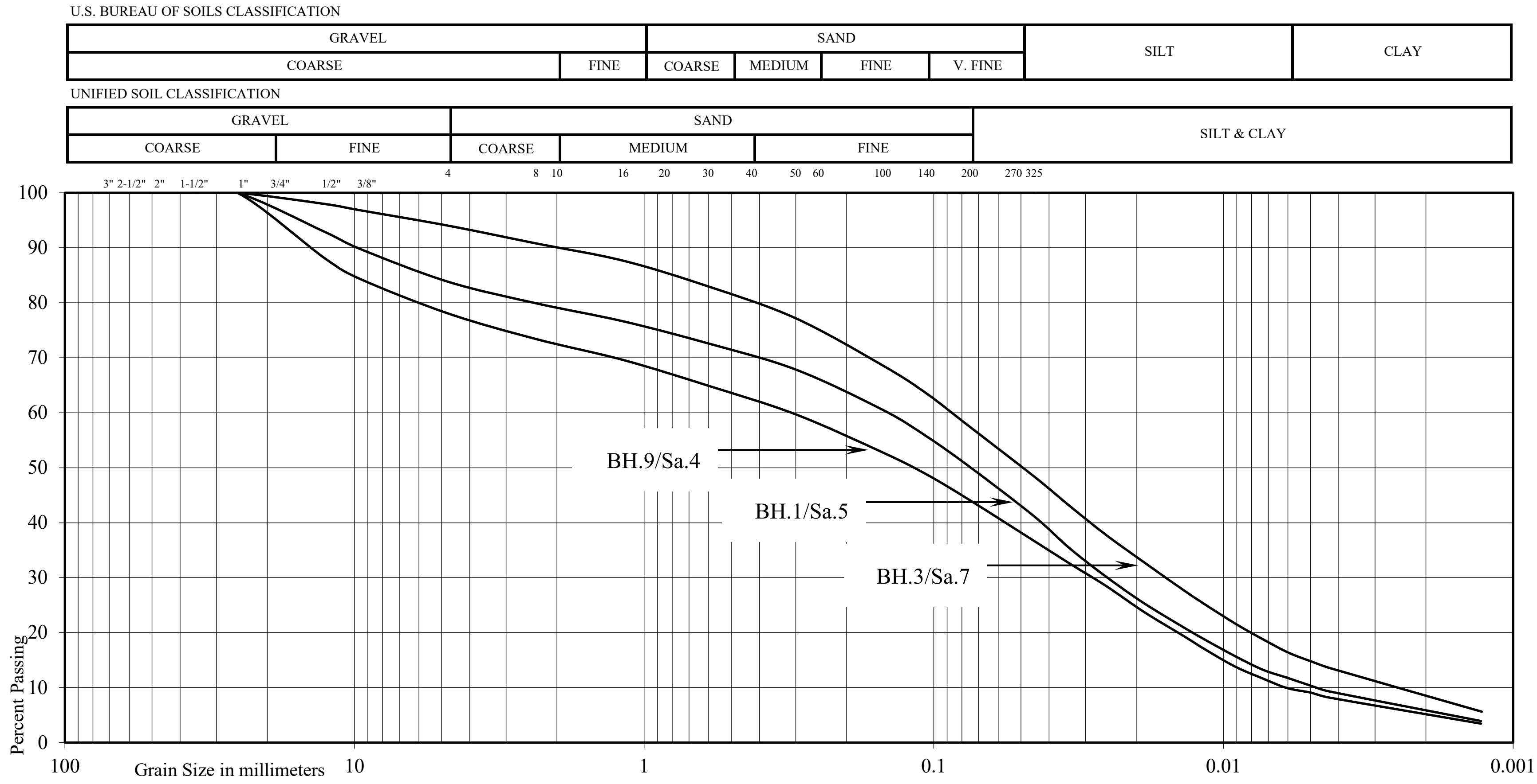
GRAIN SIZE DISTRIBUTION

Reference No: 2009-S020



Project: Proposed Development

Location: 5916 Trafalgar Road North, Town of Erin (Hillsburgh)

Borehole No:	1	3	9
Sample No:	5	7	4
Depth (m):	3.3	6.2	2.5
Elevation (m):	461.7	465.8	467.1

BH./Sa.	1/5	3/7	9/4
Liquid Limit (%) =	-	-	-
Plastic Limit (%) =	-	-	-
Plasticity Index (%) =	-	-	-
Moisture Content (%) =	9	11	10
Estimated Permeability (cm./sec.) =	10^{-6}	10^{-6}	10^{-5}

Classification of Sample [& Group Symbol]: SANDY SILT TILL, a trace to some gravel to gravelly, a trace of clay

Figure: 13

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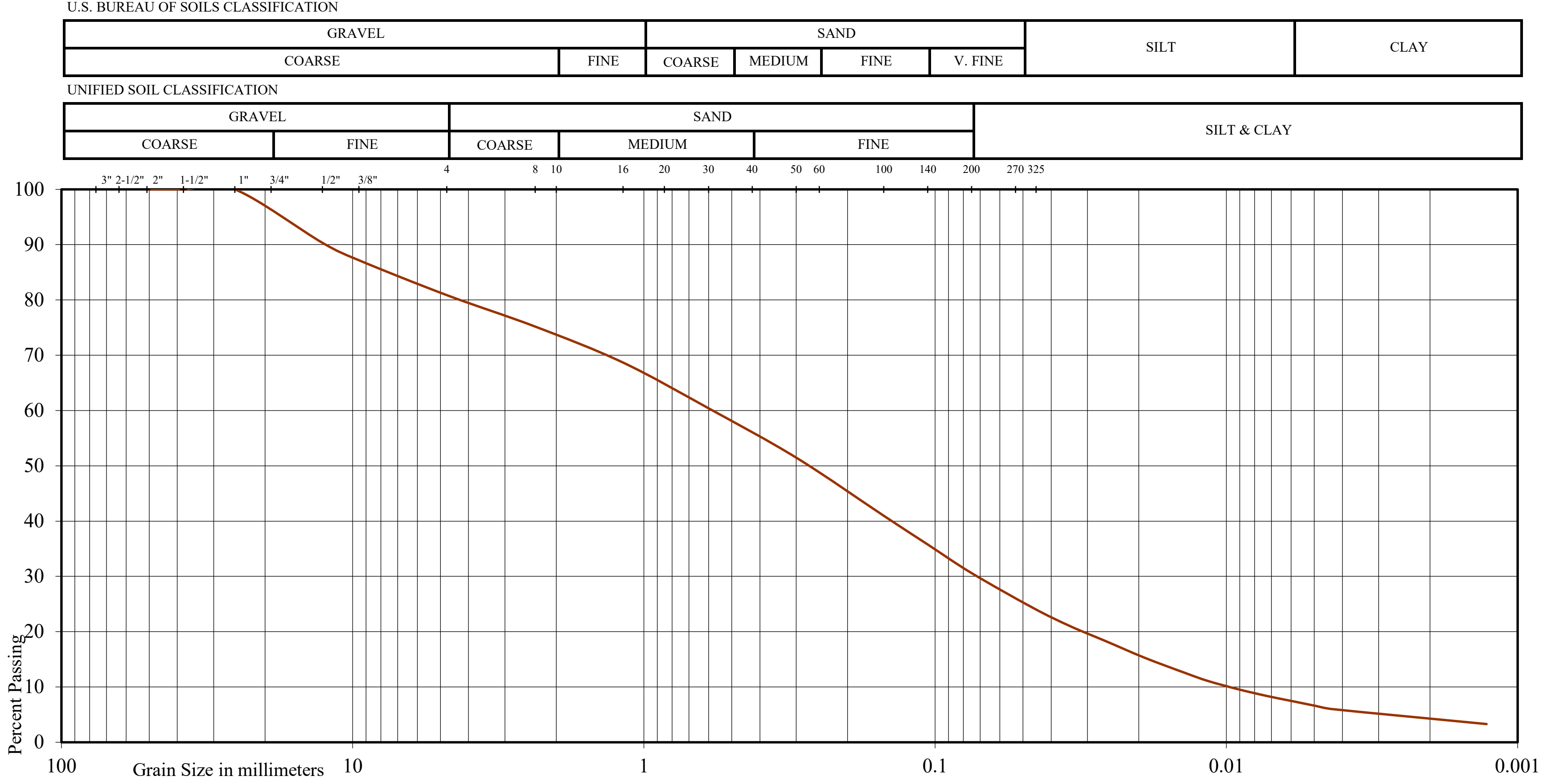
GRAIN SIZE DISTRIBUTION

Reference No: 2009-S020



Project: Proposed Development

Location: 5916 Trafalgar Road North, Town of Erin (Hillsburgh)

Liquid Limit (%) = -

Plastic Limit (%) = -

Borehole No: 12

Plasticity Index (%) = -

Sample No: 3

Moisture Content (%) = 7

Depth (m): 1.8

Estimated Permeability

Elevation (m): 458.9

(cm./sec.) = 10^{-5}

Classification of Sample [& Group Symbol]: SILTY SAND TILL, some gravel, a trace of clay

Figure: 14

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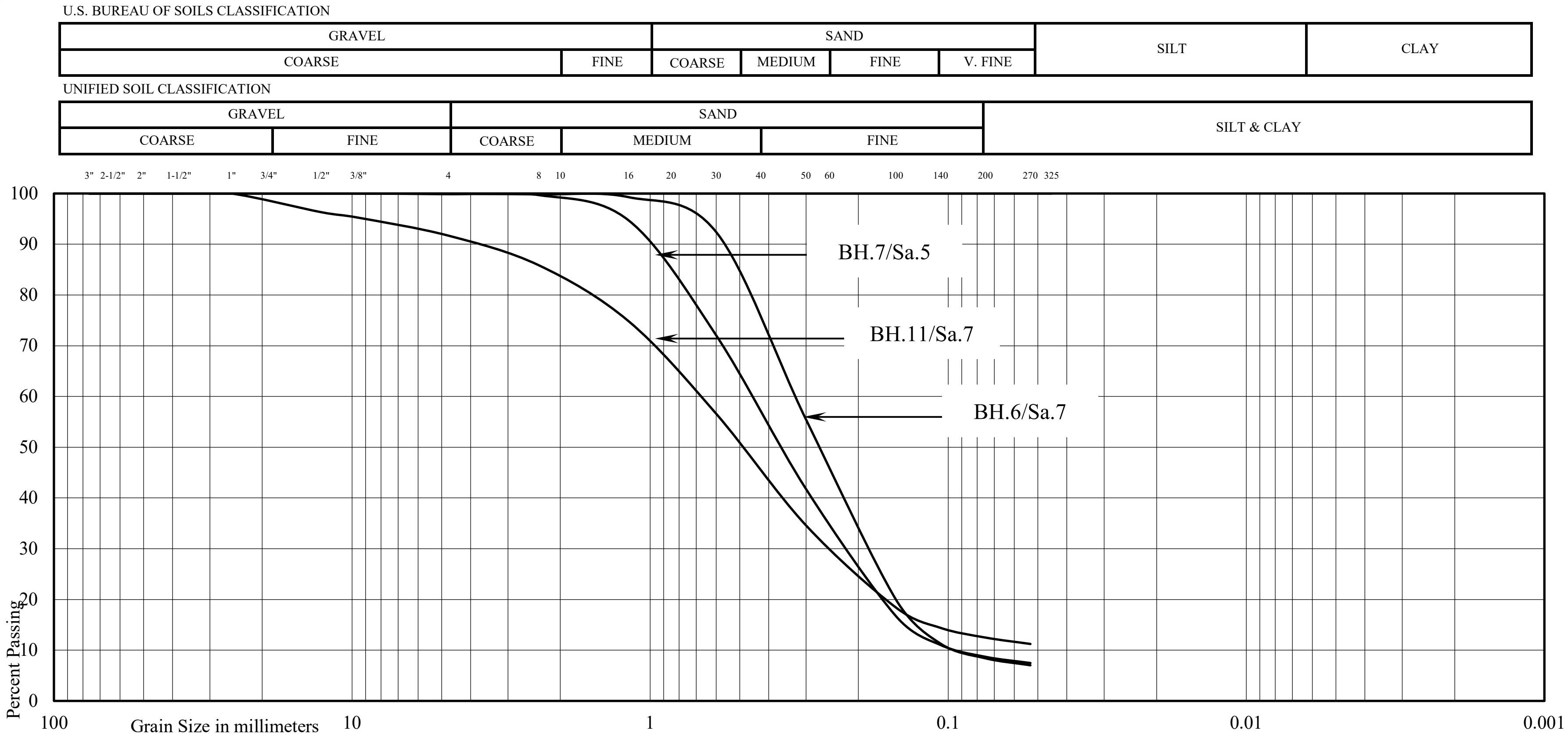
GRAIN SIZE DISTRIBUTION

Reference No: 2009-S020



Project: Proposed Development

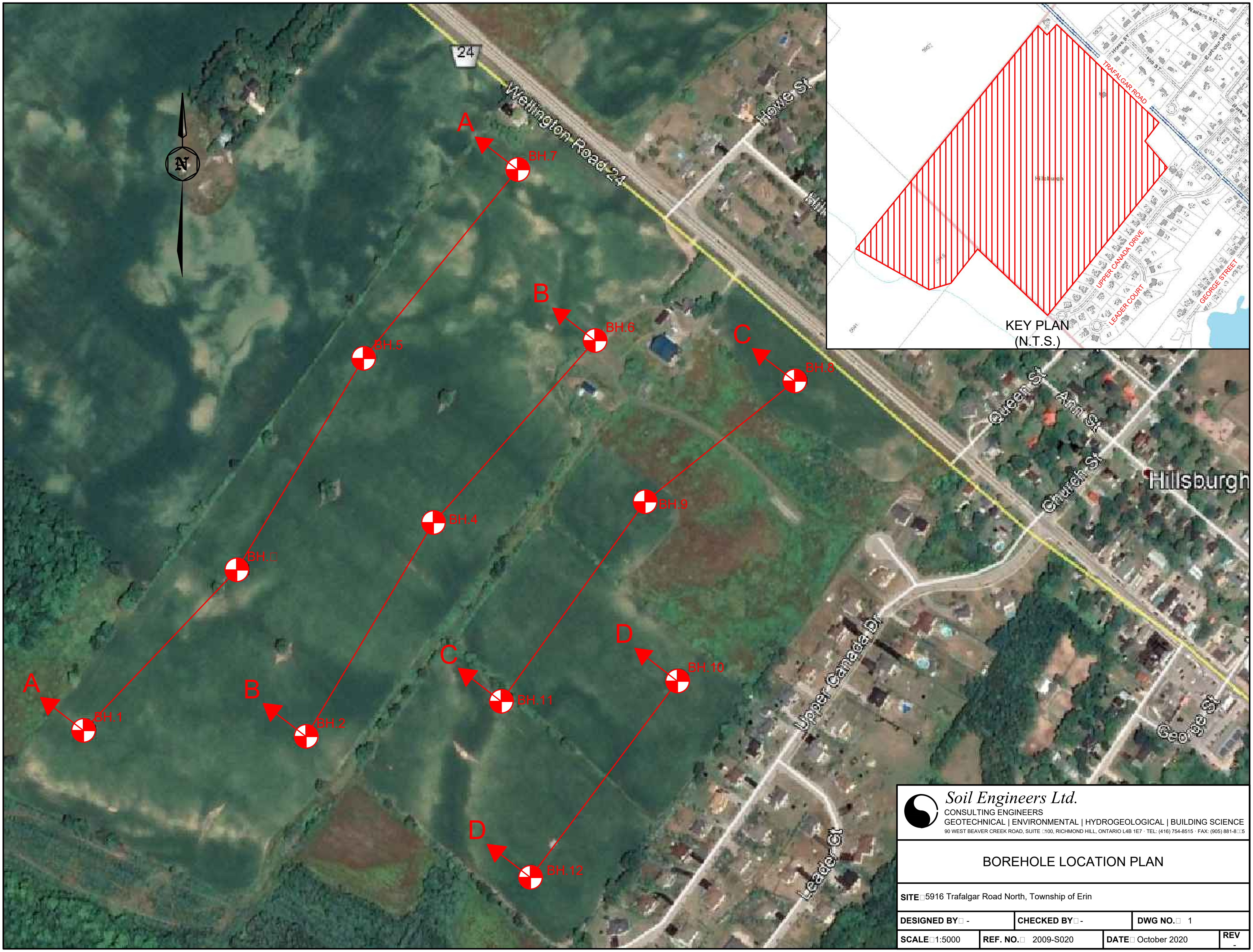
Location: 5916 Trafalgar Road North, Town of Erin (Hillsburgh)

Borehole No:	6	7	11
Sample No:	7	5	7
Depth (m):	4.0	1.8	6.3
Elevation (m):	458.4	476.1	458.9

BH./Sa.	6/7	7/5	11/7
Liquid Limit (%) =	-	-	-
Plastic Limit (%) =	-	-	-
Plasticity Index (%) =	-	-	-
Moisture Content (%) =	4	3	4
Estimated Permeability (cm./sec.) =	10^{-2}	10^{-2}	10^{-3}

Classification of Sample [& Group Symbol]: FINE TO MEDIUM SAND, a trace to some silt, traces of coarse sand and gravel

Figure: 15



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90 WEST BEAVER CREEK ROAD, SUITE □100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8□□5

BOREHOLE LOCATION PLAN

SITE□5916 Trafalgar Road North, Township of Erin

DESIGNED BY□ -
CHECKED BY□ -
DWG NO.□ 1
SCALE□1:5000
REF. NO.□ 2009-S020
DATE□ October 2020
REV -

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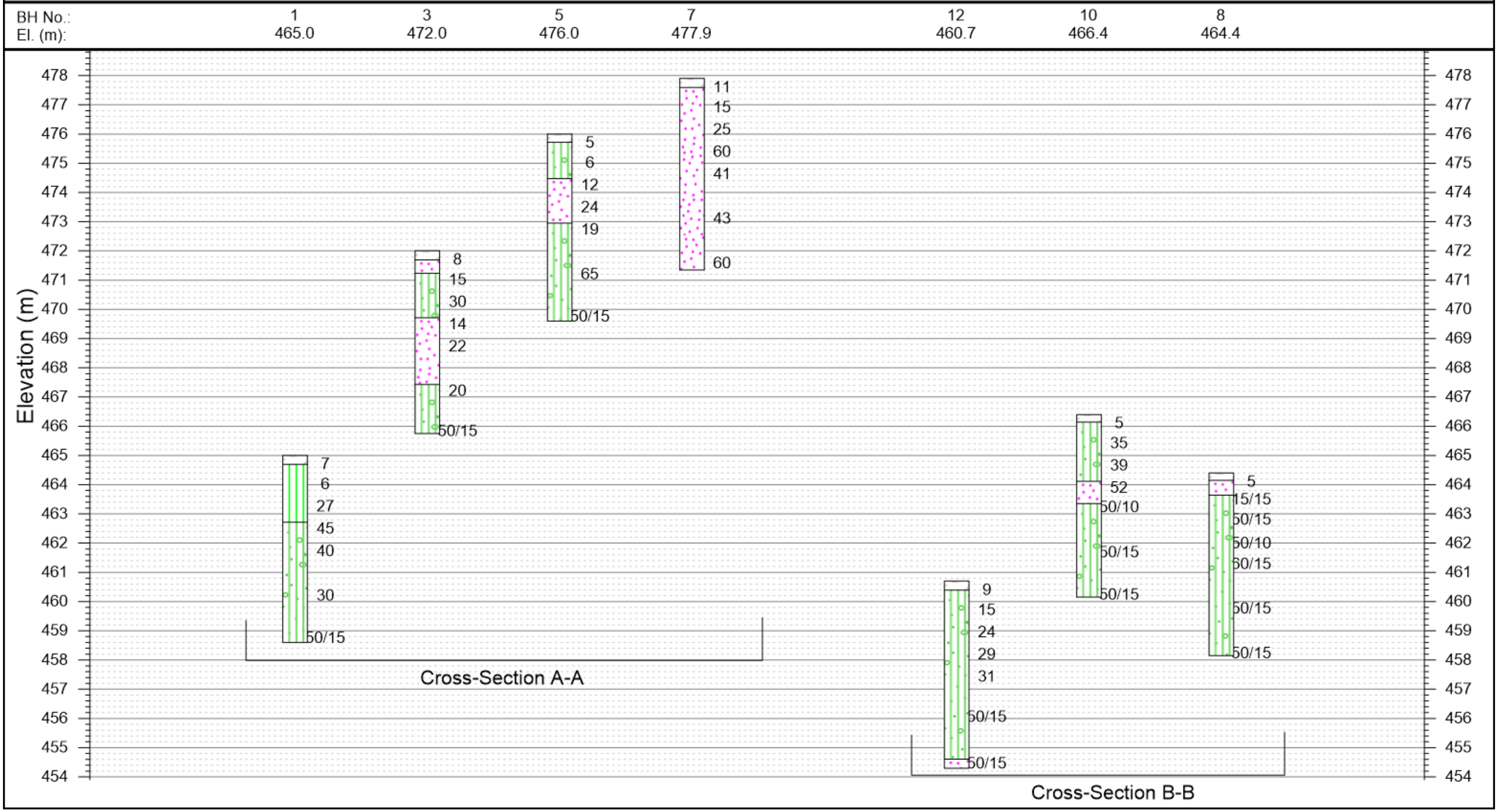
SUBSURFACE PROFILE
DRAWING NO. 2
SCALE: AS SHOWN

JOB NO.: 2009-S020
REPORT DATE: October 2020
PROJECT DESCRIPTION: Proposed Development
PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin (Hillsburgh)

LEGEND

▨ TOPSOIL ▨ SAND ▨ SANDY SILT/SILTY SAND TILL ▨ SILT



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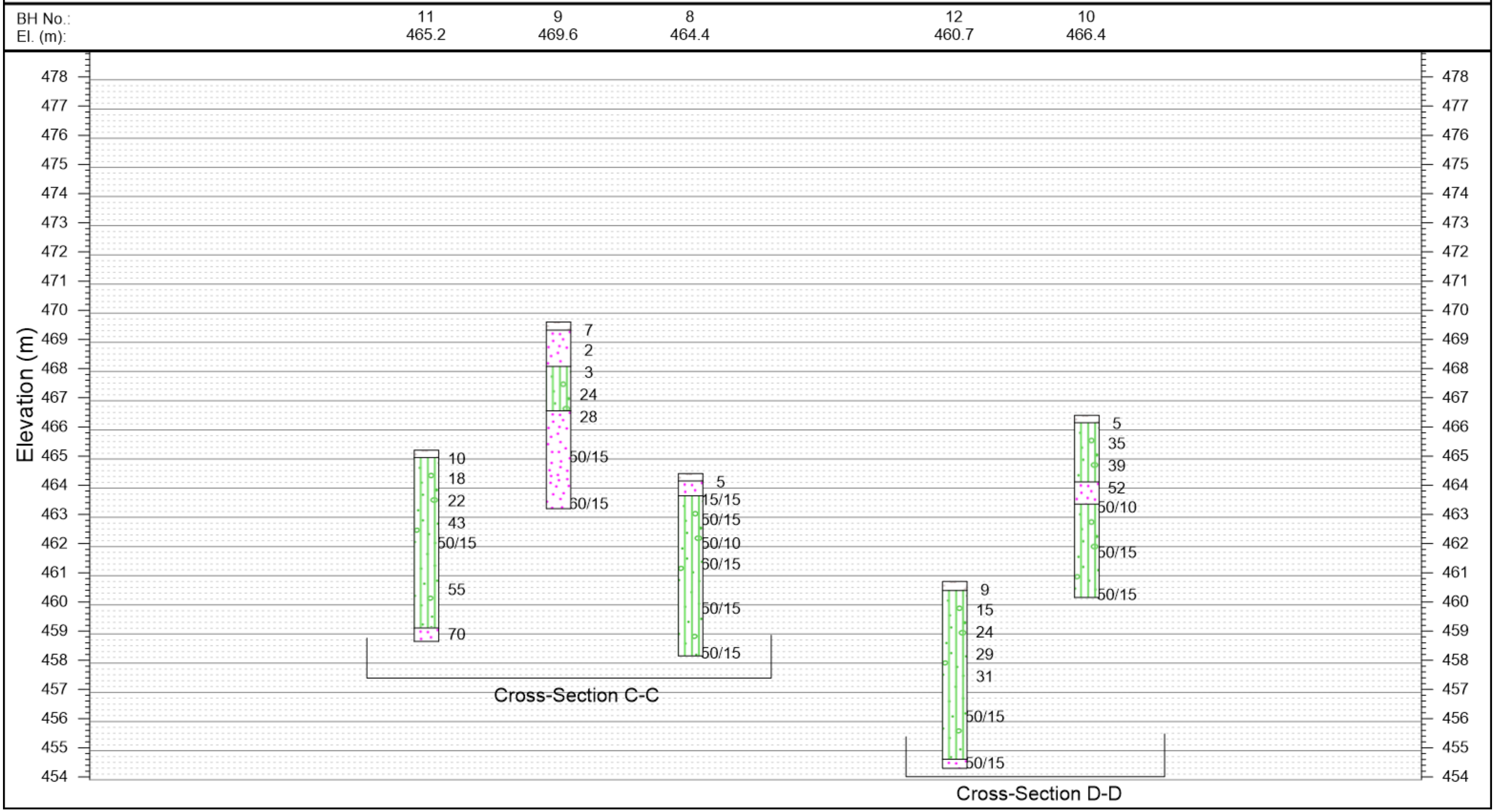
SUBSURFACE PROFILE
DRAWING NO. 3
SCALE: AS SHOWN

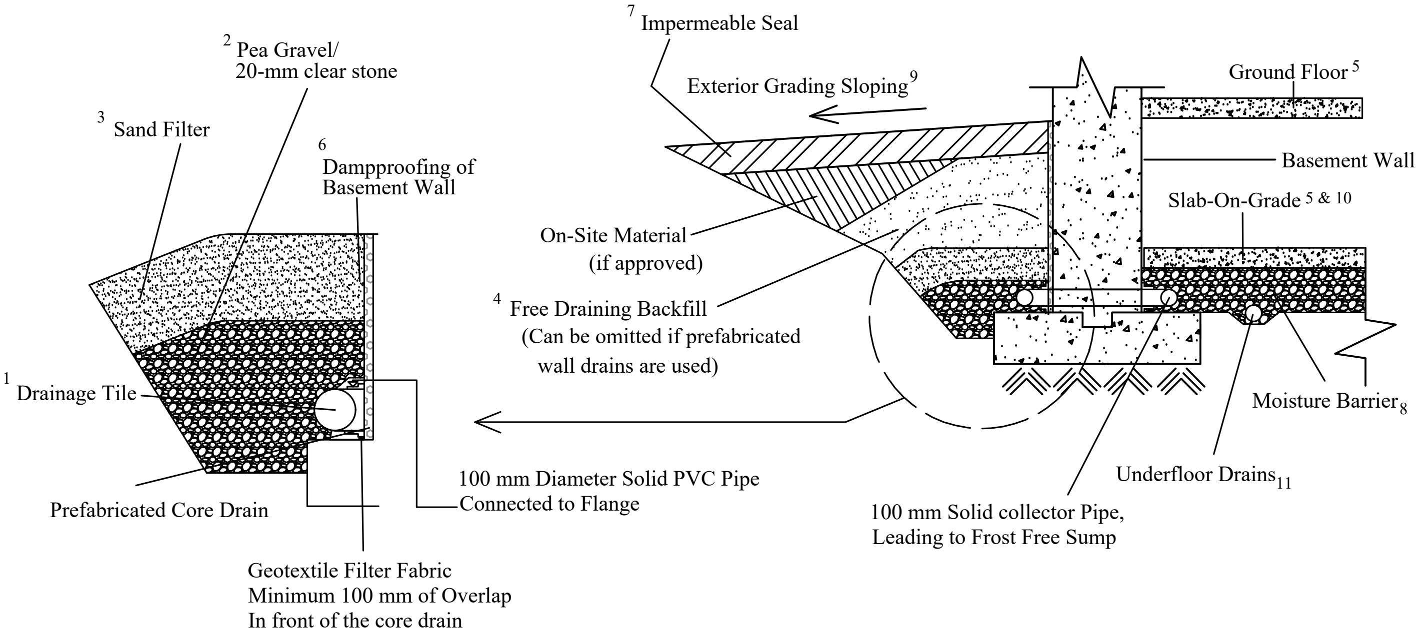
JOB NO.: 2009-S020
REPORT DATE: October 2020
PROJECT DESCRIPTION: Proposed Development

PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin (Hillsburgh)

LEGEND

▨ TOPSOIL ▨ SAND ▨ SANDY SILT/SILTY SAND TILL





NOTES:

1. **Drainage tile**: consists of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. Invert to be at minimum of 150 mm (6") below underside of basement floor slab.

2. **Pea gravel**: at 150 mm (6") on the top and sides of drain. If drain is not placed on concrete footing, provide 100 mm (4") of pea gravel below drain. The pea gravel may be replaced by 20 mm clear stone provided that the drain is covered by a porous geotextile membrane of Terrafix 270R or equivalent.

3. **Filter material**: consists of C.S.A. fine concrete aggregate. A minimum of 300 mm (12") on the top and sides of gravel. This may be replaced by an approved porous geotextile membrane of Terrafix 270R or equivalent.

4. **Free-draining backfill**: OPSS Granular 'B' or equivalent, compacted to 95% to 98% (maximum) Standard Proctor dry density. Do not compact closer than 1.8 m (6') from wall with heavy equipment. This may be replaced by on-site material if prefabricated wall drains (Miradrain) extending from the finished grade to the bottom of the basement wall are used.

5. **Do not backfill** until the wall is supported by the basement floor slab and ground floor framing, or adquate bracing.

6. **Dampproofing** of the basement wall is required before backfilling

7. **Impermeable backfill seal** of compacted clay, clayey silt or equivalent. If the original soil in the vicinity is a free-draining sand, the seal may be omitted.

8. **Moisture barrier**: 20-mm clear stone or compacted OPSS Granular 'A', or equivalent. The thickness of this layer should be 150 mm (6") minimum.

9. **Exterior Grade**: slope away from basement wall on all the sides of the building.

10. **Slab-On-Grade** should not be structurally connected to walls or foundations.

11. **Underfloor drains*** should be placed in parallel rows at 6 to 8 m (20'-25') centre, on 100 mm (4") of pea gravel with 150 mm (6") of pea gravel on top and sides. The invert should be at least 300 mm (12") below the underside of the floor slab. The drains should be connected to positive sumps or outlets. Do not connect the underfloor drains to the perimeter drains.

*Underfloor drains can be deleted where not required.

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90 WEST BEAVER CREEK, SUITE 100, RICHMOND HILL, ONTARIO · TEL: (416) 754-8515 · FAX: (416) 754-8516

Details of Perimeter Drainage System

SITE 5916 Trafalgar Road North, Township of Erin

DESIGNED BY K.L. | **CHECKED BY** B.S. | **DWG NO.** 4

SCALE N.T.S. | **REF. NO.** 2009-S020 | **DATE** October 2020 | **REV** -

APPENDIX “D”

Hydrogeological Investigation and Water Balance Report

HYDROGEOLOGICAL INVESTIGATION
PROPOSED BRIARWOOD HILLSBURGH DEVELOPMENT
5916 Trafalgar Road North, Town of Erin, Ontario

Prepared for:

Hillsburgh Heights Inc.

636 Edward Avenue, Suite 14
Richmond Hill, Ontario L4C 0V4

Prepared by:

HLV2K
ENGINEERING LIMITED
Consulting Engineers

2179 Dunwin Drive, Unit 4
Mississauga, ON L5L 1X2

Project No. 2100428AH

August 3, 2022

HLV2K
ENGINEERING LIMITED
Consulting Engineers

August 3, 202 Project No. 2100428AH

Hillsburgh Heights Inc.
636 Edward Avenue, Suite 14
Richmond Hill, Ontario L4C 0V4

Email: Fausto@briarwoodhomes.ca

Attention: Mr. Fausto Saponara

Dear Mr. Saponara

RE: Hydrogeological Investigation for Proposed Briarwood Hillsburgh Development
5916 Trafalgar Road North, Town of Erin, Ontario

HLV2K Engineering Limited (HLV2K) is pleased to provide the hydrogeological investigation report for the above mentioned project. The report presents HLV2K's understanding of the hydrogeological setting of the study area based on exploratory drilling, data collection, analyses, and review.

We trust that this information meets your present requirements. If we can be of additional assistance in this regard, please contact this office.

For and on behalf of HLV2K Engineering Limited,

k. Mohamadi

Kourosh Mohammadi, Ph.D., P.Eng.

President & Principal Engineer

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LIST OF ACRONYMS AND DEFINITIONS

BH	Borehole
EASR	Environmental Activity and Sector Registry
K	Hydraulic Conductivity
GPM	Gallon per Minute
mbgs	Metres Below Ground Surface
MECP	Ontario Ministry of the Environment, Conservation and Parks
O.Reg.903	Ontario’s Wells Regulation
PTTW	Permit To Take Water

1 INTRODUCTION

1.1 General

HLV2K Engineering Limited (HLV2K) was retained by Hillsburgh Heights Inc. (the Client) with a proposal to conduct the hydrogeological investigations for the proposed Briarwood Hillsburgh Development located at 5916 Trafalgar Road North, Town of Erin, Ontario (the Site). The Site is situated in a mixed rural, residential, and agricultural area. It is on the west side of Trafalgar Road, between Sideroad 27 to the north and Upper Canada Drive to the south. The Site is surrounded by residential housing, agricultural fields, and forested area.

At the time of investigation, the Site was vacant and covered by grass. There are two residential houses within the property. The total area of the Site is approximately 46.9 hectares (ha).

Based on the information provided by the client, the proposed development will consist of 195 single family residential lots, 174 townhouse units, one (1) school block, one (1) heritage house, two (2) storm water management (SWM) facilities, one (1) park block, and new private roads with total area of 40.4 ha. The subdivision will be fully connected to municipal services (municipal water and sanitary sewers). The location of the Site is shown on **Figure 1**.

1.2 Purpose

The purpose of the hydrogeological investigation was to characterize the existing hydrogeological conditions at and in the vicinity of the Site, assess the need for, and options for, groundwater control in association with the proposed construction, evaluate potential impacts to the local groundwater regime resulting from the proposed construction, and identify appropriate mitigative measures, as warranted.

This hydrogeological study may be utilized in support for an application for a Permit to Take Water (PTTW) for dewatering purposes during construction or registering in Environmental Activity and Sector Registry (EASR), if necessary. The purpose of completing the PTTW / EASR application is to conduct the work in compliance with Ontario Regulation 387/04 (as amended) and the Ontario Water Resources Act (OWRA). The water taking EASR is for construction projects that require more than 50,000 liters per day (L/day) of water and less than 400,000 L/day under normal conditions. A PTTW is required for any surface water or groundwater taking during construction in excess of 400 cubic metres per day (m^3/day).

2 METHOD OF INVESTIGATION

2.1 General

This hydrogeological study began with a review of previously completed geotechnical and environmental reports and published information for the study area, including previously published regional physiographic and geologic mapping and watershed planning reports. Many of these documents are referred to throughout various sections of this report and the relevant details can be found in the References section following the text of the report.

In particular, the work completed in association with this hydrogeological study consisted of the following tasks:

- Reviewing and interpreting available reports and published data;
- Developing Health & Safety and Sampling and Analysis Plans for work at the Site;
- Assessing the current Site conditions, and areas of interest;
- Installing five (5) monitoring wells;
- Reviewing water well records available from the Ministry of the Environment, Conservation and Parks (MECP);
- Developing the groundwater monitoring wells installed on the Site by removing at least three well volumes of groundwater or two times to dry;
- Performing in-situ hydraulic conductivity testing (slug tests) to assess the aquifer permeability;
- Measuring groundwater levels in each of the monitoring wells located at the Site;
- Evaluating proposed construction dewatering requirements; and
- Prepare a final report on the findings of this investigation.

2.2 Boreholes and Monitoring Wells

HLV2K drilled five (5) boreholes on September 1 and 7, 2021 and installed five (5) monitoring wells (MW1 to MW5) for groundwater monitoring and sampling. One monitoring well (MW1) was installed at approximate depth of 10 m below ground surface (mbgs) and others were installed at approximately 6.2 mbgs. Borehole logs for all boreholes are provided in **Appendix A**. One piezometer to approximate depth of 1 mbgs was installed close to the wetland to monitor the shallow water level close to the wetland. In addition, HLV2K drilled 4 test holes to approximate depth of 2.4 mbgs for percolation tests.

The well survey was conducted using a GPS unit (Sokkia GCX3 with SHC500 controller). The monitoring well, test holes, and piezometer locations are shown in **Figure 2**. The details of construction of the monitoring wells are summarized in **Table 1**.

It should be noted that the ground surface elevations noted on the appended borehole logs are approximate and were used for the purpose of relating borehole soil stratigraphy and should not be used or relied on for other purposes.

Table 1: Information on Boreholes and Groundwater Monitoring Wells

MW ID	Estimated Ground Surface Elevation (m)	Borehole Bottom		Well Screen Interval Depth (mbgs)		Well Screen Interval Elevation (m)	
		Depth (mbgs)	Elevation (m)	from	to	from	to
MW1	473.50	9.8	463.70	6.65	9.7	466.85	463.80
MW2	469.37	6.2	463.17	3.05	6.1	466.32	463.27
MW3	471.00	6.3	464.70	3.15	6.2	467.85	464.80
MW4	458.48	6.7	451.78	3.55	6.6	454.93	451.88
MW5	454.05	6.5	447.55	3.35	6.4	450.70	447.65
Piezometer	448.19	0.9	447.29	0.3	0.9	447.89	447.29

2.3 Groundwater Monitoring

As part of this investigation, HLV2K visited the site on September 17th and 30th to measure the groundwater levels in the monitoring wells. Groundwater was encountered only in MW5 and the rest of the wells were found dry.

2.4 In-Situ Hydraulic Conductivity Testing

Monitoring wells were dry except MW5. The depth of the water in MW5 was not enough to conduct hydraulic conductivity test. Wells will be revisited in spring when the high groundwater level is expected. If enough water is encountered in any of the wells, the hydraulic conductivity test will be conducted.

2.5 In-Situ Percolation Test

HLV2K's staff visited the Site on September 1st and 7th, 2021. After receiving utility locates, four (4) 150-mm borehole was drilled to approximate depth of 2.4 m below ground surface (mbgs). All loose material was removed from the sides and bottom of the hole. **Figure 2** shows the location of the test holes. Groundwater level was measured in the monitoring well in vicinity of the test hole.

The installed monitoring wells were used to measure the groundwater levels at the time of percolation tests. The borehole logs are provided in **Appendix A**.

The bottom of the hole was covered with 10 cm of sand and then the hole was filled with the water to a depth close to the surface (15 cm to 30 cm below ground surface). The water levels versus time were recorded. Field test measurements are provided in **Appendix B**.

3 SITE CONDITIONS

3.1 Physical Setting

The Site is situated in a mixed rural, residential, and agricultural area. It is on the west side of Trafalgar Road, between Sideroad 27 to the north and Upper Canada Drive to the south. The Site is surrounded by residential housing, agricultural fields, and forested area. According to the Oak Ridges Moraine Atlas which is available online at (http://www.mah.gov.on.ca/page334.aspx) and the Niagara Escarpment Plan (NEP) Maps available online at (http://www.escarpment.org/landplanning), the Site is not located within an area where either the Oak Ridges Moraine Conservation Plan or the Niagara Escarpment Plan would be applicable.

3.2 Climatic Conditions

Average monthly climate data from an Environment Canada climate station located at the Fergus Shand Dam (Station ID 6142400), approximately 14 km west of the Site, for the period between 1981 and 2010 is provided in **Table 2**, below (Environment Canada, 2021). The data indicates that the climate in the study area is typical continental with cold winters and warm summers and precipitation records showing local seasonal variation. As shown in **Table 2**, below, the mean annual precipitation is 945.7 mm/year, with annual mean rainfall of 797.8 mm/year (84% of total precipitation). Average monthly precipitation ranged from 55.9 mm in February to 96.6 mm in August. The mean annual daily temperature is 6.7 degrees Celsius (°C), ranging from -7.4 °C in January to 20.0 °C in July.

Table 2: Climate Data Summary (1981 – 2010) – Fergus Shand Dam Station (ID 6142400)

MONTH	Daily Average Temperature (°C)	Average Rainfall (mm)	Average Snow (cm)	Average Precipitation (mm)
January	-7.4	27.8	40.1	67.9
February	-6.3	25.3	30.6	55.9
March	-1.9	36.7	22.9	59.6
April	5.7	67.9	6.2	74.1
May	12.2	86.8	0.1	86.9
June	17.5	83.8	0.0	83.8
July	20.0	89.2	0.0	89.2
August	19.0	96.6	0.0	96.6
September	14.9	93.1	0.0	93.1
October	8.3	75.6	1.6	77.2
November	2.1	80.5	12.5	93.0
December	-3.9	34.7	33.9	68.6
Year	**6.7**	**797.8**	**147.8**	**945.7**

NOTE: Data was obtained from Environment Canada website (Environment Canada 2021).

3.3 Physiography and Drainage

A review of the topographic map provided online by Natural Resources Canada (Toporama) depicts the Site as located within an area that is generally high relief at an approximate elevation of 450 m to 470 m. The project is located in the Little Credit River Watershed within the Credit Valley River Conservation

Authority (CVCA) jurisdiction. The watershed is approximately 1,000 square kilometers (km^2). The main branch of the Credit River originates north of Orangeville and flows southerly to Lake Ontario at Port Credit, Mississauga, ON (CVC, 2011).

According to the physiographic regions of Ontario identified by Chapman and Putnam (2007), the Site is located in Hillsburgh Sandhills (**Figure 3**). The Hillsburgh Sandhills physiographic region is found in the northwestern portion of the watershed and consists of coarse-grained sediments. It is an area of high relief with thick deposits of glacial outwash (sandy materials) overlying glacial tills and bedrock (CVC, 2011)

3.4 Geological Mapping

The geology of the Credit River watershed generally consists of ice-contact stratified drift (CVC, 2011). A regional description of the Quaternary geology for the area of the Site can be found on the Ontario Geological Survey Digital Map - Surficial geology of southern Ontario (OGS, 2010). A section of this map showing the surficial geology in the vicinity of the Site is presented on **Figure 4**.

As shown on **Figure 4**, the surficial deposits in the immediate vicinity of the Site are mapped as Orangeville Moraine with materials consisted of sand and gravel including some till or silt. The western side of the Site is modern alluvial deposits.

Bedrock is comprised of upper Silurian to lower Devonian of Guelph Formation. The bedrock surface is expected to be approximately 60 mbgs. None of the boreholes drilled for this investigation reached the bedrock. **Figure 5** shows the bedrock at the Site and its vicinity.

3.5 Subsurface Soil Conditions

The subsurface soil conditions encountered during boreholes advanced at the Site are shown on the borehole logs in **Appendix A**. A summary of the soil conditions is provided below.

Topsoil with approximate thickness of 200 to 300 mm was encountered in all boreholes. Below the topsoil, a layer of sandy silt to silty sand was encountered at all borehole locations and extended in general to approximately from 1.5 to 3.1 m below the existing ground surface. Organic matter, rootlets, gravel and cobbles were found in this layer. Below this layer, a layer of sand and gravel was encountered in all boreholes and extended to maximum explored depth of 9.8 m.

4 GROUNDWATER CONDITIONS

4.1 Regional Groundwater Recharge

Recharge is the process by which groundwater is replenished and involves the vertical infiltration of water through the subsoil deposits and geologic materials to the saturated zone. The major sources of recharge in the study area are a result of precipitation and freshet. The amount of groundwater recharge in a particular area depends on surficial geology, topography, and the extent of land development in that area. Generally, regional groundwater recharge is irregularly distributed temporally and spatially as interpreted from specific climatic conditions, local geology, and land development status.

The Site is a vacant land and is used for agriculture. Therefore, the groundwater recharge occurs under natural condition. A water balance analysis was completed for the site to estimate the change in water recharge pre and post development and will be presented in the following sections.

4.2 Groundwater Level Fluctuations

The groundwater level data collected from the monitoring wells are provided in **Table 3**, below. The screen elevations of these monitoring wells are shown in **Table 1** above and on the borehole logs provided in **Appendix A**.

Groundwater level monitoring rounds were completed from September 2021 to July 2022. As shown in **Table 3** below, the groundwater has found only in MW5 at approximate elevation of 449.5 m. The rest of the monitoring wells were dry.

Regional groundwater flow in the area typically reflects the local topography and generally occurs from topographic highs to topographic lows. The dominant regional groundwater flow direction is southerly, toward Lake Ontario.

It should be noted that groundwater conditions vary depending on factors such as temperature, season, precipitation, construction activity and other situations, which may be different from those encountered at the time of the monitoring. The possibility of groundwater level fluctuations at the Site should be considered when designing and developing the construction plans for the project.

Table 3: Summary of Groundwater Level Observations in Monitoring Wells

BH ID	**MW1**		**MW2**		**MW3**		**MW4**		**MW5**		**P1**	
Ground Elevation (m)	473.50		469.37		471.00		458.48		454.05		448.19	
Borehole Depth (m)	9.80		6.20		6.30		6.70		6.50		0.90	
	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)
1&7-Sep-21 **(at completion)**	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
17-Sep-21	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.64	449.41	Dry	Dry
30-Sep-21	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.70	449.35	Dry	Dry
05-Oct-21	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.64	449.41	Dry	Dry
15-Oct-21	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.65	449.40	Dry	Dry
30-Oct-21	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.69	449.36	Dry	Dry
16-Nov-21	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.67	449.38	Dry	Dry
30-Nov-21	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.65	449.40	Dry	Dry
15-Dec-21	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.66	449.39	Dry	Dry
04-Jan-22	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.67	449.38	Dry	Dry
17-Jan-22	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.68	449.37	Dry	Dry
31-Jan-22	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.68	449.37	Dry	Dry
14-Feb-22	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.65	449.40	Dry	Dry

BH ID	**MW1**		**MW2**		**MW3**		**MW4**		**MW5**		**P1**	
Ground Elevation (m)	473.50		469.37		471.00		458.48		454.05		448.19	
Borehole Depth (m)	9.80		6.20		6.30		6.70		6.50		0.90	
28-Feb-22	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.63	449.42	Dry	Dry
15-Mar-22	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.55	449.50	Dry	Dry
31-Mar-22	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.51	449.54	Dry	Dry
12-Apr-22	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.42	449.63	Dry	Dry
27-Apr-22	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.35	449.70	Dry	Dry
18-May-22	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.30	449.75	Dry	Dry
01-Jun-22	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.28	449.77	Dry	Dry
16-Jun-22	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.28	449.77	Dry	Dry
30-Jun-22	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.30	449.75	Dry	Dry
15-Jul-22	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.34	449.71	Dry	Dry
27-Jul-22	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	4.36	449.69	Dry	Dry

4.3 Percolation Test Results

Table 4 below is the summary of the percolation test results. The selected value for the test presented in the table is the average of final three percolation rates during each test which is closer to the steady-state infiltration rate. Detailed calculations are provided in **Appendix B**.

Table 4: Summary of Infiltration Test Results

Test ID	Hole Depth (mbgs)	Hole Bottom Elevation (m)	Groundwater Depth (mbgs)	Infiltration Rate (mm/hr)	Percolation Time (min/cm)
TP1	2.4	466.3	<9.8 (MW1)	600	1
TP2	2.4	466.7	<6.2 (MW2)	120	5
TP3	1.85	460.5	<6.7 (MW4)	1200	0.5
TP4	2.2	452.8	4.8 (MW5)	300	2

4.4 Groundwater Use in the Study Area

A search of the MECP Water Well Information System (WWIS) database to identify active wells near the Site were conducted. The database search was requested for the area located within 500 m from the Site. The database search identified records for 90 wells.

Figure 5 presents the locations of the identified wells as well as the associated water use categories within 500 m around the Site. A detailed table showing water well record (WRR) information for these wells is provided in **Appendix C**. The classification of these wells is as follows:

- 4 monitoring/observation wells and test hole;
- 16 wells identified as abandoned; and
- 2 wells were not stated;
- 68 wells as water supply wells.

The monitoring wells/test holes identified in the database search are typically interpreted as geotechnical/geological boreholes and normally no water would be obtained or used from these boreholes. The search revealed the presence of 68 domestic water wells or other water supply wells potentially in use in the area of the Site. If groundwater use or dewatering is required for the Site, a door-to-door well survey is recommended.

5 GROUNDWATER DEWATERING ESTIMATES

Details of construction was not provided to HLV2K at the time of this investigation; however, it is our understanding that one level of basement is considered for the houses in this development. **Appendix D** shows the layout of the proposed development. The water level monitored during the investigation shows that dewatering would not be required during the construction to control the groundwater. The monitoring well depths are 6.5 to 9.8 mbgs and no groundwater encountered within this depth except in MW5 at 4.8 mbgs or elevation of 449.3 m. Perch water may be present during the construction and the contractor should be ready to control that water, if encountered.

During the excavation for foundation or underground utilities, rainwater may need to be pumped from the trenches. According to MTO IDF Curve Lookup website[1], 24-hour rainfall with a 2-year return period in Erin area is 56.5 mm. The volume of the water depends on the area of excavation at the time.

6 WELLHEAD PROTECTION AREA

A small portion of the Site (approximately 0.6 ha) in the northeast is located within the Well Head Protection Area A (WHPA-A) which represents a 100 m circle around a municipality water supply well as shown in **Figure 7**. It is also located within the Significant Groundwater Recharge Area (SGRA). A water balance analysis was conducted to estimate the recharge rate in pre and post construction. The results are provided in the following section.

7 PREDICTED EFFECTS

Based on the hydrogeological information and data analysis in this report, the potential impacts to surface water and groundwater resources in the vicinity of the Site due to excavation dewatering for construction of the proposed houses at the Site are described below.

7.1 Groundwater Use

As indicated in Section 4.3, the search of the MECP water well records indicated 68 water supply wells within approximately 500 m of the Site. The area of the Site is currently serviced with a municipal water supply. The groundwater depth at the site is expected to be below basement floor and foundation. However, if groundwater dewatering and/or use is considered for this development, a door-to-door survey is recommended.

7.2 Surface Water Resources

The only surface water feature in the vicinity of the Site is the wetland at the southwest side of the Site (**Figure 8**). Since no groundwater use/dewatering is expected for this development, the impact on surface water is not anticipated. The change in the infiltration rate or runoff due to the development is considered in the water balance analysis.

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[1] http://www.mto.gov.on.ca/IDF_Curves

7.3 Potential for Dewatering-Related Consolidation Settlement

Based on the investigation completed, temporary dewatering (i.e. during construction) is not expected. No settlement due to dewatering is expected for this Site.

8 SUMMARY AND CONCLUSION

Based on the results of the subsurface investigation, hydrogeological assessment, and analysis of hydraulic conductivity testing and groundwater level monitoring data, the following summary of conclusions and recommendations is provided:

- The groundwater was not encountered in any of the monitoring wells within the depth of expected excavation and PTTW/EASR is not required for dewatering during construction. Perched water and rainfall might be present during excavation and the contractor should be ready to deal with the water, if encountered.

- The Site is located within the Significant Groundwater Recharge Area (SGRA). Based on water balance analysis, implementing mitigation measures to reduce the infiltration deficit will assist in maintaining the current level of groundwater contribution to the surface water features. As such, no negative impact is expected if LID measures are implemented to maintain the groundwater recharge similar to the existing conditions.

- A small portion of Site (approximately 0.6 ha) is within the Wellhead Protection Area A (WHPA-A), which represent a 100 m distance from one municipal supply well. The sanitary sewer and stormwater management facility should be designed as per policy SWG-13 and SWG-14 to protect the groundwater quality.

- HLV2K recommends the decommissioning of existing groundwater monitoring wells after completion of the construction of the project. In conformance with Ontario’s Wells Regulation (O.Reg.903) of the Ontario Water Resources Act, the installation and eventual decommissioning of groundwater wells must be carried out by a licensed well contractor. If a well is damaged/destroyed during the construction activities, then the well should be properly decommissioned in advance of that work.

9 STATEMENT OF LIMITATIONS

The contents of this report are subject to the attached 'Statement of Limitation' sheet. The reader's attention is specifically drawn to these conditions as it is considered essential that they be followed for proper use and interpretation of this report. The Statement of Limitations is not intended to reduce the level of responsibility accepted by HLV2K, but rather to ensure that all parties who have been given reliance for this report are aware of the responsibilities each assumes in so doing.

This report was prepared by HLV2K exclusively for the account of Hillsburgh Heights Inc. (the CLIENT). Other than by the CLIENT, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of HLV2K. Any use, reliance on or decision made by any person other than CLIENT based on this report is the sole responsibility of such other person. The CLIENT and HLV2K make no representation or warranty to any other person with regard to this report and the work referred to in this report and the CLIENT and HLV2K accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, any decision made or any action taken based on this report or the work referred to in this report.

10 CLOSURE

We trust that this information is satisfactory for your present requirements. Should you have any questions or require additional information, please do not hesitate to contact this office.

For and Behalf of HLV2K Engineering Limited

K. Mohamadi

Kourosh Mohammadi, PhD, P.Eng.

Principal Hydrogeological Engineer

LICENSED PROFESSIONAL ENGINEER
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Aug. 03, 2022
PROVINCE OF ONTARIO

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STATEMENT OF LIMITATIONS

Your report has been developed based on your unique project specific requirements as understood by HLV2K Engineering Limited (HLV2K) and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking HLV2K to assess how factors that changed subsequent to the date of the report affect the report's recommendations. HLV2K cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions, which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult HLV2K to be advised how time may have impacted on the project.

The findings derived from this investigation were based on information collected and/or provided by the Client. It may become apparent that soil and groundwater conditions differ between and beyond the testing locations examined during future investigations or other work that could not be detected or anticipated at the time of this study. As such, HLV2K cannot be held liable for environmental conditions that were not apparent from the available information. The conclusions presented represent the best judgment of the assessors based on limited investigations.

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature, external data source review, sampling, and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions, which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of HLV2K through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report is based on the assumption that he site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only HLV2K, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and HLV2K cannot be held responsible for such misinterpretation.

To avoid misuse of the information contained in your report it is recommended that you confer with HLV2K before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

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Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain HLV2K to work with other project design professionals who are affected by the report. Have HLV2K explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment.

Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact HLV2K for information relating to geoenvironmental issues.

HLV2K is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with HLV2K to develop alternative approaches to problems that may be of genuine benefit both in time and in cost.

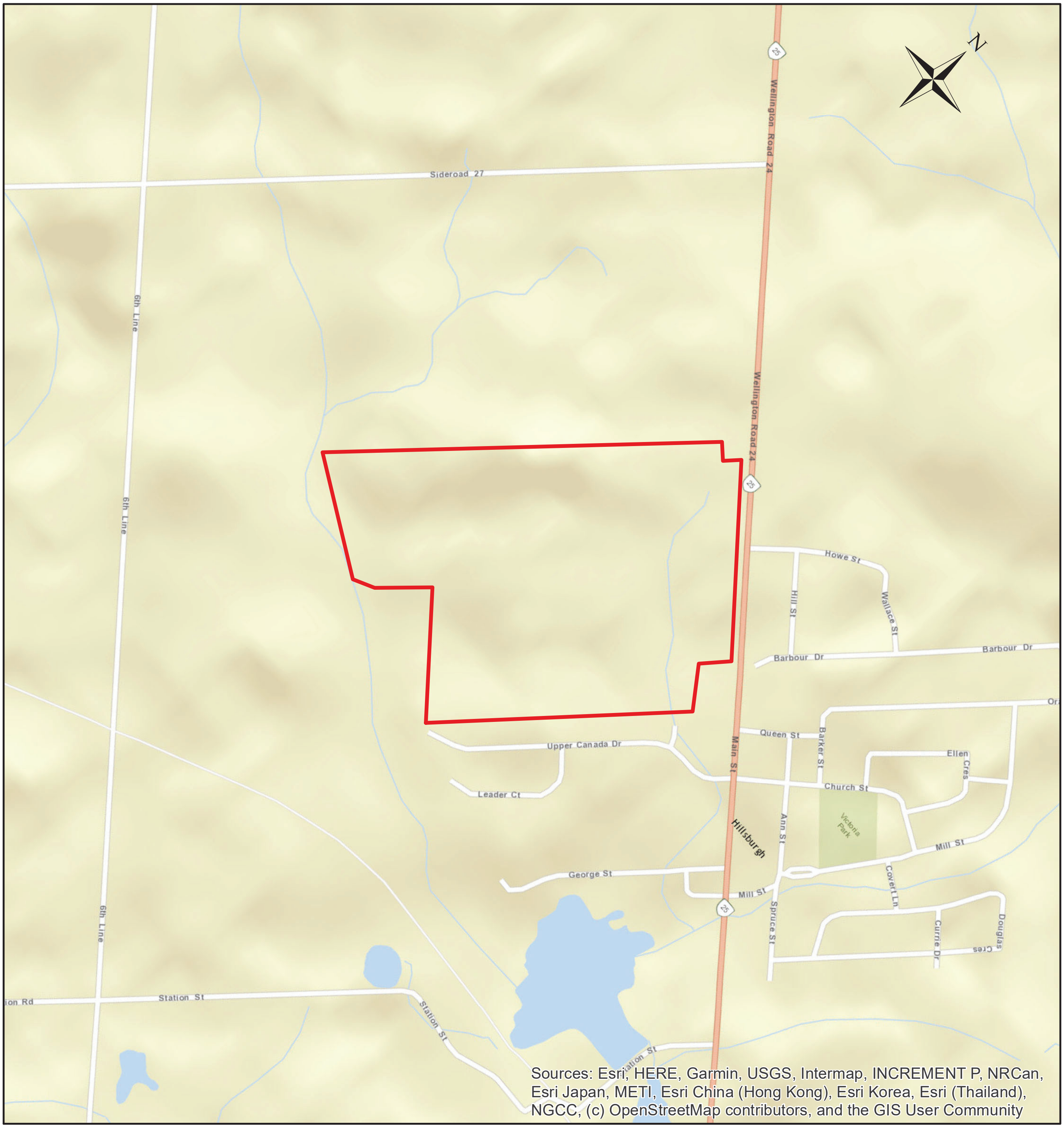
Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from HLV2K to other parties but are included to identify where HLV2K's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from HLV2K closely and do not hesitate to ask any questions you may have.

Third party information reviewed and used to formulate this report is assumed to be complete and correct. HLV2K used this information in good faith and will not accept any responsibility for deficiencies, misinterpretation or incompleteness of the information contained in documents prepared by third parties.

Nothing in this report is intended to constitute or provide a legal opinion.

Should additional information become available, HLV2K requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.

FIGURES



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Legend

🟥 Site Boundary

Drawn: MM

Approved: KM

Date: SEP. 2021

Project No.: 2100428AH

Title SITE LOCATION PLAN

Project

HYDROGEOLOGICAL INVESTIGATION
5916 Trafalgar Road North, Town of Erin, Ontario

Client Hillsburgh Heights Inc.

HLV2K ENGINEERING LIMITED

0 105 210 420 Meters

FIGURE 1

Source: Esri, Maxar, GeoEye, Earthstar G
USDA, USGS, AeroGRID, IGN, and the

Legend

⌖ Monitoring Wells/Boreholes

◎ Piezometer Percolation Test

⊕ Site Boundary

▭

Drawn: MM

Approved: KM

Date: SEP. 2021

Project No.: 2100428AH

Title BOREHOLES LOCATION PLAN

Project

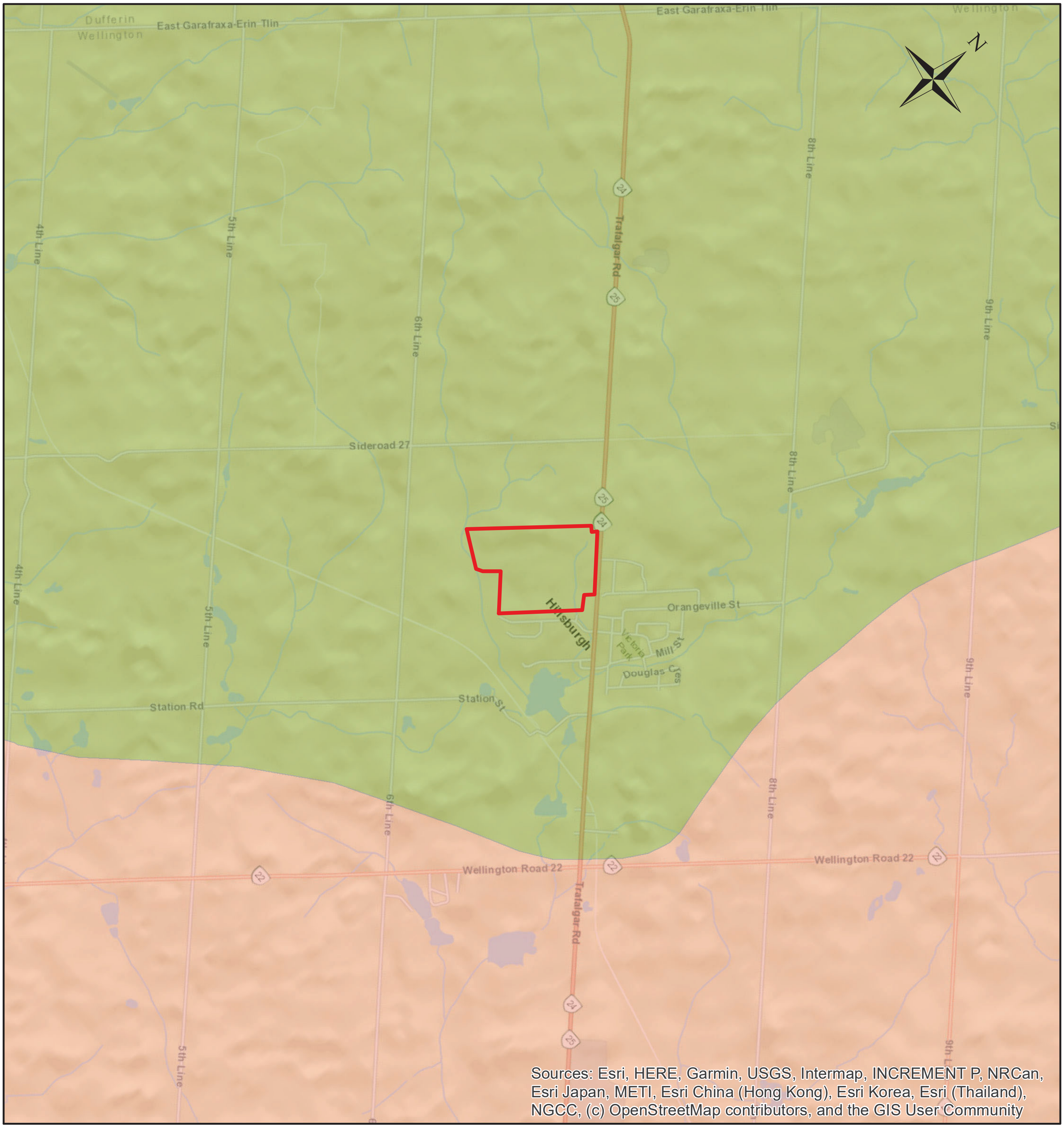
HYDROGEOLOGICAL INVESTIGATION
5916 Trafalgar Road North, Town of Erin, Ontario

Client Hillsburgh Heights Inc.

HLV2K ENGINEERING LIMITED

0 40 80 160 Meters

FIGURE 2



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Legend

🟥	Site Boundary
🟩	9, Hillsburgh Sandhills
🟧	11, Guelph Drumlin Field

Drawn: MM

Approved: KM

Date: SEP. 2021

Project No.: 2100428AH

Title PHYSIOGRAPHIC MAP

Project

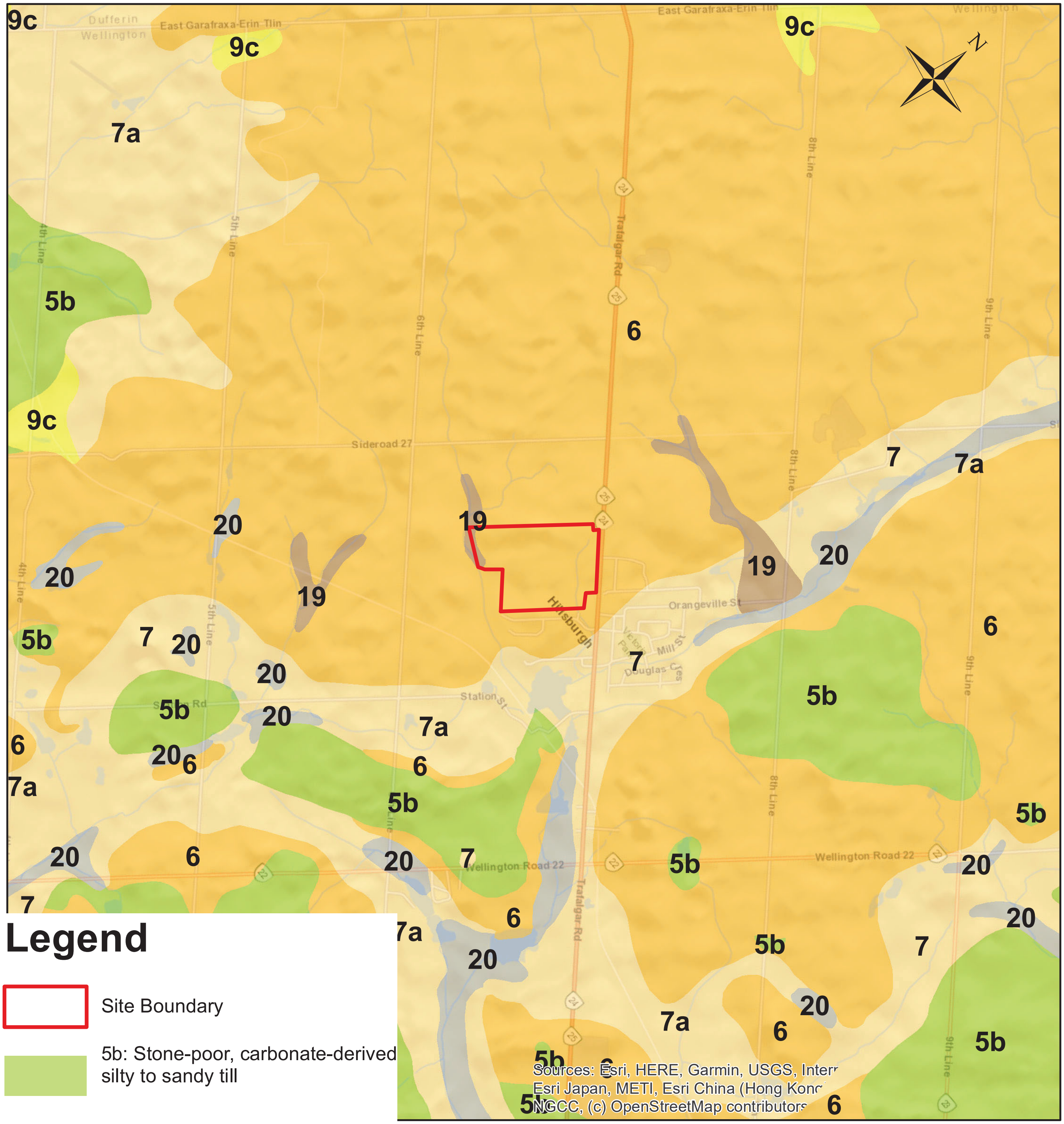
HYDROGEOLOGICAL INVESTIGATION
5916 Trafalgar Road North, Town of Erin, Ontario

Client Hillsburgh Heights Inc.

HLV2K ENGINEERING LIMITED

0 337.5 675 1,350 Meters

FIGURE 3



Legend

▭ Site Boundary

🟩 5b: Stone-poor, carbonate-derived silty to sandy till

🟧 6: Ice-contact stratified deposits

▨ 7: Glaciofluvial deposits

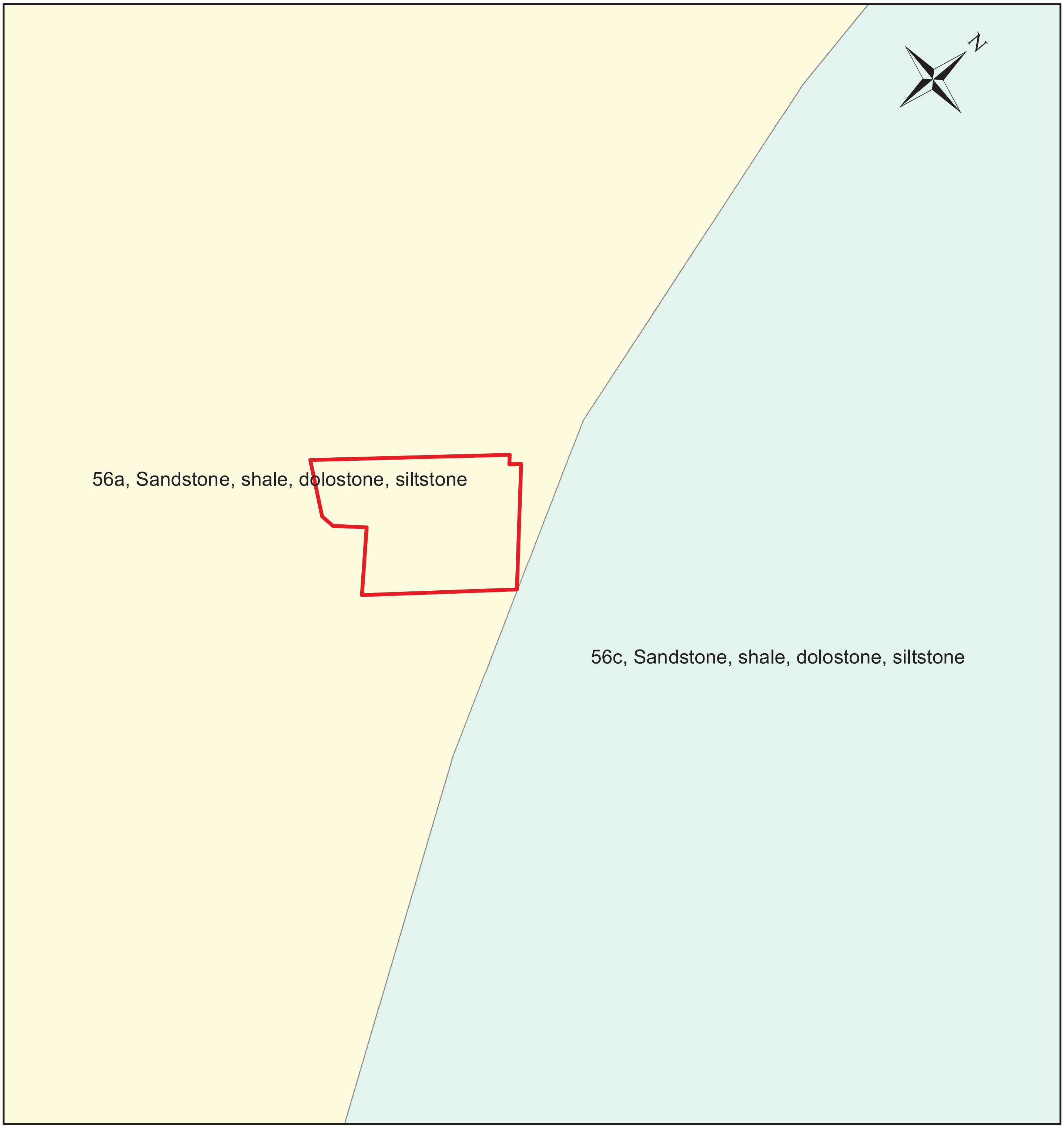
▨ 7a: Sandy deposits

🟨 9c: Foreshore-basinal deposits

🟫 19: Modern alluvial deposits

⬜ 20: Organic deposits

Drawn: MM	Title SURFICIAL GEOLOGY
Approved: KM	Project HYDROGEOLOGICAL INVESTIGATION 5916 Trafalgar Road North, Town of Erin, Ontario
Date: SEP. 2021	
Project No.: 2100428AH	
	Client Hillsburgh Heights Inc.
HLV2K ENGINEERING LIMITED	0 337.5 675 1,350 Meters
	FIGURE 4



Legend

□ Site Boundary

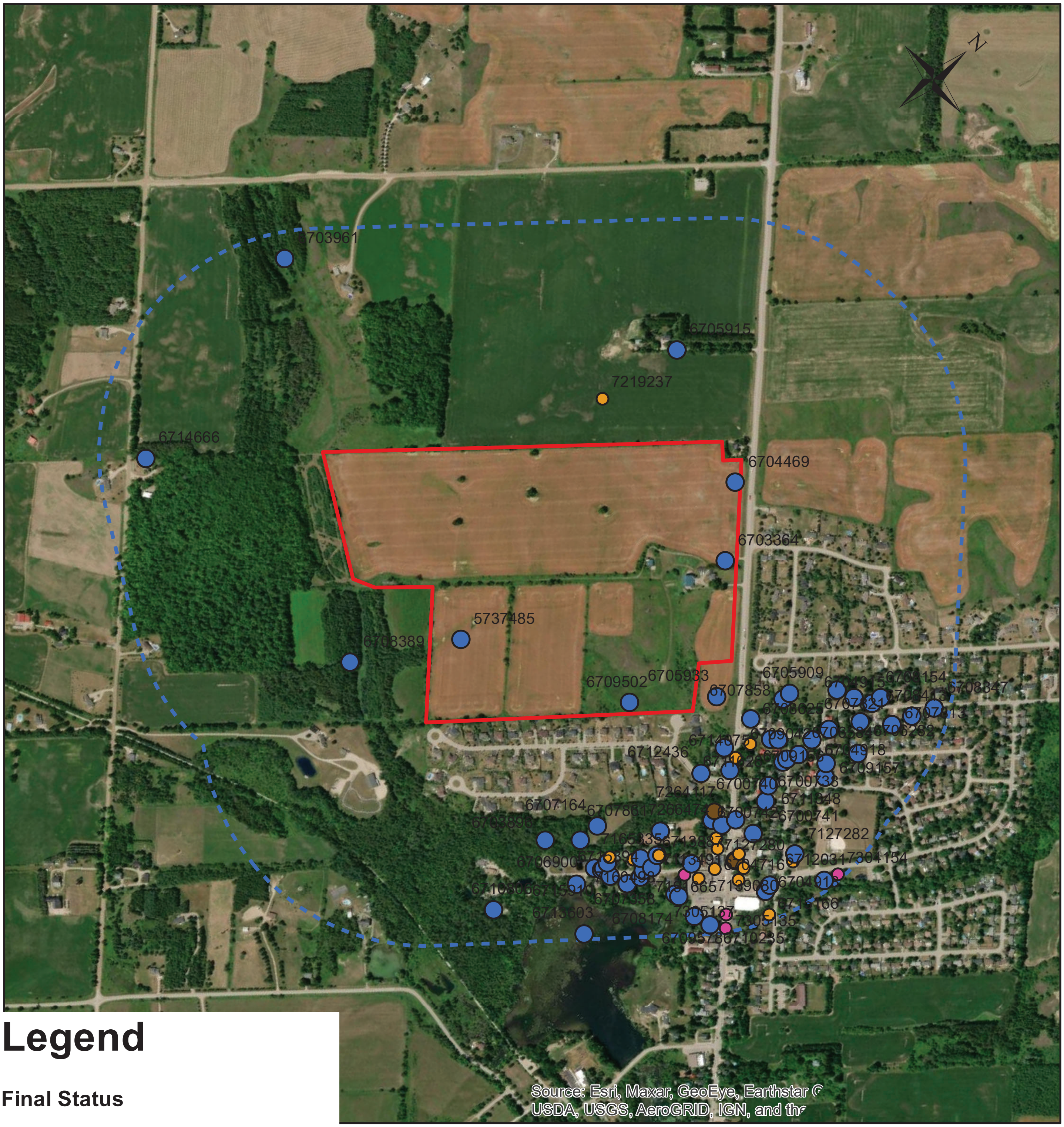
Bedrock Formation

🟨 56a, Guelph Formation

🟩 56c, Armabel Formation

Drawn: MM	Title BEDROCK GEOLOGY
Approved: KM	Project HYDROGEOLOGICAL INVESTIGATION 5916 Trafalgar Road North, Town of Erin, Ontario
Date: SEP. 2021	
Project No.: 2100428AH	
	Client Hillsburgh Heights Inc.
HLV2K ENGINEERING LIMITED	0 210 420 840 Meters

FIGURE 5



Legend

Final Status

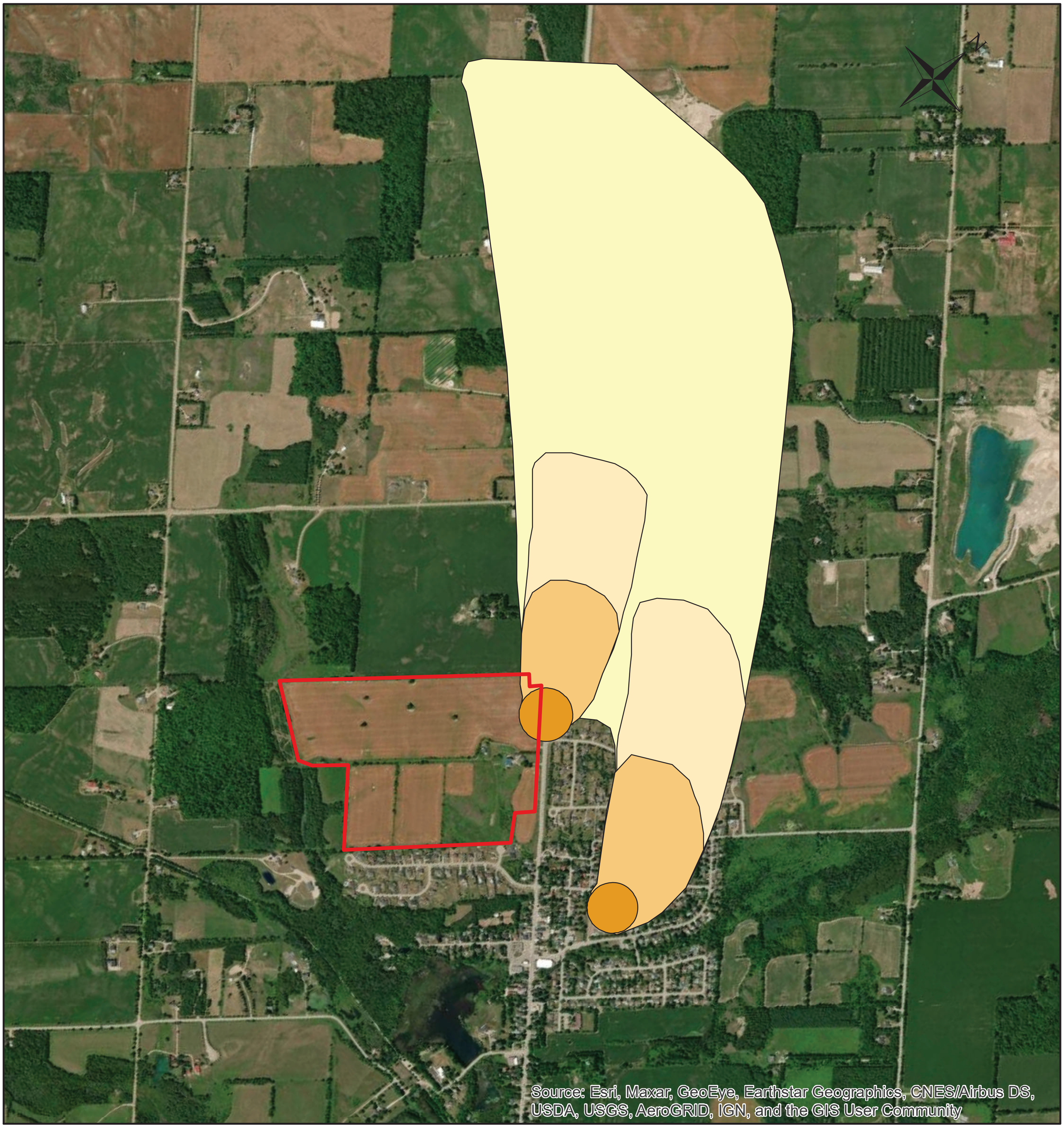
- ● Abandoned
- ● Monitoring and Test Hole
- ● Not Stated
- ● Water Supply
- ▭ 500m Buffer
- ▭ Site Boundary

Drawn: MM	Title WATER WELL USE MAP
Approved: KM	Project HYDROGEOLOGICAL INVESTIGATION 5916 Trafalgar Road North, Town of Erin, Ontario
Date: SEP. 2021	
Project No.: 2100428AH	
	Client Hillsburgh Heights Inc.

HLV2K ENGINEERING LIMITED

0 105 210 420 Meters

FIGURE 6



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- □ Site Boundary
- 🟧 WHPA-A
- 🟧 WHPA-B
- 🟨 WHPA-C
- 🟨 WHPA-D

Drawn: MM

Approved: KM

Date: NOV. 2021

Project No.: 2100428AH

Title WELLHEAD PROTECTION AREA CLOSE TO SITE

Project

HYDROGEOLOGICAL INVESTIGATION
5916 Trafalgar Road North, Town of Erin, Ontario

Client Hillsburgh Heights Inc.

HLV2K ENGINEERING LIMITED

0 170 340 680 Meters

FIGURE 7

APPENDIX A

BOREHOLE LOGS AND GRAIN SIZE ANALYSIS

HLV2K ENGINEERING LIMITED

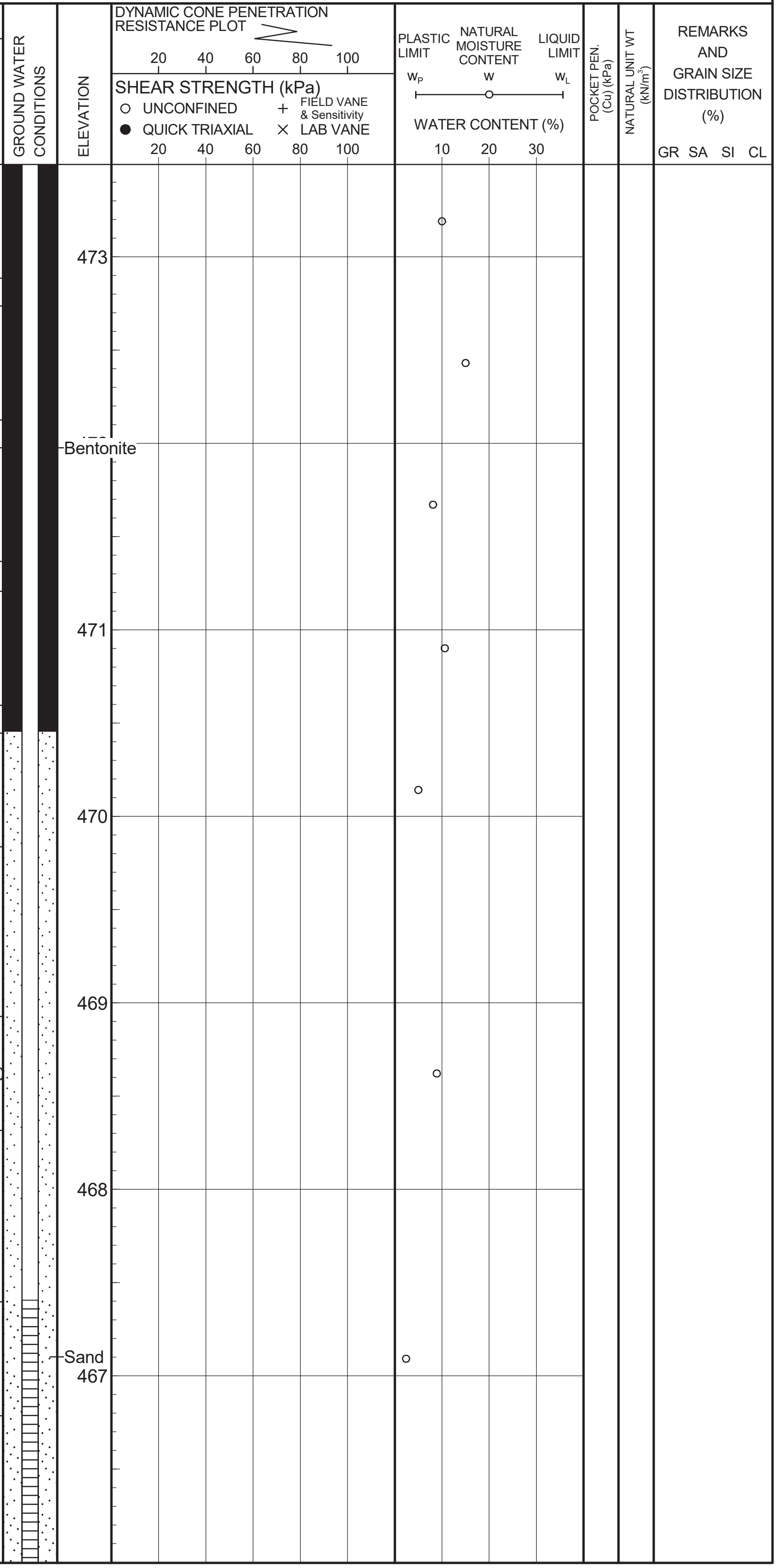
LOG OF BOREHOLE BH1

PROJECT: Briarwood Hillsburgh Development
CLIENT: Briarwood Homes
PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4849474.973 E 568214.5891

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 150mm
Date: Sep-07-2021

REF. NO.: 2100428AH
DRAWING NO.: 2

SOIL PROFILE		SAMPLES		
(m) ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS 0.3 m
473.5				
0.0	**Topsoil:** 200mm			
473.3 0.2	**Sandy Silt:** trace gravel/cobblees, trace clay, trace rootlets, oxidized, greyish brown, moist, loose to compact	1	SS	4
		2	SS	12
		3	SS	23
		4	SS	23
470.4 3.1	**Sand and gravel:** trace silt, trace clay, brown, moist, loose to very dense	5	SS	39
		6	SS	50/150
		7	SS	67



Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

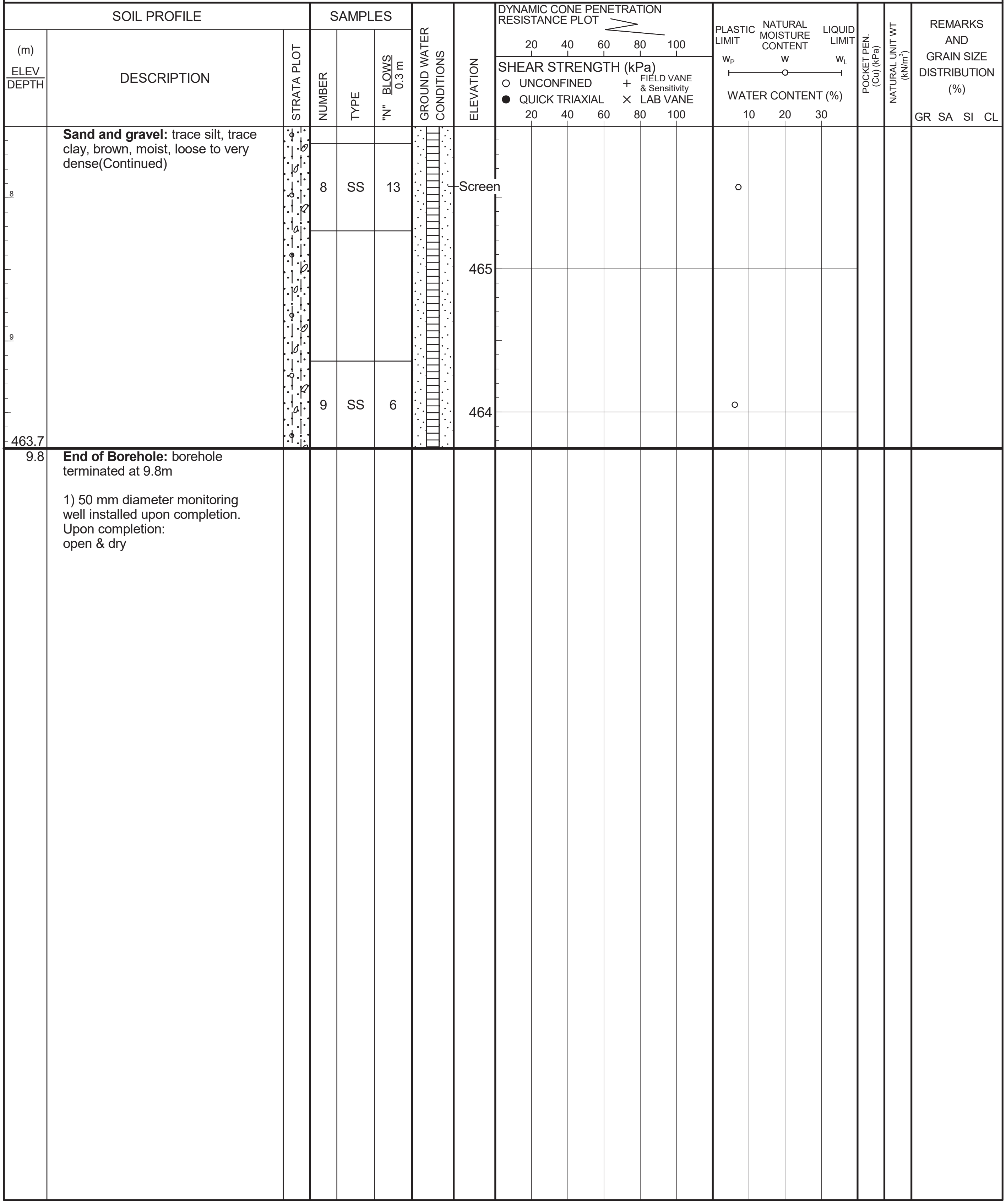
GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

LOG OF BOREHOLE BH1

PROJECT: Briarwood Hillsburgh Development
CLIENT: Briarwood Homes
PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4849474.973 E 568214.5891

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 150mm
Date: Sep-07-2021

REF. NO.: 2100428AH
DRAWING NO.: 2



ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS 0.3 m
	Sand and gravel: trace silt, trace clay, brown, moist, loose to very dense(Continued)	8	SS	13
		9	SS	6
463.7 9.8	**End of Borehole:** borehole terminated at 9.8m 1) 50 mm diameter monitoring well installed upon completion. Upon completion: open & dry			

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

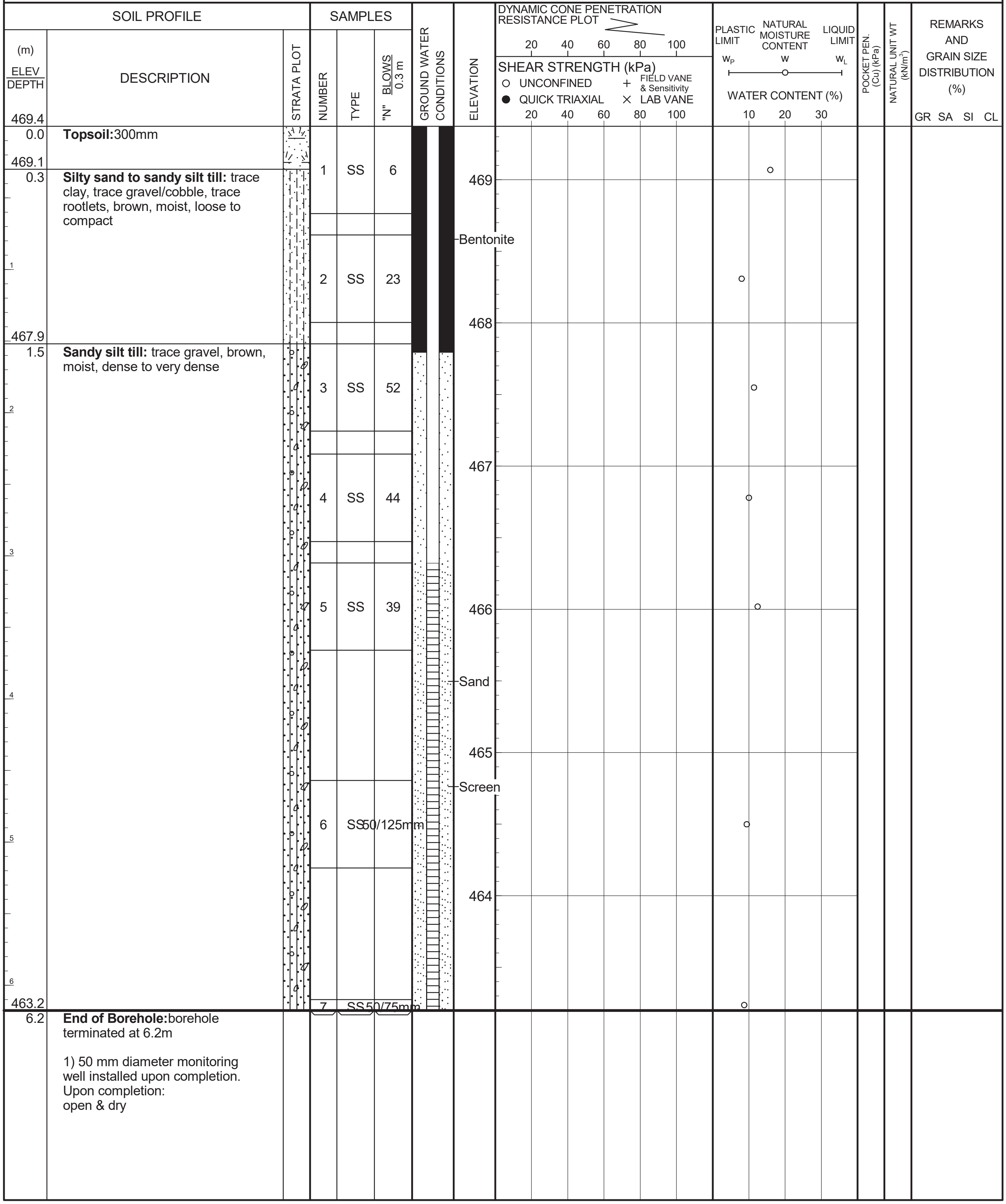
GRAPH NOTES
$+^3, \times^3$: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

LOG OF BOREHOLE BH2

PROJECT: Briarwood Hillsburgh Development
CLIENT: Briarwood Homes
PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4849079.566 E 567864.1193

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 150mm
Date: Sep-07-2021

REF. NO.: 2100428AH
DRAWING NO.: 3



(m) ELEV DEPTH	DESCRIPTION
469.4	
0.0	**Topsoil:**300mm
469.1 0.3	**Silty sand to sandy silt till:** trace clay, trace gravel/cobble, trace rootlets, brown, moist, loose to compact
467.9 1.5	**Sandy silt till:** trace gravel, brown, moist, dense to very dense
463.2 6.2	**End of Borehole:**borehole terminated at 6.2m 1) 50 mm diameter monitoring well installed upon completion. Upon completion: open & dry

NUMBER	TYPE	"N" BLOWS / 0.3 m
1	SS	6
2	SS	23
3	SS	52
4	SS	44
5	SS	39
6	SS	50/125mm
7	SS	50/75mm

GROUNDWATER ELEVATIONS

Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES $+^3, \times^3$: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

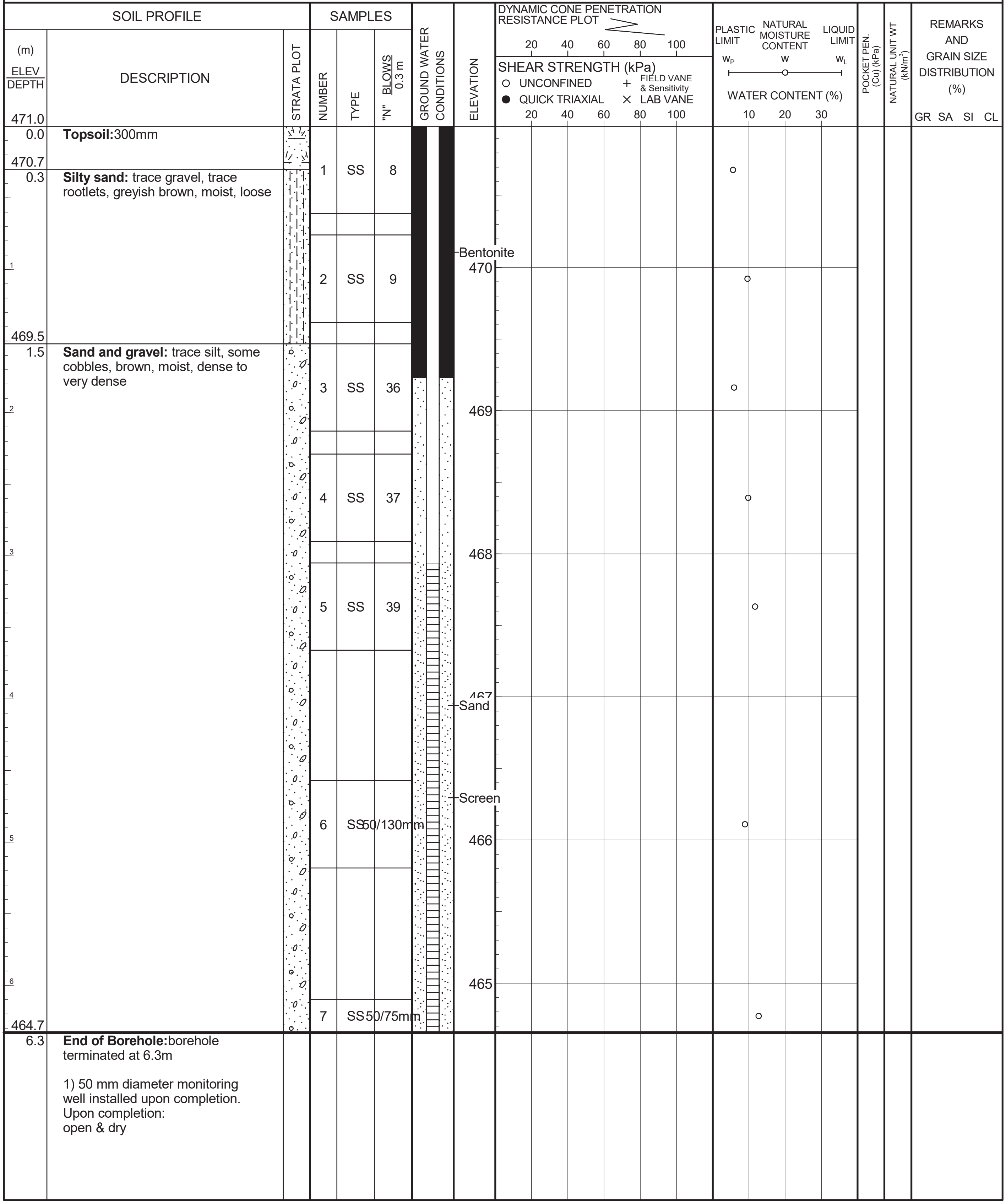
LOG OF BOREHOLE BH3

PROJECT: Briarwood Hillsburgh Development
CLIENT: Briarwood Homes
PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4849170.944 E 568075.1217

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 150mm
Date: Sep-07-2021

REF. NO.: 2100428AH
DRAWING NO.: 4

(m) ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS 0.3 m
471.0 0.0	**Topsoil:**300mm			
470.7 0.3	**Silty sand:** trace gravel, trace rootlets, greyish brown, moist, loose	1	SS	8
		2	SS	9
469.5 1.5	**Sand and gravel:** trace silt, some cobbles, brown, moist, dense to very dense	3	SS	36
		4	SS	37
		5	SS	39
		6	SS	50/130mm
		7	SS	50/75mm
464.7 6.3	**End of Borehole:**borehole terminated at 6.3m 1) 50 mm diameter monitoring well installed upon completion. Upon completion: open & dry			



GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES $+^3$, $\times^3$: Numbers refer to Sensitivity

○ ε=3% Strain at Failure

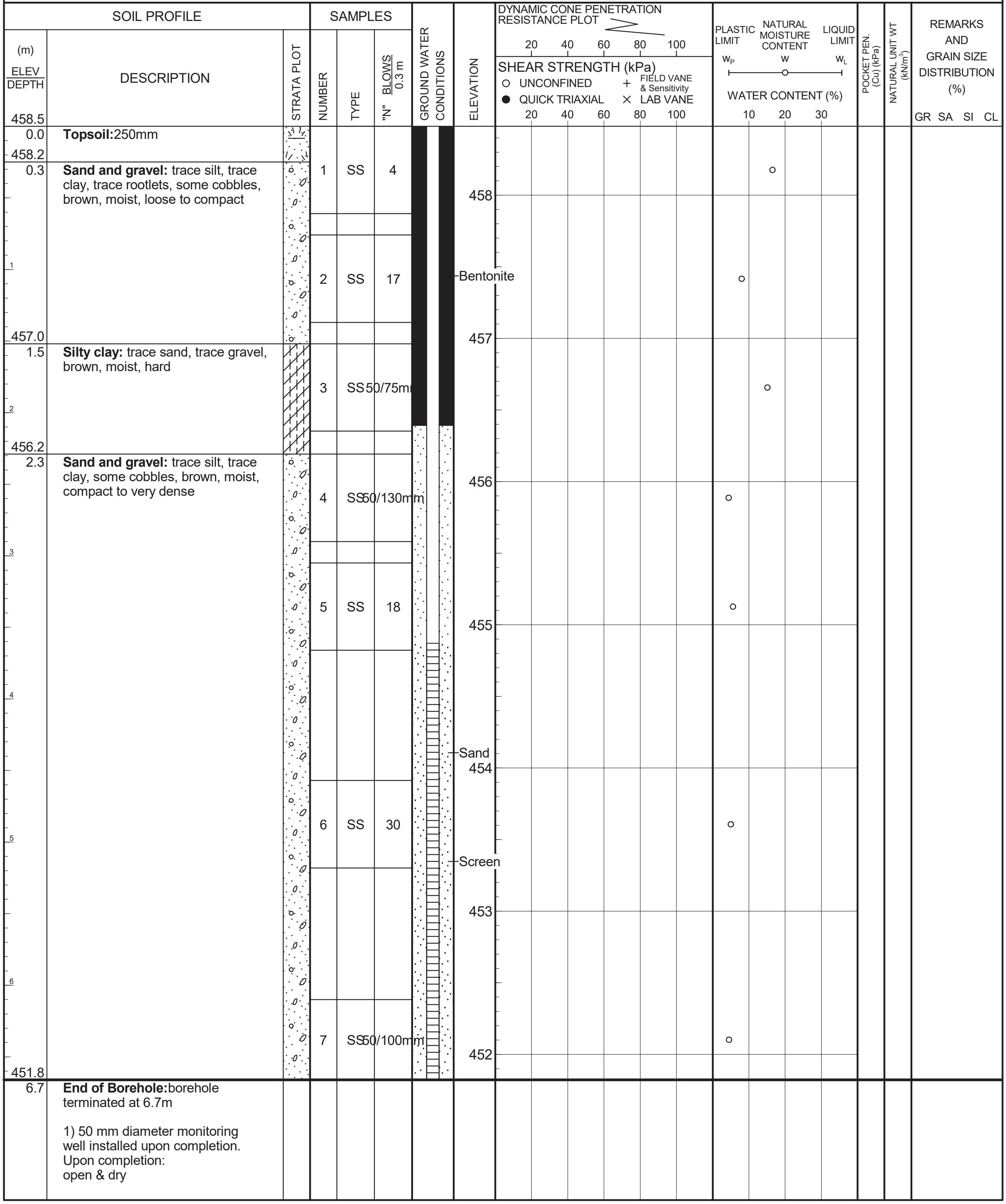
HLV2K ENGINEERING LIMITED

LOG OF BOREHOLE BH4

PROJECT: Briarwood Hillsburgh Development
CLIENT: Briarwood Homes
PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4848881.638 E 568028.4108

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 150mm
Date: Sep-07-2021

REF. NO.: 2100428AH
DRAWING NO.: 5



(m) ELEV DEPTH	DESCRIPTION
458.5	
0.0	**Topsoil:**250mm
458.2 0.3	**Sand and gravel:** trace silt, trace clay, trace rootlets, some cobbles, brown, moist, loose to compact
457.0 1.5	**Silty clay:** trace sand, trace gravel, brown, moist, hard
456.2 2.3	**Sand and gravel:** trace silt, trace clay, some cobbles, brown, moist, compact to very dense
451.8 6.7	**End of Borehole:**borehole terminated at 6.7m 1) 50 mm diameter monitoring well installed upon completion. Upon completion: open & dry

NUMBER	TYPE	"N" BLOWS/0.3 m
1	SS	4
2	SS	17
3	SS	50/75mm
4	SS	50/130mm
5	SS	18
6	SS	30
7	SS	50/100mm

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES $+^3, \times^3$: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

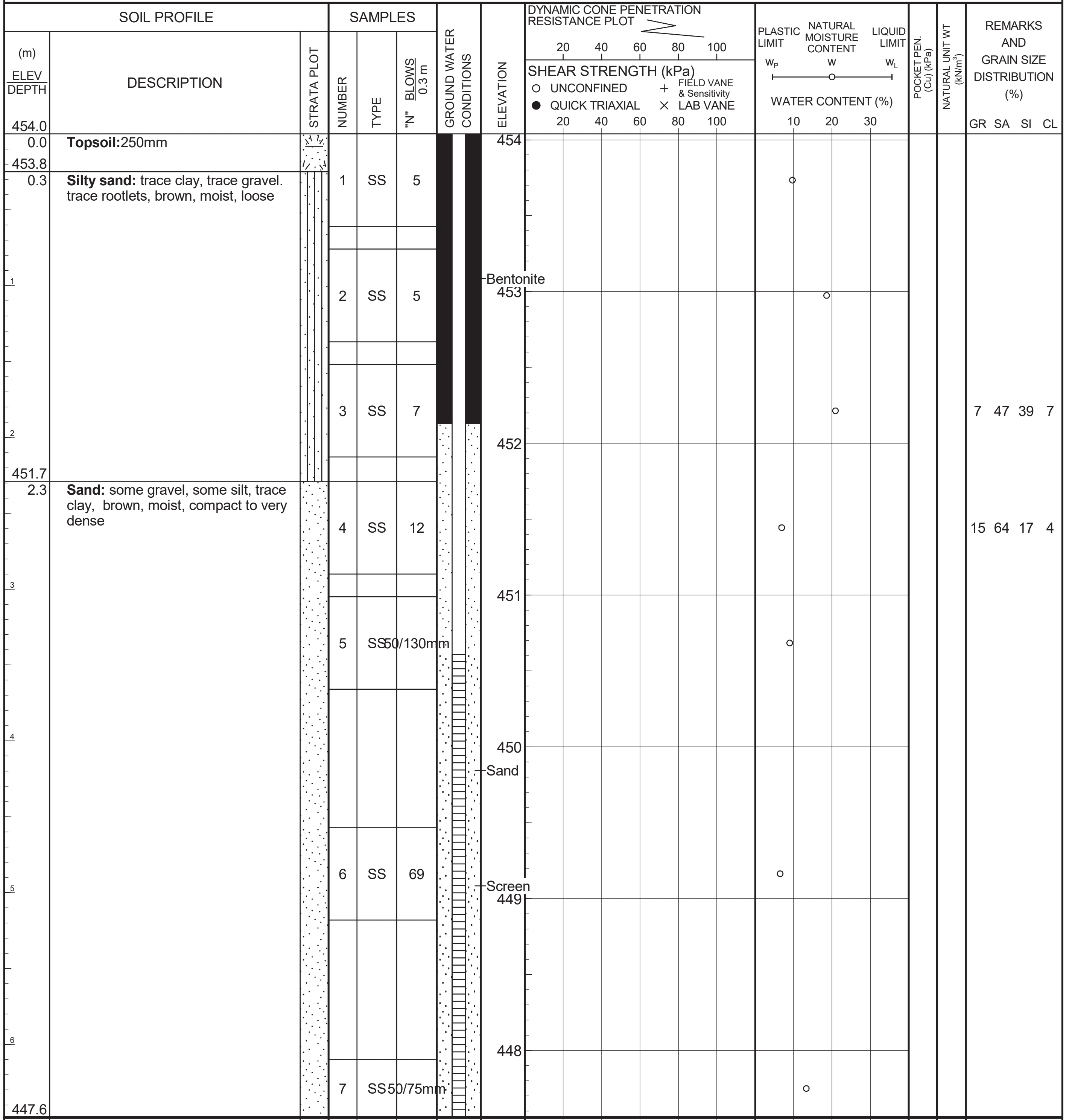
HLV2K ENGINEERING LIMITED

LOG OF BOREHOLE BH5

PROJECT: Briarwood Hillsburgh Development
CLIENT: Briarwood Homes
PROJECT LOCATION: 5916 Trafalgar Road North, Town of Erin, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4849136.503 E 568418.3089

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 150mm
Date: Sep-07-2021

REF. NO.: 2100428AH
DRAWING NO.: 6



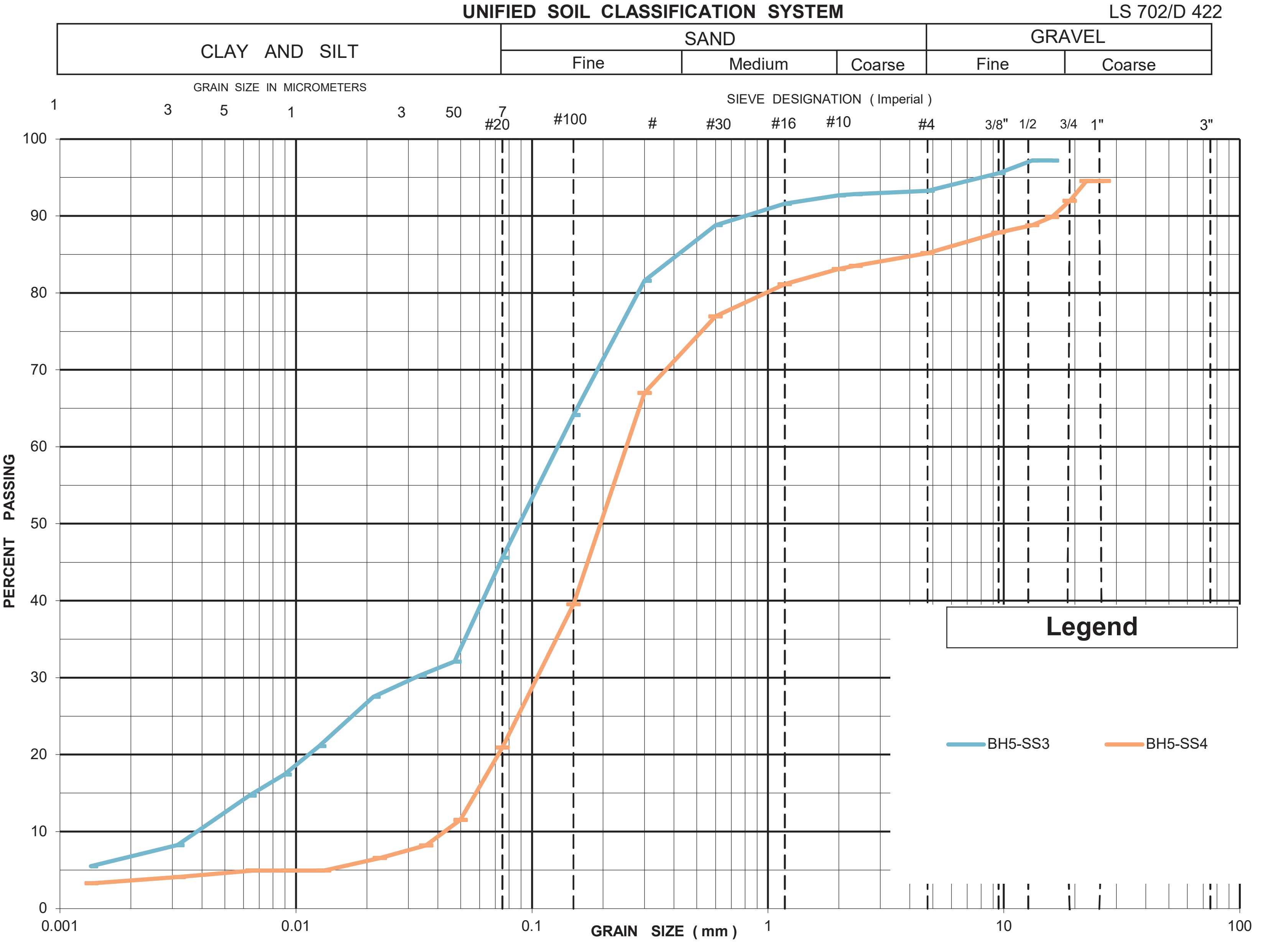
ELEV (m)	DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS / 0.3 m	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR	SA	SI	CL
454.0	0.0	**Topsoil:**250mm							
453.8	0.3	**Silty sand:** trace clay, trace gravel. trace rootlets, brown, moist, loose	1	SS	5				
			2	SS	5				
			3	SS	7	7	47	39	7
451.7	2.3	**Sand:** some gravel, some silt, trace clay, brown, moist, compact to very dense	4	SS	12	15	64	17	4
			5	SS	50/130mm				
			6	SS	69				
			7	SS	50/75mm				
447.6	6.5	**End of Borehole:**borehole terminated at 6.5m							

1) 50 mm diameter monitoring well installed upon completion.
2) Water Level Readings:

Date:	Water Level(mbgl):
Sept 07, 2021	4.8

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure



HLV2K ENGINEERING LIMITED

GRAIN SIZE DISTRIBUTION

Drawing No : 2

PROJECT # : 2100428AH

DATE : Sept 23, 2021

APPENDIX B

INFILTRATION TESTS
FIELD MEASUREMENTS AND CALCULATIONS

Test Hole:	TP4
Tested By:	Bruce Kashani

Date:	07-Sep-21
Weather:	Cloud & windy
Depth to Water (m):	>6.5
Diameter (cm):	15

Project No.:	2100428AH
Depth to bedrock (m): N/A	
Depth (cm):	220

Horizon (m)	Soil Texture	Soil color	Comments
0.0 - 0.25	Topsoil	Brown, black	
0.25 - 2.20	Sandy silt	Brown	

Time (min)	Water Depth (cm)
0	15.00
2	30.00
5	38.00
12	42.00
20	53.00
30	58.00
40	63.00
50	68.00

Δt (min)	Δh (cm)		Inf. Rate (cm/min)	Inf. Rate (mm/hr)	Percolation time (min/cm)	Average (min/cm)
2	15.00		7.5	4500.0		
3	8.00		2.7	1600.0	0.38	
7	4.00		0.6	342.9	1.75	
8	11.00		1.4	825.0	0.73	
10	5.00		0.5	300.0	2.00	
10	5.00		0.5	300.0	2.00	
10	5.00		0.5	300.0	2.00	**2.0**

Test Hole:	TP1
Tested By:	Bruce Kashani

Date:	01-Sep-21
Weather:	Sunny
Depth to Water (m):	>6.5
Diameter (cm):	15

Project No.:	2100428AH
Depth to bedrock (m): N/A	
Depth (cm):	240

Horizon (m)	Soil Texture	Soil color	Comments
0.0 - 0.20	Topsoil	Brown, black	
0.20 - 2.40	Sandy silt to silty sand with gravel and cobbles	Brown	

Time (min)	Water Depth (cm)
0	30.00
2	60.00
5	75.00
10	83.00
20	105.00
30	115.00
40	125.00
50	135.00

Δt (min)	Δh (cm)		Inf. Rate (cm/min)	Inf. Rate (mm/hr)	Percolation time (min/cm)	Average (min/cm)
2	30.00		15.0	9000.0		
3	15.00		5.0	3000.0	0.20	
5	8.00		1.6	960.0	0.63	
10	22.00		2.2	1320.0	0.45	
10	10.00		1.0	600.0	1.00	
10	10.00		1.0	600.0	1.00	
10	10.00		1.0	600.0	1.00	**1.0**

Test Hole:	TP2
Tested By:	Bruce Kashani

Date:	07-Sep-21
Weather:	Cloud & windy
Depth to Water (m):	>6.5
Diameter (cm):	15

Project No.:	2100428AH
Depth to bedrock (m): N/A	
Depth (cm):	240

Horizon (m)	Soil Texture	Soil color	Comments
0.0 - 0.30	Topsoil	Brown, black	
0.30 - 1.50	Silty sand to sandy silt with gravel and cobbles	Brown	
1.50 - 2.40	Sandy silt till	Brown	

Time (min)	Water Depth (cm)
0	30
2	33
6	39
11	45
16	48
21	49
26	50
31	51
36	52

Δt (min)	Δh (cm)		Inf. Rate (cm/min)	Inf. Rate (mm/hr)	Percolation time (min/cm)	Average (min/cm)
2	3.00		1.5	900.0		
4	6.00		1.5	900.0	0.67	
5	6.00		1.2	720.0	0.83	
5	3.00		0.6	360.0	1.67	
5	1.00		0.2	120.0	5.00	
5	1.00		0.2	120.0	5.00	
5	1.00		0.2	120.0	5.00	
5	1.00		0.2	120.0	5.00	**5.0**

Test Hole:	TP3
Tested By:	Bruce Kashani

Date:	07-Sep-21
Weather:	Cloud & windy
Depth to Water (m):	>6.5
Diameter (cm):	15

Project No.:	2100428AH
Depth to bedrock (m): N/A	
Depth (cm):	185

Horizon (m)	Soil Texture	Soil color	Comments
0.0 - 0.25	Topsoil	Brown, black	
0.25 - 1.50	Sand and gravel	Brown	
1.50 - 2.30	Silty caly	Brown	
1.50 - 1.85	Sand and gravel	Brown	

Time (min)	Water Depth (cm)
0	18
2	36
6	55
9	62
12	68
15	74
18	80
21	86

Δt (min)	Δh (cm)		Inf. Rate (cm/min)	Inf. Rate (mm/hr)	Percolation time (min/cm)	Average (min/cm)
2	18.00		9.0	5400.0		
4	19.00		4.8	2850.0	0.21	
3	7.00		2.3	1400.0	0.43	
3	6.00		2.0	1200.0	0.50	
3	6.00		2.0	1200.0	0.50	
3	6.00		2.0	1200.0	0.50	
3	6.00		2.0	1200.0	0.50	**0.5**

APPENDIX C

INFORMATION ON WATER WELL RECORDS RECEIVED FROM MECP

Water Well Record

WELL_ID	BOREHOLE ID	Easting	Northing	Well Depth (m)	Water Table Depth (m)	Date Completed	Final Status
5737485	10541210	568049	4848857	47.2	31.4	10-Dec-02	Water Supply
6700714	10464860	568613	4849152	33.5	19.8	19-Oct-57	Water Supply
6700738	10464884	568722	4849243	45.7	10.4	16-Feb-65	Water Supply
6700740	10464886	568722	4849233	42.7	12.2	04-Aug-58	Water Supply
6700741	10464887	568764	4849146	25.9	4.3	20-May-60	Water Supply
6700742	10464888	568801	4849079	29.9	6.1	21-Mar-61	Water Supply
6703364	10467506	568294	4849423	68.6	25.9	05-Feb-69	Water Supply
6703528	10467665	568634	4848703	54.9	7.6	05-Aug-69	Water Supply
6703896	10468025	568514	4848713	50.3	8.5	01-Apr-71	Water Supply
6703961	10468086	567144	4849103	41.8	15.2	14-Jun-71	Water Supply
6704469	10468577	568174	4849553	88.4	42.1	22-Sep-72	Water Supply
6704716	10468823	568914	4849033	45.7	2.4	11-May-73	Water Supply
6704913	10469017	568918	4849017	74.7	4.6	25-Oct-73	Water Supply
6704915	10469019	568749	4849470	47.2	13.7	20-Sep-73	Water Supply
6704918	10469022	568725	4849314	27.7	9.8	18-Sep-73	Water Supply
6705909	10469993	568614	4849343	46.6	9.8	08-Jul-75	Water Supply
6705915	10469999	567864	4849643	68.0	35.1	05-Jun-75	Water Supply
6705933	10470017	568514	4849213	35.1	12.5	30-May-75	Water Supply
6706282	10470362	568764	4849423	27.4	12.8	16-Oct-76	Water Supply
6706584	10470660	568814	4849373	53.0	0.9	20-May-77	Water Supply
6706900	10470970	568564	4848773	60.0	7.6	29-Apr-78	Water Supply
6707164	10471227	568564	4848823	29.0	6.4	09-Jan-79	Water Supply
6707358	10471410	568714	4848823	32.9	3.7	18-Apr-80	Water Supply
6707813	10471818	568814	4849473	32.0	12.2	29-Apr-83	Water Supply
6707821	10471826	568814	4849473	20.4	12.8	08-Jun-83	Water Supply
6707858	10471859	568614	4849323	36.6	14.9	06-Jul-83	Water Supply
6707861	10471862	568664	4848923	36.6	2.4	12-May-83	Water Supply
6708154	10472069	568752	4849492	19.2	12.2	29-Jun-84	Water Supply
6708174	10472089	568803	4848861	22.9	2.1	18-Apr-84	Water Supply
6708346	10472255	568642	4848787	35.4	4.3	24-Jul-85	Water Supply
6708347	10472256	568847	4849569	33.5	12.2	04-Dec-85	Water Supply
6708360	10472268	568714	4849447	33.5	14.3	18-Dec-85	Water Supply
6708365	10472273	568793	4848858	34.1	3.0	24-Dec-85	Water Supply
6708389	10472295	567929	4848635	41.1	6.4	09-May-85	Water Supply
6708413	10472319	568828	4849519	33.5	10.7	07-Apr-86	Water Supply
6708616	10472508	568719	4849027	29.6	8.8	01-Dec-86	Water Supply
6708625	10472517	568732	4849358	23.5	10.7	11-Aug-86	Water Supply
6708826	10472716	568676	4849428	15.2	6.7	13-Apr-87	Water Supply
6709042	10472915	568731	4849270	48.2	12.2	10-Dec-87	Water Supply
6709050	10472923	568646	4848767	57.0	5.5	30-Nov-87	Water Supply
6709156	10473026	568808	4849283	51.8	7.6	12-Jan-88	Water Supply
6709157	10473027	568786	4849305	30.2	7.6	09-Dec-87	Water Supply
6709502	10473351	568399	4849055	15.2	5.5	20-Dec-88	Water Supply
6709578	10473427	568859	4848859	49.7	7.0	15-Dec-88	Water Supply
6710235	10474082	568896	4848874	32.0	2.7	27-Jul-89	Water Supply
6710806	10474647	568559	4848525	25.6	3.0	24-Jul-91	Water Supply
6710809	10474650	568682	4848850	34.1	6.7	24-May-91	Water Supply
6711075	10474916	568765	4848930	57.0	4.3	30-Oct-92	Water Supply
6711348	10475182	568741	4849173	48.8	12.2	19-Oct-93	Water Supply
6711628	10475461	568665	4849244	44.2	16.8	27-Oct-94	Water Supply
6712031	10475864	568983	4849133	57.9	1.8	01-May-96	Water Supply
6712436	10476269	568623	4849076	39.6	9.8	30-Jul-97	Water Supply
6713318	10477151	568660	4849130	49.4	8.5	26-Jan-00	Water Supply
6713603	10477436	568730	4848645	29.6	3.0	22-Nov-00	Water Supply
6713631	10477464	568677	4849256	51.8	15.2	09-Jan-01	Water Supply
6713887	10523019	568753	4849068	29.0	8.5	04-Oct-01	Water Supply
6713900	10523032	568707	4848838	38.1	4.3	25-Oct-01	Water Supply
6714075	10528610	568602	4849240	38.4	17.4	18-Jun-02	Water Supply
6714666	10548217	567286	4848578	72.5	34.1	09-Oct-03	Water Supply
6715166	11179802	568963	4848990			10-Dec-04	Abandoned
6715250	11327036	568800	4848921	4.3		10-Feb-05	Abandoned
6715394	11327180	568714	4848856	30.5	5.2	04-Jul-05	Water Supply
6715503	11327289	568674	4848836			02-Sep-05	Abandoned
6715772	11558293	568669	4848773	30.5	6.1	15-Jun-06	Water Supply
6715910	11695692	568647	4848772	30.5	7.0	06-Sep-06	Water Supply
7050905	23050905	568707	4848791	30.5	5.2	01-Oct-07	Water Supply
7105350	1001599370	568636	4848799			05-May-08	Abandoned
7113491	1001839380	568822	4849009	27.7	3.4	07-May-08	Water Supply
7118031	1001955780	568633	4848757	44.8	7.0	25-Sep-08	Water Supply
7127280	1002637730	568907	4849107			02-Jun-09	Abandoned
7127282	1002637730	568897	4849121	25.0	2.7	09-Jun-09	Water Supply

Water Well Record

WELL_ID	BOREHOLE ID	Easting	Northing	Well Depth (m)	Water Table Depth (m)	Date Completed	Final Status
7139080	1002932280	568847	4849013			14-Aug-08	Abandoned
7139081	1002932280	568822	4849009			14-Aug-09	Not Stated
7160498	1003486390	568701	4848883	18.3	3.7	23-Feb-11	Water Supply
7165335	1003534010	568704	4848886			13-Jun-11	Abandoned
7174984	1003633140	568777	4848996			12-Nov-11	Abandoned
7191665	1004205580	568807	4848962			25-Sep-12	Abandoned
7194971	1004232460	568816	4849025			06-Nov-12	Abandoned
7197600	1004256250	568757	4849009			20-Dec-12	Abandoned
7201338	1004288380	568860	4848987			25-Apr-13	Abandoned
7201342	1004288390	568787	4848856			25-Apr-13	Abandoned
7219237	1004731810	567841	4849446			15-Sep-13	Abandoned
7249486	1005717520	568647	4849158			02-Sep-15	Abandoned
7264117	1006030530	568708	4849044			29-May-16	Not Stated
7266474	1006141900	568742	4849038	23.5	6.4	11-Apr-16	Water Supply
7278147	1006322440	568644	4849203			21-Dec-16	Abandoned
7304154	1006975720	568993	4849166	7.6		03-Nov-17	Monitoring and Test Hole
7305135	1006981980	568902	4848916	4.6		29-Nov-17	Monitoring and Test Hole
7305136	1006981980	568773	4848902	5.5		24-Nov-17	Monitoring and Test Hole
7305137	1006981980	568924	4848896	4.6		24-Nov-17	Monitoring and Test Hole

APPENDIX D

DRAWINGS PROVIDED BY THE CLIENT

ROADWAY/WALKWAY	8.79ha
RESIDENTIAL	11.93ha
RESIDENTIAL (TOWNHOUSING)	5.13ha
SCHOOL	2.27ha
PARK	1.75ha
POND	4.09ha
FUTURE DEVELOPMENT	6.36ha
TOTAL	40.32ha

NO.	DESCRIPTION	DATE	BY
5			
4			
3			
2			
1			

REVISIONS

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
TEL. (905) 794-0600 FAX (905) 794-0611

HILLSBURGH HEIGHTS INC.
RESIDENTIAL SUBDIVISION

5616 TRAFALGAR ROAD NORTH
PART 1 OF PLAN 61R-9590
PART OF LOT 26, CONCESSION 7

HILLSBURGH URBAN AREA
TOWN OF ERIN

SHEET TITLE:

WATER BALANCE AREA PLAN

DRAWN BY: S.G.K.
PROJECT No. W21081
CHECKED BY: D.K.H.
DRAWING No. **WBAP-1**
SCALE: 1:1000
DATE: JAN., 23rd 2023

WATER BALANCE ASSESSMENT
PROPOSED BRIARWOOD HILLSBURGH DEVELOPMENT
5916 Trafalgar Road North, Town of Erin, Ontario

Prepared for:

Hillsburgh Heights Inc.

636 Edward Avenue, Suite 14
Richmond Hill, Ontario L4C 0V4

Prepared by:

HLV2K
ENGINEERING LIMITED
Consulting Engineers

2179 Dunwin Drive, Unit 4
Mississauga, Ontario L5L 1X2

Project No. 2100428AH

January 30, 2023

HLV2K
ENGINEERING LIMITED
Consulting Engineers

January 30, 2023 Reference No.: 2100428AH

Hillsburgh Heights Inc.
636 Edward Avenue, Suite 14
Richmond Hill, Ontario L4C 0V4

Email: Fausto@briarwoodhomes.ca

Attention: Mr. Fausto Saponara

Dear Mr. Saponara

RE: Water Balance Assessment for Proposed Briarwood Hillsburgh Development
5916 Trafalgar Road North, Town of Erin, Ontario

HLV2K Engineering Limited (HLV2K) is pleased to provide the water balance assessment report for the above mentioned project. The report presents HLV2K's understanding of the hydrogeological setting of the study area based on exploratory drilling, data collection, analyses, and review.

We trust that this information meets your present requirements. If we can be of additional assistance in this regard, please contact this office.

For and on behalf of HLV2K Engineering Limited,

K. Mohamadi

Kourosh Mohammadi, Ph.D., P.Eng.

President & Principal Engineer

TABLE OF CONTENT

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

HLV2K Engineering Limited (HLV2K) was retained by Hillsburgh Heights Inc. (the Client) with a proposal to conduct the water balance assessment for the proposed Briarwood Hillsburgh Development located at 5916 Trafalgar Road North, Town of Erin, Ontario (the Site). The Site is situated in a mixed rural, residential, and agricultural area. It is on the west side of Trafalgar Road, between Sideroad 27 to the north and Upper Canada Drive to the south. The Site is surrounded by residential housing, agricultural fields, and forested area. The Site location is shown on **Figure 1**. This report is intended to provide the water balance analysis for pre and post proposed development. A hydrogeological report was prepared by HLV2K in 2021 and provides the site characterizations.

Based on the information provided by the client, the proposed development will consist of 195 single family residential lots, 174 townhouse units, one (1) school block, one (1) heritage house, two (2) storm water management (SWM) facilities, one (1) park block, and new private roads with total area of 40.4 ha. The subdivision will be fully connected to municipal services (municipal water and sanitary sewers). Draft plan of subdivision shows the location of these blocks and features provided in **Appendix A**.

2 WATER BALANCE ANALYSIS

When precipitation (P) occurs, it can either run off (R) through the surface water system, infiltrate (I) to the water table, or evapotranspire (ET) from the earth's surface and vegetation. The sum of R and I is defined 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). On a yearly basis, however, there is a potential for small changes in ST.

The annual water budget can be stated as,

$$P = ET + R + I + ST$$

The monthly averages of P and temperature (T) were collected from Environment Canada data. Based on the physiographic setting and proximity to weather stations, the Fergus Shand Dam Station (ID 6142400) located approximately 14 km west of the Site chosen as the most representative precipitation and temperature data

Climate Normals are arithmetic calculations of observed climate values over a specified time period and are used to describe the climatic characteristics of a location. Real-time values, such as daily temperature, may be compared to the "climate normal" to compare departures from the "average". The Canadian Climate Normals are calculated based on World Meteorological Organization (WMO) Standards. The WMO considers 30 years sufficient to eliminate year-to-year variations. The most recently published 30-year period from Environment Canada is January 1981 to December 2010.

In addition, the WMO established that normals should be arithmetic means calculated for each month of the year from daily data. To qualify, temperature data, soil temperatures and evaporation must fit the following rule: "If more than 3 consecutive daily values are missing or more than 5 daily values in total in a given month are missing, the monthly mean should not be computed and the year-month mean should be considered missing." This is referred to as the "3/5" rule. For total precipitation, degree-days, and "days with" calculations, no missing days are allowed.

2.1 Thornthwaite Monthly Water-Balance Model

The Thornthwaite water balance (Thornthwaite, 1948; Mather, 1978; 1979) uses an accounting type procedure to analyze the allocation of water among various components of the hydrologic cycle. Inputs to the model are monthly temperature, precipitation and the site latitude. Outputs include monthly potential and actual evapotranspiration, soil moisture storage, soil moisture storage change, surplus, and runoff. For ease of calculation, an Excel spreadsheet was developed. This water balance was prepared according to the "Hydrogeological Assessment Submissions: Conservation Authority Guidelines to Support Development Application (2013).

2.2 Pre-Construction Water Balance

Total proposed development area is 40.32 ha, however, 6.36 ha has been considered for future development. The future development was not considered in the water balance assessment.

To predict water balance elements the 30-year average weather data was used. The detailed calculations are presented in below sections.

Precipitation (P)

Based on the 30-year average (1981-2010) for the Fergus Shand Dam meteorological station, the average precipitation is about 945.9 mm/year. The monthly precipitation distribution is presented in **Table B.1** of **Appendix B**.

Storage (ST)

Long-term annual change in storage is 0, although there is some variation on a monthly basis. It should be noted that for the topography, soil conditions (silty sand till to sandy silt till) and vegetative cover (moderate to deep rooted crops), the maximum soil moisture storage was estimated at about 250 mm according to Table 3.1 of MECP Stormwater Management Planning and Design Manual (2003).

Evapotranspiration

Calculated potential evapotranspiration (PET) based on the Thornthwaite monthly water balance model is about 573 mm/year, or about 61% of the total precipitation. The actual evapotranspiration is calculated based on a potential evapotranspiration (PET) and soil-moisture-storage withdrawal (SMW). PET is estimated from monthly temperature and is defined as a water loss from a homogeneous, vegetation covered area that never lacks water (Thornthwaite, 1948; Mather, 1978). In Thornthwaite water balance, PET is calculated using Thornthwaite Method (Ponce, 1989). The method is based on an annual temperature efficiency index J, defined as the sum of 12 monthly values of heat index I. Each index I is a function of the mean monthly temperature T, in degrees Celsius, as follows:

$$I = \left(\frac{T}{5}\right)^{1.514}$$

Evapotranspiration is calculated by the following formula:

$$PET(0) = 1.6\left(\frac{10T}{J}\right)^{c}$$

in which PET(0) is the potential evapotranspiration at 0^{o} latitude in centimeters per month; and c is an exponent to be evaluated as follows:

$$c = 0.000000675J^{3} - 0.0000771J^{2} + 0.01792J + 0.49239$$

At the latitude other than 0^{o} potential evapotranspiration is calculated by

$$PET = K\ PET(0)$$

in which K is a constant for each month of the year, varying as a function of latitude. The latitude for Fergus Shand Dam station is 43º 44' and values of K are provided in **Table D.2** in **Appendix D**.

Water Surplus

The overall pre-construction water surplus for study area is estimated at 374 mm/year. Water surplus (S) has two components in Thornthwaite model: a runoff component, which is the overland flow component that occurs when soil moisture capacity is exceeded; and, an infiltration component. Using the MECP SWM manual (MECP, 2003) for guidance, it is estimated that about 50% of the water surplus (187 mm/year) infiltrates and the remaining 50% (187 mm/year) runs off either directly or as interflow. The details calculation is presented in **Table B.2** in **Appendix B**.

Annual Water Balance

The summary of annual water balance assessment for the pre-construction condition is provided in **Table B.3** in **Appendix B**.

2.3 Post-Construction Water Balance without LID

Based on the proposed Draft Plan provided by the Client (**Appendix E**), **Table 1** below shows a summary of post (proposed) construction land statistics.

Table 1: Post-Construction (Proposed) Land Statistics

Item	Area (m^2)
Total Area	403,200
Paved roadways/walkway/Vista	87,900
Residential (total area)	170,600
Residentials (Impervious area: 55% of lot area)	93,830
School block (Total area)	22,700
School (Impervious area)	4,500
Park Block	17,500
Park (Impervious area: 20% of lot area)	3,500
Soft landscaped lot lawns, Boulevards, 80% of Park, 45% of residentials, Open space (excluding SWM Pond)	108,970
SWM Ponds	40,900
Future Development (not used in water balance assessment)	63,600

It was estimated that 55% of the residential lots, 20% of the park, and 4,500 m^2 of the school to be covered with impervious surfaces. The future development (63,600 m^2) was not considered in this assessment, and it was considered to remain vacant, however, its contribution to recharge was not counted in water balance analysis.

To predict water balance elements, the 30-year average weather data was used. Based on the provided development information, it is our understanding that about 68% of the post construction surface will be considered impervious (excluding future development). Additionally, the Conservation Authority guidelines suggest infiltration will be lowered by 10% (a factor of 0.1) because of site grading and compaction of the soil due to construction work. However, the soil compaction issue might be resolved by increasing the topsoil depth to 300 mm. **Table B.4** in **Appendix B** presents the components of post construction water balance.

Precipitation (P)

Precipitation remains the same, the 30-year average (1981-2010) for the Fergus Shand Dam Station meteorological station (945.9 mm/year) was used.

Storage (ST)

Long-term change in storage is 0. It should be noted that compared to pre-construction, there is a change in the distribution and magnitude of monthly soil moisture storage. It is assumed that development of the land will result in reduced grades that, with the same soil conditions (clayey silt to sandy silt till) and changed vegetative cover (shallow rooted lawns and gardens), will reduce the maximum soil moisture storage to 125 mm.

Evapotranspiration

In post construction, it was assumed that the increased impervious area would result in an additional 20% in potential evaporation from the areas covered with hard surfaces. The total water lost to evaporation increases, but the PET for pervious areas, calculated at 573 mm/year, remains about the same.

Water Surplus

The post-construction water surplus for the entire Site is calculated to be about 1,130 mm/year. Of this, about 621 mm/year will be converted to runoff on impervious areas and 508 mm/year will be available for infiltration or runoff on pervious areas in post-development condition. This exceeds the infiltration potential for the surficial soils; thus a component of the available infiltration water will also run off.

The results of the post construction water balance calculation suggest that there is enough water to maintain recharge, as there is a positive surplus (S) in the post construction scenario.

Annual Water Balance without LID

The major change between the pre- and post-construction water balance is that in the pre-construction setting, most of the water surplus is carried off the site as interflow and infiltration, whereas in the post construction setting, there is more interflow and overland flow. **Table B.5** in **Appendix B** shows that the volume of runoff will be increased from 63,923 m^3/year in pre-development to 192,818 m^3/year. The post-development infiltration volume is approximately 22,361 m^3/year which is almost 41% of the pre-development, if no mitigation measure is implemented and 68% of the site surface is converted to impervious surface.

Table 2 below summarizes the post-construction water balance and the annual recharge deficit which needs to be compensated by increasing infiltration using the LID measures.

Table 2: Post -Construction Water Balance Summary

Parameter	Value
Average Annual Rainfall (mm)	946
Pre- Development Infiltration (m^3/year)	63,166
Post-Development Infiltration without Mitigation (m^3/year)	22,361
Pre- and Post-Development Infiltration Deficit (m^3/year)	-40,805

2.4 Post-Construction Water Balance with LID

Post development infiltration and runoff rates will be affected by the presence of impervious surfaces (i.e. building/garage rooftops, asphalt driveways and road), which based on the proposed development plan will comprise approximately 68% of the development property. The results of the post-construction water balance assessment without LID measures (**Table B.5** in **Appendix B**) show that there will be enough water to infiltrate in the pervious areas to increase the infiltration rate and reduce the runoff in post-construction development. Techniques to maximize the water availability in pervious areas such as designing grades to direct roof runoff towards lawns, side and rear yard swales, and other pervious areas throughout the development where possible can considerably increase the volume of infiltration in developed areas. Increasing the topsoil thickness by about two times the normal thickness is also considered as beneficial to enhance storage of water in the topsoil and increase the potential for infiltration. Other mitigation techniques that can be considered to mitigate increases in runoff and reductions in infiltration include such measures as subsurface infiltration trenches, permeable pavements, rain gardens, bioswales, galleries and pervious pipe systems. Surface methods should only be considered in areas where there is sufficient depth to water table to accommodate the systems within the unsaturated zone and sufficient soil hydraulic conductivity to function effectively. The MECP manual recommends that subsurface galleries or trenches should be about 1 m above the high water table.

The proposed LID measures will be designed by others.

2.5 Impact Assessment

To assess the potential impacts of the proposed development on groundwater resources, the draft development plan was reviewed. From a hydrogeological perspective, the following changes will occur as a result of the proposed development.

- The subject site is characteristically homogeneous with respect to soil types at ground surface. It is mainly silty sand over sand and gravel.
- The development will create new hard surfaces over a portion of the site, increasing the impervious area. The amount of impervious areas is estimated to be about 64%.
- As a result of the increase in impervious area, the overall infiltration will decrease and the amount of overland flow runoff will increase, particularly during storm events. Runoff will be managed using

conventional storm water management techniques or Low Impact Development (LID) that include storm water management (SWM) facilities.

- With the inevitable changes in impervious areas and potential changes to groundwater quality and quantity, best management practices (BMPs) that promote groundwater infiltration/recharge for the purpose of trying to establish post-development infiltration at pre-development levels makes a significant contribution to mitigate the effects of development. The type and location of these facilities and the function/operation are addressed by others.
- Although, the increase in impervious area can potentially result in a slight lowering of shallow groundwater levels, maintaining infiltration at levels similar to existing conditions will result water levels within the current range of seasonal fluctuations. No change in the overall flow direction is expected.
- The contribution of groundwater can be an important factor in the overall health of aquatic systems. Implementing mitigation measures to reduce the infiltration deficit will assist in maintaining the current level of groundwater contribution to the surface water features. As such, no negative impact is expected if LID measures are implemented to maintain the groundwater recharge similar to the existing conditions.

3 STATEMENT OF LIMITATIONS

The contents of this report are subject to the attached 'Statement of Limitation' sheet. The reader's attention is specifically drawn to these conditions as it is considered essential that they be followed for proper use and interpretation of this report. The Statement of Limitations is not intended to reduce the level of responsibility accepted by HLV2K, but rather to ensure that all parties who have been given reliance for this report are aware of the responsibilities each assumes in so doing.

This report was prepared by HLV2K exclusively for the account of Hillsburgh Heights Inc. (the CLIENT). Other than by the CLIENT, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of HLV2K. Any use, reliance on or decision made by any person other than CLIENT based on this report is the sole responsibility of such other person. The CLIENT and HLV2K make no representation or warranty to any other person with regard to this report and the work referred to in this report and the CLIENT and HLV2K accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, any decision made or any action taken based on this report or the work referred to in this report.

4 CLOSURE

We trust that this information is satisfactory for your present requirements. Should you have any questions or require additional information, please do not hesitate to contact this office.

For and Behalf of HLV2K Engineering Limited

LICENSED PROFESSIONAL ENGINEER
K. Mohammadi
100172155
Jan. 30, 2023
PROVINCE OF ONTARIO

K. Mohamadi

Kourosh Mohammadi, PhD., P.Eng.

Principal Hydrogeological Engineer and Groundwater Modeller

REFERENCES

Conservation Authority (2013). Hydrogeological Assessment Submissions: Conservation Authority Guideline to Support Development Applications.

Environment Canada (2021). Canadian National Climate Archive, Canadian Climate Norms and Averages (1981 – 2010), Fergus Shand Dam – Station ID 6142400– Website: https://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?searchType=stnName&txtStationName=fergus+shand+dam&searchMethod=contains&txtCentralLatMin=0&txtCentralLatSec=0&txtCentralLongMin=0&txtCentralLongSec=0&stnID=4760&dispBack=1

HLV2K Engineering Limited. (2022). Hydrogeological Investigation for Proposed Briarwood Hillsburgh Development at 5916 Trafalgar Road North, Town of Erin, Ontario, Project Number 2100428AH, dated August 2022.

MECP (2003). Stormwater Management Planning and Design Manual, Ontario Ministry of Environment, 379p.

HLV2K Engineering Limited

STATEMENT OF LIMITATIONS

Your report has been developed based on your unique project specific requirements as understood by HLV2K Engineering Limited (HLV2K) and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking HLV2K to assess how factors that changed subsequent to the date of the report affect the report's recommendations. HLV2K cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions, which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult HLV2K to be advised how time may have impacted on the project.

The findings derived from this investigation were based on information collected and/or provided by the Client. It may become apparent that soil and groundwater conditions differ between and beyond the testing locations examined during future investigations or other work that could not be detected or anticipated at the time of this study. As such, HLV2K cannot be held liable for environmental conditions that were not apparent from the available information. The conclusions presented represent the best judgment of the assessors based on limited investigations.

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature, external data source review, sampling, and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions, which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of HLV2K through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report is based on the assumption that he site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only HLV2K, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and HLV2K cannot be held responsible for such misinterpretation.

To avoid misuse of the information contained in your report it is recommended that you confer with HLV2K before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain HLV2K to work with other project design professionals who are affected by the report. Have HLV2K explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment.

Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact HLV2K for information relating to geoenvironmental issues.

HLV2K is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with HLV2K to develop alternative approaches to problems that may be of genuine benefit both in time and in cost.

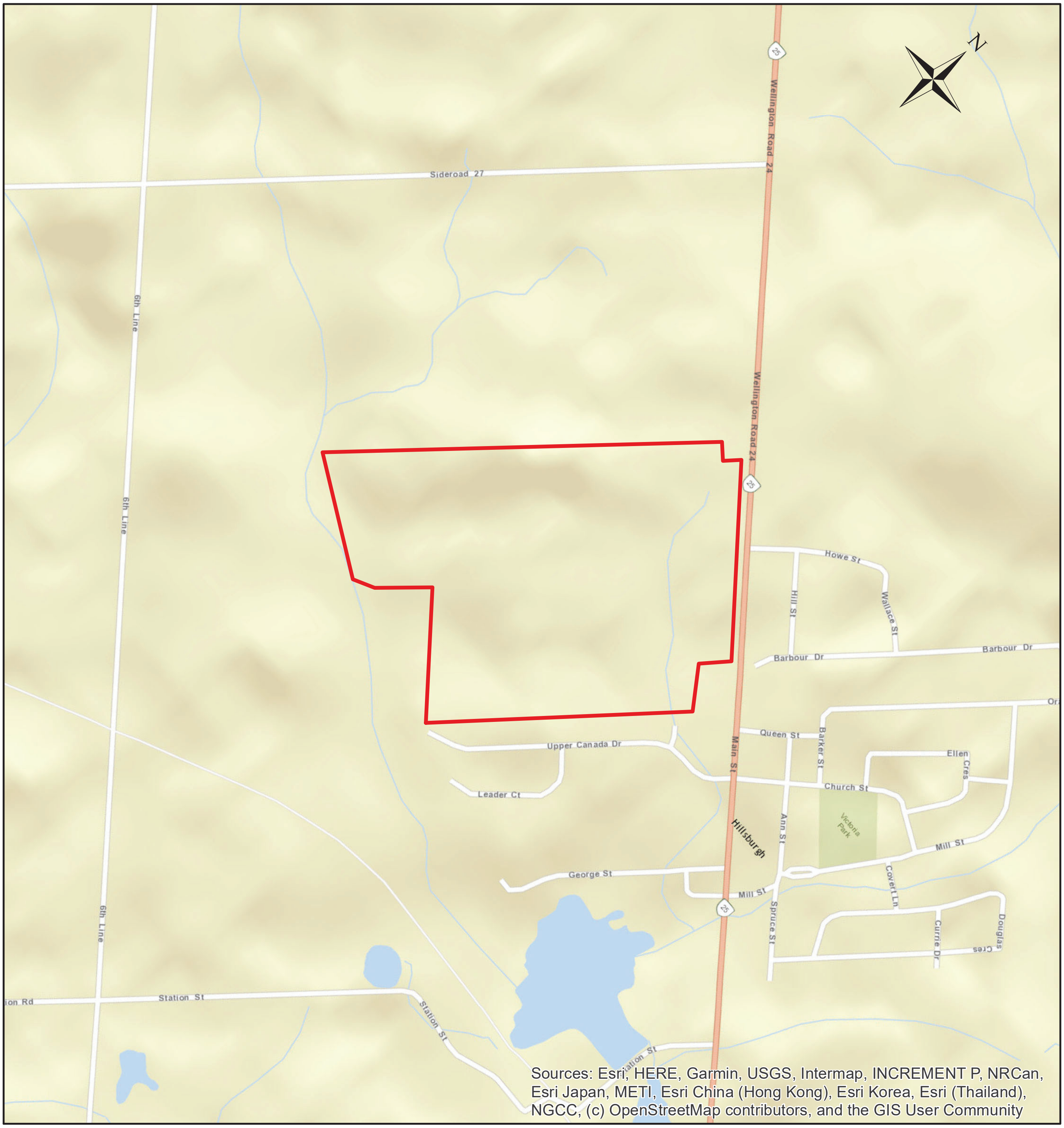
Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from HLV2K to other parties but are included to identify where HLV2K's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from HLV2K closely and do not hesitate to ask any questions you may have.

Third party information reviewed and used to formulate this report is assumed to be complete and correct. HLV2K used this information in good faith and will not accept any responsibility for deficiencies, misinterpretation or incompleteness of the information contained in documents prepared by third parties.

Nothing in this report is intended to constitute or provide a legal opinion.

Should additional information become available, HLV2K requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.

FIGURES



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Legend

▭ Site Boundary

Drawn: MM

Approved: KM

Date: SEP. 2021

Project No.: 2100428AH

Title SITE LOCATION PLAN

Project

HYDROGEOLOGICAL INVESTIGATION
5916 Trafalgar Road North, Town of Erin, Ontario

Client Hillsburgh Heights Inc.

HLV2K ENGINEERING LIMITED

0 105 210 420 Meters

FIGURE 1

APPENDIX A

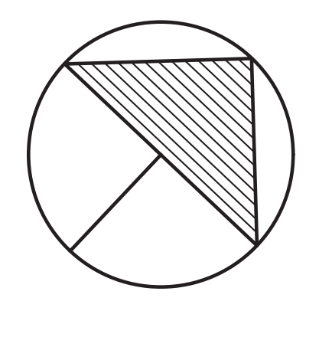
Drawing Provided by the Client

ROADWAY/WALKWAY	8.79ha
RESIDENTIAL	11.93ha
RESIDENTIAL (TOWNHOUSING)	5.13ha
SCHOOL	2.27ha
PARK	1.75ha
POND	4.09ha
FUTURE DEVELOPMENT	6.36ha
TOTAL	40.32ha

NO.	DESCRIPTION	DATE	BY
5			
4			
3			
2			
1			

REVISIONS

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
TEL. (905) 794-0600 FAX (905) 794-0611



HILLSBURGH HEIGHTS INC.
RESIDENTIAL SUBDIVISION

5616 TRAFALGAR ROAD NORTH
PART 1 OF PLAN 61R-9590
PART OF LOT 26, CONCESSION 7

HILLSBURGH URBAN AREA
TOWN OF ERIN

SHEET TITLE:

WATER BALANCE AREA PLAN

DRAWN BY: S.G.K.
PROJECT No. W21081
CHECKED BY: D.K.H.
DRAWING No. **WBAP-1**
SCALE: 1:1000
DATE: JAN., 23rd 2023

APPENDIX B

Water Balance Tables

TABLE B.1 - Climate Data

Fergus Shand Dam Station, Ontario

Latitude: 43°44' N Longitude: 80°19' W Elevation: 417.6 m

Temperature: Temperature:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Daily Average (°C)	-7.4	-6.3	-1.9	5.7	12.2	17.5	20.0	19.0	14.9	8.3	2.1	-3.9	6.7
Rainfall (mm)	27.8	25.3	36.7	67.9	86.8	83.8	89.2	96.6	93.1	75.6	80.5	34.7	798
Snowfall (mm)	40.1	30.6	22.9	6.2	0.1	0.0	0.0	0.0	0.0	1.6	12.5	33.9	147.9
Precipitation (mm)	67.9	55.9	59.6	74.1	86.9	83.8	89.2	96.6	93.1	77.2	93.0	68.6	945.9

TABLE B.2

Pre- and Post-Development Water Balance Components
Based on Thornthwaite's Soil Moisture Balance Approach

Potential Evapotranspiration Calculation	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Davily Average Temperature (°C)	-7	-6	-2	6	12	18	20	19	15	8	2	-4	7
Heat index: $i = (t/5)^{1.514}$	0.00	0.00	0.00	1.22	3.86	6.66	8.16	7.55	5.22	2.15	0.27	0.00	**35.1**
Unadjusted Daily Potential Evapotranspiration U (mm)	0.00	0.00	0.00	26.65	59.36	86.76	99.85	94.61	73.26	39.58	9.32	0.00	**489**
Adjusting Factor K for U (Latitude 43° 44' N)	0.77	0.87	0.99	1.11	1.23	1.29	1.27	1.17	1.05	0.92	0.80	0.74	
Adjusted Potential Evapotranspiration PET (mm)	0	0	0	30	73	112	127	111	77	36	7	0	**573**
PRE-DEVELOPMENT WATER BALANCE	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Precipitation (P)	68	56	60	74	87	84	89	97	93	77	93	69	946
Potential Evapotranspiration (PET)	0	0	0	30	73	112	127	111	77	36	7	0	573
P - PET	68	56	60	44	14	-28	-37	-14	16	41	86	69	373
Change in Soil Moisture Storage	0	0	0	0	0	-28	-37	-14	16	41	23	0	**0**
Soil Moisture Storage (Assume January Soil Moisture Storage = 100% SMS)	250	250	250	250	250	222	184	170	186	227	250	250	
Actual Evapotranspiration (AET)	0	0	0	30	73	112	127	111	77	36	7	0	573
Soil Moisture Deficit (in mm)	0	0	0	0	0	28	66	80	64	23	0	0	
Surplus - available for infiltration or runoff	68	56	60	44	14	0	0	0	0	0	63	69	**373**
Potential Infiltration (based on MOE metholodogy*; independent of temperature)	34.0	28.0	29.8	22.2	6.9	0.0	0.0	0.0	0.0	0.0	31.4	34.3	187
Potential Surface Water Runoff (independent of temperature)	34.0	28.0	29.8	22.2	6.9	0.0	0.0	0.0	0.0	0.0	31.4	34.3	187
POST- DEVELOPMENT WATER BALANCE ON IMPERVIOUS AREAS	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Precipitation (P)	68	56	60	74	87	84	89	97	93	77	93	69	946
Potential Evaporation (PE) from impervious areas (assume 20%)	13.6	11.2	11.9	14.8	17.4	16.8	17.8	19.3	18.6	15.4	18.6	13.7	189
P-PE (surplus available from impervious areas)	54	45	48	59	70	67	71	77	74	62	74	55	757
Water surplus change compared to pre-condition (for areas that change from vegetated open areas to impervious areas)	-14	-11	-12	15	56	67	71	77	74	62	12	-14	384

Soil Moisture Storage	250
PE from impervious areas %	20

*MOE SWM infiltration factor calculation	
topography - Rolling land (approximately 2.8 to 3.8m/km)	0.2
soils - relatively tight silty clay till materials	0.2
cover - predominantly cultivated land	0.1
Infiltration Factor	0.5

TABLE B.3 - Annual Pre-Construction Water Balance

	Pre-Construction		
	Unpaved Areas	Impervious Areas (Existing building)	Totals
Area	338600	1000	339600
Pervious Area	338600	0	338600
Impervious Area	0	1000	1000
Infiltration Factors			
Topography Infiltration Factor	0.2	0.15	
Soil Infiltration Factor	0.2	0.1	
Land Cover Infiltration Factor	0.1	0	
MOE Infiltration Factor	0.5	0.25	
Actual Infiltration Factor	0.5	0	
Runoff Coefficient Pervious Surfaces	0.5	1	
Runoff from Impervious Surfaces*	0	0.8	
Inputs (per Unit Area)			
Precipitation (mm/yr)	946	946	946
Run-On (mm/yr)	0	0	0
Other Inputs (mm/yr)	0	0	0
Total Inputs (mm/yr)	946	946	946
Outputs (per Unit Area)			
Precipitation Surplus (mm/yr)	373	757	374
Net Surplus (mm/yr)	373	757	374
Evapotranspiration (mm/yr)	573	189	572
Infiltration (mm/yr)	187	0	186
Rooftop Infiltration (mm/yr)	0	0	0
Total Infiltration (mm/yr)	187	0	186
Runoff Pervious Areas	187	0	186
Runoff Impervious Areas	0	757	2
Total Runoff (mm/yr)	187	757	188
Total Outputs (mm/yr)	946	946	946
Difference (Inputs - Outputs)	0	0	
Inputs (Volumes)			
Precipitation (m3/yr)	320282	946	321228
Run-On (m3/yr)	0	0	0
Other Inputs (m3/yr)	0	0	0
Total Inputs (m3/yr)	320282	945.9	321228
Outputs (Volumes)			
Precipitation Surplus (m3/yr)	126332	757	127089
Net Surplus (m3/yr)	126332	757	127089
Evapotranspiration (m3/yr)	193950	189	194139
Infiltration (m3/yr)	63166	0	63166
Rooftop Infiltration (m3/yr)	0	0	0
Total Infiltration (m3/yr)	63166	0	**63166**
Runoff Pervious Area (m3/yr)	63166	0	63166
Runoff Impervious Areas (m3/yr)	0	757	757
Total Runoff (m3/yr)	63166	757	**63923**
Total Outputs (m3/yr)	320282	946	321228
Difference (Inputs - Outputs)	0	0	0

* Evaporation from impervious areas was assumed to be 20% of precipitation

TABLE B.4 - WATER BALANCE COMPONENTS FOR CASE WHERE RUNOFF IS DIRECTED TO PERVIOUS AREAS

POTENTIAL EVAPOTRANSPIRATION CALCULATION	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Average Temperature (°C)	-7.4	-6.3	-1.9	5.7	12.2	17.5	20.0	19.0	14.9	8.3	2.1	-3.9	6.7
Heat index: $i = (t/5)^{1.514}$	0.00	0.00	0.00	1.22	3.86	6.66	8.16	7.55	5.22	2.15	0.27	0.00	**35.1**
Unadjusted Daily Potential Evapotranspiration U (mm)	0.00	0.00	0.00	26.65	59.36	86.76	99.85	94.61	73.26	39.58	9.32	0.00	**489**
Adjusting Factor K for U (Latitude 43° 44' N)	0.77	0.87	0.99	1.11	1.23	1.29	1.27	1.17	1.05	0.92	0.80	0.74	
Adjusted Potential Evapotranspiration PET (mm)	0	0	0	30	73	112	127	111	77	36	7	0	**573**
POST-DEVELOPMENT WATER BALANCE	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Pervious areas will receive rainfall plus some runoff from impervious areas, so the following balance calculations use this total water supply to assess potential infiltration.													
Precipitation (P)	68	56	60	74	87	84	89	97	93	77	93	69	946
Potential Evaporation (PE) from impervious areas (assume 20% of P)	14	11	12	15	17	17	18	19	19	15	19	14	189
P-PE (surplus available for runoff from impervious areas)	54	45	48	59	70	67	71	77	74	62	74	55	**757**
WAT (Total water supply to pervious areas = rain plus impervious area runoff)	122	101	107	133	156	151	161	174	168	139	167	123	**1703**
Potential Evapotranspiration from pervious areas (PET)	0	0	0	30	73	112	127	111	77	36	7	0	**573**
WAT - PET	122	101	107	104	83	39	34	63	91	103	160	123	**1130**
Change in Soil Moisture (mm)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Soil Moisture Storage (mm)*	125	125	125	125	125	125	125	125	125	125	125	125	
Actual Evapotranspiration (AET)	0	0	0	30	73	112	127	111	77	36	7	0	**573**
Total surplus - available for infiltration or runoff on pervious areas	122	101	107	104	83	39	34	63	91	103	160	123	**1130**
Estimate of I and R (based on MOE infiltration factor)*													
Potential Infiltration* (based on soil conditions; independent of temperature)	55.0	45.3	48.3	46.6	37.5	17.5	15.3	28.3	40.9	46.2	72.0	55.6	**508**
Potential Surface Water Runoff (independent of temperature)	67.2	55.3	59.0	57.0	45.9	21.4	18.7	34.6	50.0	56.4	87.9	67.9	**621**
Estimate of I and R (based on MOE Factors and CA Guideline assumption of a 10% reduction in infiltration reduction related to soil compaction)													
Potential Infiltration (based on soil conditions; independent of temperature)	49.5	40.8	43.4	42.0	33.8	15.7	13.8	25.5	36.8	41.6	64.8	50.0	**458**
Potential Surface Water Runoff (independent of temperature)	72.7	59.9	63.8	61.7	49.6	23.1	20.2	37.5	54.1	61.0	95.1	73.5	**672**

Max SMS	125
PE from impervious areas %	20

*MOE SWM infiltration factor calculation	
topography - flat to rolling	0.2
soils - tight sandy to clayey silt till	0.2
cover - predominantly impervious paved surface	0.05
Infiltration Factor	0.45

TABLE B.5 - Annual Post-Construction Water Balance without LID

	Unpaved Areas	Impervious Areas (Paved/Buildings)	Water (Pond)	Totals
Area	108970	189730	40900	339600
Pervious Area	108970	0	0	108970
Impervious Area	0	189730	40900	230630
Infiltration Factors				
Topography Infiltration Factor	0.2	0	0	
Soil Infiltration Factor	0.2	0	0	
Land Cover Infiltration Factor	0.05	0	0	
MOE Infiltration Factor	0.45	0	0	
Actual Infiltration Factor	0.55	0	0	
Runoff Coefficient Pervious Surfaces	0.45	1	1	
Runoff from Impervious Surfaces*	0	0.8	0.8	
Inputs (per Unit Area)				
Precipitation (mm/yr)	946	946	946	946
Run-On (mm/yr)	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0
Total Inputs (mm/yr)	946	946	946	946
Outputs (per Unit Area)				
Precipitation Surplus (mm/yr)	373	757	757	634
Net Surplus (mm/yr)	373	757	757	634
Evapotranspiration (mm/yr)	573	189	189	312
Infiltration (mm/yr)	205	0	0	66
Rooftop Infiltration (mm/yr)	0	0	0	0
Total Infiltration (mm/yr)	205	0	0	66
Runoff Pervious Areas	168	0	0	54
Runoff Impervious Areas	0	757	757	514
Total Runoff (mm/yr)	168	757	757	568
Total Outputs (mm/yr)	946	946	946	946
Difference (Inputs - Outputs)	0	0	0	
Inputs (Volumes)				
Precipitation (m3/yr)	103075	179466	38687	321228
Run-On (m3/yr)	0	0	0	0
Other Inputs (m3/yr)	0	0	0	0
Total Inputs (m3/yr)	103075	179466	38687	321228
Outputs (Volumes)				
Precipitation Surplus (m3/yr)	40657	143572	30950	215179
Net Surplus (m3/yr)	40657	143572	30950	215179
Evapotranspiration (m3/yr)	62418	35893	7737	106048
Infiltration (m3/yr)	22361	0	0	22361
Rooftop Infiltration (m3/yr)	0	0	0	0
Total Infiltration (m3/yr)	22361	0	0	**22361**
Runoff Pervious Area (m3/yr)	18296	0	0	18296
Runoff Impervious Areas (m3/yr)	0	143572	30950	174522
Total Runoff (m3/yr)	18296	143572	30950	**192818**
Total Outputs (m3/yr)	103075	179466	38687	321228
Difference (Inputs - Outputs)	0	0	0	0

* Evaporation from impervious areas was assumed to be 20% of precipitation

APPENDIX “E”

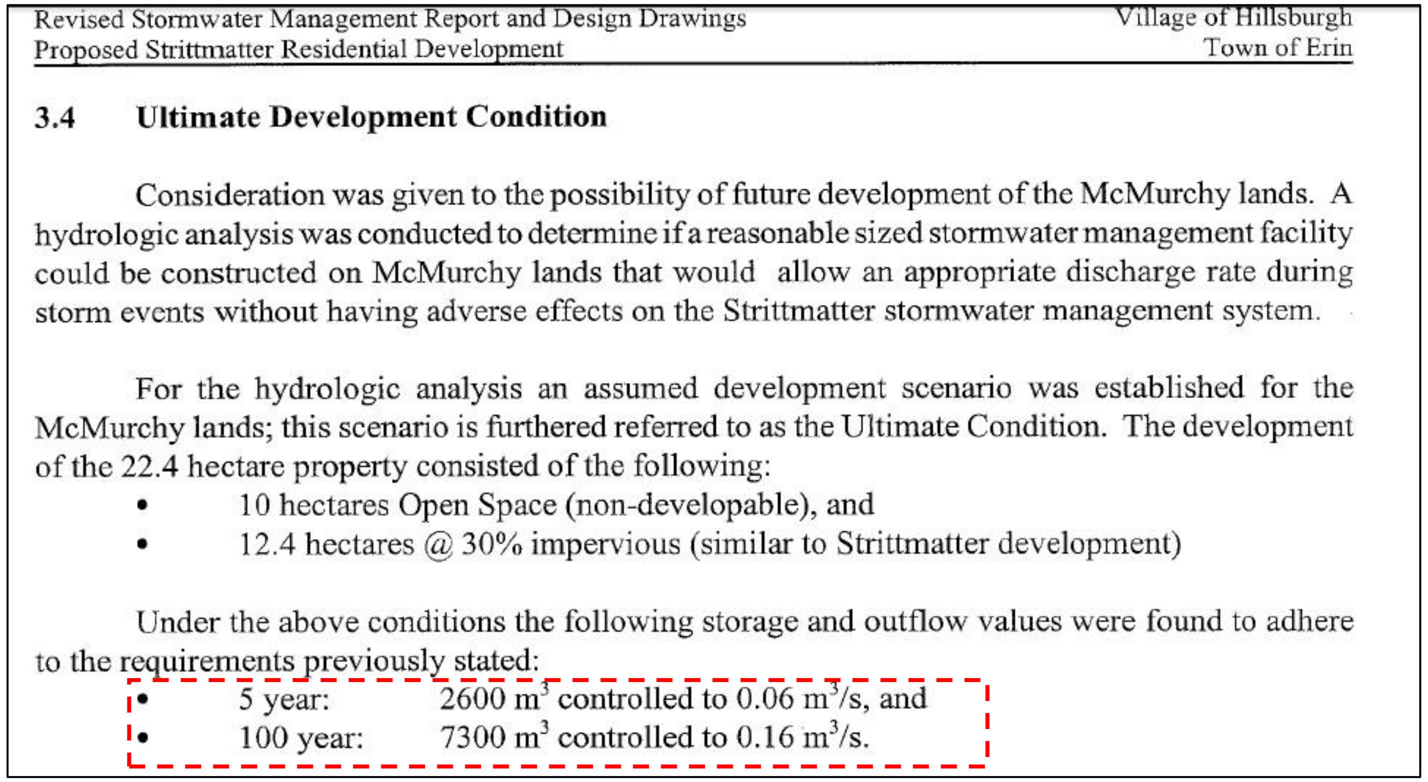
Storm Water Management Calculations

SWM POND - 1 (EAST)

Project Number : W21081 **Prepared By :** S.S
Project Name : Hillsburgh **Checked By:** Scott/D.K.H
Date : 15/02/2023

Pre-Development Scenario/ Release Rate targets for proposed SWM Pond - EAST ;

Note : Data Extracted from Strittmatter Residential Development SWM Report ;



Revised Stormwater Management Report and Design Drawings
Proposed Strittmatter Residential Development

Village of Hillsburgh
Town of Erin

3.4 Ultimate Development Condition

Consideration was given to the possibility of future development of the McMurchy lands. A hydrologic analysis was conducted to determine if a reasonable sized stormwater management facility could be constructed on McMurchy lands that would allow an appropriate discharge rate during storm events without having adverse effects on the Strittmatter stormwater management system.

For the hydrologic analysis an assumed development scenario was established for the McMurchy lands; this scenario is furthered referred to as the Ultimate Condition. The development of the 22.4 hectare property consisted of the following:

- 10 hectares Open Space (non-developable), and
- 12.4 hectares @ 30% impervious (similar to Strittmatter development)

Under the above conditions the following storage and outflow values were found to adhere to the requirements previously stated:

- 5 year: 2600 m^3 controlled to 0.06 m^3/s, and
- 100 year: 7300 m^3 controlled to 0.16 m^3/s.

Allowable Release Rate Targets for Proposed East Pond ;

5-Year Target =	**0.060 m^3/s**
100-Year Target =	**0.160 m^3/s**

The SWM Strategy *is to control the Post-development peak flows to the above mentioned targets ;*
routed flows from proposed East SWM Pond will connect to existing 450mm sewers located on McMurchy Lane.

SWM Pond -East - Pond Stage Storage Calculations

	LAND USE TYPES										
	Resid. Dev. Area	Multiple Family (Townhouses)	Road ROW	Retail / Commercial	School	Future Development	External Drainage (Wood Lot-North)	SWM Pond	Total	Composite Runoff Coeff.	Composite Imperv. %
Typical C Value	0.50	0.75	0.90	0.90	0.75	0.75	0.25	0.50			
Typical Impervious %	60%	80%	95%	95%	80%	80%	10%	75%			
Pond No - East	5.19	3.59	4.44	1.80	2.27	0.00	0.00	2.15	19.44	0.704	79%

MOE Standard Requirements = 240.00 (Excludes 40m^3/ha Extended Detention)

Permanent Pool Volume Required = 4,666 m^3

Permanent Pool Volume Provided = 12,362 m^3

Elevations	Total Area	Average Area	Depth	Delta Volume	Total Volume	
(m)	(m^2)	(m^2)	(m)	(m^3)	(m^3)	
452.00	4044					
		5133	1.00	5133		
453.00	6222				5133	
		7229	1.00	7229		
454.00	**8236**				**12362**	**Permanent Pool Storage**
454.00	8236				0	
		9082	0.65	5903		
454.65	9928				5903	
		10452	0.75	7839		
455.40	10976				13742	
		11262	0.30	3378		
455.70	11547				17121	
		12404	0.00	0		Maintenance Access
455.70	13261				17121	
		13828	0.30	4148		
456.00	14394				21269	

CVC's 25mm Erosion Control Requirement ;

Contributing Drainage Area (ha) = 19.85 Ha

25mm 4Hr Chicago Post Development Runoff Volume in Depth = 19.968 mm (Refer to VO Results)

(R. V x Drainage Area)

25mm 4Hr Chicago Volume Required = **3,964** m^3

25mm 4Hr Chicago Volume Provided = **3970** m^3

25mm 4-hour Chicago storm to be stored and released over a min. of 48-hour period ;

Drawdown Time for Water Quality Level - EAST POND ;

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)

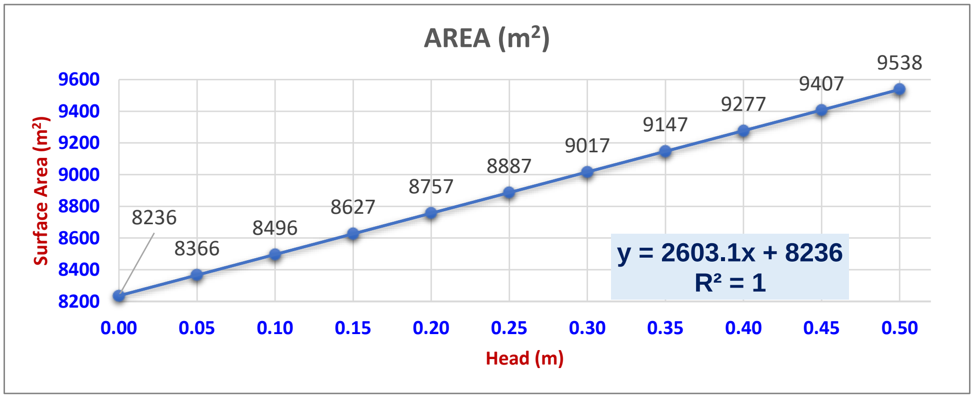
h_1 = Starting water elevation above the orifice (m)

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)
454.00	0.00	8236
454.05	0.05	8366
454.10	0.10	8496
454.15	0.15	8627
454.20	0.20	8757
454.25	0.25	8887
454.30	0.30	9017
454.35	0.35	9147
454.40	0.40	9277
454.45	0.45	9407
454.50	0.50	9538



Intercept of Regression , C_3 = 8236.0

Slope coef. of Regression, C_2 = 2603.0

Ultimate Ponding Elevation = 454.45 m (25m Water Quality Level)

Depth over orifice = 0.45 m (25mm Level - Permanent Pool Elevation)

(454.45 - 454.0)

Orifice Diameter = 156 mm

Orifice Area = 0.01911 m^2

Drawdown Time (t)= 220090 seconds

61 hours

EAST POND CONTROL STRUCTURE DESIGN

Project Number : W21081
Prepared By : S.S
Project Name : HillsBurgh
Checked By: D.K.H/Scott
Date : 15/02/2023

Orifice No. 1 (25mm Erosion Control)

Orifice Plate Diameter = 0.156 m
156 mm
Area = 0.0191 m^2
Orifice Coeff. (C) = 0.63
Invert = 454.00 m
Orifice Plate Centroid = 454.08 m

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

Where,
Q_o = Flow rate (m^3/s)
C = Discharge Coefficient
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 = 0.25 m
Orifice Height = 0.13 m
Area of Opening = 0.033 m^2
BOX CUT-OUT DETAILS
Orifice Coeff. (C) = 0.63
Invert = 455.40 m
Orifice Centroid = 455.47 m

Weir Equation = $Q_w = 1.67 \times L \times H^{\wedge 1.5}$

Weir Specifications
Length of Weir = 0.25 m
Weir Sill = 455.40 m
Weir Top = 455.53 m
Weir Coefficient = 1.67

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

Stage (m):	**0.05**	**ORIFICE CONTROL-1 (ORIFICE PLATE)**		**ORIFICE/WEIR CONTROL - 2 (BOX CUT-OUT)**					
Active Storage (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	454.00	0	0					0.000	**Permanent Pool Elevation**
415	454.05	0	0					0.000	
837	454.10	0	0					0.000	
1265	454.15	0.07	0.014					0.014	
1699	454.20	0.12	0.019					0.019	
2140	454.25	0.17	0.022					0.022	
2588	454.30	0.22	0.025					0.025	
3042	454.35	0.27	0.028					0.028	
3503	454.40	0.32	0.030					0.030	
3970	***454.45***	***0.37***	***0.033***					***0.033***	**25mm Chicago - Erosion Control**
4443	454.50	0.42	0.035					0.035	
4923	454.55	0.47	0.037					0.037	
5410	454.60	0.52	0.039					0.039	
5903	454.65	0.57	0.040					0.040	
6401	454.70	0.62	0.042					0.042	
6903	454.75	0.67	0.044					0.044	
7408	454.80	0.72	0.045					0.045	
7917	454.85	0.77	0.047					0.047	
8429	454.90	0.82	0.048					0.048	
8945	454.95	0.87	0.050					0.050	
9464	455.00	0.92	0.051					0.051	
9986	455.05	0.97	0.053					0.053	
10512	455.10	1.02	0.054					0.054	
11042	455.15	1.07	0.055					0.055	
11575	455.20	1.12	0.056					0.056	
12112	455.25	1.17	0.058					0.058	
12652	455.30	1.22	0.059					0.059	
13086	***455.34***	***1.26***	***0.060***					***0.060***	**5-Year (Target - 0.060m^3/s)**
13195	455.35	1.27	0.060					0.060	
13742	455.40	1.32	0.061			0.00	0.000	0.061	
14294	455.45	1.37	0.062			0.05	0.005	0.067	
14849	455.50	1.42	0.064			0.10	0.013	0.077	
15410	455.55	1.47	0.065	0.08	0.027			0.091	
15976	455.60	1.52	0.066	0.13	0.034			0.100	
16546	455.65	1.57	0.067	0.18	0.040			0.106	
17121	455.70	1.62	0.068	0.23	0.045			0.112	
17789	455.75	1.67	0.069	0.28	0.049			0.118	
18466	455.80	1.72	0.070	0.33	0.053			0.123	
19152	455.85	1.77	0.071	0.38	0.057			0.128	
19849	455.90	1.82	0.072	0.43	0.061			0.133	
20554	455.95	1.87	0.073	0.48	0.064			0.137	
21269	***456.00***	***1.92***	***0.074***	***0.53***	***0.067***			***0.141***	**100-Year (Target - 0.160 m^3/s)**

Emergency Spillway Design - East Pond

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.*

The Emergency spillway is proposed at 100-year Elevation = 456.00 m

100-Year Storm Peak Flows (Q_{inflow})* =	**8.976**	**$m^{3/}s$**	**(Refer to 100-Yr VO Model Results)**
Hurricane Hazel Storm Peak Flows (Q_{inflow})* =	**2.884**	**$m^{3/}s$**	**(Refer to Regional Storm Model Results)**

****Peak Flows generated by 100-year is more than that of Regional (Hurricane Hazel) Storm ; the Spillway is designed for 100-Year Peak Flows***

Emergency Spillway Weir Parameters

Top Width of Weir =	35	m
Downstream Width of Weir =	30	m
Median Width (B) =	32.9	m
Weir Sill Elevation =	456.00	m
Weir Top Elevation =	456.30	m
Depth of Weir =	0.30	m
Weir Side Slopes =	10	: 1

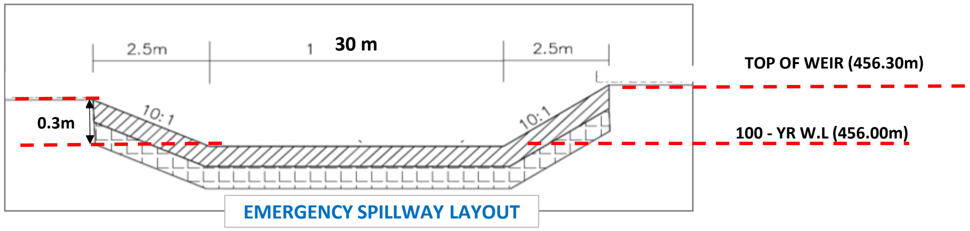
Weir Equation;

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

Stage :	0.05		
	Depth	**Cd**	**Q**
456.00	0	1.7	0.000
456.05	0.05	1.7	0.625
456.10	0.10	1.7	1.769
456.15	0.15	1.7	3.249
456.20	0.20	1.7	5.003
456.25	0.25	1.7	6.991
456.30	0.30	1.7	9.190

Therefore, Maximum capacity of Spillway is = 9.190 $m^{3/}s$ > 8.976 $m^{3/}s$

(100-Year Storm Peak Flows)



EMERGENCY SPILLWAY LAYOUT

FOREBAY DESIGN CALCULATIONS - POND WEST

Settling Calculations

Forebay Settling Length based on (MOE Equation 4.5)

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

Length-to-width ratio of forebay (r) = 2 : 1

Peak Quality flow rate (Qp) from pond based on release rate and volume of extended detention.

Peak flow rate from the pond during design quality storm (Q_p)= 0.040 m^3/s

Peak Flow from the Pond (Refer to Control Structure Design Calcs)

Settling Velocity (V_s) = 0.0003 m/s (Recommended from MOEE Manual)

Forebay Settling Length Required = 16.3 m

Total Forebay Length Provided = 60.0 m

Dispersion Length Calculations

Length of Dispersion based on (MOE Equation 4.6)

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

Inlet flow rate (Q) = 2.907 m^3/s (Inlet flow rate from Storm Sewer Design Sheet - 5 Yr Storm-Town of Erin IDF)

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) = 23.3 m

Total Forebay Length Provided = 60.0 m

Minimum Forebay Deep Zone Bottom Width

Minimum Forebay Deep Zone Bottom Width (MOE Equation 4.7)

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

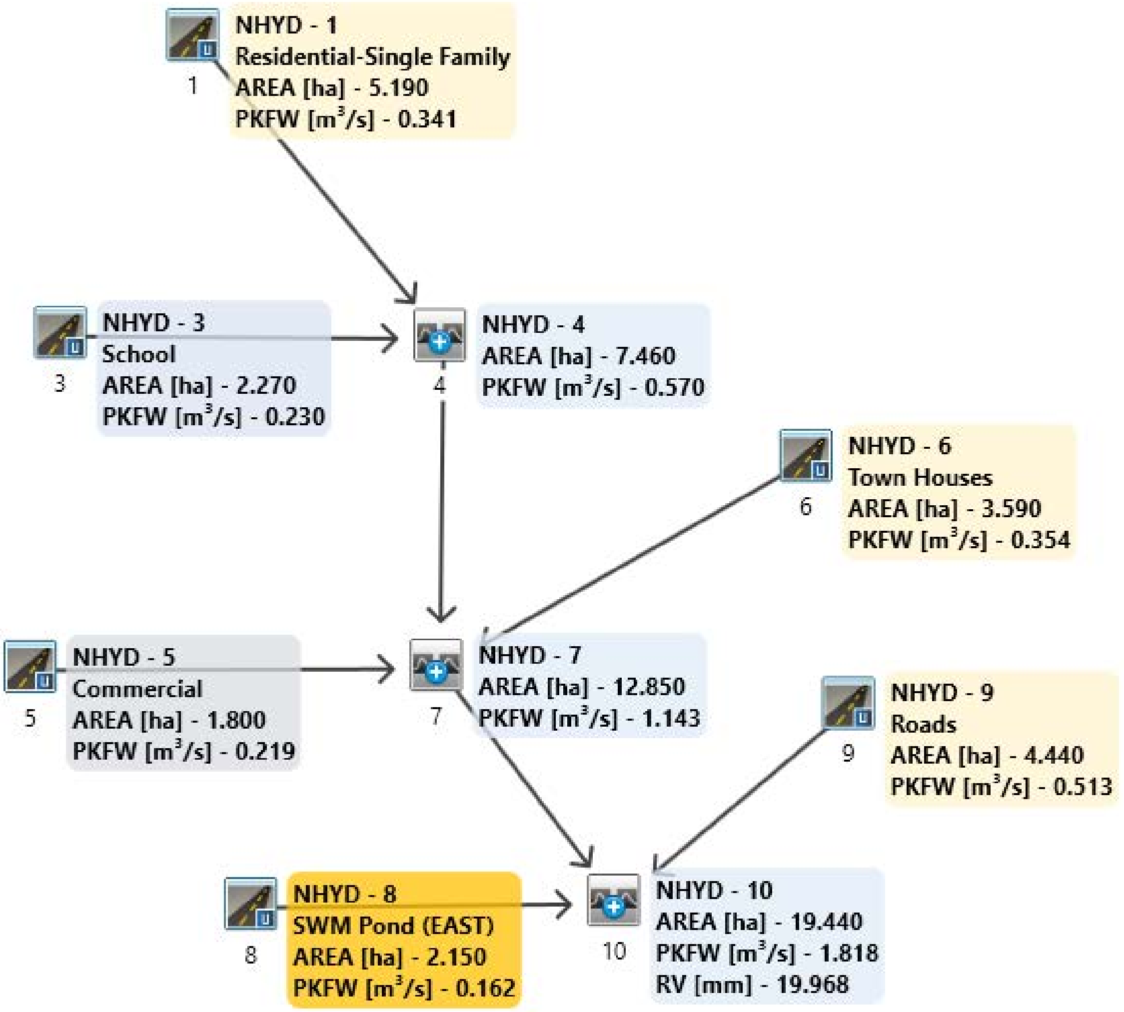
Distance (D_R) = 23.3 m (Required Dispersion Length)

Width (W_R) = 2.91 m (Required Forebay Bottom Width)

Forebay Bottom Width (W_P) = 28.00 m (Provided Forebay Bottom Width)

VO MODEL RESULTS

POST-DEVELOPMENT



25mm Erosion Control Results

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

       V    V   I    SSSSS  U   U    A    L            (v 6.2.2010)
       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 *****

---------------------------------------------------------------------------
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  ************************************************
  ** SIMULATION : 25mm Erosion Control          **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              02f14d05-9cd4-4ad8-a0c2-
21d09af9e1d5\36608cdd
| 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            |
| STANDHYD (  0001)|   Area    (ha)=   5.19
|ID= 1 DT=10.0 min |   Total  Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.11         2.08
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     186.01        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      50.21        14.81
                over (min)       10.00        30.00
     Storage Coeff.  (min)=       4.88 (ii)   20.03 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.15         0.05
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       0.32         0.05           0.341 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.83            1.50
     RUNOFF VOLUME    (mm)=      24.00         9.49           16.74
     TOTAL RAINFALL   (mm)=      25.00        25.00           25.00
     RUNOFF COEFFICIENT   =       0.96         0.38            0.67

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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 (  0003)|   Area    (ha)=   2.27
|ID= 1 DT=10.0 min |   Total  Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.82         0.45
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.02        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      50.21        14.81
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       3.81 (ii)   18.96 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.16         0.06
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       0.22         0.01           0.230 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.67            1.50
```

```
     RUNOFF VOLUME    (mm)=      24.00         9.49          20.37
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.38           0.81

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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):     5.19   0.341     1.50    16.74
      + ID2= 2 (  0003):     2.27   0.230     1.50    20.37
        ====================================================
        ID = 3 (  0004):     7.46   0.570     1.50    17.84

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   3.59
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.87         0.72
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     154.70        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      50.21        14.81
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.37 (ii)   19.52 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.06
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.35         0.02          0.354 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.67           1.50
     RUNOFF VOLUME    (mm)=      24.00         9.49          20.37
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.38           0.81

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```

```
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   1.80
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       1.71          0.09
     Dep. Storage      (mm)=       1.00          1.50
     Average Slope      (%)=       1.00          2.00
     Length             (m)=     109.54         40.00
     Mannings n            =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=      50.21         48.59
                over (min)       10.00         20.00
     Storage Coeff.  (min)=       3.55 (ii)   12.97 (ii)
     Unit Hyd. Tpeak (min)=      10.00         20.00
     Unit Hyd. peak  (cms)=       0.16          0.07
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.22          0.01          0.219 (iii)
     TIME TO PEAK    (hrs)=       1.50          1.67           1.50
     RUNOFF VOLUME    (mm)=      24.00         12.60          22.85
     TOTAL RAINFALL   (mm)=      25.00         25.00          25.00
     RUNOFF COEFFICIENT   =       0.96          0.50           0.91

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):     7.46   0.570     1.50    17.84
      + ID2= 2 (  0005):     1.80   0.219     1.50    22.85
        ====================================================
        ID = 3 (  0007):     9.26   0.789     1.50    18.82

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     9.26   0.789     1.50    18.82
      + ID2= 2 (  0006):     3.59   0.354     1.50    20.37
        ====================================================
        ID = 1 (  0007):    12.85   1.143     1.50    19.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0008)|   Area    (ha)=   2.15
|ID= 1 DT=10.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.61          0.54
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     119.72         40.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=      50.21         48.59
                over (min)       10.00         20.00
     Storage Coeff.  (min)=       3.75 (ii)    13.17 (ii)
     Unit Hyd. Tpeak (min)=      10.00         20.00
     Unit Hyd. peak  (cms)=       0.16          0.07
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       0.14          0.04          0.162 (iii)
     TIME TO PEAK    (hrs)=       1.50          1.67           1.50
     RUNOFF VOLUME    (mm)=      24.00         12.60          18.29
     TOTAL RAINFALL   (mm)=      25.00         25.00          25.00
     RUNOFF COEFFICIENT   =       0.96          0.50           0.73

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0009)|   Area    (ha)=   4.44
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.22          0.22
```
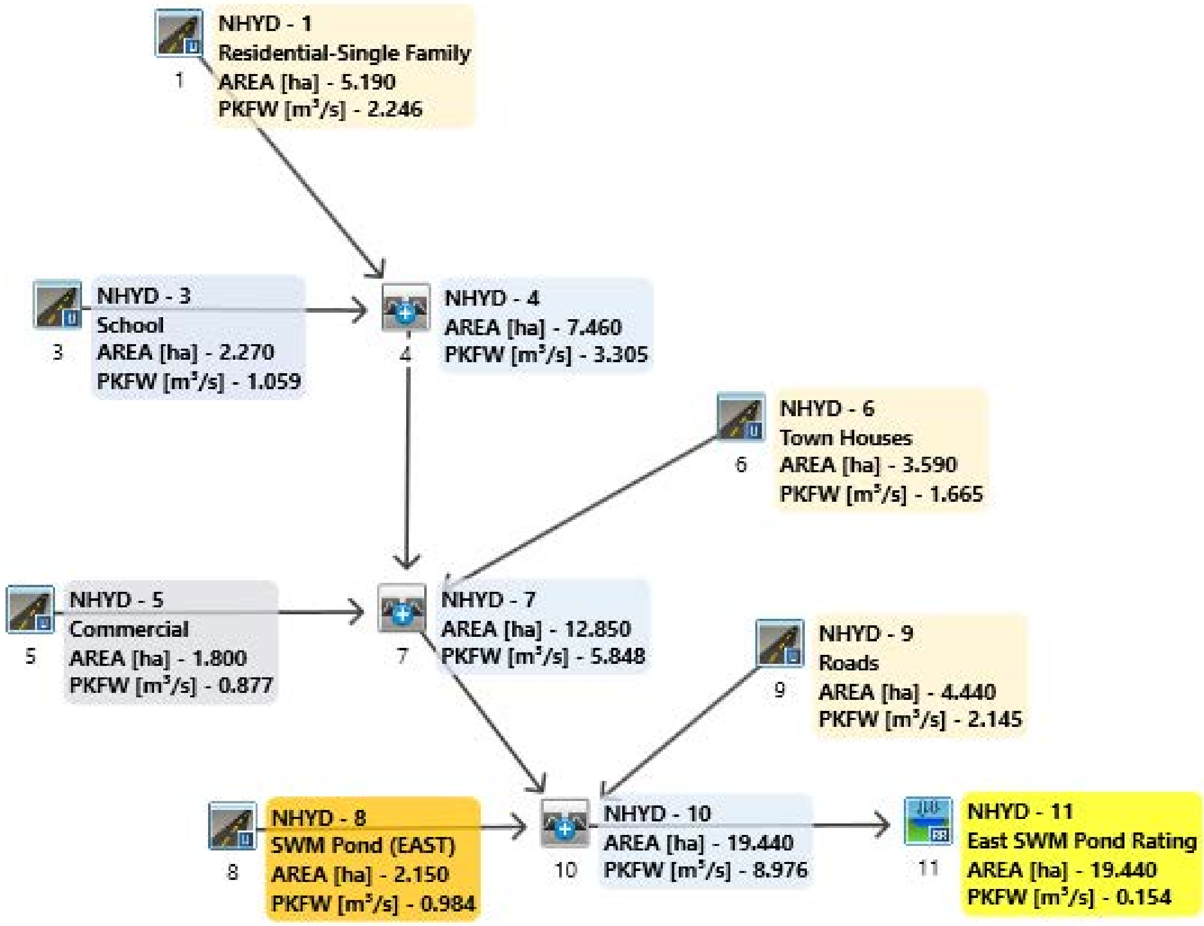

```
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     172.05        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      50.21        48.59
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.66 (ii)   14.08 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                              *  TOTALS*
     PEAK FLOW       (cms)=       0.51         0.02             0.513 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.67              1.50
     RUNOFF VOLUME    (mm)=      24.00        12.60             22.85
     TOTAL RAINFALL   (mm)=      25.00        25.00             25.00
     RUNOFF COEFFICIENT   =       0.96         0.50              0.91

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0007):    12.85   1.143     1.50    19.25
     + ID2= 2 (  0008):     2.15   0.162     1.50    18.29
       ==================================================
       ID = 3 (  0010):    15.00   1.305     1.50    19.11

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

--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0010):    15.00   1.305     1.50    19.11
     + ID2= 2 (  0009):     4.44   0.513     1.50    22.85
       ==================================================
       ID = 1 (  0010):    19.44   1.818     1.50    19.97

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



VO LAYOUT for 2 to 100-Year SCS Type II 24 Hr
based on Town of Erin IDF Curves

5 Year - Post

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==========================================================================
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       V     V   I    SSSSS  U   U    A    L              (v 6.2.2010)
       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 : 5yr 24hr 10min SCS Type II (M **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              929281ae-6f09-47a8-9800-
99169f2340f3\d563091b
| Ptotal= 88.91 mm |    Comments: 5yr 24hr 10min SCS Type II (MTO)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  6.17    1.60 | 12.33   12.80 | 18.50
1.60
                 0.17    0.98 |  6.33    1.60 | 12.50   12.80 | 18.67
1.60
                 0.33    0.98 |  6.50    1.60 | 12.67    6.58 | 18.83
1.60
                 0.50    0.98 |  6.67    1.60 | 12.83    6.58 | 19.00
1.60
                 0.67    0.98 |  6.83    1.60 | 13.00    6.58 | 19.17
1.60
                 0.83    0.98 |  7.00    1.60 | 13.17    4.80 | 19.33
1.60
                 1.00    0.98 |  7.17    1.96 | 13.33    4.80 | 19.50
1.60
                 1.17    0.98 |  7.33    1.96 | 13.50    4.80 | 19.67
1.60
```

```
                 1.33    0.98 |  7.50    1.96 | 13.67    3.73 | 19.83
1.60
                 1.50    0.98 |  7.67    1.96 | 13.83    3.73 | 20.00
1.60
                 1.67    0.98 |  7.83    1.96 | 14.00    3.73 | 20.17
1.07
                 1.83    0.98 |  8.00    1.96 | 14.17    2.67 | 20.33
1.07
                 2.00    0.98 |  8.17    2.31 | 14.33    2.67 | 20.50
1.07
                 2.17    1.16 |  8.33    2.31 | 14.50    2.67 | 20.67
1.07
                 2.33    1.16 |  8.50    2.31 | 14.67    2.67 | 20.83
1.07
                 2.50    1.16 |  8.67    2.49 | 14.83    2.67 | 21.00
1.07
                 2.67    1.16 |  8.83    2.49 | 15.00    2.67 | 21.17
1.07
                 2.83    1.16 |  9.00    2.49 | 15.17    2.67 | 21.33
1.07
                 3.00    1.16 |  9.17    2.85 | 15.33    2.67 | 21.50
1.07
                 3.17    1.16 |  9.33    2.85 | 15.50    2.67 | 21.67
1.07
                 3.33    1.16 |  9.50    2.85 | 15.67    2.67 | 21.83
1.07
                 3.50    1.16 |  9.67    3.20 | 15.83    2.67 | 22.00
1.07
                 3.67    1.16 |  9.83    3.20 | 16.00    2.67 | 22.17
1.07
                 3.83    1.16 | 10.00    3.20 | 16.17    1.60 | 22.33
1.07
                 4.00    1.16 | 10.17    4.09 | 16.33    1.60 | 22.50
1.07
                 4.17    1.42 | 10.33    4.09 | 16.50    1.60 | 22.67
1.07
                 4.33    1.42 | 10.50    4.09 | 16.67    1.60 | 22.83
1.07
                 4.50    1.42 | 10.67    5.51 | 16.83    1.60 | 23.00
1.07
                 4.67    1.42 | 10.83    5.51 | 17.00    1.60 | 23.17
1.07
                 4.83    1.42 | 11.00    5.51 | 17.17    1.60 | 23.33
1.07
                 5.00    1.42 | 11.17    8.54 | 17.33    1.60 | 23.50
1.07
                 5.17    1.42 | 11.33    8.54 | 17.50    1.60 | 23.67
1.07
                 5.33    1.42 | 11.50    8.54 | 17.67    1.60 | 23.83
1.07
                 5.50    1.42 | 11.67   26.32 | 17.83    1.60 | 24.00
1.07
                 5.67    1.42 | 11.83   67.57 | 18.00    1.60 |
                 5.83    1.42 | 12.00  108.83 | 18.17    1.60 |
```

```
               6.00    1.42 | 12.17   12.80 | 18.33    1.60 |

----------------------------------------------------------------------------
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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=   5.19
|ID= 1 DT=10.0 min |   Total  Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.11         2.08
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     186.01        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     108.83       111.27
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       3.58 (ii)   10.35 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.16         0.08
                                                        *  TOTALS*
     PEAK FLOW       (cms)=       0.77         0.40          1.113 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.33          12.17
     RUNOFF VOLUME    (mm)=      87.91        62.26          75.08
     TOTAL RAINFALL   (mm)=      88.91        88.91          88.91
     RUNOFF COEFFICIENT   =       0.99         0.70           0.84

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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 (  0003)|   Area    (ha)=   2.27
|ID= 1 DT=10.0 min |   Total  Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.82         0.45
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.02        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     108.83       111.27
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       2.80 (ii)    9.56 (ii)
```

```
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.11
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.51         0.11         0.620 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17         12.17
     RUNOFF VOLUME    (mm)=      87.91        62.26         81.49
     TOTAL RAINFALL   (mm)=      88.91        88.91         88.91
     RUNOFF COEFFICIENT   =       0.99         0.70          0.92

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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):     5.19   1.113    12.17    75.08
      + ID2= 2 (  0003):     2.27   0.620    12.17    81.49
        ====================================================
        ID = 3 (  0004):     7.46   1.733    12.17    77.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   3.59
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.87         0.72
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     154.70        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     108.83       111.27
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       3.21 (ii)    9.97 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.11
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.80         0.17         0.973 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17         12.17
     RUNOFF VOLUME    (mm)=      87.91        62.26         81.50
     TOTAL RAINFALL   (mm)=      88.91        88.91         88.91
```

```
     RUNOFF COEFFICIENT   =       0.99         0.70           0.92

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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 (  0005)|   Area    (ha)=   1.80
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       1.71         0.09
     Dep. Storage      (mm)=       1.00         1.50
     Average Slope      (%)=       1.00         2.00
     Length             (m)=     109.54        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     108.83       195.94
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       2.61 (ii)    8.00 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       0.49         0.04           0.527 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=      87.91        70.29          86.15
     TOTAL RAINFALL   (mm)=      88.91        88.91          88.91
     RUNOFF COEFFICIENT   =       0.99         0.79           0.97

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):     7.46   1.733    12.17    77.03
      + ID2= 2 (  0005):     1.80   0.527    12.17    86.15
        ====================================================
```

```
        ID = 3 (  0007):     9.26   2.260    12.17    78.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     9.26   2.260    12.17    78.80
      + ID2= 2 (  0006):     3.59   0.973    12.17    81.50
        ==================================================
        ID = 1 (  0007):    12.85   3.234    12.17    79.56

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0008)|   Area    (ha)=   2.15
|ID= 1 DT=10.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.61          0.54
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     119.72         40.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     108.83        195.94
                over (min)      10.00         10.00
     Storage Coeff.  (min)=       2.75 (ii)    8.14 (ii)
     Unit Hyd. Tpeak (min)=      10.00         10.00
     Unit Hyd. peak  (cms)=       0.17          0.12
                                                         *  TOTALS*
     PEAK FLOW       (cms)=       0.32          0.25          0.568 (iii)
     TIME TO PEAK    (hrs)=      12.17         12.17          12.17
     RUNOFF VOLUME    (mm)=      87.91         70.29          79.10
     TOTAL RAINFALL   (mm)=      88.91         88.91          88.91
     RUNOFF COEFFICIENT   =       0.99          0.79           0.89

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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 (  0009)|   Area    (ha)=   4.44
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.22         0.22
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     172.05        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     108.83       195.94
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       3.42 (ii)    8.81 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.12
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       1.18         0.10          1.281 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=      87.91        70.29          86.15
     TOTAL RAINFALL   (mm)=      88.91        88.91          88.91
     RUNOFF COEFFICIENT   =       0.99         0.79           0.97

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):    12.85   3.234    12.17    79.56
      + ID2= 2 (  0008):     2.15   0.568    12.17    79.10
        ====================================================
        ID = 3 (  0010):    15.00   3.802    12.17    79.49

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

--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0010):    15.00   3.802    12.17    79.49
      + ID2= 2 (  0009):     4.44   1.281    12.17    86.15
        ====================================================
        ID = 1 (  0010):    19.44   5.083    12.17    81.01
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
----------------------------------------------------------------------------
-----
--------------------
| RESERVOIR(  0011)|     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   |   0.1600      2.1269
                           0.0600     1.3086   |   0.0000      0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0010)     19.440      5.083     12.17      81.01
   OUTFLOW: ID= 1 (  0011)     19.440      0.060     20.33      80.60

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.18
                   TIME SHIFT OF PEAK FLOW         (min)=490.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.3054

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

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

       V     V   I    SSSSS  U   U    A    L              (v 6.2.2010)
       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 : 100yr 24hr 10min SCS Type II  **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              929281ae-6f09-47a8-9800-
99169f2340f3\71436d79
| Ptotal=145.92 mm |    Comments: 100yr 24hr 10min SCS Type II (MTO)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  6.17    2.63 | 12.33   21.01 | 18.50
2.63
                 0.17    1.61 |  6.33    2.63 | 12.50   21.01 | 18.67
2.63
                 0.33    1.61 |  6.50    2.63 | 12.67   10.80 | 18.83
2.63
                 0.50    1.61 |  6.67    2.63 | 12.83   10.80 | 19.00
2.63
                 0.67    1.61 |  6.83    2.63 | 13.00   10.80 | 19.17
2.63
                 0.83    1.61 |  7.00    2.63 | 13.17    7.88 | 19.33
2.63
                 1.00    1.61 |  7.17    3.21 | 13.33    7.88 | 19.50
2.63
                 1.17    1.61 |  7.33    3.21 | 13.50    7.88 | 19.67
2.63
```

```
                 1.33    1.61 |  7.50    3.21 | 13.67    6.13 | 19.83
2.63
                 1.50    1.61 |  7.67    3.21 | 13.83    6.13 | 20.00
2.63
                 1.67    1.61 |  7.83    3.21 | 14.00    6.13 | 20.17
1.75
                 1.83    1.61 |  8.00    3.21 | 14.17    4.38 | 20.33
1.75
                 2.00    1.61 |  8.17    3.79 | 14.33    4.38 | 20.50
1.75
                 2.17    1.90 |  8.33    3.79 | 14.50    4.38 | 20.67
1.75
                 2.33    1.90 |  8.50    3.79 | 14.67    4.38 | 20.83
1.75
                 2.50    1.90 |  8.67    4.09 | 14.83    4.38 | 21.00
1.75
                 2.67    1.90 |  8.83    4.09 | 15.00    4.38 | 21.17
1.75
                 2.83    1.90 |  9.00    4.09 | 15.17    4.38 | 21.33
1.75
                 3.00    1.90 |  9.17    4.67 | 15.33    4.38 | 21.50
1.75
                 3.17    1.90 |  9.33    4.67 | 15.50    4.38 | 21.67
1.75
                 3.33    1.90 |  9.50    4.67 | 15.67    4.38 | 21.83
1.75
                 3.50    1.90 |  9.67    5.25 | 15.83    4.38 | 22.00
1.75
                 3.67    1.90 |  9.83    5.25 | 16.00    4.38 | 22.17
1.75
                 3.83    1.90 | 10.00    5.25 | 16.17    2.63 | 22.33
1.75
                 4.00    1.90 | 10.17    6.71 | 16.33    2.63 | 22.50
1.75
                 4.17    2.33 | 10.33    6.71 | 16.50    2.63 | 22.67
1.75
                 4.33    2.33 | 10.50    6.71 | 16.67    2.63 | 22.83
1.75
                 4.50    2.33 | 10.67    9.05 | 16.83    2.63 | 23.00
1.75
                 4.67    2.33 | 10.83    9.05 | 17.00    2.63 | 23.17
1.75
                 4.83    2.33 | 11.00    9.05 | 17.17    2.63 | 23.33
1.75
                 5.00    2.33 | 11.17   14.01 | 17.33    2.63 | 23.50
1.75
                 5.17    2.33 | 11.33   14.01 | 17.50    2.63 | 23.67
1.75
                 5.33    2.33 | 11.50   14.01 | 17.67    2.63 | 23.83
1.75
                 5.50    2.33 | 11.67   43.19 | 17.83    2.63 | 24.00
1.75
                 5.67    2.33 | 11.83  110.90 | 18.00    2.63 |
                 5.83    2.33 | 12.00  178.61 | 18.17    2.63 |
```

```
                 6.00    2.33 | 12.17   21.01 | 18.33    2.63 |

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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=   5.19
|ID= 1 DT=10.0 min |   Total  Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       3.11          2.08
     Dep. Storage      (mm)=       1.00          1.50
     Average Slope      (%)=       1.00          2.00
     Length             (m)=     186.01         40.00
     Mannings n            =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     178.61        201.76
                over (min)      10.00         10.00
     Storage Coeff.  (min)=       2.94 (ii)     8.27 (ii)
     Unit Hyd. Tpeak (min)=      10.00         10.00
     Unit Hyd. peak  (cms)=       0.16          0.12
                                                                *  TOTALS*
     PEAK FLOW       (cms)=       1.27          0.98            2.246 (iii)
     TIME TO PEAK    (hrs)=      12.17         12.17            12.17
     RUNOFF VOLUME    (mm)=     144.92        115.98           130.45
     TOTAL RAINFALL   (mm)=     145.92        145.92           145.92
     RUNOFF COEFFICIENT   =       0.99          0.79             0.89

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0003)|   Area    (ha)=   2.27
|ID= 1 DT=10.0 min |   Total  Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       1.82          0.45
     Dep. Storage      (mm)=       1.00          1.50
     Average Slope      (%)=       1.00          2.00
     Length             (m)=     123.02         40.00
     Mannings n            =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     178.61        201.76
                over (min)      10.00         10.00
     Storage Coeff.  (min)=       2.29 (ii)     7.62 (ii)
```

```
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.84         0.22          1.059 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=     144.92       115.98         137.68
     TOTAL RAINFALL   (mm)=     145.92       145.92         145.92
     RUNOFF COEFFICIENT   =       0.99         0.79           0.94

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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):     5.19   2.246    12.17   130.45
      + ID2= 2 (  0003):     2.27   1.059    12.17   137.68
        ====================================================
        ID = 3 (  0004):     7.46   3.305    12.17   132.65

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   3.59
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.87         0.72
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     154.70        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     178.61       201.76
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       2.63 (ii)    7.96 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       1.32         0.34          1.665 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=     144.92       115.98         137.68
     TOTAL RAINFALL   (mm)=     145.92       145.92         145.92
```

```
     RUNOFF COEFFICIENT   =       0.99         0.79           0.94

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   1.80
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         0.09
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     109.54        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     178.61       340.12
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       2.14 (ii)    6.46 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.13
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       0.80         0.08           0.877 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17           12.17
     RUNOFF VOLUME    (mm)=     144.92       125.75          143.00
     TOTAL RAINFALL   (mm)=     145.92       145.92          145.92
     RUNOFF COEFFICIENT   =       0.99         0.86           0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0004):      7.46   3.305    12.17   132.65
      + ID2= 2 (  0005):      1.80   0.877    12.17   143.00
        ====================================================
```

```
        ID = 3 (  0007):     9.26   4.182    12.17   134.66

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     9.26   4.182    12.17   134.66
      + ID2= 2 (  0006):     3.59   1.665    12.17   137.68
        ===================================================
        ID = 1 (  0007):    12.85   5.848    12.17   135.51

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0008)|   Area    (ha)=   2.15
|ID= 1 DT=10.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  50.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.61         0.54
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     119.72        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     178.61       340.12
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       2.26 (ii)    6.58 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.13
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.53         0.45          0.984 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=     144.92       125.76         135.34
     TOTAL RAINFALL   (mm)=     145.92       145.92         145.92
     RUNOFF COEFFICIENT   =       0.99         0.86           0.93

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

```
| STANDHYD (  0009)|   Area    (ha)=   4.44
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.22         0.22
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     172.05        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     178.61       340.12
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       2.81 (ii)    7.13 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.13
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       1.96         0.18          2.145 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=     144.92       125.76         143.00
     TOTAL RAINFALL   (mm)=     145.92       145.92         145.92
     RUNOFF COEFFICIENT   =       0.99         0.86           0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):    12.85   5.848    12.17   135.51
      + ID2= 2 (  0008):     2.15   0.984    12.17   135.34
        ====================================================
        ID = 3 (  0010):    15.00   6.832    12.17   135.48

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

--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0010):    15.00   6.832    12.17   135.48
      + ID2= 2 (  0009):     4.44   2.145    12.17   143.00
        ====================================================
        ID = 1 (  0010):    19.44   8.976    12.17   137.20
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| RESERVOIR(  0011)|     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   |   0.1600      2.1269
                          0.0600     1.3086   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0010)     19.440      8.976     12.17     137.20
   OUTFLOW: ID= 1 (  0011)     19.440      0.154     16.33     136.63

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.72
                   TIME SHIFT OF PEAK FLOW         (min)=250.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  2.0811

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 FINISH
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SWM Pond - (WEST/POND 2) Stage Storage Calculations

	LAND USE TYPE								
	Single Family Resid. Dev. Area	Multiple Family (Townhouses)	Road ROW	Park/ Open Space	External Drainage (Wood Lot-North)	SWM Pond	Total Area (Ha)	Composite Runoff Coeff.	Composite Imperv. %
Typical C Value	0.50	0.75	0.90	0.25	0.25	0.50			
Typical Impervious %	60%	80%	95%	10%	10%	75%			
Drainage Area (Ha)	6.37	5.35	5.06	1.75	0.00	1.66	**20.19**	**0.645**	**71%**

Water Quality Requirements

MOE Water Quality Storage Requirement = 226.6 m^3/ha (Includes 40m^3/ha Extended Detention)
for 71% Imperviousness

(Based on MOE Table 3.2 for Enhanced Level , 80% Long Term TSS Removal)

Permanent Pool Volume Required = 4,575 m^3 (20.48 Ha x 225 m^3 /Ha)

Permanent Pool Volume Provided = 7,704 m^3

STAGE VS STORAGE TABLE

Elevations (m)	Total Area (m^2)	Average Area (m^2)	Depth (m)	Delta Volume (m^3)	Total Volume (m^3)	
456.30	2179					
		2955	1.00	2955		
457.30	3730				2955	
		4750	1.00	4750		
458.30	**5769**				**7704**	**Permanent Pool**
458.30	5769					
		6440	0.55	3542		
458.85	7110				3542	
		7702	0.80	6161		
459.65	8293				9703	
		8523	0.30	2557		
459.95	8753				12260	
		9553	0.00	0		
459.95	10352				12260	
		11107	0.35	3887		
460.30	11861				16147	

Pre-Development Model Parameters ;

Existing Drainage Area Breakdown ;

Area (Ha)

External Drainage from North = 4.28 (Refer to Pre-Development Plan - EX-DR-1)

Note : We are not considering External Drainage flows from North to establish West Pond Release Rate Targets

Farm Land = 21.63 (Refer to Pre-Development Plan - Area No. A-1, A-2 and A-3)

A-1 = 4.10 Ha (draining to Adjacent Lands)

A-2 = 13.10 Ha (draining to a low point the west)

A-3 = 4.43 Ha (draining to a low point the west)

	NHYD	DT (min)	Area (Ha)	CN	IA (mm)	N	Tp (hr)
Farm Land	1	10	21.63	64	8	3	0.2

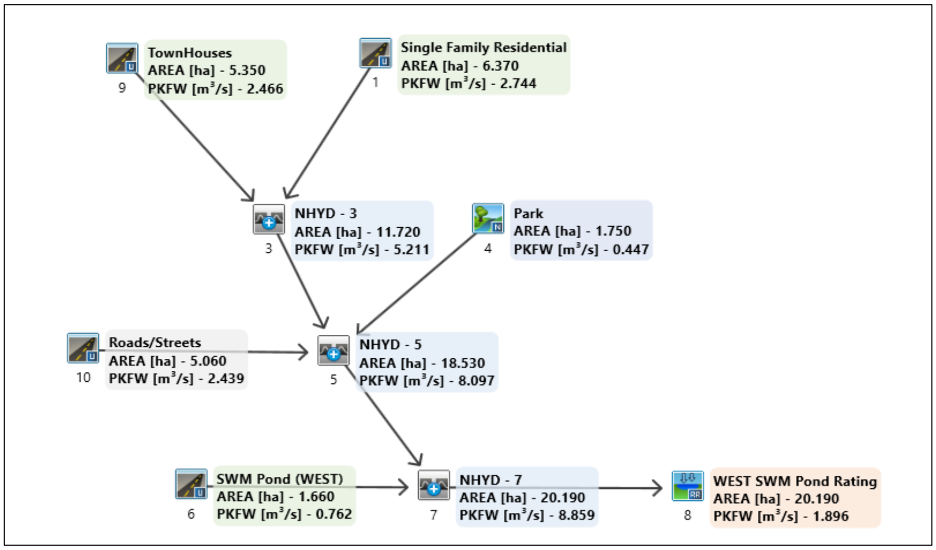
Total Pre-Development Drainage to CVC lands = 21.630 Ha

Pre-Development (Hydrograph Results) ;

	NHYD	Flow Type	DT (Hr)	Area (Ha)	PKFW (m^3/s)	TP (hr)	RV (mm)
Town of Erin IDF - 2yr 24hr 10min SCS Type II	1	Outflow	0.167	21.63	*0.925*	12.167	16.87
Town of Erin IDF - 5yr 24hr 10min SCS Type II	1	Outflow	0.167	21.63	*1.595*	12.167	28.49
Town of Erin IDF - 10yr 24hr 10min SCS Type II	1	Outflow	0.167	21.63	*2.089*	12.167	37.01
Town of Erin IDF - 25yr 24hr 10min SCS Type II	1	Outflow	0.167	21.63	*2.793*	12.167	49.08
Town of Erin IDF - 50yr 24hr 10min SCS Type II	1	Outflow	0.167	21.63	*3.309*	12.167	57.90
Town of Erin IDF - 100yr 24hr 10min SCS Type II	1	Outflow	0.167	21.63	*3.783*	12.167	65.98

Release Rate Targets for SWM Pond

Post-Development Results ;



Total Drainage to West SWM Pond/Pond 2 = 20.19 Ha

Note: Under Post-Development Condition, the overall drainage to the west is less than compared to Pre-development areas as some portion of the West areas will drain to East Pond. Refer to Grading Plan and Storm Drainage Area Plan attached in the Report; hence discrepancies between Pre & post drainage areas

SUMMARY OF VO MODELLING RESULTS FOR WEST POND

	Control Structure Data			VO RESULTS			
Storm Event	**Pre-Dev Targets**	**Control Structure Release Rate**	**Storage Provided in Pond**	**Inflows/Peak Flows Generated**	**Outflows**	**Max Storage Used**	**Elevation in Pond**
	(m^3/s)	(m^3/s)	(m^3)	(m^3/s)	(m^3/s)	(m^3)	(m)
2-Year	*0.925*	0.356	*6,274*	3.491	**0.342**	6,030	459.22
5-Year	*1.595*	0.779	*7,914*	4.835	**0.746**	7,798	459.43
10-Year	*2.089*	1.273	*8,963*	6.020	**1.188**	8,840	459.56
25-Year	*2.793*	1.605	*10,540*	7.249	**1.549**	10,349	459.75
50-Year	*3.309*	1.782	*11,564*	8.103	**1.744**	11,408	459.87
100-Year	*3.783*	1.956	*12,873*	8.859	**1.896**	12,426	460.00

WEST POND - (Erosion Control)

CVC's 25mm Erosion Control Requirement ;

Contributing Drainage Area (ha) = 20.19 Ha

25mm 4Hr Chicago Post Development Runoff Volume in Depth = 18.317 mm (Refer to 25mm VO Results appended)

(R. V x Drainage Area)

25mm 4Hr Chicago Post Development Storage Volume = **3698 m^3 (Required)**

25mm 4Hr Chicago Post Development Storage Volume = **3899 m^3 (Provided)**

25mm 4-hour Chicago storm to be stored and released over a 48-hour period

Drawdown Time for Erosion Control - WEST POND ;

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)

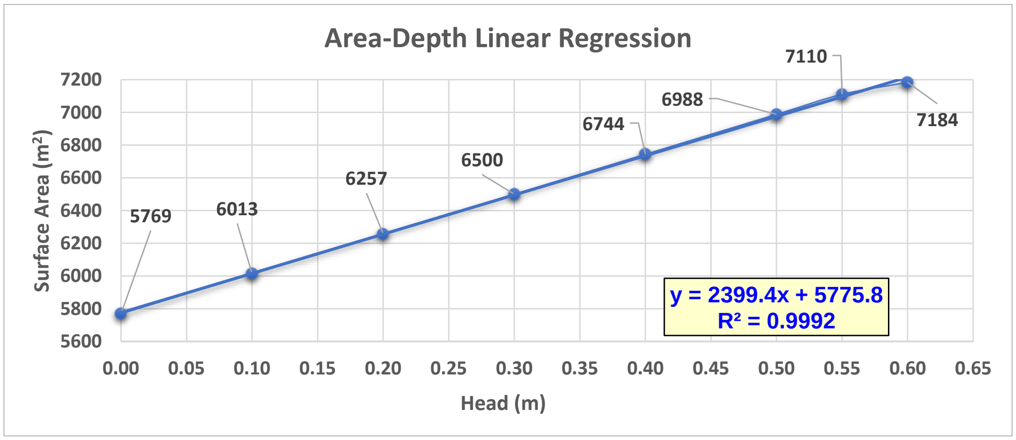
h_1 = Starting water elevation above the orifice (m)

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)
458.30	0.00	5769
458.40	0.10	6013
458.50	0.20	6257
458.60	0.30	6500
458.70	0.40	6744
458.80	0.50	6988
458.85	0.55	7110
458.90	0.60	7184



Intercept of Regression , C_3 = 5775.8

Slope coef. of Regression, C_2 = 2399.4

Ultimate Ponding Elevation = 458.90 m (25m Water Quality Level)

Depth over orifice = 0.60 m (25mm Level - Permanent Pool Elevation)

(458.90 - 458.30)

Orifice Diameter = 160 mm

Orifice Area = 0.02021 m^2

Drawdown Time (t)= 174267 seconds

48 hours

WEST POND CONTROL STRUCTURE DESIGN

Project Number : W21081 **Prepared By :** S.S

Project Name : HillsBurgh **Checked By:** D.K.H/Scott

Date : 14/02/2023

Orifice Plate No. 1 (25mm Erosion Control)

Orifice Plate Diameter = 0.160 m
160 mm
Area = 0.0201 m^2
Orifice Coeff. (C) = 0.63
Invert = 458.30 m
Orifice Plate Centroid = 458.38 m

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

Where,
Q_o = Flow rate (m^3/s)
C = Discharge Coefficient
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 = 1.30 m
Orifice Height = 0.60 m
Area of Opening = 0.780 m^2
Orifice Coeff. (C) = 0.63
Invert = 458.95 m
Orifice Centroid = 459.25 m

BOX CUT-OUT DETAILS

Weir Equation = $Q_w = 1.67 \times L \times H^{1.5}$

Weir Specifications
Length of Weir = 1.30 m
Weir Sill = 458.95 m
Weir Top = 459.55 m
Weir Coefficient = 1.67

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

Stage (m):	**0.05**	**ORIFICE CONTROL-1 (Orifice Plate)**		**ORIFICE/WEIR CONTROL - 2 (Box/Rectangular Weir)**					
Active Storage (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	458.30	0	0					0.000	**PPE**
292	458.35	0	0					0.000	
589	458.40	0	0					0.000	
893	458.45	0.07	0.015					0.015	
1203	458.50	0.12	0.019					0.019	
1518	458.55	0.17	0.023					0.023	
1840	458.60	0.22	0.026					0.026	
2169	458.65	0.27	0.029					0.029	
2503	458.70	0.32	0.032					0.032	
2843	458.75	0.37	0.034					0.034	
3189	458.80	0.42	0.036					0.036	
3542	458.85	0.47	0.038					0.038	
3899	**458.90**	**0.52**	**0.040**					**0.040**	**25mm Chicago-Erosion C**
4260	458.95	0.57	0.042					0.042	
4625	459.00	0.62	0.044			0.05	0.024	0.068	
4993	459.05	0.67	0.046			0.10	0.069	0.115	
5365	459.10	0.72	0.048			0.15	0.126	0.174	
5741	459.15	0.77	0.049			0.20	0.194	0.243	
6121	459.20	0.82	0.051			0.25	0.271	0.322	
6274	**459.22**	**0.84**	**0.051**			**0.27**	**0.305**	**0.356**	**2-Year**
6504	459.25	0.87	0.052			0.30	0.357	0.409	
6891	459.30	0.92	0.054			0.35	0.450	0.503	
7282	459.35	0.97	0.055			0.40	0.549	0.604	
7676	459.40	1.02	0.057			0.45	0.655	0.712	
7914	**459.43**	**1.05**	**0.057**			**0.48**	**0.722**	**0.779**	**5-Year**
8074	459.45	1.07	0.058			0.50	0.768	0.826	
8476	459.50	1.12	0.059			0.55	0.886	0.945	
8881	459.55	1.17	0.061			0.60	1.009	1.070	
8963	**459.56**	**1.18**	**0.061**	**0.31**	**1.212**			**1.273**	**10-Year**
9290	459.60	1.22	0.062	0.35	1.288			1.350	
9703	459.65	1.27	0.063	0.40	1.377			1.440	
10120	459.70	1.32	0.064	0.45	1.460			1.525	
10540	**459.75**	**1.37**	**0.066**	**0.50**	**1.539**			**1.605**	**25-Year**
10964	459.80	1.42	0.067	0.55	1.614			1.681	
11392	459.85	1.47	0.068	0.60	1.686			1.754	
11564	**459.87**	**1.49**	**0.068**	**0.62**	**1.714**			**1.782**	**50-Year**
11824	459.90	1.52	0.069	0.65	1.755			1.824	
12260	459.95	1.57	0.070	0.70	1.821			1.891	
12783	**460.00**	**1.62**	**0.071**	**0.75**	**1.885**			**1.956**	**100-Year**
13317	460.05	1.67	0.073	0.80	1.947			2.019	
13861	460.10	1.72	0.074	0.85	2.007			2.080	
14416	460.15	1.77	0.075	0.90	2.065			2.140	
14983	460.20	1.82	0.076	0.95	2.122			2.197	
15559	460.25	1.87	0.077	1.00	2.177			2.253	
16147	460.30	1.92	0.078	1.05	2.230			2.308	

Emergency Spillway Design - West Pond

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.***

The Emergency spillway is proposed at 100-year Elevation = 460.00 m

100-Year Storm Peak Flows (Q_{inflow})* =	**8.859**	**$m^{3/}s$**	**(Refer to 100-Yr VO Model Results)**
RegionalStorm Peak Flows (Q_{inflow})* =	**2.971**	**$m^{3/}s$**	**(Refer to Regional VO Model Results)**

****Peak Flows generated by 100-year is more than that of Regional (Hurricane Hazel) Storm ; the Spillway is designed for 100-Year Peak Flows***

Emergency Spillway Weir Parameters

Top Width of Weir =	35	m
Downstream Width of Weir =	30	m
Median Width (B) =	32.5	m
Weir Sill Elevation =	460.00	m
Weir Top Elevation =	460.30	m
Depth of Weir =	0.30	m
Weir Side Slopes =	10	: 1

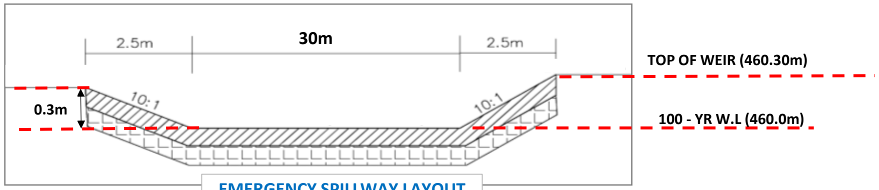
Weir Equation;

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

Stage : 0.05

	Depth	Cd	Q
460.00	0	1.7	0.000
460.05	0.05	1.7	0.618
460.10	0.10	1.7	1.747
460.15	0.15	1.7	3.210
460.20	0.20	1.7	4.942
460.25	0.25	1.7	6.906
460.30	0.30	1.7	9.079

Therefore, Maximum capacity of Spillway is = 9.079 $m^{3/}s$ > 8.859 $m^{3/}s$
(100-Year Storm Peak Flows)



EMERGENCY SPILLWAY LAYOUT

FOREBAY DESIGN CALCULATIONS - POND WEST/2

Settling Calculations

Forebay Settling Length based on (MOE Equation 4.5)

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

Length-to-width ratio of forebay (r) = 2 : 1

Peak Quality flow rate (Qp) from pond based on release rate and volume of extended detention.

Peak flow rate from the pond during design quality storm (Q_p)= 0.040 m^3/s

Peak Flow from the Pond (Refer to Control Structure Design Calcs)

Settling Velocity (V_s) = 0.0003 m/s (Recommended from MOEE Manual)

Forebay Settling Length Required = 16.3 m

Total Forebay Length Provided = 60.0 m

Dispersion Length Calculations

Length of Dispersion based on (MOE Equation 4.6)

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

Inlet flow rate (Q) = 1.56 m^3/s (Inlet flow rate from Storm Sewer Design Sheet - 5 Yr Storm-Town of Erin IDF)

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) = 12.5 m

Total Forebay Length Provided = 60.0 m

Minimum Forebay Deep Zone Bottom Width

Minimum Forebay Deep Zone Bottom Width (MOE Equation 4.7)

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

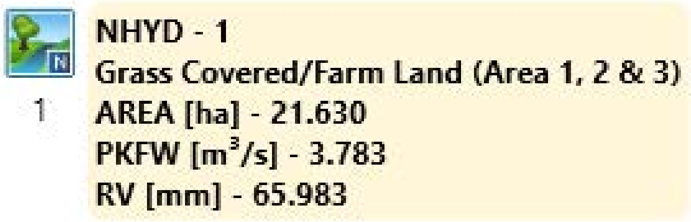
Distance (D_R) = 12.5 m (Required Dispersion Length)

Width (W_R) = 1.56 m (Required Forebay Bottom Width)

Forebay Bottom Width (W_P) = 28.00 m (Provided Forebay Bottom Width)

VO MODEL RESULTS

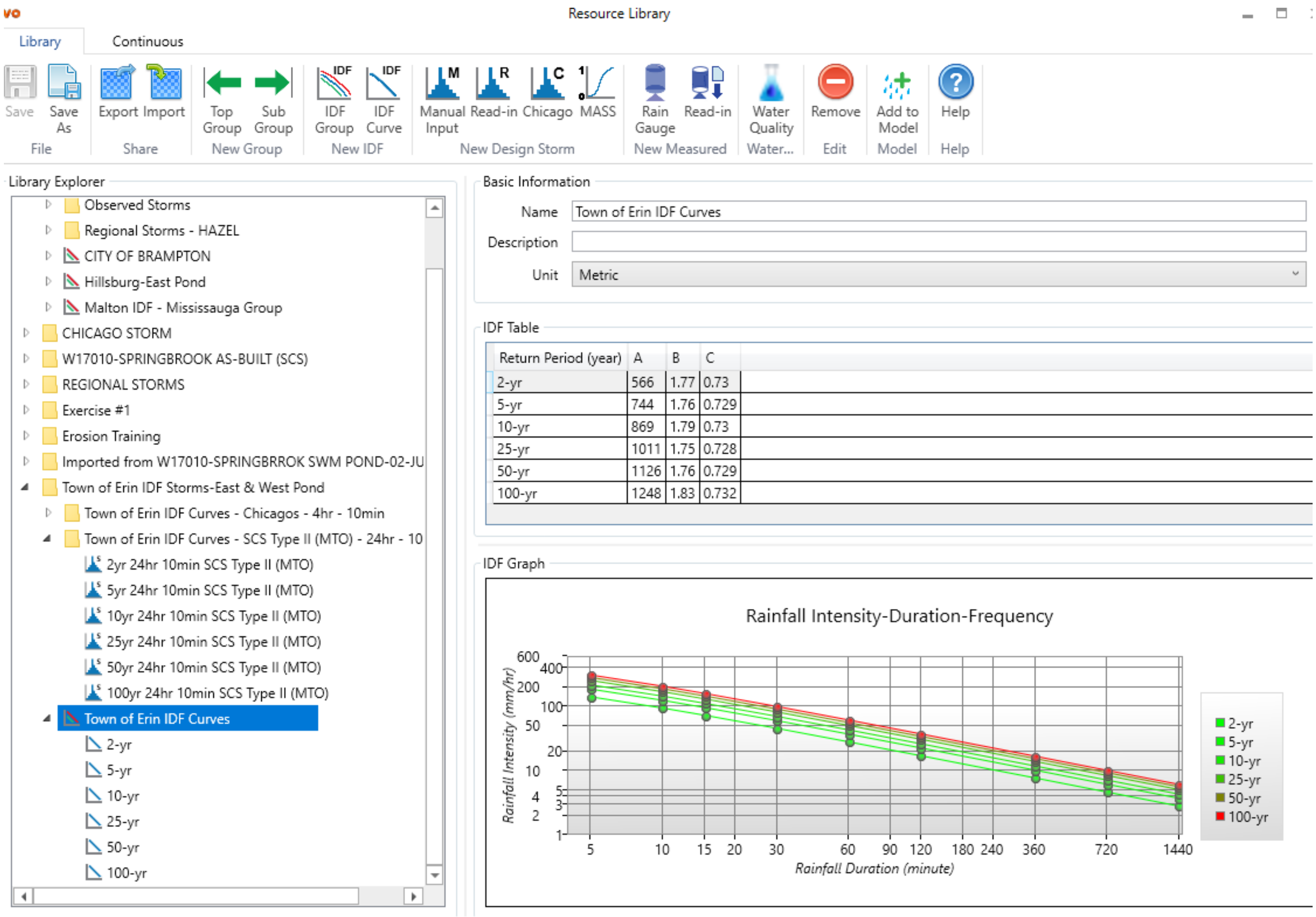
PRE-DEVELOPMENT RESULTS



NHYD - 1
Grass Covered/Farm Land (Area 1, 2 & 3)
AREA [ha] - 21.630
PKFW [m^3/s] - 3.783
RV [mm] - 65.983

Pre- Development VO Model Layout

Town of Erin IDF Curves for SCS Type II - 24 Hour Run



Basic Information

Name: Town of Erin IDF Curves

Description:

Unit: Metric

IDF Table

Return Period (year)	A	B	C
2-yr	566	1.77	0.73
5-yr	744	1.76	0.729
10-yr	869	1.79	0.73
25-yr	1011	1.75	0.728
50-yr	1126	1.76	0.729
100-yr	1248	1.83	0.732

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       V    V   I   SSSSS  U   U    A    L             (v 6.2.2010)
       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 *****

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  ************************************************
  ** SIMULATION : 2yr 24hr 10min SCS Type II (M **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              beed067c-aded-498a-be37-
5ab7a3d89fbe\89c7fa09
| Ptotal= 67.15 mm |    Comments: 2yr 24hr 10min SCS Type II (MTO)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  6.17    1.21 | 12.33    9.67 | 18.50
1.21
                 0.17    0.74 |  6.33    1.21 | 12.50    9.67 | 18.67
1.21
                 0.33    0.74 |  6.50    1.21 | 12.67    4.97 | 18.83
1.21
                 0.50    0.74 |  6.67    1.21 | 12.83    4.97 | 19.00
1.21
                 0.67    0.74 |  6.83    1.21 | 13.00    4.97 | 19.17
1.21
                 0.83    0.74 |  7.00    1.21 | 13.17    3.63 | 19.33
1.21
                 1.00    0.74 |  7.17    1.48 | 13.33    3.63 | 19.50
1.21
                 1.17    0.74 |  7.33    1.48 | 13.50    3.63 | 19.67
1.21
```

```
                 1.33    0.74 |  7.50    1.48 | 13.67    2.82 | 19.83
1.21
                 1.50    0.74 |  7.67    1.48 | 13.83    2.82 | 20.00
1.21
                 1.67    0.74 |  7.83    1.48 | 14.00    2.82 | 20.17
0.81
                 1.83    0.74 |  8.00    1.48 | 14.17    2.01 | 20.33
0.81
                 2.00    0.74 |  8.17    1.75 | 14.33    2.01 | 20.50
0.81
                 2.17    0.87 |  8.33    1.75 | 14.50    2.01 | 20.67
0.81
                 2.33    0.87 |  8.50    1.75 | 14.67    2.01 | 20.83
0.81
                 2.50    0.87 |  8.67    1.88 | 14.83    2.01 | 21.00
0.81
                 2.67    0.87 |  8.83    1.88 | 15.00    2.01 | 21.17
0.81
                 2.83    0.87 |  9.00    1.88 | 15.17    2.01 | 21.33
0.81
                 3.00    0.87 |  9.17    2.15 | 15.33    2.01 | 21.50
0.81
                 3.17    0.87 |  9.33    2.15 | 15.50    2.01 | 21.67
0.81
                 3.33    0.87 |  9.50    2.15 | 15.67    2.01 | 21.83
0.81
                 3.50    0.87 |  9.67    2.42 | 15.83    2.01 | 22.00
0.81
                 3.67    0.87 |  9.83    2.42 | 16.00    2.01 | 22.17
0.81
                 3.83    0.87 | 10.00    2.42 | 16.17    1.21 | 22.33
0.81
                 4.00    0.87 | 10.17    3.09 | 16.33    1.21 | 22.50
0.81
                 4.17    1.07 | 10.33    3.09 | 16.50    1.21 | 22.67
0.81
                 4.33    1.07 | 10.50    3.09 | 16.67    1.21 | 22.83
0.81
                 4.50    1.07 | 10.67    4.16 | 16.83    1.21 | 23.00
0.81
                 4.67    1.07 | 10.83    4.16 | 17.00    1.21 | 23.17
0.81
                 4.83    1.07 | 11.00    4.16 | 17.17    1.21 | 23.33
0.81
                 5.00    1.07 | 11.17    6.45 | 17.33    1.21 | 23.50
0.81
                 5.17    1.07 | 11.33    6.45 | 17.50    1.21 | 23.67
0.81
                 5.33    1.07 | 11.50    6.45 | 17.67    1.21 | 23.83
0.81
                 5.50    1.07 | 11.67   19.88 | 17.83    1.21 | 24.00
0.81
                 5.67    1.07 | 11.83   51.03 | 18.00    1.21 |
                 5.83    1.07 | 12.00   82.19 | 18.17    1.21 |
```

```
                 6.00    1.07 | 12.17    9.67 | 18.33    1.21 |

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--------------------
| CALIB             |
| NASHYD   (  0001)|   Area    (ha)=  21.63   Curve Number   (CN)= 64.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   4.131

     PEAK FLOW       (cms)=   0.925 (i)
     TIME TO PEAK    (hrs)=  12.167
     RUNOFF VOLUME    (mm)=  16.868
     TOTAL RAINFALL   (mm)=  67.150
     RUNOFF COEFFICIENT   =   0.251

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

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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2010)
       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 *****
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  ************************************************
  ** SIMULATION : 5yr 24hr 10min SCS Type II (M **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              beed067c-aded-498a-be37-
5ab7a3d89fbe\e85488a6
| Ptotal= 88.91 mm |    Comments: 5yr 24hr 10min SCS Type II (MTO)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  6.17    1.60 | 12.33   12.80 | 18.50
1.60
                 0.17    0.98 |  6.33    1.60 | 12.50   12.80 | 18.67
1.60
                 0.33    0.98 |  6.50    1.60 | 12.67    6.58 | 18.83
1.60
                 0.50    0.98 |  6.67    1.60 | 12.83    6.58 | 19.00
1.60
                 0.67    0.98 |  6.83    1.60 | 13.00    6.58 | 19.17
1.60
                 0.83    0.98 |  7.00    1.60 | 13.17    4.80 | 19.33
1.60
                 1.00    0.98 |  7.17    1.96 | 13.33    4.80 | 19.50
1.60
                 1.17    0.98 |  7.33    1.96 | 13.50    4.80 | 19.67
1.60
```

```
                 1.33    0.98 |  7.50    1.96 | 13.67    3.73 | 19.83
1.60
                 1.50    0.98 |  7.67    1.96 | 13.83    3.73 | 20.00
1.60
                 1.67    0.98 |  7.83    1.96 | 14.00    3.73 | 20.17
1.07
                 1.83    0.98 |  8.00    1.96 | 14.17    2.67 | 20.33
1.07
                 2.00    0.98 |  8.17    2.31 | 14.33    2.67 | 20.50
1.07
                 2.17    1.16 |  8.33    2.31 | 14.50    2.67 | 20.67
1.07
                 2.33    1.16 |  8.50    2.31 | 14.67    2.67 | 20.83
1.07
                 2.50    1.16 |  8.67    2.49 | 14.83    2.67 | 21.00
1.07
                 2.67    1.16 |  8.83    2.49 | 15.00    2.67 | 21.17
1.07
                 2.83    1.16 |  9.00    2.49 | 15.17    2.67 | 21.33
1.07
                 3.00    1.16 |  9.17    2.85 | 15.33    2.67 | 21.50
1.07
                 3.17    1.16 |  9.33    2.85 | 15.50    2.67 | 21.67
1.07
                 3.33    1.16 |  9.50    2.85 | 15.67    2.67 | 21.83
1.07
                 3.50    1.16 |  9.67    3.20 | 15.83    2.67 | 22.00
1.07
                 3.67    1.16 |  9.83    3.20 | 16.00    2.67 | 22.17
1.07
                 3.83    1.16 | 10.00    3.20 | 16.17    1.60 | 22.33
1.07
                 4.00    1.16 | 10.17    4.09 | 16.33    1.60 | 22.50
1.07
                 4.17    1.42 | 10.33    4.09 | 16.50    1.60 | 22.67
1.07
                 4.33    1.42 | 10.50    4.09 | 16.67    1.60 | 22.83
1.07
                 4.50    1.42 | 10.67    5.51 | 16.83    1.60 | 23.00
1.07
                 4.67    1.42 | 10.83    5.51 | 17.00    1.60 | 23.17
1.07
                 4.83    1.42 | 11.00    5.51 | 17.17    1.60 | 23.33
1.07
                 5.00    1.42 | 11.17    8.54 | 17.33    1.60 | 23.50
1.07
                 5.17    1.42 | 11.33    8.54 | 17.50    1.60 | 23.67
1.07
                 5.33    1.42 | 11.50    8.54 | 17.67    1.60 | 23.83
1.07
                 5.50    1.42 | 11.67   26.32 | 17.83    1.60 | 24.00
1.07
                 5.67    1.42 | 11.83   67.57 | 18.00    1.60 |
                 5.83    1.42 | 12.00  108.83 | 18.17    1.60 |
```

```
                 6.00    1.42 | 12.17   12.80 | 18.33    1.60 |

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

--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  21.63   Curve Number   (CN)= 64.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   4.131

     PEAK FLOW       (cms)=   1.595 (i)
     TIME TO PEAK    (hrs)=  12.167
     RUNOFF VOLUME    (mm)=  28.493
     TOTAL RAINFALL   (mm)=  88.910
     RUNOFF COEFFICIENT   =   0.320

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

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       V    V   I    SSSSS  U   U    A    L             (v 6.2.2010)
       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 *****
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  ************************************************
  ** SIMULATION : 10yr 24hr 10min SCS Type II ( **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              beed067c-aded-498a-be37-
5ab7a3d89fbe\d7cd7d34
| Ptotal=103.09 mm |    Comments: 10yr 24hr 10min SCS Type II (MTO)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  6.17    1.86 | 12.33   14.84 | 18.50
1.86
                 0.17    1.13 |  6.33    1.86 | 12.50   14.84 | 18.67
1.86
                 0.33    1.13 |  6.50    1.86 | 12.67    7.63 | 18.83
1.86
                 0.50    1.13 |  6.67    1.86 | 12.83    7.63 | 19.00
1.86
                 0.67    1.13 |  6.83    1.86 | 13.00    7.63 | 19.17
1.86
                 0.83    1.13 |  7.00    1.86 | 13.17    5.57 | 19.33
1.86
                 1.00    1.13 |  7.17    2.27 | 13.33    5.57 | 19.50
1.86
                 1.17    1.13 |  7.33    2.27 | 13.50    5.57 | 19.67
1.86
```

```
                 1.33    1.13 |  7.50    2.27 | 13.67    4.33 | 19.83
1.86
                 1.50    1.13 |  7.67    2.27 | 13.83    4.33 | 20.00
1.86
                 1.67    1.13 |  7.83    2.27 | 14.00    4.33 | 20.17
1.24
                 1.83    1.13 |  8.00    2.27 | 14.17    3.09 | 20.33
1.24
                 2.00    1.13 |  8.17    2.68 | 14.33    3.09 | 20.50
1.24
                 2.17    1.34 |  8.33    2.68 | 14.50    3.09 | 20.67
1.24
                 2.33    1.34 |  8.50    2.68 | 14.67    3.09 | 20.83
1.24
                 2.50    1.34 |  8.67    2.89 | 14.83    3.09 | 21.00
1.24
                 2.67    1.34 |  8.83    2.89 | 15.00    3.09 | 21.17
1.24
                 2.83    1.34 |  9.00    2.89 | 15.17    3.09 | 21.33
1.24
                 3.00    1.34 |  9.17    3.30 | 15.33    3.09 | 21.50
1.24
                 3.17    1.34 |  9.33    3.30 | 15.50    3.09 | 21.67
1.24
                 3.33    1.34 |  9.50    3.30 | 15.67    3.09 | 21.83
1.24
                 3.50    1.34 |  9.67    3.71 | 15.83    3.09 | 22.00
1.24
                 3.67    1.34 |  9.83    3.71 | 16.00    3.09 | 22.17
1.24
                 3.83    1.34 | 10.00    3.71 | 16.17    1.86 | 22.33
1.24
                 4.00    1.34 | 10.17    4.74 | 16.33    1.86 | 22.50
1.24
                 4.17    1.65 | 10.33    4.74 | 16.50    1.86 | 22.67
1.24
                 4.33    1.65 | 10.50    4.74 | 16.67    1.86 | 22.83
1.24
                 4.50    1.65 | 10.67    6.39 | 16.83    1.86 | 23.00
1.24
                 4.67    1.65 | 10.83    6.39 | 17.00    1.86 | 23.17
1.24
                 4.83    1.65 | 11.00    6.39 | 17.17    1.86 | 23.33
1.24
                 5.00    1.65 | 11.17    9.90 | 17.33    1.86 | 23.50
1.24
                 5.17    1.65 | 11.33    9.90 | 17.50    1.86 | 23.67
1.24
                 5.33    1.65 | 11.50    9.90 | 17.67    1.86 | 23.83
1.24
                 5.50    1.65 | 11.67   30.51 | 17.83    1.86 | 24.00
1.24
                 5.67    1.65 | 11.83   78.35 | 18.00    1.86 |
                 5.83    1.65 | 12.00  126.18 | 18.17    1.86 |
```

```
                  6.00    1.65 | 12.17   14.84 | 18.33    1.86 |

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--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  21.63   Curve Number   (CN)= 64.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   4.131

     PEAK FLOW       (cms)=   2.089 (i)
     TIME TO PEAK    (hrs)=  12.167
     RUNOFF VOLUME    (mm)=  37.010
     TOTAL RAINFALL   (mm)= 103.090
     RUNOFF COEFFICIENT   =   0.359

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

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25-Year-Pre

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       V     V    I    SSSSS  U   U    A    L              (v 6.2.2010)
       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 *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\94dcb993-ab51-4e54-a787-a7d17a3f01cf\scena
  Summary filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\94dcb993-ab51-4e54-a787-a7d17a3f01cf\scena

--------------------------------------------------------------------------
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  ************************************************
  ** SIMULATION : 25yr 24hr 10min SCS Type II ( **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              beed067c-aded-498a-be37-
5ab7a3d89fbe\bed76262
| Ptotal=121.70 mm |    Comments: 25yr 24hr 10min SCS Type II (MTO)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  6.17    2.19 | 12.33   17.52 | 18.50
2.19
                 0.17    1.34 |  6.33    2.19 | 12.50   17.52 | 18.67
2.19
                 0.33    1.34 |  6.50    2.19 | 12.67    9.01 | 18.83
2.19
                 0.50    1.34 |  6.67    2.19 | 12.83    9.01 | 19.00
2.19
```

```
                            0.67    1.34 |  6.83    2.19 | 13.00    9.01 | 19.17
           2.19
                            0.83    1.34 |  7.00    2.19 | 13.17    6.57 | 19.33
           2.19
                            1.00    1.34 |  7.17    2.68 | 13.33    6.57 | 19.50
           2.19
                            1.17    1.34 |  7.33    2.68 | 13.50    6.57 | 19.67
           2.19
                            1.33    1.34 |  7.50    2.68 | 13.67    5.11 | 19.83
           2.19
                            1.50    1.34 |  7.67    2.68 | 13.83    5.11 | 20.00
           2.19
                            1.67    1.34 |  7.83    2.68 | 14.00    5.11 | 20.17
           1.46
                            1.83    1.34 |  8.00    2.68 | 14.17    3.65 | 20.33
           1.46
                            2.00    1.34 |  8.17    3.16 | 14.33    3.65 | 20.50
           1.46
                            2.17    1.58 |  8.33    3.16 | 14.50    3.65 | 20.67
           1.46
                            2.33    1.58 |  8.50    3.16 | 14.67    3.65 | 20.83
           1.46
                            2.50    1.58 |  8.67    3.41 | 14.83    3.65 | 21.00
           1.46
                            2.67    1.58 |  8.83    3.41 | 15.00    3.65 | 21.17
           1.46
                            2.83    1.58 |  9.00    3.41 | 15.17    3.65 | 21.33
           1.46
                            3.00    1.58 |  9.17    3.89 | 15.33    3.65 | 21.50
           1.46
                            3.17    1.58 |  9.33    3.89 | 15.50    3.65 | 21.67
           1.46
                            3.33    1.58 |  9.50    3.89 | 15.67    3.65 | 21.83
           1.46
                            3.50    1.58 |  9.67    4.38 | 15.83    3.65 | 22.00
           1.46
                            3.67    1.58 |  9.83    4.38 | 16.00    3.65 | 22.17
           1.46
                            3.83    1.58 | 10.00    4.38 | 16.17    2.19 | 22.33
           1.46
                            4.00    1.58 | 10.17    5.60 | 16.33    2.19 | 22.50
           1.46
                            4.17    1.95 | 10.33    5.60 | 16.50    2.19 | 22.67
           1.46
                            4.33    1.95 | 10.50    5.60 | 16.67    2.19 | 22.83
           1.46
                            4.50    1.95 | 10.67    7.55 | 16.83    2.19 | 23.00
           1.46
                            4.67    1.95 | 10.83    7.55 | 17.00    2.19 | 23.17
           1.46
                            4.83    1.95 | 11.00    7.55 | 17.17    2.19 | 23.33
           1.46
                            5.00    1.95 | 11.17   11.68 | 17.33    2.19 | 23.50
           1.46
```

```
                 5.17    1.95 | 11.33   11.68 | 17.50    2.19 | 23.67
1.46
                 5.33    1.95 | 11.50   11.68 | 17.67    2.19 | 23.83
1.46
                 5.50    1.95 | 11.67   36.02 | 17.83    2.19 | 24.00
1.46
                 5.67    1.95 | 11.83   92.49 | 18.00    2.19 |
                 5.83    1.95 | 12.00  148.96 | 18.17    2.19 |
                 6.00    1.95 | 12.17   17.52 | 18.33    2.19 |

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--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  21.63   Curve Number   (CN)= 64.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   4.131

     PEAK FLOW       (cms)=   2.793 (i)
     TIME TO PEAK    (hrs)=  12.167
     RUNOFF VOLUME    (mm)=  49.076
     TOTAL RAINFALL   (mm)= 121.700
     RUNOFF COEFFICIENT   =   0.403

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

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       V     V   I    SSSSS  U   U    A    L              (v 6.2.2010)
       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 *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\35386cb2-c3f3-4324-855f-21dc2a9f7cb9\scena
  Summary filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\35386cb2-c3f3-4324-855f-21dc2a9f7cb9\scena
--------------------------------------------------------------------------
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  ************************************************
  ** SIMULATION : 50yr 24hr 10min SCS Type II ( **
  ************************************************


--------------------
|    READ STORM     |    Filename: C:\Users\shuchi\AppD
|                   |              ata\Local\Temp\
|                   |              beed067c-aded-498a-be37-
5ab7a3d89fbe\b12258bd
| Ptotal=134.56 mm |    Comments: 50yr 24hr 10min SCS Type II (MTO)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  6.17    2.42 | 12.33   19.38 | 18.50
2.42
                 0.17    1.48 |  6.33    2.42 | 12.50   19.38 | 18.67
2.42
                 0.33    1.48 |  6.50    2.42 | 12.67    9.96 | 18.83
2.42
                 0.50    1.48 |  6.67    2.42 | 12.83    9.96 | 19.00
2.42
                 0.67    1.48 |  6.83    2.42 | 13.00    9.96 | 19.17
2.42
```

```
                 0.83    1.48 |  7.00    2.42 | 13.17    7.27 | 19.33
2.42
                 1.00    1.48 |  7.17    2.96 | 13.33    7.27 | 19.50
2.42
                 1.17    1.48 |  7.33    2.96 | 13.50    7.27 | 19.67
2.42
                 1.33    1.48 |  7.50    2.96 | 13.67    5.65 | 19.83
2.42
                 1.50    1.48 |  7.67    2.96 | 13.83    5.65 | 20.00
2.42
                 1.67    1.48 |  7.83    2.96 | 14.00    5.65 | 20.17
1.61
                 1.83    1.48 |  8.00    2.96 | 14.17    4.04 | 20.33
1.61
                 2.00    1.48 |  8.17    3.50 | 14.33    4.04 | 20.50
1.61
                 2.17    1.75 |  8.33    3.50 | 14.50    4.04 | 20.67
1.61
                 2.33    1.75 |  8.50    3.50 | 14.67    4.04 | 20.83
1.61
                 2.50    1.75 |  8.67    3.77 | 14.83    4.04 | 21.00
1.61
                 2.67    1.75 |  8.83    3.77 | 15.00    4.04 | 21.17
1.61
                 2.83    1.75 |  9.00    3.77 | 15.17    4.04 | 21.33
1.61
                 3.00    1.75 |  9.17    4.31 | 15.33    4.04 | 21.50
1.61
                 3.17    1.75 |  9.33    4.31 | 15.50    4.04 | 21.67
1.61
                 3.33    1.75 |  9.50    4.31 | 15.67    4.04 | 21.83
1.61
                 3.50    1.75 |  9.67    4.84 | 15.83    4.04 | 22.00
1.61
                 3.67    1.75 |  9.83    4.84 | 16.00    4.04 | 22.17
1.61
                 3.83    1.75 | 10.00    4.84 | 16.17    2.42 | 22.33
1.61
                 4.00    1.75 | 10.17    6.19 | 16.33    2.42 | 22.50
1.61
                 4.17    2.15 | 10.33    6.19 | 16.50    2.42 | 22.67
1.61
                 4.33    2.15 | 10.50    6.19 | 16.67    2.42 | 22.83
1.61
                 4.50    2.15 | 10.67    8.34 | 16.83    2.42 | 23.00
1.61
                 4.67    2.15 | 10.83    8.34 | 17.00    2.42 | 23.17
1.61
                 4.83    2.15 | 11.00    8.34 | 17.17    2.42 | 23.33
1.61
                 5.00    2.15 | 11.17   12.92 | 17.33    2.42 | 23.50
1.61
                 5.17    2.15 | 11.33   12.92 | 17.50    2.42 | 23.67
1.61
```

```
                 5.33    2.15 | 11.50   12.92 | 17.67    2.42 | 23.83
1.61
                 5.50    2.15 | 11.67   39.83 | 17.83    2.42 | 24.00
1.61
                 5.67    2.15 | 11.83  102.27 | 18.00    2.42 |
                 5.83    2.15 | 12.00  164.70 | 18.17    2.42 |
                 6.00    2.15 | 12.17   19.38 | 18.33    2.42 |

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

--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  21.63   Curve Number   (CN)= 64.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   4.131

     PEAK FLOW       (cms)=   3.309 (i)
     TIME TO PEAK    (hrs)=  12.167
     RUNOFF VOLUME    (mm)=  57.904
     TOTAL RAINFALL   (mm)= 134.560
     RUNOFF COEFFICIENT   =   0.430

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

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       V    V   I    SSSSS  U   U    A    L               (v 6.2.2010)
       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 *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\e3ad4dcd-98f3-485e-abaf-04de8b8ac021\scena
  Summary filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\e3ad4dcd-98f3-485e-abaf-04de8b8ac021\scena
--------------------------------------------------------------------------
---------------------------------
  ************************************************
  ** SIMULATION : 100yr 24hr 10min SCS Type II  **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              beed067c-aded-498a-be37-
5ab7a3d89fbe\337e82e6
| Ptotal=145.92 mm |    Comments: 100yr 24hr 10min SCS Type II (MTO)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  6.17    2.63 | 12.33   21.01 | 18.50
2.63
                 0.17    1.61 |  6.33    2.63 | 12.50   21.01 | 18.67
2.63
                 0.33    1.61 |  6.50    2.63 | 12.67   10.80 | 18.83
2.63
                 0.50    1.61 |  6.67    2.63 | 12.83   10.80 | 19.00
2.63
                 0.67    1.61 |  6.83    2.63 | 13.00   10.80 | 19.17
2.63
```

0.83	1.61	7.00	2.63	13.17	7.88	19.33	2.63
1.00	1.61	7.17	3.21	13.33	7.88	19.50	2.63
1.17	1.61	7.33	3.21	13.50	7.88	19.67	2.63
1.33	1.61	7.50	3.21	13.67	6.13	19.83	2.63
1.50	1.61	7.67	3.21	13.83	6.13	20.00	2.63
1.67	1.61	7.83	3.21	14.00	6.13	20.17	1.75
1.83	1.61	8.00	3.21	14.17	4.38	20.33	1.75
2.00	1.61	8.17	3.79	14.33	4.38	20.50	1.75
2.17	1.90	8.33	3.79	14.50	4.38	20.67	1.75
2.33	1.90	8.50	3.79	14.67	4.38	20.83	1.75
2.50	1.90	8.67	4.09	14.83	4.38	21.00	1.75
2.67	1.90	8.83	4.09	15.00	4.38	21.17	1.75
2.83	1.90	9.00	4.09	15.17	4.38	21.33	1.75
3.00	1.90	9.17	4.67	15.33	4.38	21.50	1.75
3.17	1.90	9.33	4.67	15.50	4.38	21.67	1.75
3.33	1.90	9.50	4.67	15.67	4.38	21.83	1.75
3.50	1.90	9.67	5.25	15.83	4.38	22.00	1.75
3.67	1.90	9.83	5.25	16.00	4.38	22.17	1.75
3.83	1.90	10.00	5.25	16.17	2.63	22.33	1.75
4.00	1.90	10.17	6.71	16.33	2.63	22.50	1.75
4.17	2.33	10.33	6.71	16.50	2.63	22.67	1.75
4.33	2.33	10.50	6.71	16.67	2.63	22.83	1.75
4.50	2.33	10.67	9.05	16.83	2.63	23.00	1.75
4.67	2.33	10.83	9.05	17.00	2.63	23.17	1.75
4.83	2.33	11.00	9.05	17.17	2.63	23.33	1.75
5.00	2.33	11.17	14.01	17.33	2.63	23.50	1.75
5.17	2.33	11.33	14.01	17.50	2.63	23.67	1.75

```
                 5.33    2.33 | 11.50   14.01 | 17.67    2.63 | 23.83
1.75
                 5.50    2.33 | 11.67   43.19 | 17.83    2.63 | 24.00
1.75
                 5.67    2.33 | 11.83  110.90 | 18.00    2.63 |
                 5.83    2.33 | 12.00  178.61 | 18.17    2.63 |
                 6.00    2.33 | 12.17   21.01 | 18.33    2.63 |

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

--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  21.63   Curve Number   (CN)= 64.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   4.131

     PEAK FLOW       (cms)=   3.783 (i)
     TIME TO PEAK    (hrs)=  12.167
     RUNOFF VOLUME    (mm)=  65.983
     TOTAL RAINFALL   (mm)= 145.920
     RUNOFF COEFFICIENT   =   0.452

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

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 FINISH
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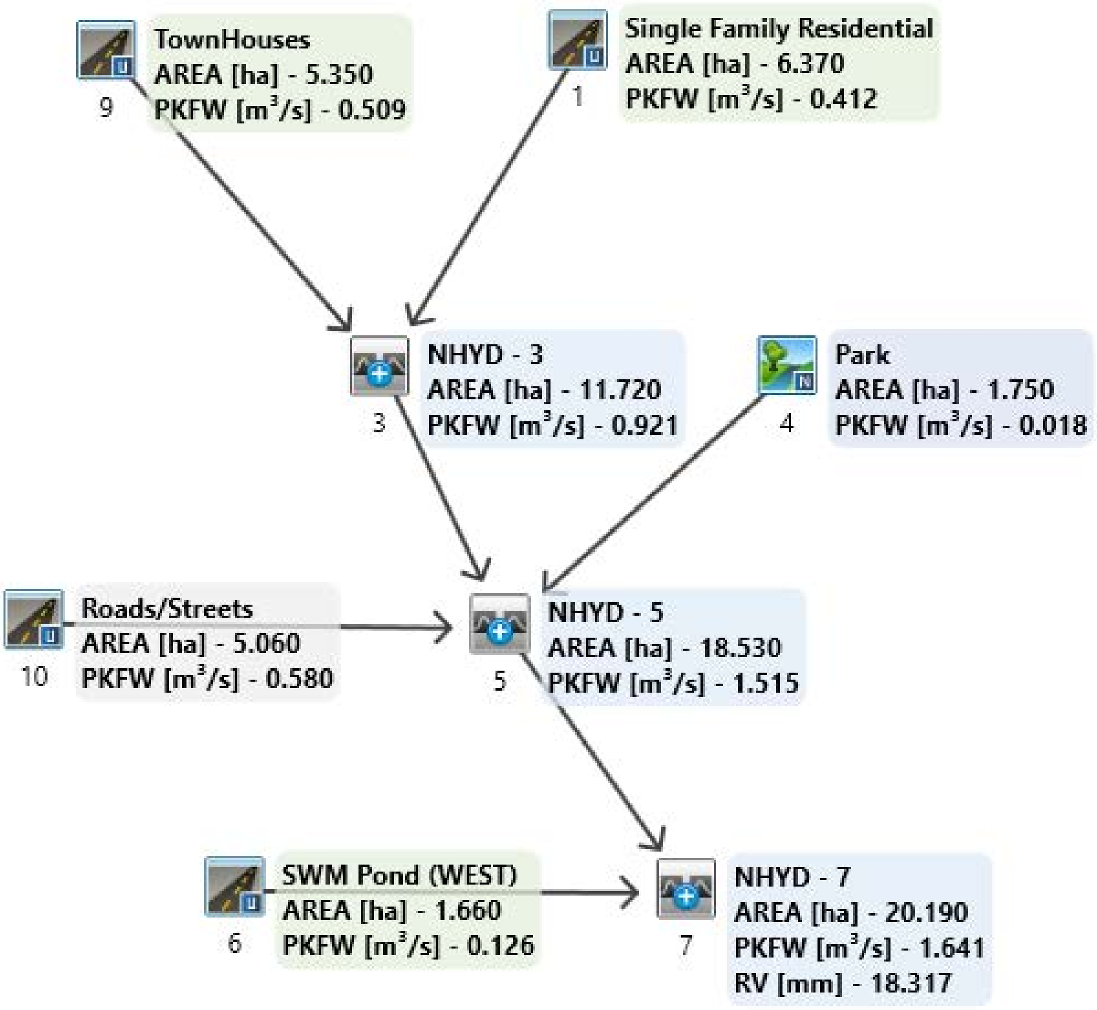
POST-DEVELOPMENT SCENARIO



25mm Erosion Control Layout

25mm Erosion Control

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==========================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2010)
       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 *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\4c65e329-79c5-4d63-a31c-975113909b6e\scena
  Summary filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\4c65e329-79c5-4d63-a31c-975113909b6e\scena

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  ************************************************
  ** SIMULATION : 25mm-Erosion Control          **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              3ace684b-8633-4455-8ee0-
3491e34bff1d\d8fc9c9e
| 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

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

--------------------
| CALIB             |
| NASHYD   (  0004)|   Area    (ha)=   1.75   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)=   0.334

     PEAK FLOW       (cms)=   0.018 (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.

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--------------------
| CALIB             |
| STANDHYD (  0001)|   Area    (ha)=   6.37
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.82         2.55
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     206.07        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      50.21        14.81
                over (min)      10.00        30.00
     Storage Coeff.  (min)=       5.19 (ii)   20.34 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.15         0.05
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.39         0.06          0.412 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.83           1.50
     RUNOFF VOLUME    (mm)=      24.00         9.49          16.74
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.38           0.67

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
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      (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 (  0009)|   Area    (ha)=   5.35
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.28         1.07
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.86        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      50.21        14.81
                over (min)       10.00        30.00
     Storage Coeff.  (min)=       4.93 (ii)   20.08 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.15         0.05
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.50         0.03           0.509 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.83            1.50
     RUNOFF VOLUME    (mm)=      24.00         9.49           20.37
     TOTAL RAINFALL   (mm)=      25.00        25.00           25.00
     RUNOFF COEFFICIENT   =       0.96         0.38            0.81

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     6.37   0.412     1.50    16.74
      + ID2= 2 (  0009):     5.35   0.509     1.50    20.37
        ==================================================
        ID = 3 (  0003):    11.72   0.921     1.50    18.40

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

```
| CALIB             |
| STANDHYD (  0010)|   Area    (ha)=   5.06
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.81         0.25
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     183.67        40.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      50.21        48.59
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       4.85 (ii)   14.27 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.57         0.02           0.580 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.67            1.50
     RUNOFF VOLUME    (mm)=      24.00        12.60           22.86
     TOTAL RAINFALL   (mm)=      25.00        25.00           25.00
     RUNOFF COEFFICIENT   =       0.96         0.50            0.91

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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 (  0010):     5.06   0.580     1.50    22.86
      + ID2= 2 (  0003):    11.72   0.921     1.50    18.40
        ====================================================
        ID = 3 (  0005):    16.78   1.501     1.50    19.74

     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):    16.78   1.501     1.50    19.74
      + ID2= 2 (  0004):     1.75   0.018     1.67     4.66
        ====================================================
```

```
        ID = 1 (  0005):    18.53   1.515     1.50    18.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB             |
| STANDHYD (  0006)|   Area    (ha)=   1.66
|ID= 1 DT=10.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.25          0.42
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     105.20         40.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=      50.21         48.59
                over (min)       10.00         20.00
     Storage Coeff.  (min)=       3.47 (ii)    12.89 (ii)
     Unit Hyd. Tpeak (min)=      10.00         20.00
     Unit Hyd. peak  (cms)=       0.16          0.07
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       0.11          0.03          0.126 (iii)
     TIME TO PEAK    (hrs)=       1.50          1.67           1.50
     RUNOFF VOLUME    (mm)=      24.00         12.60          18.29
     TOTAL RAINFALL   (mm)=      25.00         25.00          25.00
     RUNOFF COEFFICIENT   =       0.96          0.50           0.73

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

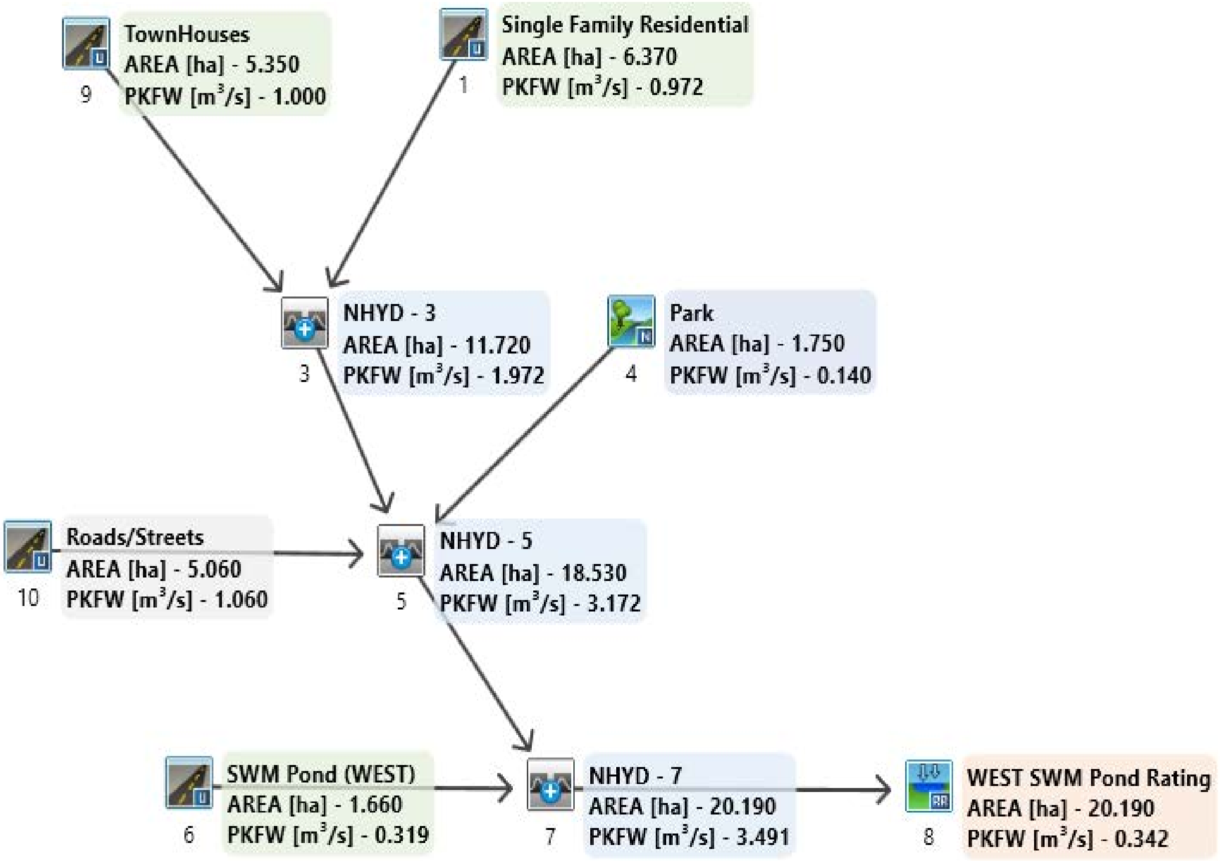
---------------------------------------------------------------------------
-----

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0005):    18.53   1.515     1.50    18.32
      + ID2= 2 (  0006):     1.66   0.126     1.50    18.29
        ==================================================
        ID = 3 (  0007):    20.19   1.641     1.50    18.32

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

 FINISH
```

POST-DEVELOPMENT RESULTS



2 to 100-Year VO Results SCS Type II - 24 Hour Runs

2-Year-Post

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

       V    V   I    SSSSS  U   U    A    L             (v 6.2.2010)
       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 *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\d9597df3-c1ae-40dc-b105-7bc0b4cd899f\scena
  Summary filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\d9597df3-c1ae-40dc-b105-7bc0b4cd899f\scena
-----------------------------------------------------------------------------
---
  ************************************************
  ** SIMULATION : 2yr 24hr 10min SCS Type II (M **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              03ddde23-12c1-4881-ac3e-
e542d956e93c\b248018d
| Ptotal= 67.15 mm |    Comments: 2yr 24hr 10min SCS Type II (MTO)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  6.17    1.21 | 12.33    9.67 | 18.50
1.21
                 0.17    0.74 |  6.33    1.21 | 12.50    9.67 | 18.67
1.21
                 0.33    0.74 |  6.50    1.21 | 12.67    4.97 | 18.83
1.21
                 0.50    0.74 |  6.67    1.21 | 12.83    4.97 | 19.00
1.21
                 0.67    0.74 |  6.83    1.21 | 13.00    4.97 | 19.17
1.21
```

```
                0.83    0.74 |  7.00    1.21 | 13.17    3.63 | 19.33
1.21
                1.00    0.74 |  7.17    1.48 | 13.33    3.63 | 19.50
1.21
                1.17    0.74 |  7.33    1.48 | 13.50    3.63 | 19.67
1.21
                1.33    0.74 |  7.50    1.48 | 13.67    2.82 | 19.83
1.21
                1.50    0.74 |  7.67    1.48 | 13.83    2.82 | 20.00
1.21
                1.67    0.74 |  7.83    1.48 | 14.00    2.82 | 20.17
0.81
                1.83    0.74 |  8.00    1.48 | 14.17    2.01 | 20.33
0.81
                2.00    0.74 |  8.17    1.75 | 14.33    2.01 | 20.50
0.81
                2.17    0.87 |  8.33    1.75 | 14.50    2.01 | 20.67
0.81
                2.33    0.87 |  8.50    1.75 | 14.67    2.01 | 20.83
0.81
                2.50    0.87 |  8.67    1.88 | 14.83    2.01 | 21.00
0.81
                2.67    0.87 |  8.83    1.88 | 15.00    2.01 | 21.17
0.81
                2.83    0.87 |  9.00    1.88 | 15.17    2.01 | 21.33
0.81
                3.00    0.87 |  9.17    2.15 | 15.33    2.01 | 21.50
0.81
                3.17    0.87 |  9.33    2.15 | 15.50    2.01 | 21.67
0.81
                3.33    0.87 |  9.50    2.15 | 15.67    2.01 | 21.83
0.81
                3.50    0.87 |  9.67    2.42 | 15.83    2.01 | 22.00
0.81
                3.67    0.87 |  9.83    2.42 | 16.00    2.01 | 22.17
0.81
                3.83    0.87 | 10.00    2.42 | 16.17    1.21 | 22.33
0.81
                4.00    0.87 | 10.17    3.09 | 16.33    1.21 | 22.50
0.81
                4.17    1.07 | 10.33    3.09 | 16.50    1.21 | 22.67
0.81
                4.33    1.07 | 10.50    3.09 | 16.67    1.21 | 22.83
0.81
                4.50    1.07 | 10.67    4.16 | 16.83    1.21 | 23.00
0.81
                4.67    1.07 | 10.83    4.16 | 17.00    1.21 | 23.17
0.81
                4.83    1.07 | 11.00    4.16 | 17.17    1.21 | 23.33
0.81
                5.00    1.07 | 11.17    6.45 | 17.33    1.21 | 23.50
0.81
                5.17    1.07 | 11.33    6.45 | 17.50    1.21 | 23.67
0.81
```

```
                 5.33    1.07 | 11.50    6.45 | 17.67    1.21 | 23.83
0.81
                 5.50    1.07 | 11.67   19.88 | 17.83    1.21 | 24.00
0.81
                 5.67    1.07 | 11.83   51.03 | 18.00    1.21 |
                 5.83    1.07 | 12.00   82.19 | 18.17    1.21 |
                 6.00    1.07 | 12.17    9.67 | 18.33    1.21 |

---------------------------------------------------------------------------
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--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   1.75   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)=   0.334

     PEAK FLOW       (cms)=   0.140 (i)
     TIME TO PEAK    (hrs)=  12.167
     RUNOFF VOLUME    (mm)=  29.942
     TOTAL RAINFALL   (mm)=  67.150
     RUNOFF COEFFICIENT   =   0.446

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

---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=   6.37
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.82         2.55
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     206.07        40.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      82.19        77.26
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.26 (ii)   12.09 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       0.70         0.32          0.972 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.33          12.17
     RUNOFF VOLUME    (mm)=      66.15        42.72          54.43
     TOTAL RAINFALL   (mm)=      67.15        67.15          67.15
     RUNOFF COEFFICIENT   =       0.99         0.64           0.81

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

```
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  85.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB             |
| STANDHYD (  0009)|   Area    (ha)=   5.35
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.28         1.07
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.86        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      82.19        77.26
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       4.05 (ii)   11.87 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.16         0.08
                                                        *  TOTALS*
     PEAK FLOW       (cms)=       0.88         0.14          1.000 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.33          12.17
     RUNOFF VOLUME    (mm)=      66.15        42.72          60.29
     TOTAL RAINFALL   (mm)=      67.15        67.15          67.15
     RUNOFF COEFFICIENT   =       0.99         0.64           0.90

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

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  85.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     6.37   0.972    12.17    54.43
      + ID2= 2 (  0009):     5.35   1.000    12.17    60.29
        ====================================================
        ID = 3 (  0003):    11.72   1.972    12.17    57.11

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

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---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0010)|   Area    (ha)=   5.06
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.81         0.25
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     183.67        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      82.19       140.61
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       3.98 (ii)   10.14 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.16         0.08
                                                             *  TOTALS*
     PEAK FLOW       (cms)=       1.01         0.06            1.060 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.33            12.17
     RUNOFF VOLUME    (mm)=      66.15        49.64            64.50
     TOTAL RAINFALL   (mm)=      67.15        67.15            67.15
     RUNOFF COEFFICIENT   =       0.99         0.74             0.96

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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 (  0010):     5.06   1.060    12.17    64.50
      + ID2= 2 (  0003):    11.72   1.972    12.17    57.11
        =======================================================
        ID = 3 (  0005):    16.78   3.032    12.17    59.34

     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):    16.78   3.032    12.17    59.34
      + ID2= 2 (  0004):     1.75   0.140    12.17    29.94
        ====================================================
        ID = 1 (  0005):    18.53   3.172    12.17    56.56

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB              |
| STANDHYD (  0006)|   Area    (ha)=   1.66
|ID= 1 DT=10.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.25         0.42
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     105.20        40.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      82.19       140.61
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       2.85 (ii)    9.01 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.11
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       0.19         0.13           0.319 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=      66.15        49.64          57.89
     TOTAL RAINFALL   (mm)=      67.15        67.15          67.15
     RUNOFF COEFFICIENT   =       0.99         0.74           0.86

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0005):    18.53   3.172    12.17    56.56
      + ID2= 2 (  0006):     1.66   0.319    12.17    57.89
        ====================================================
        ID = 3 (  0007):    20.19   3.491    12.17    56.67

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

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---------------------------------------------------------------------------
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--------------------
| 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   |   1.6050     1.0540
                          0.3560     0.6274   |   1.7820     1.1564
                          0.7790     0.7914   |   1.9560     1.2783
                          1.2730     0.8963   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     20.190      3.491     12.17      56.67
   OUTFLOW: ID= 1 (  0008)     20.190      0.342     12.83      56.65

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.79
                   TIME SHIFT OF PEAK FLOW         (min)= 40.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.6030

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

5-Year-Post

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2010)
       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 *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\f85bafac-346a-4aa2-a14f-b8e955dbdbe3\scena
  Summary filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\f85bafac-346a-4aa2-a14f-b8e955dbdbe3\scena

--------------------------------------------------------------------------
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  ************************************************
  ** SIMULATION : 5yr 24hr 10min SCS Type II (M **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              03ddde23-12c1-4881-ac3e-
e542d956e93c\936566f3
| Ptotal= 88.91 mm |    Comments: 5yr 24hr 10min SCS Type II (MTO)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  6.17    1.60 | 12.33   12.80 | 18.50
1.60
                 0.17    0.98 |  6.33    1.60 | 12.50   12.80 | 18.67
1.60
                 0.33    0.98 |  6.50    1.60 | 12.67    6.58 | 18.83
1.60
                 0.50    0.98 |  6.67    1.60 | 12.83    6.58 | 19.00
1.60
```

```
                  0.67    0.98 |  6.83    1.60 | 13.00    6.58 | 19.17
1.60
                  0.83    0.98 |  7.00    1.60 | 13.17    4.80 | 19.33
1.60
                  1.00    0.98 |  7.17    1.96 | 13.33    4.80 | 19.50
1.60
                  1.17    0.98 |  7.33    1.96 | 13.50    4.80 | 19.67
1.60
                  1.33    0.98 |  7.50    1.96 | 13.67    3.73 | 19.83
1.60
                  1.50    0.98 |  7.67    1.96 | 13.83    3.73 | 20.00
1.60
                  1.67    0.98 |  7.83    1.96 | 14.00    3.73 | 20.17
1.07
                  1.83    0.98 |  8.00    1.96 | 14.17    2.67 | 20.33
1.07
                  2.00    0.98 |  8.17    2.31 | 14.33    2.67 | 20.50
1.07
                  2.17    1.16 |  8.33    2.31 | 14.50    2.67 | 20.67
1.07
                  2.33    1.16 |  8.50    2.31 | 14.67    2.67 | 20.83
1.07
                  2.50    1.16 |  8.67    2.49 | 14.83    2.67 | 21.00
1.07
                  2.67    1.16 |  8.83    2.49 | 15.00    2.67 | 21.17
1.07
                  2.83    1.16 |  9.00    2.49 | 15.17    2.67 | 21.33
1.07
                  3.00    1.16 |  9.17    2.85 | 15.33    2.67 | 21.50
1.07
                  3.17    1.16 |  9.33    2.85 | 15.50    2.67 | 21.67
1.07
                  3.33    1.16 |  9.50    2.85 | 15.67    2.67 | 21.83
1.07
                  3.50    1.16 |  9.67    3.20 | 15.83    2.67 | 22.00
1.07
                  3.67    1.16 |  9.83    3.20 | 16.00    2.67 | 22.17
1.07
                  3.83    1.16 | 10.00    3.20 | 16.17    1.60 | 22.33
1.07
                  4.00    1.16 | 10.17    4.09 | 16.33    1.60 | 22.50
1.07
                  4.17    1.42 | 10.33    4.09 | 16.50    1.60 | 22.67
1.07
                  4.33    1.42 | 10.50    4.09 | 16.67    1.60 | 22.83
1.07
                  4.50    1.42 | 10.67    5.51 | 16.83    1.60 | 23.00
1.07
                  4.67    1.42 | 10.83    5.51 | 17.00    1.60 | 23.17
1.07
                  4.83    1.42 | 11.00    5.51 | 17.17    1.60 | 23.33
1.07
                  5.00    1.42 | 11.17    8.54 | 17.33    1.60 | 23.50
1.07
```

```
                 5.17    1.42 | 11.33    8.54 | 17.50    1.60 | 23.67
1.07
                 5.33    1.42 | 11.50    8.54 | 17.67    1.60 | 23.83
1.07
                 5.50    1.42 | 11.67   26.32 | 17.83    1.60 | 24.00
1.07
                 5.67    1.42 | 11.83   67.57 | 18.00    1.60 |
                 5.83    1.42 | 12.00  108.83 | 18.17    1.60 |
                 6.00    1.42 | 12.17   12.80 | 18.33    1.60 |

----------------------------------------------------------------------------
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--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   1.75   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)=   0.334

     PEAK FLOW       (cms)=   0.219 (i)
     TIME TO PEAK    (hrs)=  12.167
     RUNOFF VOLUME    (mm)=  46.523
     TOTAL RAINFALL   (mm)=  88.910
     RUNOFF COEFFICIENT   =   0.523

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

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-----
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=   6.37
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.82         2.55
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     206.07        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     108.83       111.27
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       3.81 (ii)   10.57 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.16         0.08
                                                        *  TOTALS*
     PEAK FLOW       (cms)=       0.93         0.48          1.358 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.33          12.17
     RUNOFF VOLUME    (mm)=      87.91        62.26          75.08
     TOTAL RAINFALL   (mm)=      88.91        88.91          88.91
     RUNOFF COEFFICIENT   =       0.99         0.70           0.84
```

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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 (  0009)|   Area    (ha)=   5.35
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.28         1.07
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.86        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     108.83       111.27
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       3.62 (ii)   10.38 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.16         0.08
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       1.18         0.20         1.361 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.33         12.17
     RUNOFF VOLUME    (mm)=      87.91        62.26         81.50
     TOTAL RAINFALL   (mm)=      88.91        88.91         88.91
     RUNOFF COEFFICIENT   =       0.99         0.70          0.92

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     6.37   1.358    12.17    75.08
      + ID2= 2 (  0009):     5.35   1.361    12.17    81.50
        ==================================================
        ID = 3 (  0003):    11.72   2.719    12.17    78.01
```

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     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-----
--------------------
| CALIB            |
| STANDHYD (  0010)|   Area    (ha)=   5.06
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.81         0.25
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     183.67        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     108.83       195.94
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       3.56 (ii)    8.95 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.11
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       1.34         0.11          1.456 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=      87.91        70.29          86.15
     TOTAL RAINFALL   (mm)=      88.91        88.91          88.91
     RUNOFF COEFFICIENT   =       0.99         0.79           0.97

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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 (  0010):     5.06   1.456    12.17    86.15
      + ID2= 2 (  0003):    11.72   2.719    12.17    78.01
        ====================================================
        ID = 3 (  0005):    16.78   4.175    12.17    80.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0005)|
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|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    16.78   4.175    12.17    80.46
      + ID2= 2 (  0004):     1.75   0.219    12.17    46.52
        ====================================================
        ID = 1 (  0005):    18.53   4.394    12.17    77.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   1.66
|ID= 1 DT=10.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  50.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.25          0.42
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     105.20         40.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     108.83        195.94
                over (min)       10.00         10.00
     Storage Coeff.  (min)=       2.55 (ii)     7.94 (ii)
     Unit Hyd. Tpeak (min)=      10.00         10.00
     Unit Hyd. peak  (cms)=       0.17          0.12
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.25          0.19          0.441 (iii)
     TIME TO PEAK    (hrs)=      12.17         12.17          12.17
     RUNOFF VOLUME    (mm)=      87.91         70.29          79.10
     TOTAL RAINFALL   (mm)=      88.91         88.91          88.91
     RUNOFF COEFFICIENT   =       0.99          0.79           0.89

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0005):    18.53   4.394    12.17    77.26
      + ID2= 2 (  0006):     1.66   0.441    12.17    79.10
        ====================================================
        ID = 3 (  0007):    20.19   4.835    12.17    77.41
```

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     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   |   1.6050      1.0540
                          0.3560     0.6274   |   1.7820      1.1564
                          0.7790     0.7914   |   1.9560      1.2783
                          1.2730     0.8963   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     20.190      4.835     12.17      77.41
   OUTFLOW: ID= 1 (  0008)     20.190      0.746     12.67      77.39

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.44
                   TIME SHIFT OF PEAK FLOW         (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.7798

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```

10-Year-Post

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2010)
       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 *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\e5dfa7e2-7e48-45c7-abe9-bc7da5e3421a\scena
  Summary filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\e5dfa7e2-7e48-45c7-abe9-bc7da5e3421a\scena


DATE: 02/14/2023                           TIME: 02:37:15

USER:
--------------------------------------------------------------------------
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  ************************************************
  ** SIMULATION : 10yr 24hr 10min SCS Type II ( **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              03ddde23-12c1-4881-ac3e-
e542d956e93c\312c39e7
| Ptotal=103.09 mm |    Comments: 10yr 24hr 10min SCS Type II (MTO)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  6.17    1.86 | 12.33   14.84 | 18.50
1.86
                 0.17    1.13 |  6.33    1.86 | 12.50   14.84 | 18.67
1.86
```

```
                 0.33    1.13 |  6.50    1.86 | 12.67    7.63 | 18.83
1.86
                 0.50    1.13 |  6.67    1.86 | 12.83    7.63 | 19.00
1.86
                 0.67    1.13 |  6.83    1.86 | 13.00    7.63 | 19.17
1.86
                 0.83    1.13 |  7.00    1.86 | 13.17    5.57 | 19.33
1.86
                 1.00    1.13 |  7.17    2.27 | 13.33    5.57 | 19.50
1.86
                 1.17    1.13 |  7.33    2.27 | 13.50    5.57 | 19.67
1.86
                 1.33    1.13 |  7.50    2.27 | 13.67    4.33 | 19.83
1.86
                 1.50    1.13 |  7.67    2.27 | 13.83    4.33 | 20.00
1.86
                 1.67    1.13 |  7.83    2.27 | 14.00    4.33 | 20.17
1.24
                 1.83    1.13 |  8.00    2.27 | 14.17    3.09 | 20.33
1.24
                 2.00    1.13 |  8.17    2.68 | 14.33    3.09 | 20.50
1.24
                 2.17    1.34 |  8.33    2.68 | 14.50    3.09 | 20.67
1.24
                 2.33    1.34 |  8.50    2.68 | 14.67    3.09 | 20.83
1.24
                 2.50    1.34 |  8.67    2.89 | 14.83    3.09 | 21.00
1.24
                 2.67    1.34 |  8.83    2.89 | 15.00    3.09 | 21.17
1.24
                 2.83    1.34 |  9.00    2.89 | 15.17    3.09 | 21.33
1.24
                 3.00    1.34 |  9.17    3.30 | 15.33    3.09 | 21.50
1.24
                 3.17    1.34 |  9.33    3.30 | 15.50    3.09 | 21.67
1.24
                 3.33    1.34 |  9.50    3.30 | 15.67    3.09 | 21.83
1.24
                 3.50    1.34 |  9.67    3.71 | 15.83    3.09 | 22.00
1.24
                 3.67    1.34 |  9.83    3.71 | 16.00    3.09 | 22.17
1.24
                 3.83    1.34 | 10.00    3.71 | 16.17    1.86 | 22.33
1.24
                 4.00    1.34 | 10.17    4.74 | 16.33    1.86 | 22.50
1.24
                 4.17    1.65 | 10.33    4.74 | 16.50    1.86 | 22.67
1.24
                 4.33    1.65 | 10.50    4.74 | 16.67    1.86 | 22.83
1.24
                 4.50    1.65 | 10.67    6.39 | 16.83    1.86 | 23.00
1.24
                 4.67    1.65 | 10.83    6.39 | 17.00    1.86 | 23.17
1.24
```

```
                 4.83    1.65 | 11.00    6.39 | 17.17    1.86 | 23.33
1.24
                 5.00    1.65 | 11.17    9.90 | 17.33    1.86 | 23.50
1.24
                 5.17    1.65 | 11.33    9.90 | 17.50    1.86 | 23.67
1.24
                 5.33    1.65 | 11.50    9.90 | 17.67    1.86 | 23.83
1.24
                 5.50    1.65 | 11.67   30.51 | 17.83    1.86 | 24.00
1.24
                 5.67    1.65 | 11.83   78.35 | 18.00    1.86 |
                 5.83    1.65 | 12.00  126.18 | 18.17    1.86 |
                 6.00    1.65 | 12.17   14.84 | 18.33    1.86 |

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--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   1.75   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)=   0.334

     PEAK FLOW       (cms)=   0.274 (i)
     TIME TO PEAK    (hrs)=  12.167
     RUNOFF VOLUME    (mm)=  57.996
     TOTAL RAINFALL   (mm)= 103.090
     RUNOFF COEFFICIENT   =   0.563

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

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-----
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=   6.37
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.82         2.55
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     206.07        40.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     126.18       133.71
               over  (min)      10.00        10.00
     Storage Coeff.  (min)=       3.59 (ii)    9.88 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.11
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       1.09         0.75          1.834 (iii)
```

```
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=     102.09        75.37          88.73
     TOTAL RAINFALL   (mm)=     103.09       103.09         103.09
     RUNOFF COEFFICIENT   =       0.99         0.73           0.86

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
-----
--------------------
| CALIB             |
| STANDHYD (  0009)|   Area    (ha)=   5.35
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.28         1.07
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.86        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     126.18       133.71
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       3.41 (ii)    9.69 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.11
                                                             *  TOTALS*
     PEAK FLOW       (cms)=       1.38         0.32           1.692 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=     102.09        75.37          95.41
     TOTAL RAINFALL   (mm)=     103.09       103.09         103.09
     RUNOFF COEFFICIENT   =       0.99         0.73           0.93

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
```

```
        ID1= 1 (  0001):     6.37   1.834    12.17    88.73
      + ID2= 2 (  0009):     5.35   1.692    12.17    95.41
        ====================================================
        ID = 3 (  0003):    11.72   3.525    12.17    91.78

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB              |
| STANDHYD (  0010)|   Area    (ha)=   5.06
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       4.81          0.25
     Dep. Storage      (mm)=       1.00          1.50
     Average Slope      (%)=       1.00          2.00
     Length             (m)=     183.67         40.00
     Mannings n            =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     126.18        231.95
                over (min)       10.00         10.00
     Storage Coeff.  (min)=       3.35 (ii)     8.39 (ii)
     Unit Hyd. Tpeak (min)=      10.00         10.00
     Unit Hyd. peak  (cms)=       0.16          0.12
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       1.56          0.14          1.700 (iii)
     TIME TO PEAK    (hrs)=      12.17         12.17          12.17
     RUNOFF VOLUME    (mm)=     102.09         83.95         100.28
     TOTAL RAINFALL   (mm)=     103.09        103.09         103.09
     RUNOFF COEFFICIENT   =       0.99          0.81           0.97

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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 (  0010):     5.06   1.700    12.17   100.28
      + ID2= 2 (  0003):    11.72   3.525    12.17    91.78
        ====================================================
        ID = 3 (  0005):    16.78   5.226    12.17    94.34

     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):    16.78   5.226    12.17    94.34
      + ID2= 2 (  0004):     1.75   0.274    12.17    58.00
        ====================================================
        ID = 1 (  0005):    18.53   5.499    12.17    90.91

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   1.66
|ID= 1 DT=10.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  50.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.25         0.42
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     105.20        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     126.18       231.95
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       2.40 (ii)    7.44 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.13
                                                        *  TOTALS*
     PEAK FLOW       (cms)=       0.29         0.23          0.520 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=     102.09        83.95          93.02
     TOTAL RAINFALL   (mm)=     103.09       103.09         103.09
     RUNOFF COEFFICIENT   =       0.99         0.81           0.90

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
```

```
        ID1= 1 (  0005):    18.53   5.499    12.17    90.91
      + ID2= 2 (  0006):     1.66   0.520    12.17    93.02
        =====================================================
        ID = 3 (  0007):    20.19   6.020    12.17    91.08

     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   |   1.6050      1.0540
                          0.3560     0.6274   |   1.7820      1.1564
                          0.7790     0.7914   |   1.9560      1.2783
                          1.2730     0.8963   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     20.190      6.020     12.17      91.08
   OUTFLOW: ID= 1 (  0008)     20.190      1.188     12.50      91.06

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 19.74
                   TIME SHIFT OF PEAK FLOW        (min)= 20.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.8840

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

25-Year-Post

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2010)
       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 *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\e533238e-bbc7-4fec-807b-c39ddf24577d\scena
  Summary filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\e533238e-bbc7-4fec-807b-c39ddf24577d\scena
--------------------------------------------------------------------------
---------------------------------
  ************************************************
  ** SIMULATION : 25yr 24hr 10min SCS Type II ( **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              03ddde23-12c1-4881-ac3e-
e542d956e93c\06899552
| Ptotal=121.70 mm |    Comments: 25yr 24hr 10min SCS Type II (MTO)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  6.17    2.19 | 12.33   17.52 | 18.50
2.19
                 0.17    1.34 |  6.33    2.19 | 12.50   17.52 | 18.67
2.19
                 0.33    1.34 |  6.50    2.19 | 12.67    9.01 | 18.83
2.19
                 0.50    1.34 |  6.67    2.19 | 12.83    9.01 | 19.00
2.19
                 0.67    1.34 |  6.83    2.19 | 13.00    9.01 | 19.17
2.19
```

```
                  0.83    1.34 |  7.00    2.19 | 13.17    6.57 | 19.33
2.19
                  1.00    1.34 |  7.17    2.68 | 13.33    6.57 | 19.50
2.19
                  1.17    1.34 |  7.33    2.68 | 13.50    6.57 | 19.67
2.19
                  1.33    1.34 |  7.50    2.68 | 13.67    5.11 | 19.83
2.19
                  1.50    1.34 |  7.67    2.68 | 13.83    5.11 | 20.00
2.19
                  1.67    1.34 |  7.83    2.68 | 14.00    5.11 | 20.17
1.46
                  1.83    1.34 |  8.00    2.68 | 14.17    3.65 | 20.33
1.46
                  2.00    1.34 |  8.17    3.16 | 14.33    3.65 | 20.50
1.46
                  2.17    1.58 |  8.33    3.16 | 14.50    3.65 | 20.67
1.46
                  2.33    1.58 |  8.50    3.16 | 14.67    3.65 | 20.83
1.46
                  2.50    1.58 |  8.67    3.41 | 14.83    3.65 | 21.00
1.46
                  2.67    1.58 |  8.83    3.41 | 15.00    3.65 | 21.17
1.46
                  2.83    1.58 |  9.00    3.41 | 15.17    3.65 | 21.33
1.46
                  3.00    1.58 |  9.17    3.89 | 15.33    3.65 | 21.50
1.46
                  3.17    1.58 |  9.33    3.89 | 15.50    3.65 | 21.67
1.46
                  3.33    1.58 |  9.50    3.89 | 15.67    3.65 | 21.83
1.46
                  3.50    1.58 |  9.67    4.38 | 15.83    3.65 | 22.00
1.46
                  3.67    1.58 |  9.83    4.38 | 16.00    3.65 | 22.17
1.46
                  3.83    1.58 | 10.00    4.38 | 16.17    2.19 | 22.33
1.46
                  4.00    1.58 | 10.17    5.60 | 16.33    2.19 | 22.50
1.46
                  4.17    1.95 | 10.33    5.60 | 16.50    2.19 | 22.67
1.46
                  4.33    1.95 | 10.50    5.60 | 16.67    2.19 | 22.83
1.46
                  4.50    1.95 | 10.67    7.55 | 16.83    2.19 | 23.00
1.46
                  4.67    1.95 | 10.83    7.55 | 17.00    2.19 | 23.17
1.46
                  4.83    1.95 | 11.00    7.55 | 17.17    2.19 | 23.33
1.46
                  5.00    1.95 | 11.17   11.68 | 17.33    2.19 | 23.50
1.46
                  5.17    1.95 | 11.33   11.68 | 17.50    2.19 | 23.67
1.46
```

```
                 5.33    1.95 | 11.50   11.68 | 17.67    2.19 | 23.83
1.46
                 5.50    1.95 | 11.67   36.02 | 17.83    2.19 | 24.00
1.46
                 5.67    1.95 | 11.83   92.49 | 18.00    2.19 |
                 5.83    1.95 | 12.00  148.96 | 18.17    2.19 |
                 6.00    1.95 | 12.17   17.52 | 18.33    2.19 |

---------------------------------------------------------------------------
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--------------------
| CALIB              |
| NASHYD   (  0004)|   Area    (ha)=   1.75   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)=   0.334

     PEAK FLOW       (cms)=   0.348 (i)
     TIME TO PEAK    (hrs)=  12.167
     RUNOFF VOLUME    (mm)=  73.612
     TOTAL RAINFALL   (mm)= 121.700
     RUNOFF COEFFICIENT   =   0.605

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

---------------------------------------------------------------------------
-----
--------------------
| CALIB              |
| STANDHYD (  0001)|   Area    (ha)=   6.37
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       3.82         2.55
     Dep. Storage      (mm)=       1.00         1.50
     Average Slope      (%)=       1.00         2.00
     Length             (m)=     206.07        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     148.96       163.27
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       3.36 (ii)    9.16 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.11
                                                         *  TOTALS*
     PEAK FLOW       (cms)=       1.29         0.94          2.227 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=     120.70        92.86         106.78
     TOTAL RAINFALL   (mm)=     121.70       121.70         121.70
     RUNOFF COEFFICIENT   =       0.99         0.76           0.88

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

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0009)|   Area    (ha)=   5.35
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.28         1.07
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.86        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     148.96       163.27
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       3.19 (ii)    8.99 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.11
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       1.63         0.40          2.027 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=     120.70        92.86         113.74
     TOTAL RAINFALL   (mm)=     121.70       121.70         121.70
     RUNOFF COEFFICIENT   =       0.99         0.76           0.93

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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


--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     6.37   2.227    12.17   106.78
      + ID2= 2 (  0009):     5.35   2.027    12.17   113.74
        ====================================================
        ID = 3 (  0003):    11.72   4.255    12.17   109.96

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

```
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0010)|   Area    (ha)=   5.06
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.81         0.25
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     183.67        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     148.96       279.06
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       3.14 (ii)    7.82 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.12
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       1.85         0.17          2.021 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=     120.70       102.04         118.83
     TOTAL RAINFALL   (mm)=     121.70       121.70         121.70
     RUNOFF COEFFICIENT   =       0.99         0.84           0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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 (  0010):     5.06   2.021    12.17   118.83
      + ID2= 2 (  0003):    11.72   4.255    12.17   109.96
        ====================================================
        ID = 3 (  0005):    16.78   6.276    12.17   112.63

     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):    16.78   6.276    12.17   112.63
      + ID2= 2 (  0004):     1.75   0.348    12.17    73.61
        ====================================================
        ID = 1 (  0005):    18.53   6.624    12.17   108.95

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB              |
| STANDHYD (  0006)|   Area    (ha)=   1.66
|ID= 1 DT=10.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.25         0.42
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     105.20        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     148.96       279.06
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       2.25 (ii)    6.93 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.13
                                                         *  TOTALS*
     PEAK FLOW       (cms)=       0.34         0.28          0.625 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=     120.70       102.04         111.37
     TOTAL RAINFALL   (mm)=     121.70       121.70         121.70
     RUNOFF COEFFICIENT   =       0.99         0.84           0.92

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0005):    18.53   6.624    12.17   108.95
      + ID2= 2 (  0006):     1.66   0.625    12.17   111.37
        ====================================================
        ID = 3 (  0007):    20.19   7.249    12.17   109.15

     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   |   1.6050      1.0540
                          0.3560     0.6274   |   1.7820      1.1564
                          0.7790     0.7914   |   1.9560      1.2783
                          1.2730     0.8963   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     20.190     7.249     12.17     109.15
   OUTFLOW: ID= 1 (  0008)     20.190     1.549     12.33     109.13

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 21.37
                   TIME SHIFT OF PEAK FLOW         (min)= 10.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.0349

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

50-Year-Post

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2010)
       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 *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\e9dd6c69-ea78-4297-b73c-f8c1ab7ae385\scena
  Summary filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\e9dd6c69-ea78-4297-b73c-f8c1ab7ae385\scena

--------------------------------------------------------------------------
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  ************************************************
  ** SIMULATION : 50yr 24hr 10min SCS Type II ( **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              03ddde23-12c1-4881-ac3e-
e542d956e93c\5b4e85d6
| Ptotal=134.56 mm |    Comments: 50yr 24hr 10min SCS Type II (MTO)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  6.17    2.42 | 12.33   19.38 | 18.50
2.42
                 0.17    1.48 |  6.33    2.42 | 12.50   19.38 | 18.67
2.42
                 0.33    1.48 |  6.50    2.42 | 12.67    9.96 | 18.83
2.42
                 0.50    1.48 |  6.67    2.42 | 12.83    9.96 | 19.00
2.42
```

0.67	1.48	6.83	2.42	13.00	9.96	19.17	2.42
0.83	1.48	7.00	2.42	13.17	7.27	19.33	2.42
1.00	1.48	7.17	2.96	13.33	7.27	19.50	2.42
1.17	1.48	7.33	2.96	13.50	7.27	19.67	2.42
1.33	1.48	7.50	2.96	13.67	5.65	19.83	2.42
1.50	1.48	7.67	2.96	13.83	5.65	20.00	2.42
1.67	1.48	7.83	2.96	14.00	5.65	20.17	1.61
1.83	1.48	8.00	2.96	14.17	4.04	20.33	1.61
2.00	1.48	8.17	3.50	14.33	4.04	20.50	1.61
2.17	1.75	8.33	3.50	14.50	4.04	20.67	1.61
2.33	1.75	8.50	3.50	14.67	4.04	20.83	1.61
2.50	1.75	8.67	3.77	14.83	4.04	21.00	1.61
2.67	1.75	8.83	3.77	15.00	4.04	21.17	1.61
2.83	1.75	9.00	3.77	15.17	4.04	21.33	1.61
3.00	1.75	9.17	4.31	15.33	4.04	21.50	1.61
3.17	1.75	9.33	4.31	15.50	4.04	21.67	1.61
3.33	1.75	9.50	4.31	15.67	4.04	21.83	1.61
3.50	1.75	9.67	4.84	15.83	4.04	22.00	1.61
3.67	1.75	9.83	4.84	16.00	4.04	22.17	1.61
3.83	1.75	10.00	4.84	16.17	2.42	22.33	1.61
4.00	1.75	10.17	6.19	16.33	2.42	22.50	1.61
4.17	2.15	10.33	6.19	16.50	2.42	22.67	1.61
4.33	2.15	10.50	6.19	16.67	2.42	22.83	1.61
4.50	2.15	10.67	8.34	16.83	2.42	23.00	1.61
4.67	2.15	10.83	8.34	17.00	2.42	23.17	1.61
4.83	2.15	11.00	8.34	17.17	2.42	23.33	1.61
5.00	2.15	11.17	12.92	17.33	2.42	23.50	1.61

```
                 5.17    2.15 | 11.33   12.92 | 17.50    2.42 | 23.67
1.61
                 5.33    2.15 | 11.50   12.92 | 17.67    2.42 | 23.83
1.61
                 5.50    2.15 | 11.67   39.83 | 17.83    2.42 | 24.00
1.61
                 5.67    2.15 | 11.83  102.27 | 18.00    2.42 |
                 5.83    2.15 | 12.00  164.70 | 18.17    2.42 |
                 6.00    2.15 | 12.17   19.38 | 18.33    2.42 |

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

--------------------
| CALIB            |
| NASHYD   (  0004)|   Area     (ha)=   1.75   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)=   0.334

     PEAK FLOW       (cms)=   0.400 (i)
     TIME TO PEAK    (hrs)=  12.167
     RUNOFF VOLUME    (mm)=  84.687
     TOTAL RAINFALL   (mm)= 134.560
     RUNOFF COEFFICIENT   =   0.629

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

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-----
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area     (ha)=   6.37
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.82         2.55
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     206.07        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     164.70       183.71
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       3.23 (ii)    8.76 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.12
                                                        *  TOTALS*
     PEAK FLOW       (cms)=       1.43         1.07          2.501 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=     133.56       105.10         119.33
     TOTAL RAINFALL   (mm)=     134.56       134.56         134.56
     RUNOFF COEFFICIENT   =       0.99         0.78           0.89
```

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB              |
| STANDHYD (  0009)|   Area    (ha)=   5.35
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.28         1.07
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.86        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     164.70       183.71
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       3.06 (ii)     8.60 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.12
                                                          *  TOTALS*
     PEAK FLOW       (cms)=       1.81         0.45          2.260 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=     133.56       105.10         126.44
     TOTAL RAINFALL   (mm)=     134.56       134.56         134.56
     RUNOFF COEFFICIENT   =       0.99         0.78           0.94

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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  (  0003)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     6.37   2.501    12.17   119.33
      + ID2= 2 (  0009):     5.35   2.260    12.17   126.44
        =======================================================
        ID = 3 (  0003):    11.72   4.762    12.17   122.58
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0010)|   Area    (ha)=   5.06
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.81         0.25
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     183.67        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     164.70       311.52
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       3.01 (ii)    7.49 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.13
                                                             *  TOTALS*
     PEAK FLOW       (cms)=       2.05         0.19            2.243 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17            12.17
     RUNOFF VOLUME    (mm)=     133.56       114.61           131.66
     TOTAL RAINFALL   (mm)=     134.56       134.56           134.56
     RUNOFF COEFFICIENT   =       0.99         0.85             0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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 (  0010):     5.06   2.243    12.17   131.66
      + ID2= 2 (  0003):    11.72   4.762    12.17   122.58
        ====================================================
        ID = 3 (  0005):    16.78   7.005    12.17   125.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0005)|
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```
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    16.78   7.005    12.17   125.32
      + ID2= 2 (  0004):     1.75   0.400    12.17    84.69
        ====================================================
        ID = 1 (  0005):    18.53   7.405    12.17   121.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   1.66
|ID= 1 DT=10.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  50.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.25         0.42
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     105.20        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     164.70       311.52
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       2.16 (ii)    6.64 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.13
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.38         0.32           0.698 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17           12.17
     RUNOFF VOLUME    (mm)=     133.56       114.61          124.08
     TOTAL RAINFALL   (mm)=     134.56       134.56          134.56
     RUNOFF COEFFICIENT   =       0.99         0.85            0.92

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0005):    18.53   7.405    12.17   121.48
      + ID2= 2 (  0006):     1.66   0.698    12.17   124.08
        ====================================================
        ID = 3 (  0007):    20.19   8.103    12.17   121.69
```

```
     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   |   1.6050      1.0540
                          0.3560     0.6274   |   1.7820      1.1564
                          0.7790     0.7914   |   1.9560      1.2783
                          1.2730     0.8963   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     20.190      8.103     12.17     121.69
   OUTFLOW: ID= 1 (  0008)     20.190      1.744     12.33     121.67

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 21.52
                   TIME SHIFT OF PEAK FLOW         (min)= 10.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.1408

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```

100-Year-Post

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2010)
       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 *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\2d9ac17e-7051-47f4-9aaf-49e3be44a95b\scena
  Summary filename: C:\Users\shuchi\AppData\Local\Civica\VH5\7b32db7d-
cfd4-42bf-b204-af6a18cc82b1\2d9ac17e-7051-47f4-9aaf-49e3be44a95b\scena
--------------------------------------------------------------------------
---------------------------------
  ************************************************
  ** SIMULATION : 100yr 24hr 10min SCS Type II   **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\shuchi\AppD
|                  |              ata\Local\Temp\
|                  |              03ddde23-12c1-4881-ac3e-
e542d956e93c\7c511a0b
| Ptotal=145.92 mm |    Comments: 100yr 24hr 10min SCS Type II (MTO)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME
RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs
mm/hr
                 0.00    0.00 |  6.17    2.63 | 12.33   21.01 | 18.50
2.63
                 0.17    1.61 |  6.33    2.63 | 12.50   21.01 | 18.67
2.63
                 0.33    1.61 |  6.50    2.63 | 12.67   10.80 | 18.83
2.63
                 0.50    1.61 |  6.67    2.63 | 12.83   10.80 | 19.00
2.63
                 0.67    1.61 |  6.83    2.63 | 13.00   10.80 | 19.17
2.63
```

```
                 0.83    1.61 |  7.00    2.63 | 13.17    7.88 | 19.33
2.63
                 1.00    1.61 |  7.17    3.21 | 13.33    7.88 | 19.50
2.63
                 1.17    1.61 |  7.33    3.21 | 13.50    7.88 | 19.67
2.63
                 1.33    1.61 |  7.50    3.21 | 13.67    6.13 | 19.83
2.63
                 1.50    1.61 |  7.67    3.21 | 13.83    6.13 | 20.00
2.63
                 1.67    1.61 |  7.83    3.21 | 14.00    6.13 | 20.17
1.75
                 1.83    1.61 |  8.00    3.21 | 14.17    4.38 | 20.33
1.75
                 2.00    1.61 |  8.17    3.79 | 14.33    4.38 | 20.50
1.75
                 2.17    1.90 |  8.33    3.79 | 14.50    4.38 | 20.67
1.75
                 2.33    1.90 |  8.50    3.79 | 14.67    4.38 | 20.83
1.75
                 2.50    1.90 |  8.67    4.09 | 14.83    4.38 | 21.00
1.75
                 2.67    1.90 |  8.83    4.09 | 15.00    4.38 | 21.17
1.75
                 2.83    1.90 |  9.00    4.09 | 15.17    4.38 | 21.33
1.75
                 3.00    1.90 |  9.17    4.67 | 15.33    4.38 | 21.50
1.75
                 3.17    1.90 |  9.33    4.67 | 15.50    4.38 | 21.67
1.75
                 3.33    1.90 |  9.50    4.67 | 15.67    4.38 | 21.83
1.75
                 3.50    1.90 |  9.67    5.25 | 15.83    4.38 | 22.00
1.75
                 3.67    1.90 |  9.83    5.25 | 16.00    4.38 | 22.17
1.75
                 3.83    1.90 | 10.00    5.25 | 16.17    2.63 | 22.33
1.75
                 4.00    1.90 | 10.17    6.71 | 16.33    2.63 | 22.50
1.75
                 4.17    2.33 | 10.33    6.71 | 16.50    2.63 | 22.67
1.75
                 4.33    2.33 | 10.50    6.71 | 16.67    2.63 | 22.83
1.75
                 4.50    2.33 | 10.67    9.05 | 16.83    2.63 | 23.00
1.75
                 4.67    2.33 | 10.83    9.05 | 17.00    2.63 | 23.17
1.75
                 4.83    2.33 | 11.00    9.05 | 17.17    2.63 | 23.33
1.75
                 5.00    2.33 | 11.17   14.01 | 17.33    2.63 | 23.50
1.75
                 5.17    2.33 | 11.33   14.01 | 17.50    2.63 | 23.67
1.75
```

```
                 5.33    2.33 | 11.50   14.01 | 17.67    2.63 | 23.83
1.75
                 5.50    2.33 | 11.67   43.19 | 17.83    2.63 | 24.00
1.75
                 5.67    2.33 | 11.83  110.90 | 18.00    2.63 |
                 5.83    2.33 | 12.00  178.61 | 18.17    2.63 |
                 6.00    2.33 | 12.17   21.01 | 18.33    2.63 |

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--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   1.75   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)=   0.334

     PEAK FLOW       (cms)=   0.447 (i)
     TIME TO PEAK    (hrs)=  12.167
     RUNOFF VOLUME    (mm)=  94.621
     TOTAL RAINFALL   (mm)= 145.920
     RUNOFF COEFFICIENT   =   0.648

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

---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=   6.37
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.82         2.55
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     206.07        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     178.61       201.76
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       3.13 (ii)    8.46 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.12
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       1.55         1.19          2.744 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=     144.92       115.98         130.45
     TOTAL RAINFALL   (mm)=     145.92       145.92         145.92
     RUNOFF COEFFICIENT   =       0.99         0.79           0.89

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

```
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  85.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----
--------------------
| CALIB              |
| STANDHYD (  0009)|   Area    (ha)=   5.35
|ID= 1 DT=10.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  75.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.28         1.07
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     188.86        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     178.61       201.76
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       2.97 (ii)    8.30 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.12
                                                            *  TOTALS*
     PEAK FLOW       (cms)=       1.96         0.50          2.466 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=     144.92       115.98         137.68
     TOTAL RAINFALL   (mm)=     145.92       145.92         145.92
     RUNOFF COEFFICIENT   =       0.99         0.79           0.94

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

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  85.0    Ia = Dep. Storage  (Above)
       (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  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     6.37   2.744    12.17   130.45
      + ID2= 2 (  0009):     5.35   2.466    12.17   137.68
        ====================================================
        ID = 3 (  0003):    11.72   5.211    12.17   133.75

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

```
---------------------------------------------------------------------------
-----
--------------------
| CALIB            |
| STANDHYD (  0010)|   Area    (ha)=   5.06
|ID= 1 DT=10.0 min |   Total Imp(%)=  95.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.81         0.25
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     183.67        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     178.61       340.12
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       2.92 (ii)    7.24 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.16         0.13
                                                         *  TOTALS*
     PEAK FLOW       (cms)=       2.23         0.21           2.439 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=     144.92       125.75         143.00
     TOTAL RAINFALL   (mm)=     145.92       145.92         145.92
     RUNOFF COEFFICIENT   =       0.99         0.86           0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (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 (  0010):     5.06   2.439    12.17   143.00
      + ID2= 2 (  0003):    11.72   5.211    12.17   133.75
        ====================================================
        ID = 3 (  0005):    16.78   7.650    12.17   136.54

     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):    16.78   7.650    12.17   136.54
      + ID2= 2 (  0004):     1.75   0.447    12.17    94.62
        ====================================================
        ID = 1 (  0005):    18.53   8.097    12.17   132.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
-----
--------------------
| CALIB             |
| STANDHYD (  0006)|   Area    (ha)=   1.66
|ID= 1 DT=10.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.25         0.42
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     105.20        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     178.61       340.12
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       2.09 (ii)    6.41 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.13
                                                           *  TOTALS*
     PEAK FLOW       (cms)=       0.41         0.35          0.762 (iii)
     TIME TO PEAK    (hrs)=      12.17        12.17          12.17
     RUNOFF VOLUME    (mm)=     144.92       125.76         135.34
     TOTAL RAINFALL   (mm)=     145.92       145.92         145.92
     RUNOFF COEFFICIENT   =       0.99         0.86           0.93

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0005):    18.53   8.097    12.17   132.58
      + ID2= 2 (  0006):     1.66   0.762    12.17   135.34
        ====================================================
        ID = 3 (  0007):    20.19   8.859    12.17   132.81

     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   |   1.6050      1.0540
                          0.3560     0.6274   |   1.7820      1.1564
                          0.7790     0.7914   |   1.9560      1.2783
                          1.2730     0.8963   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     20.190      8.859     12.17     132.81
   OUTFLOW: ID= 1 (  0008)     20.190      1.896     12.33     132.79

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 21.40
                   TIME SHIFT OF PEAK FLOW         (min)= 10.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.2426

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

 FINISH
==========================================================================
=================================
```

Roof Top & Rear Yard Drainge to Infiltration Trenches :

- Assume infiltration trenches to collect roof runoff from half of the lot areas
- Assume infiltration media = gravel with 40% void ratio
- Calculations for cross-sectional area of trenches is given below :

Total Area draining to Trenches = 12.00 Ha

Rainfall data for the below calculations is extracted from Environmental Canada's historical weather data for Fergus Shand Dam
Station Id : 6142400

Rainfall Data

Events	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
> = 0.2mm	4.70	4.50	7.40	12.90	14.30	12.00	11.50	12.40	13.90
> = 5mm	1.80	1.60	2.60	4.30	5.10	4.90	5.20	4.60	5.40
> = 10mm	1.00	0.77	1.30	2.10	3.10	3.00	3.20	3.00	3.00
> = 25mm	0.08	0.23	0.04	0.27	0.54	0.77	0.77	1.10	0.62

Trench Calculations

					Trench		Cumulative			
Storm Events	To	Storm Events	Average Depth of Events	No. of Events per Year	Infiltration Depth per event	Infiltration Volume per event	Infiltration Volume per event	Infiltration Volume per Year	Infiltration Volume per Year	Swale overflow
Col A		Col B	Col C	Col D	Col E	Col F	Col G	Col H	Col I	Col F
						(Col E x Area)		(Col F x Col D)		
(mm)		(mm)	(mm)		(mm)	(m^3)	(m^3)	(m^3)	(m^3)	(mm)
0.2	-	5	2.6	129.7	2.60	312.00	312.00	40,466	40,466	0
5.0	**-**	**10**	**7.5**	**48.0**	**7.50**	**900.00**	**1212.00**	**43,200**	**83,666**	**0**
10.0	-	25	17.5	26.6	7.50	900.00	2112.00	23,940	107,606	10
25.0	-	50	37.5	5.3	7.50	900.00	3012.00	4,770	112,376	30

Satisfies Infiltration Deficit target of **40,805 m^3/year**

Required

Infiltration Trench Length Required	1,000	m
Infiltration Trench Width	1.50	m
Infiltration Trench Height	1.50	m
Infiltration Trench Absolute Volume	2,250.00	m^3
Porosity Of Filter Material	0.40	
Infiltration Trench Net Volume	**900.00**	**m^3**

Provided

Infiltration Trench Length Provided	1100	m
Infiltration Trench Width	1.50	m
Infiltration Trench Height	1.50	m
Infiltration Trench Absolute Volume	2,475.00	m^3
Porosity Of Filter Material	0.40	
Infiltration Trench Net Volume	**990.00**	**m^3**

APPENDIX “F”

Stittmater SWM Report

Stormwater Management Report
& Design Drawings
Proposed Strittmatter Subdivision
Village of Hillsburgh, Town of Erin

July 2000

RJB File: S-405

Prepared For:
Triton Engineering

Prepared By:
Burnside Development Services
A Division of R. J. Burnside & Associates Limited
8500 Torbram Road, Suite 56
BRAMPTON, ON
L6T 5C6

Table of Contents

Tables

Figures

Appendix

1.0 Introduction

The proposed Strittmatter residential development (Figure 1) is located in the north end of the Village of Hillsburgh, Town of Erin (formerly Township of Erin). Andrew Brodie & Associates Inc. prepared a hydrologic analysis and preliminary stormwater management study for this development in June 1987. That report was updated in January of 1988.

This report uses Brodie's findings as background for the detailed grading design and drainage systems. In order to accurately address the stormwater management concerns, significant revisions have been made to Pond 1 and its hydrologic modelling. This report addresses the peak flow quantity control, erosion and sediment control during construction and reflects the modifications to design and hydrologic modelling of Pond 1.

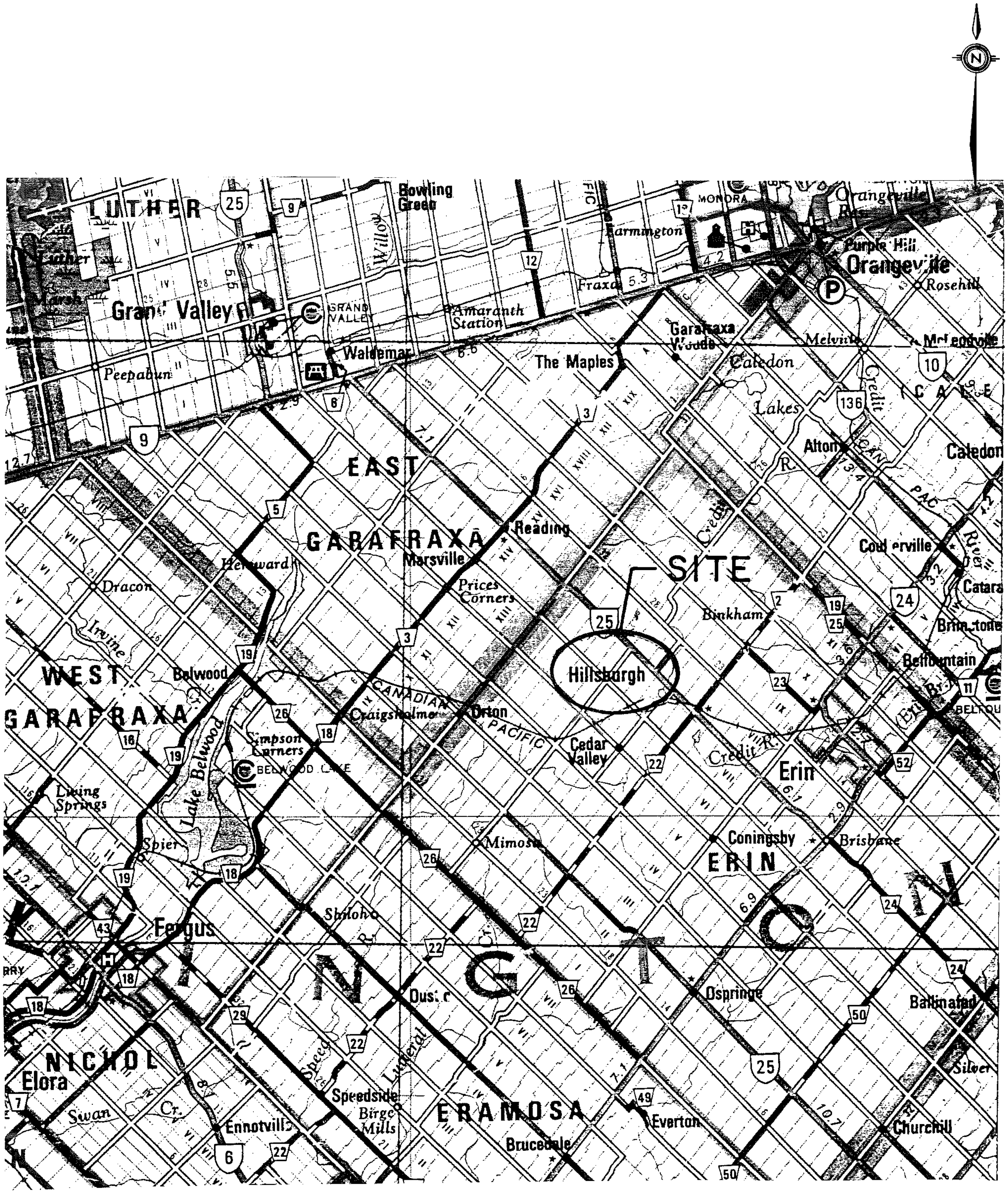
2.0 Site Description

The proposed Strittmatter development is located within the watershed of the Credit River. Drainage from the subject lands flows southerly, outletting into an existing pond in the Village referred to as the Hillsburgh Pond. The flow from the pond discharges into the Erin branch of the Credit River.

The drainage areas for the property are delineated in Figure 2. Sub-area A drains to the southeast corner of the property, continuing southward through a culvert under George Street, and eventually into the Hillsburgh pond. The remainder of the development area, sub-areas B, C and D drain westerly to a second outlet, which also discharges into the Hillsburgh pond.

The existing land is agricultural and mainly used for pasture. The proposed development consists of single family residential housing. The Ministry of Natural Resources has requested that the treed area in the southwest corner of the development remain undisturbed. This area has been zoned as open space and forms part of Lot 30.

The soils in this area consist of sandy loam and are classified in hydrologic soil Group A. The site is fairly hilly with slopes ranging from approximately four percent in the east to approximately twenty percent in the south.



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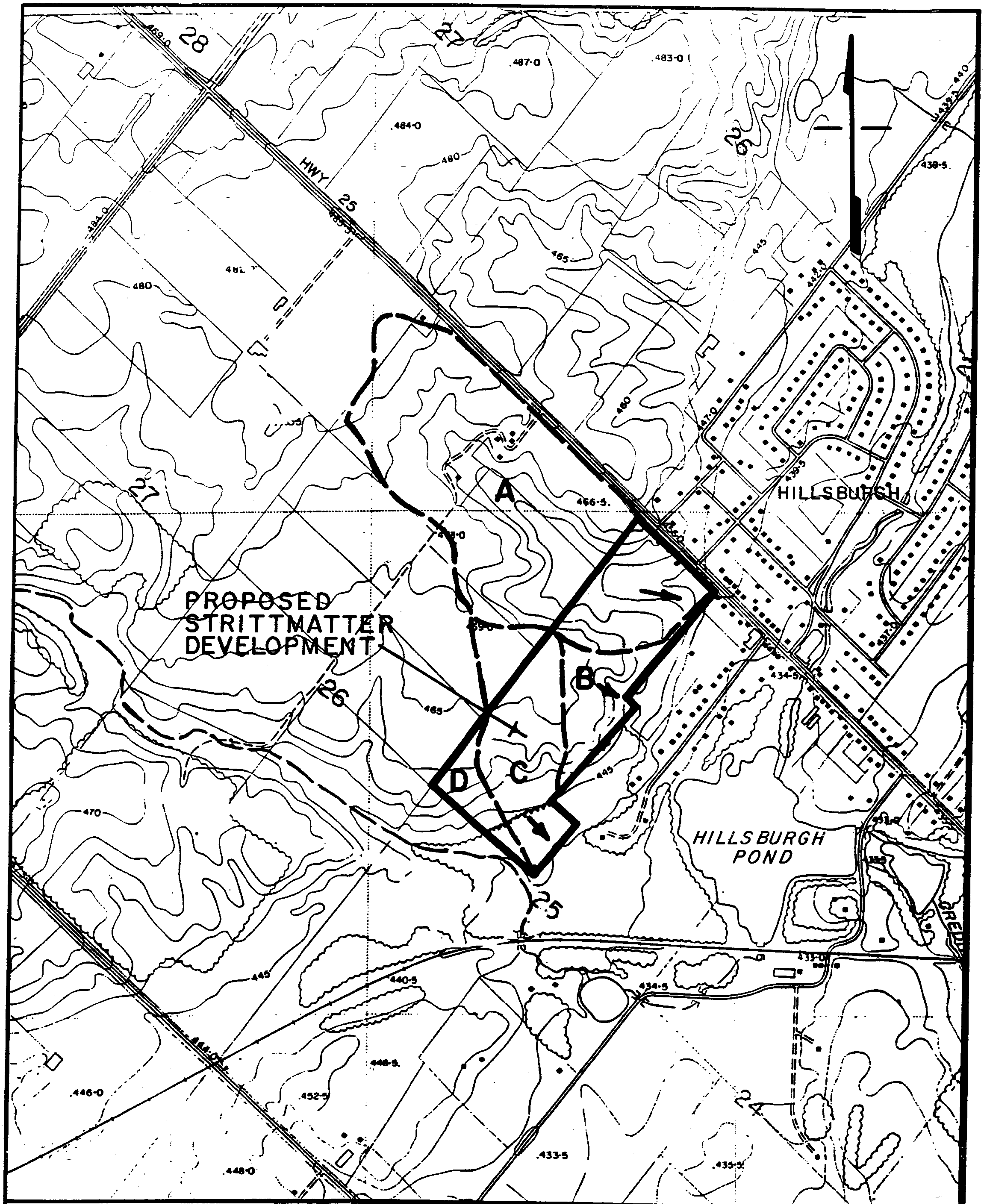
DATE JAN 1990 SCALE N.T.S. JOB No S–134
REVISED AUG 1999

LOCATION PLAN

FIGURE 1

S405FIG1.DWG



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LOCATION OF PRE - DEVELOPMENT
SUB WATERSHED

FIGURE 2

3.0 Hydrology

The Credit Valley Conservation Authority require that the post-development peak flows do not exceed the pre-development levels. This has been used as the design criteria for the detention ponds.

3.1 Pre-development Hydrologic Parameters

The pre-development flows were calculated using the OTTHYMO hydrologic computer model with the NASHYD sub-routine designed for use with rural areas. The characteristics of sub-watersheds A, B, C and D for pre-development conditions are listed in Table 1.

Table 1
Pre-Development Parameters

Sub-Watershed	Area (ha.)	CN	Slope (%)	Tp (hr.)
A	26.7	58	5.0	0.30
B	3.44	64	8.0	0.08
C	7.32	64	6.0	0.12
D	1.61	64	6.0	0.11

3.2 Post Development Conditions

Following development of the Strittmatter property, drainage area A will be somewhat different than for pre-development conditions. The upstream lands (22.4 hectares), including the McMurchy farm, will continue to drain through the Strittmatter development. However, a separate storage facility is proposed for this drainage area, to be located on the McMurchy lands. This facility will release runoff very slowly into Pond 1 of the Strittmatter development.

Furthermore, approximately 3.3 hectares of drainage from County Road 24 will also be routed through Pond 1 in an effort to reduce peak flows in the County stormsewer. Hydrologic studies completed by Triton Engineering Services Limited in 1998 on the County stormsewer indicated that, while having sufficient capacity in the steep sections, the stormsewer is under surcharge where the gradient is reduced near the Credit River (across from the Hillsburgh arena) for a 5 year storm event. By routing it through Pond 1 on the Strittmatter property, flows are reduced significantly.

To this date, the CVC has been concerned with Pond 1 outletting to the natural outlet, a swale which drains through several backyards, before flowing under an existing house on George Street. The CVC has previously requested, as a condition of Draft Plan approval, that Mr. Strittmatter secure easements along the swale to the Hillsburgh Pond in order to have access in the event of a flooding or potential flooding problem. Costs to secure the easements were prohibitive and Mr. Strittmatter chose to consider alternative drainage options.

The additional controls now provided by the McMurchy facility , the diversion of County Road drainage and the enlargement of Pond 1 into the area previously occupied by Lot 1 has reduced Mr. Strittmatter's runoff rates to a level which has permitted the routing of Pond 1 away from the natural outlet towards the County Road system without any adverse impacts. In fact, the 5 year flows in the County sewer are still significantly lower than pre-development rates and the 100 year flow at the outlet to the Credit River is lower also.

Routing the County Road drainage through Mr. Strittmatter's pond, as previously discussed, has the added benefit of providing some level of water quality treatment for this otherwise untreated runoff. As the West Credit River is the direct receiver of this road drainage, the water quality treatment aspect of the diversion is considered to be as important as the flow attenuation.

Sub-areas B, C and D were modified slightly to reflect the drainage changes resulting from the proposed road pattern. Sub-areas B and D are left to drain uncontrolled over the rear yards. The revised sub-areas are illustrated in Figure 3. Sub-area characteristics for post development conditions as revised are shown in the schematic in Figure 4.

3.3 Results

The areas and peak flows calculated for predevelopment and post Strittmatter development controlled conditions are summarized in Table 2. Sub-areas C and D drain to a common point at the southeast corner of the property. As a result, the flows from areas C and D are combined for the pre to post-development comparison. Table 2 reflects the combined flows for these two areas as well as the individual peak flows. It is clearly indicated, on this table, that pre to post-development control is met.

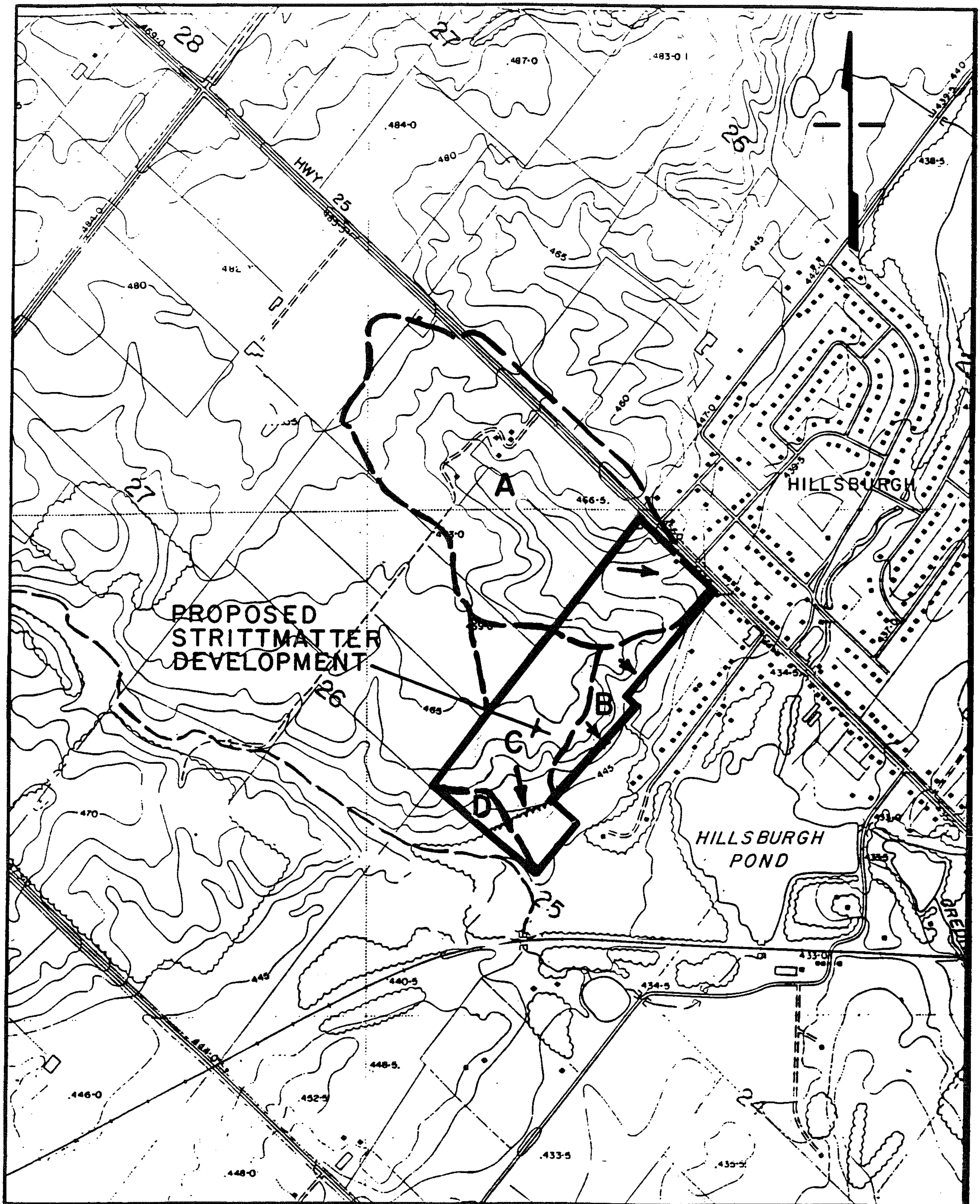
Table 2
Summary of Peak Flows (m^3/s)

Outlet	**Pre-Development**				**Post Strittmatter Development**			
	Area	**2 Year**	**5 Year**	**100 Year**	**Area**	**2 Year**	**5 Year**	**100 Year**
A	26.7	.637	.806	2.344	30.20	.186	.269	.495
B	3.44	.149	.188	.534	2.69	.102	.128	.373
C	7.32	.296	.374	1.077	8.23	.209	.340	.908
D	1.61	.067	.085	.244	1.10	.050	.123	.362
Combined C & D	8.93	.363	.459	1.322	9.33	.300	.450	1.303

* Notes:

I) Results are summarized from original OTTHYMO runs by R. J. Burnside & Associates Limited (1989). Due to changes in drainage areas to Outlet A (1999) for Post Development Conditions (diversion of County Road 24 drainage, additional storage facility on McMurchy property), post development runoff scenarios to Outlet A were re-modelled.

ii) A schematic model for drainage to Outlet A and the County Road system is provided in Appendix A with detailed output for 5 year event and 100 year event.



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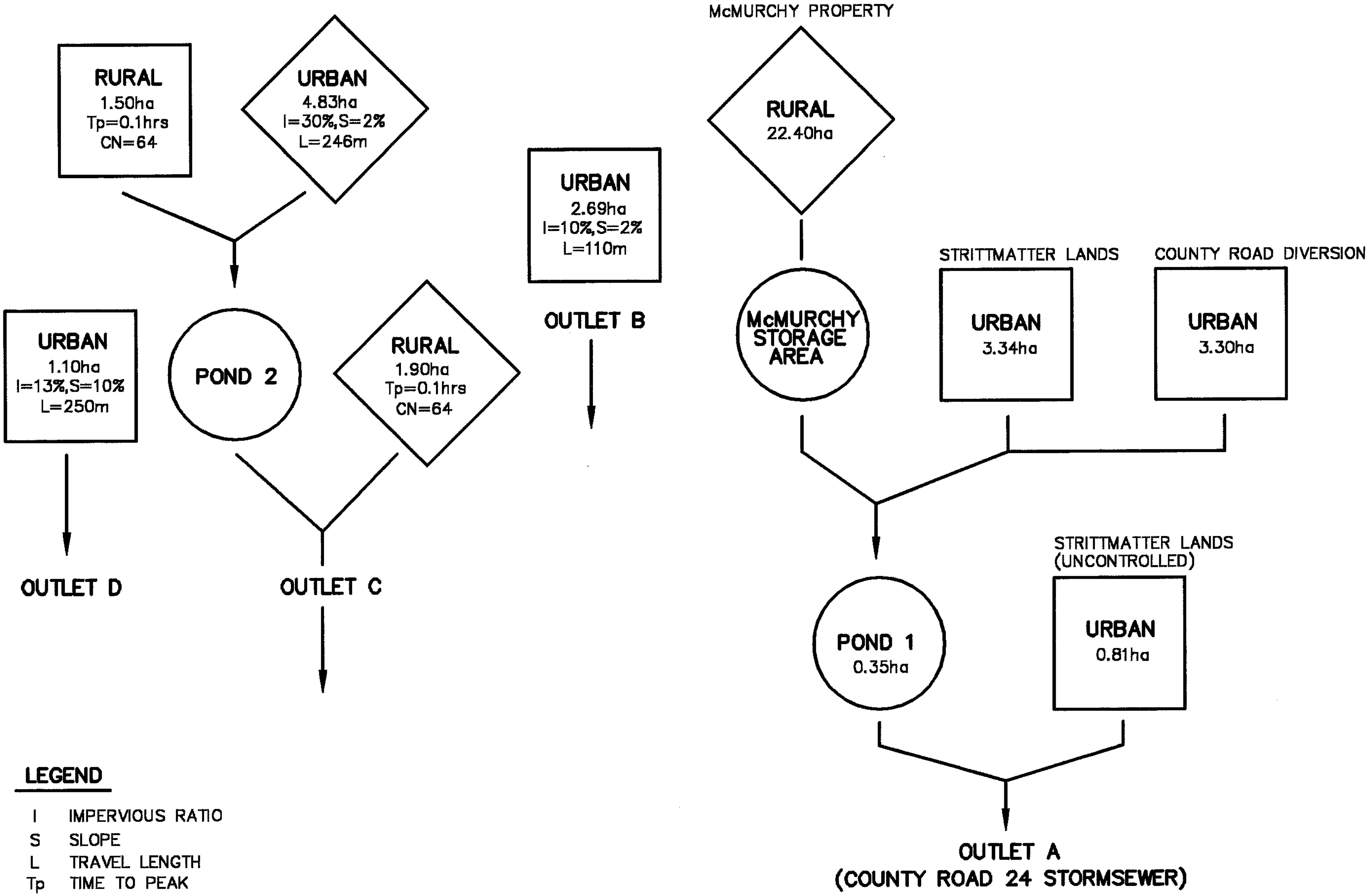
LOCATION OF POST-DEVELOPMENT SUB WATERSHED

FIGURE 3

(REVISED JULY 1999)



LEGEND

I IMPERVIOUS RATIO
S SLOPE
L TRAVEL LENGTH
Tp TIME TO PEAK

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FIGURE 4

SCHEMATIC - POST DEVELOPMENT CONDITIONS

S134.DWG

3.4 Ultimate Development Condition

Consideration was given to the possibility of future development of the McMurchy lands. A hydrologic analysis was conducted to determine if a reasonable sized stormwater management facility could be constructed on McMurchy lands that would allow an appropriate discharge rate during storm events without having adverse effects on the Strittmatter stormwater management system.

For the hydrologic analysis an assumed development scenario was established for the McMurchy lands; this scenario is furthered referred to as the Ultimate Condition. The development of the 22.4 hectare property consisted of the following:

- 10 hectares Open Space (non-developable), and
- 12.4 hectares @ 30% impervious (similar to Strittmatter development)

Under the above conditions the following storage and outflow values were found to adhere to the requirements previously stated:

- 5 year: 2600 m^3 controlled to 0.06 m^3/s, and
- 100 year: 7300 m^3 controlled to 0.16 m^3/s.

These figures are rounded from the Summary of Hydrologic Analysis for Ultimate Condition chart provided in Appendix B. The 100 year flood storage could be provided in an area approximately 60m x 60m x 2m deep which is not excessive for a stormwater management pond. Of course, water quality volumes and potentially erosion control storage volumes may be required in addition to flood storage. These storage values are reasonable for the McMurchy development and should merely be used as indications that future expansion of the property, such that the needs of both Strittmatter and McMurchy land owners are satisfied, is possible. The invert of the storm sewer within the Strittmatter system, at the north end of Street 'C', has been deepened to allow maximum flexibility for future development of the McMurchy property.

Appendix B contains SWMHYMO modelling results and a storm sewer design sheet for the Ultimate Condition (post McMurchy development). In addition, tables showing a summary of the peak flows and pond performance under the Ultimate Condition are provided in Appendix B.

4.0 Detention Ponds

4.1 Location

Storage required to control post Strittmatter development runoff rates from sub-area A will be provided by Pond #1. This facility will take advantage of the embankments required for the construction of Upper Canada Drive. Figure 5 shows Pond #1 in detail. The location of Pond #1 is shown on Drawing No. S-405-8/G8 and in detail on Drawing S-405-25/S1.

Storage for outlet C will be provided in Pond #2 located in the southwest portion of the development immediately north of the treed Open Space area. A drainage easement around the detention area will be granted to the Township for maintenance purposes. Figure 6 shows Pond #2 in detail.

Storage required to control run-off from the McMurchy property will be provided by the temporary pond located on the McMurchy property immediately north of Street 'C'. Figure 7 shows the McMurchy pond in detail.

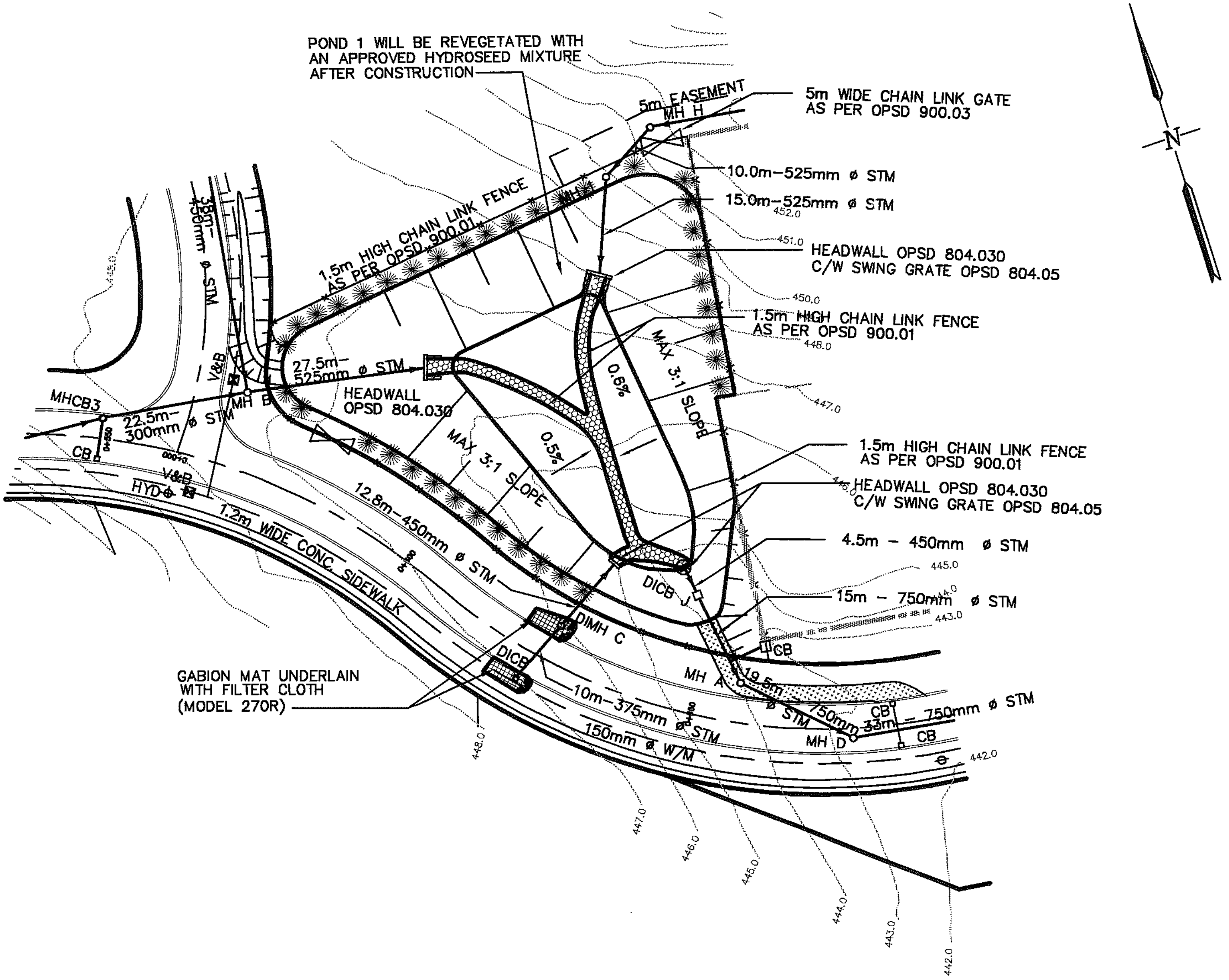
4.2 Detention Pond Details

Both detention ponds on the Strittmatter property (i.e. Pond #'s 1 and 2) will have maximum side slopes of 3:1 to facilitate maintenance. The pond bottom will be graded at 0.5%. Pond #1 has a low flow channel at a grade of 1.0%. Pond #2 will also incorporate a low flow channel at a grade of 0.5 %.

The temporary pond facility on the McMurchy property will be created by constructing a berm along the north property line of the Strittmatter development at the end of Street 'C'. The berm will allow the McMurchy runoff to pond on their site thereby creating the facility. The release of the stormwater from the McMurchy pond will be facilitated by a Hickenbottom perforated riser which will convey flows in a controlled manner to the Strittmatter storm sewers through a 75mm diameter orifice.

Table 3
Post Strittmatter Development Pond Performance

Rainfall Event	Pond #1			Pond #2			McMurchy Pond	
	Outflow, m^3/s	Depth, m	Volume, m^3	Outflow, m^3/s	Depth, m	Volume, m^3	Outflow m^3/s	Volume, m^3
25 mm	0.133	0.46	165	—	—	—	—	—
2 Year	0.165	0.57	300	.209	0.64	105	0.003	780
5 Year	0.233	1.02	660	.267	1.00	268	0.008	1820
100 Year	0.412	1.88	1620	.908	1.76	765	0.013	6120



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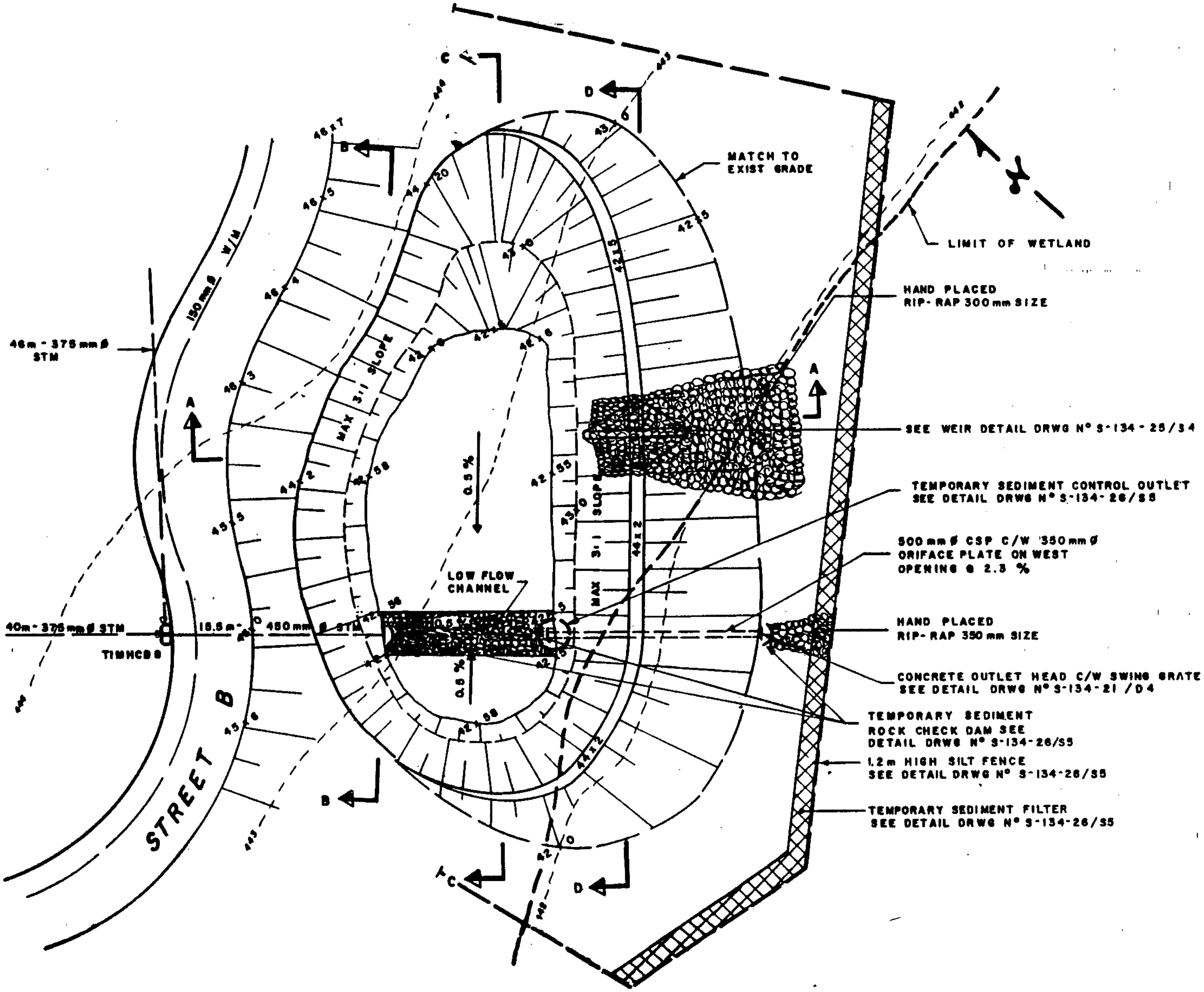
DETAIL OF POND 1

FIGURE 5

S405FIG5.DWG



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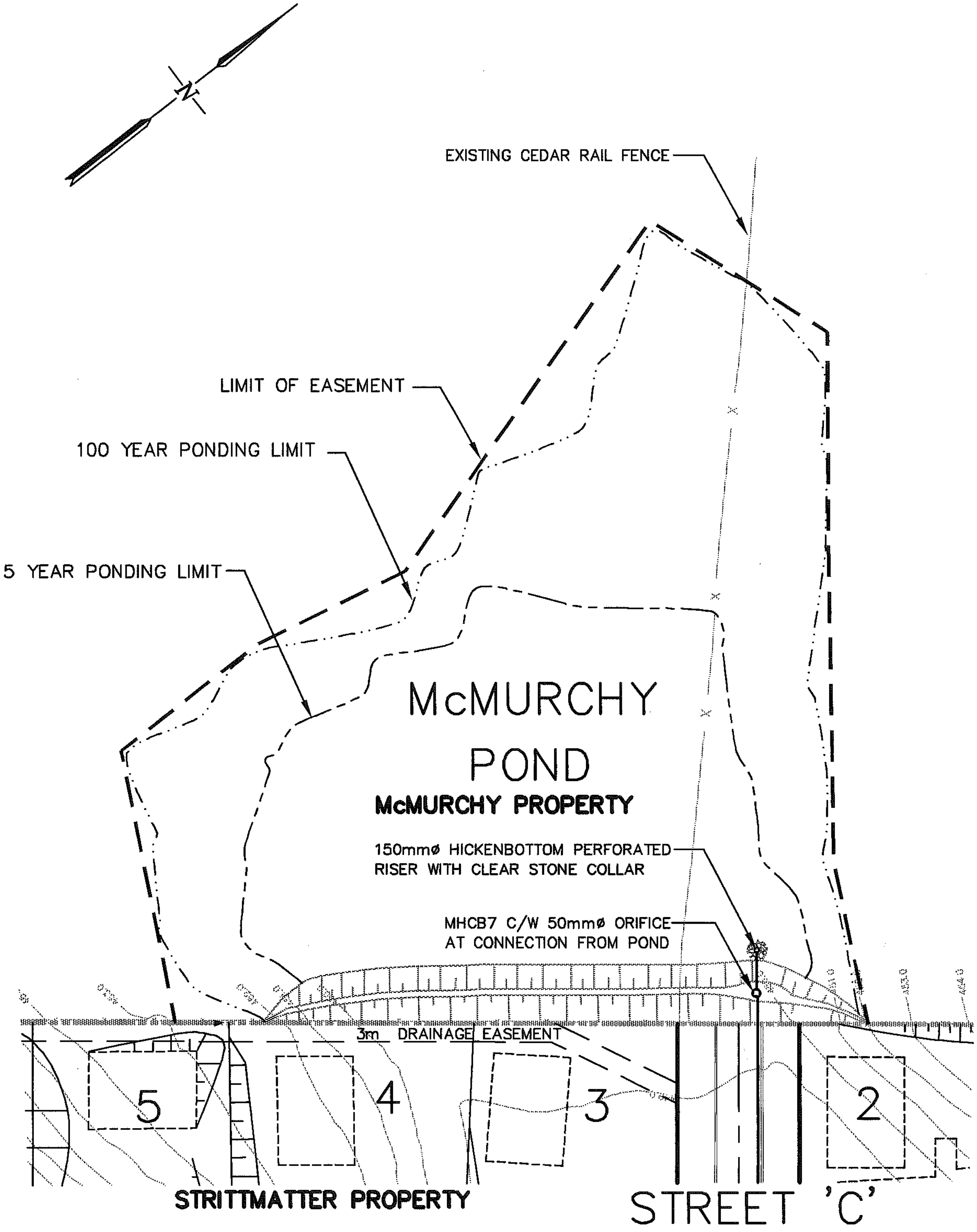
DETAIL OF POND N° 2

FIGURE 6

S405FIG7.DWG



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DATE JAN 2000 SCALE N.T.S. JOB No S-405

DETAIL OF McMURCHY POND

FIGURE 7

5.0 Sedimentation And Erosion Control Plan

Sedimentation and erosion control measures are shown on the Sediment Control Plan (Dwg. No. S-405-30/S6). The grading plans indicate that the proposed gradient and length of the slopes are moderate to steep. These, according to the MNR (1987), the site is characterised as moderate to high potential for erodibility.

The site will have measures installed to reduce the impact of sedimentation and erosion on site and downstream, including two sediment basins. One will be constructed for drainage Area A (Pond #1 location) as shown on Drawing S-405-25/S1 and one for drainage Area C (Pond #2 location) as shown on Drawing S-405-27/S3. The McMurchy property will also have a sediment collection area where the McMurchy pond will be located. According MNR criteria the sediment basin will be designed to provide 125 m^3/ha of disturbed land. For Area A, a 500 m^3 capacity is required for the sediment basin. The outfall for Pond #1 will be controlled by a temporary sediment control structure as detailed in Drawing S-405-29/S5.

For Area C a 600 m^3 capacity is required for the sediment basin. The proposed stormwater management area (i.e. Pond #2) will act as a sediment basin during the construction period. Similar to Pond #1, the outfall for the sediment basin at Pond #2 will also be controlled by a temporary sediment control structure as detailed on Drawing S-405-29/S5.

A riser pipe surrounded by clear stone and filter cloth will ensure sediment control during the construction period. The weir for Pond #2 will not be installed until after all other construction on the site is completed and the site is stabilized.

The schedule of construction is a vital component of sedimentation and erosion control. Prior to any site grading or construction, the berm at the McMurchy property line must be constructed. This will control the sediment transport from the McMurchy farm and protect the Strittmatter property from damaging sheet flow. In conjunction with the berm construction, the two sediment basins, Pond #1 and Pond #2 must be constructed to collect sediment from the site.

If either of the sediment basins lose 25% of their total volume during the construction period, the contractor on-site will be responsible for cleaning out the facility.

A silt fence and temporary sediment filters will be installed as per grading plans around the site to provide additional sedimentation and erosion control. Buffer strips and a second line of silt fence have been provided along the south property line. In addition, silt fence will be installed around the entire perimeter of the topsoil and earth stockpiles. After the stripping and removal of topsoil within the road allowance, an interceptor ditch with a minimum depth of 0.6 m will be put in place as shown on the Sediment Control Drawing, S-405-30/S6. Finally, all inlets to the storm sewers will have silt traps placed around them. Details on these measures can be found in Drawing S-405-29/S5. Site inspectors will ensure that all sediment control structures are properly maintained. Any deficiencies are to be reported to the site contractor for immediate repair.

Both ponds will incorporate low flow channels which will be lined with rip-rap (150 to 200 mm) to prevent erosion when the storm sewers are flowing full. Rock check dams are proposed at the inlets and outlets of both ponds. Stockpiling of all topsoil and earth will be on lots 8 to 16 and 20 to 28 inclusive.

All sediment basins will be thoroughly cleaned out and temporary control structures removed before they are commissioned as the new stormwater management ponds.

6.0 Summary

This stormwater management report was originally prepared and submitted in 1989 in support of this development proposal by Mr. Frank Strittmatter. The purpose of the report was to document the design details of the stormwater management plan.

In response to several drainage issues raised by the Credit Valley Conservation and the Town of Erin, we have made some modifications to the drainage system. Mr. Strittmatter's land will no longer drain to the swale outlet which used to accept approximately 26 hectares of drainage (including 22.4 hectares of upstream drainage). An additional stormwater storage area on the McMurchy property has helped to reduce outflows from Pond 1 to a level which can be accommodated in the County storm sewer without adverse effects on that system. In fact, 5 year flows are reduced appreciably and 100 year flows near the outlet at the Credit River are also reduced.

The stormwater management areas provide quantity controls for up to a 100 year storm event for the development.

Sedimentation and erosion controls, including two sediment basins, will be in place to minimize the migration of sediment from the site during the construction period.

Respectfully Submitted:

R. J. Burnside & Associates Limited

Durrant

Lorena Durrant, BSc. Eng.

Christopher Crozier, P.Eng.

LD:mm J:\AJOBRJB\S-405\060600report.wpd

APPENDIX A

POST STRITTMATTER DEVELOPMENT
SWMHYMO MODELLING RESULTS

Strittmatter Property Sewer Design
July 11, 1999 (revised Jan. 04, 2000 & April 25, 2000)

STORM SEWER DESIGN SHEET
POST STRITTMATTER DEVELOPMENT

R.J. BURNSIDE & ASSOCIATES LIMITED
ENGINEERS-HYDROGEOLIGISTS-ENVIRONMENTAL CONSULTANTS

8500 TORBRAM ROAD, SUITE 56, BRAMPTON, ONTARIO L6T5C6
TELEPHONE: 905-793-9239 FAX: 905-793-5018

Date : 01-Jun-00
Project : Strittmatter Property
Municipality : Township of Erin
Designer : LD
Checker :

Q = 2.778 CIA
Q: Peak Flow(l/sec)
C: Runoff coeficient
A : Area(Ha)
I: Rainfall Intensity (mm/hr) I =A/(B+Tc)^c
Manning's n 0.013

Township of Erin Rainfall I.D.F. 5 yr. storm
(Standards based on Malton I.D.F. curves)
A= 820.0
B= 4.6
C= 0.780

Location										Sewer Data					
Street Name	From	To	AREA A ha	COEF C	Individual 2.78AC	Accumulated 2.78AC	Time of Concentration (mins)	Rainfall Intensity (mm/hr)	Peak Flow (l/s)	Diameter (mm)	Slope (%)	Length (m)	Capacity (l/s)	Velocity (m/s)	Time of Flow (mins)
Upper Canada Drive	MHCB 5	MHCB 4	0.54	0.4	0.60	0.60	10.00	101.30	61	300	7.85	75.0	283	3.87	0.32
	MHCB 4	MHCB 3	0.53	0.4	0.59	1.19	10.32	99.59	118	300	7.81	64.0	282	3.86	0.28
	MHCB 3	MH B	0.41	0.4	0.46	1.65	10.60	98.18	162	300	8.00	22.5	285	3.91	0.10
Street C	MHCB 7	DCBMH 6	22.4	0.3	18.68	18.68	10.00	(see note 1)	8	450	1.50	39.5	364	2.22	0.30
	DCBMH 6	MH B	1.04	0.4	1.16	1.16	10.30	99.73	123	450	1.50	38.0	364	2.22	0.29
Upper Canada Drive	MH B	headwall					10.69	(see note 3)	285	525	1.00	27.5	449	2.01	0.23
	DICB (RT)	DIMH C					11.70		142	375	1.00	10.0	183	1.60	0.10
	DIMH C	headwall					11.70	(see note 4)	283	450	1.00	12.8	297	1.81	0.12
	pond	DICB J	(see note 5)	Refer to R.J. Burnside SWM Report					233	350	0.71	4.5	128	1.29	0.06
	DICB J	MH A				"			233	750	0.85	15.0	1071	2.35	0.11
	MH A	MH D				"			233	750	0.85	19.5	1071	2.35	0.14
	MH D	MH E				"			233	750	0.37	33.0	707	1.55	0.35
	MH E	MH F				"			269	750	2.00	22.5	1643	3.60	0.10
Diversion from County Rd. 24 (Triton study)	DICB 70	DICB 69	2.4	0.5	3.34	3.34	10.00	101.30	338	525	5.60	78.0	1062	4.75	0.27
	DICB 69	DICB 67	0.25	0.5	0.35	3.68	10.27	99.85	368	525	5.79	73.0	1080	4.83	0.25
	DICB 67	DCB 66	0.68	0.5	0.95	4.63	10.53	98.55	456	525	7.23	28.0	1207	5.40	0.09
New Diversion System	DCB 66	MH G				(No further inflow)			456	525	4.27	21.5	927	4.15	0.09
	MH G	MH H							456	525	1.25	53.5	502	2.25	0.40
	MH H	MH I							456	525	6.20	10.0	1117	5.00	0.03
	MH I	headwall							456	525	1.00	15.0	449	2.01	0.12

NOTES:
1) The peak flow of 8 l/s for the storm sewer from MHCB 7 to DCBMH 6 represents the 5 year routed flow from the undeveloped McMurchy ponding area.
2) The flow from DCBMH 6 to MH B was determined using a combined flow from MHCB 7 to DCBMH 6 (5 yr. SWMHYMO), and DCBMH 6 to MH B
using the rational method (5 yr. storm). The 100 yr. storm flow will go directly into the pond via an overland swale
3) The peak flow from MH B to the headwall (in the pond) is the combined flow from Street C and Upper Canada Drive to MH B.
4) The peak flow from DIMH C to pond is the 100 year storm flows from catchment SA4 as well as the carryover flow from the upstream catchements (SA1, SA2, and SA3).
This sewer must have the capacity to convey all of the runoff from the 100 year event to the pond (see Catchbasin Design Sheet).
5) 5 year outflow from Strittmatter pond (233 l\s) spills partly through the high flow outlet

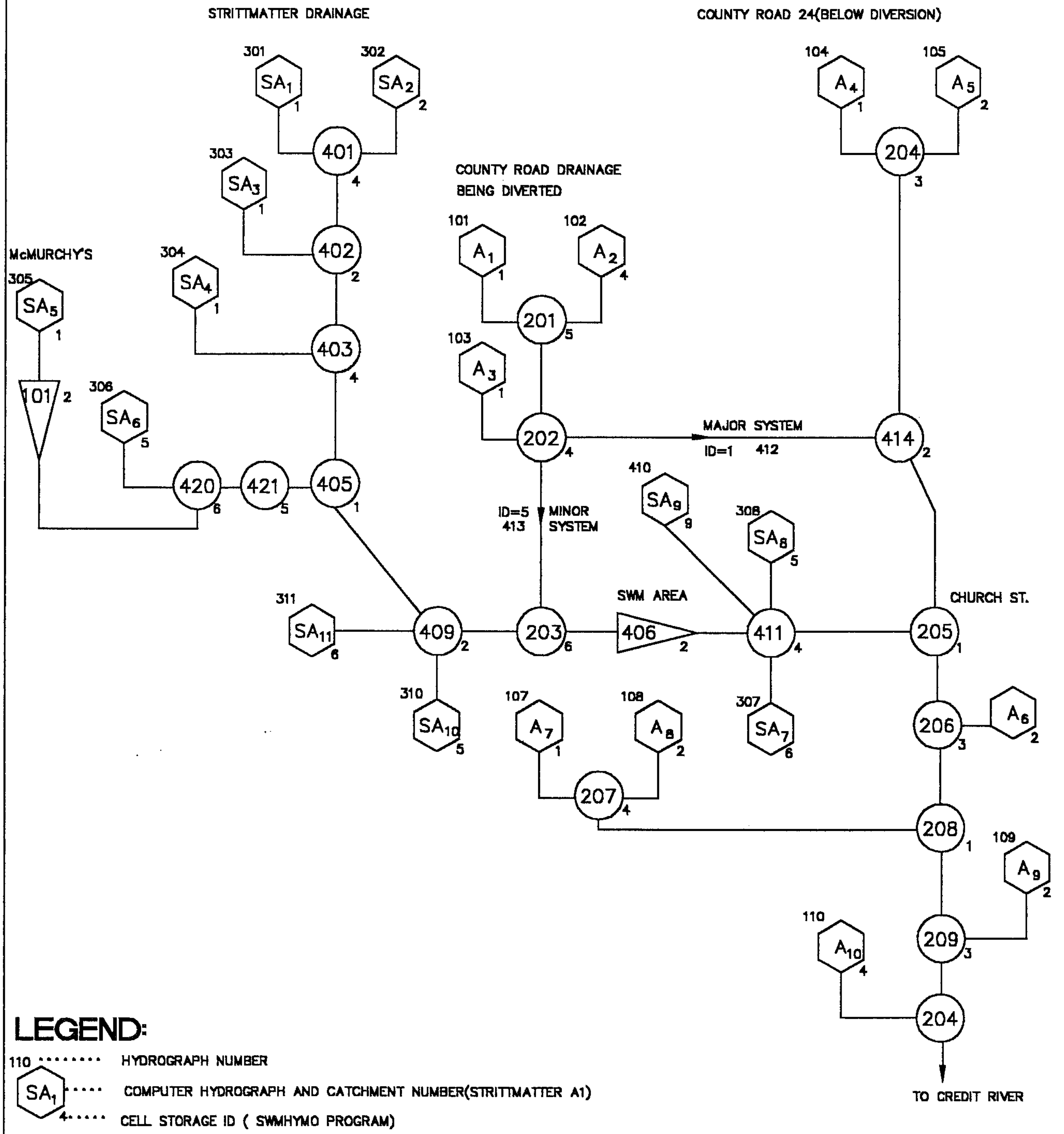
Storm Sewers into pond 2 (corrections from page 2 of June 1990 sheet)

	Location									Sewer Data					
Street Name	From	To	AREA A ha	COEF C	Individual 2.78AC	Accumulated 2.78AC	Time of Concentration (mins)	Rainfall Intensity (mm/hr)	Peak Flow (l/s)	Diameter (mm)	Slope (%)	Length (m)	Capacity (l/s)	Velocity (m/s)	Time of Flow (mins)
Leader Court	MHCB 13	MH 12	0.24	0.4	0.27	0.27	10.00	101.30	27	300	6.75	39.0	262	3.59	0.18
	MH 12	MHCB 11				0.27	10.18		27	300	8.15	38.5	288	3.95	0.16
	MHCB 11	MHCB 10	0.39	0.4	0.43	0.70	10.34	99.48	70	300	7.9	75.0	284	3.89	0.32
	MHCB 10	MHCB 9	0.97	0.4	1.08	1.78	10.67	97.84	174	300	6.5	54.0	257	3.53	0.26
	MHCB 9	TIMHCB 8	0.63	0.4	0.70	2.48	10.92	96.59	240	375	2.9	42.0	312	2.73	0.26
Upper Canada Drive	MHCB 19	MHCB 18	0.9	0.3	0.75	0.75									
			0.58	0.4	0.64	1.40	10.00	101.30	141	300	3.85	62.0	198	2.71	0.38
	MHCB 18	MHCB 17	0.6	0.3	0.50	0.50									
			0.49	0.4	0.54	2.44	10.38	99.29	242	375	5.5	72.0	429	3.76	0.32
	MHCB 17	MH 16	0.52	0.4	0.58	3.02	10.70	97.67	295	375	4.7	34.5	397	3.48	0.17
	TIMHCB 20	MH 16								525	4.42	27.0	943	4.22	0.11
Easement Lot 19/20	MH 16	MH 15	Refer to RJ Burnside SWM Report							525	8	21.0	1269	5.68	0.06
	MH 15	MH 14	"							525	8	26.0	1269	5.68	0.08
	MH 14	TIMHCB 8	"							525	8	40.0	1269	5.68	0.12
	TIMHCB 8	Pond 2	Refer to RJ Burnside SWM Report						680	750	1.25	16.5	1299	2.85	0.10

SWMHYMO SCHEMATIC
STRITTMATTER DEVELOPMENT, HILLSBURGH

POST STRITTMATTER DEVELOPMENT

- ROUTE HWY DRAINAGE (3.3ha) THRU STRITTMATTER POND
- REVISED MAY/17/99–ADDED McMURCHY LANDS & BERM
- REVISED MARCH/20/00–MODIFIED MODELLING SUBCATCHMENTS



LEGEND:

110 ········ HYDROGRAPH NUMBER

SA1 ····· COMPUTER HYDROGRAPH AND CATCHMENT NUMBER(STRITTMATTER A1)

4 ····· CELL STORAGE ID (SWMHYMO PROGRAM)

207 ····· ADD HYDROGRAPH (HYDROGRAPH NUMBER INSIDE)

4 ····· CELL STORAGE ID

406 ···· ROUTE RESERVOIR (HYDROGRAPH NUMBER INSIDE)

2 ··· CELL STORAGE ID

BURNSIDE DEVELOPMENT SERVICES
A DIVISION OF R.J. BURNSIDE AND ASSOCIATES LIMITED
DEVELOPMENT ENGINEERING & MANAGEMENT,
STORMWATER MANAGEMENT & COMMUNAL SYSTEMS
8500 TORBRAM ROAD, SUITE 56, BRAMPTON, ONTARIO L6T 5C6
TELEPHONE: 905–793–8239 FAX: 905–793–5018

S405INT1.DWG

01-Jun-00

Strittmatter Development, Village of Hillsburgh
Town of Erin

Summary of Hydrologic Analysis for Post Strittmatter Development Conditions
Drainage Area to County Road 24 Only

		5 Year Flows, m^3/s				100 Year Flows, m^3/s			
Catchment ID	Drainage Area	Local Runoff	Combined Runoff	Controlled Runoff	Storage Used	Local Runoff	Combined Runoff	Controlled Runoff	Storage Used (m^3)
Strittmatter Drainage									
SA1	0.54	0.046	0.046	0.046	-	0.105	0.105	0.105	-
SA2	0.53	0.045	0.091	0.091	-	0.103	0.209	0.209	-
SA3	0.41	0.035	0.126	0.126	-	0.080	0.289	0.289	-
SA4	0.41	0.035	0.161	0.161	-	0.080	0.369	0.369	-
SA5 *	22.40	0.313	0.313	0.008	1818.00	1.028	1.028	0.013	6114.00
SA6	1.04	0.063	0.224	0.224	-	0.166	0.536	0.536	-
SA10	0.36	0.034	0.258	0.258	-	0.077	0.613	0.613	-
SA11	0.35	0.092	0.350	0.350	-	0.154	0.767	0.767	
County Road 24 Drainage Being Diverted (Data from Triton Study (1998)									
A1	2.40	0.312	0.312	0.312	-	0.604	0.604	0.604	-
A2	0.25	0.033	0.344	0.344	-	0.064	0.668	0.668	-
A3	0.68	0.089	0.434	0.434 -	(minor system) (major system)	0.173	0.841	0.450 0.391	(minor system) (major system)
County Road + Strittmatter Drainage Routed Through Strittmatter SWM Area			0.78	0.23	660.00		1.22	0.41	1620.00
SA7	0.32	0.027	0.027	0.027	-	0.061	0.061	0.061	-
SA8	0.46	0.038	0.038	0.038	-	0.087	0.087	0.087	-
SA9	0.08	0.021	0.269	0.269	-	0.035	0.495	0.495	-
A4	0.09	0.012	0.012	0.012	-	0.023	0.023	0.023	-
A5	0.28	0.037	0.049	0.049	-	0.072	0.095	0.095	-
A6	0.31	0.048	0.348	0.348	-	0.088	0.991	0.991	-
A7	0.24	0.041	0.041	0.041	-	0.075	0.075	0.075	-
A8	0.30	0.054	0.443	0.443	-	0.096	1.162	1.162	-
A9	0.32	0.053	0.495	0.495	-	0.091	1.253	1.253	-
A10	0.21	0.036	0.531	0.531	-	0.065	1.318	1.318	-
Total	31.98	Total Flows to Credit River		0.531				0.318	

* SA5 represents the McMurchy Property . Drainage from these lands is controlled on-site in temporary facility.

28-Apr-00

Strittmatter Development, Village of Hillsburgh
Town of Erin

Stage-Storage-Discharge Relationship for Pond #1 (revised April 2000)
Post Strittmatter Development

Low Flow Outlet :	Conc. Pipe, diameter (m):	0.45
	Orifice, diameter (m):	0.35
	Invert Elevation (m):	442.95
Major Flow Outlet:	Conc. Pipe, diameter (m):	0.2
	Opening Elevation (m):	443.8
Centre of Low Flow Orifice, m		443.13
Centre of Low Flow Pipe, m		443.18
Elevation of Major Flow Pipe, m		443.80

Depth,m	Elevation, m	Low Flow Outlet	Major Flow Outlet	Total Flow, m^3/s	Total Storage, m^3
0.00	442.95	0.000	0.000	0.000	0.00
0.20	443.15	0.040	0.000	0.040	13.44
0.30	443.25	0.090	0.000	0.090	45.36
0.40	443.35	0.121	0.000	0.121	107.52
0.50	443.45	0.146	0.000	0.146	210.00
0.80	443.75	0.202	0.000	0.202	464.39
1.05	444.00	0.239	0.000	0.239	686.89
1.10	444.05	0.246	0.000	0.246	733.38
1.25	444.20	0.265	0.053	0.318	878.13
1.40	444.35	0.283	0.062	0.345	1032.38
1.60	444.55	0.305	0.072	0.378	1256.39
2.00	444.95	0.345	0.090	0.435	1786.41
2.10	445.05	0.355	0.093	0.448	1939.84
2.20	445.15	0.364	0.097	0.461	2103.02
2.30	445.25	0.373	0.101	0.473	2276.62

file: i:\Lorena\s-405\Pond_newps.wk4

Stage-Discharge Relationship for McMurchy Pond

Use 75mm Orifice as Control

Elev, m	Depth, m	Discharge, m^3/s	Storage, m^3
450.50	0.00	0.000	0.00
450.75	0.25	0.006	
451.00	0.50	0.008	1850.00
451.25	0.75	0.010	
451.50	1.00	0.012	4775.00
451.75	1.25	0.013	
452.00	1.50	0.014	8690.00
452.25	1.75	0.015	
452.40	1.90	0.582	12670.00

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

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO       999   55555 =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O     9   9  5     =========
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O ## 9   9  5     Ver. 3.1
     S   W W   M   M  H   H    Y    M   M  O   O     9999  5555  Oct. 1997
 SSSSS   W W   M   M  H   H    Y    M   M   OOO         9      5 =========
                                                    9   9      5 # 3877524
     StormWater Management HYdrologic Model          999   5555  =========

 ***************************************************************************
 ************************** SWMHYMO-95w Ver/3.1 ****************************
 *******  A single event and continuous hydrologic simulation model  *******
 *******     based on the principles of HYMO and its successors      *******
 *******                OTTHYMO-83 and OTTHYMO-89.                   *******
 ***************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.          *******
 *******                  Ottawa,  Ontario: (613) 727-5199           *******
 *******                  Gatineau, Quebec: (819) 243-6858           *******
 *******                  E-Mail: swmhymo@jfsa.Com                   *******
 ***************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: R.J. Burnside & Associates Ltd.              +++++++
 +++++++                Brampton              SERIAL#:3877524        +++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ***************************************************************************
 *******            ++++++ PROGRAM ARRAY DIMENSIONS ++++++           *******
 *******            Maximum value for ID numbers  :     10           *******
 *******            Max. number of rainfall points:   5000           *******
 *******            Max. number of flow points    :   5000           *******
 ***************************************************************************


 ********************   D E T A I L E D   O U T P U T   *******************
 ***************************************************************************
 *      DATE: 2000-06-01     TIME: 10:47:50     RUN COUNTER: 001101       *
 ***************************************************************************
 * Input   filename: I:\LORENA\S-405\CORREC~1\MAY00\STRIT5.DAT            *
 * Output  filename: I:\LORENA\S-405\CORREC~1\MAY00\STRIT5.out            *
 * Summary filename: I:\LORENA\S-405\CORREC~1\MAY00\STRIT5.sum            *
 * User comments:                                                         *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 ***************************************************************************

------------------------------------------------------------------------------
001:0001----------------------------------------------------------------------
*#****************************************************************************
*#  Project Name: [ Strittmatter Development, Hillsburgh] Project Number: [S-405
*#  Date        : 04-18-2000
*#  Modeller    : [LD]
*#  Company     : R. J. Burnside & Associates Ltd.
*#  License #   :  3877524
*#****************************************************************************
*#  Hydrologic analysis of County Road 24 stormsewer system combined with
*#  Strittmatter Development at the north end of the village of Hillsburgh.
*#
*#  McMurchy Berm added May '99
*#
```

```
*#  5 year storm event
*#
*#  Data from County Rd. 24 Stormsewer Analysis (Triton) used
*#  for Road Catchments. Strittmatter Development discharge
*#  includes stormwater controls
*#
*#  Made modifications to this file to route the road portion or upper canada SA
*#  into the pond and let the external property SA8 flow uncontrolled.  This fil
*#  was run to obtain volume requirements for the pond to store & throttle the
*#  100 year flows of the Strittmatter Development.  Lot 1 was made available
*#  as pond area so SA10 decreased 0.32 ha and SA11 increased the same amount.
*#
*# File was further modified to let SA9 flow uncontrolled off site
*#
*# File was further modified to collect some of the drainage from SA8 at the
*# south end of Lot 1.  SA8 area decreased to 0.46 ha and SA10 area increased
*# to 0.36 ha.  Change in response to Triton comments May 19, 2000
*#
--------------------
| START            |  Project  dir.: I:\LORENA\S-405\CORREC~1\MAY00\
--------------------  Rainfall dir.: I:\LORENA\S-405\CORREC~1\MAY00\
    TZERO =    .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
--------------------------------------------------------------------------------
001:0002-----------------------------------------------------------------------
*READ STORM          STORM_FILENAME=["c:\S-405\swmhymo\hazel.stm"
--------------------
| CHICAGO STORM    |     IDF curve parameters: A=1439.371
| Ptotal= 50.14 mm |                           B=  13.688
--------------------                           C=    .846
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm   =  3.00 hrs
                         Storm time step     = 10.00 min
                         Time to peak ratio  =   .33

                   TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                    .17   4.466 |  1.00  98.929 |  1.83   8.962 |  2.67   4.283
                    .33   5.747 |  1.17  42.990 |  2.00   7.369 |  2.83   3.877
                    .50   8.048 |  1.33  23.232 |  2.17   6.247 |  3.00   3.543
                    .67  13.224 |  1.50  15.419 |  2.33   5.419 |
                    .83  32.890 |  1.67  11.382 |  2.50   4.784 |

--------------------------------------------------------------------------------
001:0003-----------------------------------------------------------------------
*#
*#   Catchment A4 from Triton Study  (0.09 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .09
| 01:000104 DT=10.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         .04          .05
     Dep. Storage      (mm)=         .80         1.50
     Average Slope      (%)=        6.00         6.00
     Length             (m)=       24.49        40.00
     Mannings n           =         .013         .250
```

```
     Max.eff.Inten.(mm/hr)=      98.93        20.18
                over (min)      10.00        10.00
     Storage Coeff.  (min)=        .64 (ii)   10.27 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=        .17          .11
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .01          .00         .012 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17        1.000
     RUNOFF VOLUME    (mm)=      49.34        12.35       27.144
     TOTAL RAINFALL   (mm)=      50.14        50.14       50.135
     RUNOFF COEFFICIENT   =        .98          .25         .541
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0004-----------------------------------------------------------------------
*#
*#   Catchment A5 from Triton Study  (0.28 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .28
| 02:000105 DT=10.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .11          .17
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       6.00         6.00
     Length            (m)=      43.20        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      98.93        20.18
                over (min)      10.00        10.00
     Storage Coeff.  (min)=        .91 (ii)   10.53 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=        .17          .10
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .03          .01         .037 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17        1.000
     RUNOFF VOLUME    (mm)=      49.34        12.35       27.145
     TOTAL RAINFALL   (mm)=      50.14        50.14       50.135
     RUNOFF COEFFICIENT   =        .98          .25         .541
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0005-----------------------------------------------------------------------
*#   Add summed hydrographs from Catchments A5 to A4
--------------------
| ADD HYD (000204) | ID: NHYD     AREA      QPEAK   TPEAK    R.V.     DWF
--------------------              (ha)      (cms)   (hrs)    (mm)    (cms)
```

```
                ID1 01:000104      .09     .012    1.00  27.14    .000
               +ID2 02:000105      .28     .037    1.00  27.14    .000
                =====================================================
                SUM 03:000204      .37     .049    1.00  27.14    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0006-----------------------------------------------------------------------
*#
*#   Proposed Strittmatter Development
*#
*#   Catchment SA1 (Strittmatter A1, 0.54 hectares)
*#
----------------------
| DESIGN STANDHYD     |   Area    (ha)=     .54
| 01:000301 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .16          .38
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       3.00         3.00
     Length            (m)=      60.00        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      98.93        25.97
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       1.36 (ii)   12.08 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=        .17          .10
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .03          .02          .046 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17         1.000
     RUNOFF VOLUME    (mm)=      49.34        13.71        20.836
     TOTAL RAINFALL   (mm)=      50.14        50.14        50.135
     RUNOFF COEFFICIENT   =        .98          .27          .416
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0007-----------------------------------------------------------------------
*#
*#   Catchment SA2 (Strittmatter A2, 0.53 hectares)
*#
----------------------
| DESIGN STANDHYD     |   Area    (ha)=     .53
| 02:000302 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .16          .37
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       3.00         3.00
     Length            (m)=      59.44        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      98.93        25.97
```

```
                 over  (min)       10.00         10.00
     Storage Coeff.   (min)=        1.35 (ii)    12.07 (ii)
     Unit Hyd. Tpeak  (min)=       10.00         10.00
     Unit Hyd. peak   (cms)=         .17           .10
                                                                *TOTALS*
     PEAK FLOW        (cms)=         .03           .02            .045 (iii)
     TIME TO PEAK     (hrs)=        1.00          1.17           1.000
     RUNOFF VOLUME     (mm)=       49.34         13.71          20.836
     TOTAL RAINFALL    (mm)=       50.14         50.14          50.135
     RUNOFF COEFFICIENT   =          .98           .27            .416
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0008------------------------------------------------------------------------
*#   Add hydrographs from Strittmatter A1 and A2
--------------------
| ADD HYD (000401) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)      (cms)   (hrs)   (mm)    (cms)
                   ID1 01:000301      .54      .046    1.00  20.84    .000
                  +ID2 02:000302      .53      .045    1.00  20.84    .000
                   ==================================================
                   SUM 04:000401     1.07      .091    1.00  20.84    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0009------------------------------------------------------------------------
*#
*#   Catchment SA3 (Strittmatter A3, 0.41 hectares)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .41
| 01:000303 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         .12           .29
     Dep. Storage      (mm)=         .80          1.50
     Average Slope      (%)=        3.00          3.00
     Length             (m)=       52.28         40.00
     Mannings n            =        .013          .250

     Max.eff.Inten.(mm/hr)=        98.93         25.97
                 over  (min)       10.00         10.00
     Storage Coeff.   (min)=        1.25 (ii)    11.97 (ii)
     Unit Hyd. Tpeak  (min)=       10.00         10.00
     Unit Hyd. peak   (cms)=         .17           .10
                                                                *TOTALS*
     PEAK FLOW        (cms)=         .02           .01            .035 (iii)
     TIME TO PEAK     (hrs)=        1.00          1.17           1.000
     RUNOFF VOLUME     (mm)=       49.34         13.71          20.836
     TOTAL RAINFALL    (mm)=       50.14         50.14          50.135
     RUNOFF COEFFICIENT   =          .98           .27            .416
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
```

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0010------------------------------------------------------------------------
*#   Add hydrographs from Strittmatter A3 to Strittmatter (A1+A2)
--------------------
| ADD HYD (000402) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)      (cms)   (hrs)   (mm)    (cms)
                 ID1 01:000303      .41       .035    1.00  20.84     .000
                +ID2 04:000401     1.07       .091    1.00  20.84     .000
                 ==========================================================
                 SUM 02:000402     1.48       .126    1.00  20.84     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0011------------------------------------------------------------------------
*#
*#   Catchment SA4 (Strittmatter A4, 0.41 hectares)
*#
----------------------
| DESIGN STANDHYD    |    Area    (ha)=     .41
| 01:000304 DT=10.00 |    Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .12          .29
     Dep. Storage     (mm)=         .80         1.50
     Average Slope     (%)=        3.00         3.00
     Length            (m)=       52.28        40.00
     Mannings n          =         .013         .250

     Max.eff.Inten.(mm/hr)=       98.93        25.97
               over (min)         10.00        10.00
     Storage Coeff.  (min)=        1.25 (ii)   11.97 (ii)
     Unit Hyd. Tpeak (min)=       10.00        10.00
     Unit Hyd. peak  (cms)=         .17          .10
                                                              *TOTALS*
     PEAK FLOW       (cms)=         .02          .01            .035 (iii)
     TIME TO PEAK    (hrs)=        1.00         1.17           1.000
     RUNOFF VOLUME    (mm)=       49.34        13.71          20.836
     TOTAL RAINFALL   (mm)=       50.14        50.14          50.135
     RUNOFF COEFFICIENT   =         .98          .27            .416
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0012------------------------------------------------------------------------
*#   Add hydrographs from Strittmatter A4 to Strittmatter Upstream Drainage
--------------------
| ADD HYD (000403) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)      (cms)   (hrs)   (mm)    (cms)
                 ID1 01:000304      .41       .035    1.00  20.84     .000
```

```
                  +ID2 02:000402      1.48      .126     1.00   20.84     .000
                   =====================================================
                   SUM 04:000403      1.89      .161     1.00   20.84     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0013------------------------------------------------------------------------
*#
*#   Catchment SA5 (Strittmatter A5, 22.4 hectares of upstream
*#   agricultural drainage)
*#
----------------------
| DESIGN NASHYD       |   Area      (ha)=   22.40   Curve Number    (CN)=58.00
| 01:000305 DT=15.00  |   Ia        (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=      .750

     Unit Hyd Qpeak  (cms)=    1.141

     PEAK FLOW        (cms)=     .313 (i)
     TIME TO PEAK     (hrs)=    2.000
     RUNOFF VOLUME     (mm)=    8.474
     TOTAL RAINFALL    (mm)=   50.135
     RUNOFF COEFFICIENT   =      .169

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

--------------------------------------------------------------------------------
001:0014------------------------------------------------------------------------
---------------------
| ROUTE RESERVOIR    |    Requested routing time step = 15.0 min.
|  IN>01:(000305)    |
| OUT<02:(000101)    |    =========  OUTLFOW STORAGE TABLE  =========
---------------------     OUTFLOW    STORAGE    |  OUTFLOW     STORAGE
                            (cms)    (ha.m.)    |    (cms)     (ha.m.)
                             .000  .0000E+00    |     .014   .8700E+00
                             .008  .1850E+00    |     .016   .1270E+01
                             .012  .4800E+00    |    2.000   .1300E+01

     ROUTING RESULTS             AREA      QPEAK      TPEAK         R.V.
     --------------------        (ha)      (cms)      (hrs)         (mm)
     INFLOW >01: (000305)       22.40       .313      2.000        8.474
     OUTFLOW<02: (000101)       22.40       .008      4.500        8.464
    OVERFLOW<08: (000150)         .00       .000       .000         .000

                      PEAK   FLOW   REDUCTION [Qout/Qin](%)=    2.510
                      TIME SHIFT OF PEAK FLOW         (min)=   150.00
                      MAXIMUM  STORAGE   USED       (ha.m.)=.1818E+00

--------------------------------------------------------------------------------
001:0015------------------------------------------------------------------------
--------------------
| PRINT HYD          |   AREA        (ha)=   22.400
| ID=02 (000101)     |   QPEAK      (cms)=     .008 (i)
| DT=10.00 PCYC= 5   |   TPEAK      (hrs)=    4.500
--------------------     VOLUME      (mm)=    8.464

     (i)  PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
   TIME      FLOW |  TIME      FLOW |  TIME      FLOW |  TIME      FLOW |  TIME      FLOW
    hrs       cms |   hrs       cms |   hrs       cms |   hrs       cms |   hrs       cms
    .00      .000|  87.50      .002| 175.00      .001| 262.50      .000| 350.00      .000
    .83      .000|  88.33      .002| 175.83      .001| 263.34      .000| 350.83      .000
```

```
  1.67     .002|  89.17     .002| 176.67     .001| 264.17     .000| 351.66     .000
  2.50     .006|  90.00     .002| 177.50     .001| 265.00     .000| 352.50     .000
  3.33     .007|  90.83     .002| 178.33     .001| 265.84     .000| 353.33     .000
  4.17     .008|  91.67     .002| 179.17     .001| 266.67     .000| 354.16     .000
  5.00     .008|  92.50     .002| 180.00     .001| 267.50     .000| 355.00     .000
  5.83     .008|  93.33     .002| 180.83     .001| 268.34     .000| 355.83     .000
  6.67     .008|  94.17     .002| 181.67     .001| 269.17     .000| 356.66     .000
  7.50     .008|  95.00     .002| 182.50     .000| 270.00     .000| 357.50     .000
  8.33     .007|  95.83     .002| 183.33     .000| 270.84     .000| 358.33     .000
  9.17     .007|  96.67     .002| 184.17     .000| 271.67     .000| 359.16     .000
 10.00     .007|  97.50     .002| 185.00     .000| 272.50     .000| 360.00     .000
 10.83     .007|  98.33     .002| 185.83     .000| 273.34     .000| 360.83     .000
 11.67     .007|  99.17     .002| 186.67     .000| 274.17     .000| 361.66     .000
 12.50     .007| 100.00     .002| 187.50     .000| 275.00     .000| 362.50     .000
 13.33     .007| 100.83     .002| 188.33     .000| 275.84     .000| 363.33     .000
 14.17     .007| 101.67     .002| 189.17     .000| 276.67     .000| 364.16     .000
 15.00     .007| 102.50     .002| 190.00     .000| 277.50     .000| 365.00     .000
 15.83     .007| 103.33     .002| 190.83     .000| 278.34     .000| 365.83     .000
 16.67     .007| 104.17     .002| 191.67     .000| 279.17     .000| 366.66     .000
 17.50     .006| 105.00     .002| 192.50     .000| 280.00     .000| 367.50     .000
 18.33     .006| 105.83     .002| 193.33     .000| 280.83     .000| 368.33     .000
 19.17     .006| 106.67     .002| 194.17     .000| 281.67     .000| 369.16     .000
 20.00     .006| 107.50     .002| 195.00     .000| 282.50     .000| 370.00     .000
 20.83     .006| 108.33     .002| 195.83     .000| 283.33     .000| 370.83     .000
 21.67     .006| 109.17     .002| 196.67     .000| 284.17     .000| 371.66     .000
 22.50     .006| 110.00     .002| 197.50     .000| 285.00     .000| 372.50     .000
 23.33     .006| 110.83     .002| 198.33     .000| 285.83     .000| 373.33     .000
 24.17     .006| 111.67     .001| 199.17     .000| 286.67     .000| 374.16     .000
 25.00     .006| 112.50     .001| 200.00     .000| 287.50     .000| 375.00     .000
 25.83     .006| 113.33     .001| 200.83     .000| 288.33     .000| 375.83     .000
 26.67     .006| 114.17     .001| 201.67     .000| 289.17     .000| 376.66     .000
 27.50     .006| 115.00     .001| 202.50     .000| 290.00     .000| 377.50     .000
 28.33     .005| 115.83     .001| 203.33     .000| 290.83     .000| 378.33     .000
 29.17     .005| 116.67     .001| 204.17     .000| 291.67     .000| 379.16     .000
 30.00     .005| 117.50     .001| 205.00     .000| 292.50     .000| 380.00     .000
 30.83     .005| 118.33     .001| 205.83     .000| 293.33     .000| 380.83     .000
 31.67     .005| 119.17     .001| 206.67     .000| 294.17     .000| 381.66     .000
 32.50     .005| 120.00     .001| 207.50     .000| 295.00     .000| 382.50     .000
 33.33     .005| 120.83     .001| 208.33     .000| 295.83     .000| 383.33     .000
 34.17     .005| 121.67     .001| 209.17     .000| 296.67     .000| 384.16     .000
 35.00     .005| 122.50     .001| 210.00     .000| 297.50     .000| 385.00     .000
 35.83     .005| 123.33     .001| 210.84     .000| 298.33     .000| 385.83     .000
 36.67     .005| 124.17     .001| 211.67     .000| 299.17     .000| 386.66     .000
 37.50     .005| 125.00     .001| 212.50     .000| 300.00     .000| 387.50     .000
 38.33     .005| 125.83     .001| 213.34     .000| 300.83     .000| 388.33     .000
 39.17     .005| 126.67     .001| 214.17     .000| 301.67     .000| 389.16     .000
 40.00     .005| 127.50     .001| 215.00     .000| 302.50     .000| 389.99     .000
 40.83     .005| 128.33     .001| 215.84     .000| 303.33     .000| 390.83     .000
 41.67     .004| 129.17     .001| 216.67     .000| 304.17     .000| 391.66     .000
 42.50     .004| 130.00     .001| 217.50     .000| 305.00     .000| 392.49     .000
 43.33     .004| 130.83     .001| 218.34     .000| 305.83     .000| 393.33     .000
 44.17     .004| 131.67     .001| 219.17     .000| 306.67     .000| 394.16     .000
 45.00     .004| 132.50     .001| 220.00     .000| 307.50     .000| 394.99     .000
 45.83     .004| 133.33     .001| 220.84     .000| 308.33     .000| 395.83     .000
 46.67     .004| 134.17     .001| 221.67     .000| 309.17     .000| 396.66     .000
 47.50     .004| 135.00     .001| 222.50     .000| 310.00     .000| 397.49     .000
 48.33     .004| 135.83     .001| 223.34     .000| 310.83     .000| 398.33     .000
 49.17     .004| 136.67     .001| 224.17     .000| 311.67     .000| 399.16     .000
 50.00     .004| 137.50     .001| 225.00     .000| 312.50     .000| 399.99     .000
 50.83     .004| 138.33     .001| 225.84     .000| 313.33     .000| 400.83     .000
 51.67     .004| 139.17     .001| 226.67     .000| 314.17     .000| 401.66     .000
 52.50     .004| 140.00     .001| 227.50     .000| 315.00     .000| 402.49     .000
```

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    53.33     .004| 140.83    .001| 228.34    .000| 315.83    .000| 403.33    .000
    54.17     .004| 141.67    .001| 229.17    .000| 316.67    .000| 404.16    .000
    55.00     .004| 142.50    .001| 230.00    .000| 317.50    .000| 404.99    .000
    55.83     .004| 143.33    .001| 230.84    .000| 318.33    .000| 405.83    .000
    56.67     .004| 144.17    .001| 231.67    .000| 319.17    .000| 406.66    .000
    57.50     .003| 145.00    .001| 232.50    .000| 320.00    .000| 407.49    .000
    58.33     .003| 145.83    .001| 233.34    .000| 320.83    .000| 408.33    .000
    59.17     .003| 146.67    .001| 234.17    .000| 321.67    .000| 409.16    .000
    60.00     .003| 147.50    .001| 235.00    .000| 322.50    .000| 409.99    .000
    60.83     .003| 148.33    .001| 235.84    .000| 323.33    .000| 410.83    .000
    61.67     .003| 149.17    .001| 236.67    .000| 324.17    .000| 411.66    .000
    62.50     .003| 150.00    .001| 237.50    .000| 325.00    .000| 412.49    .000
    63.33     .003| 150.83    .001| 238.34    .000| 325.83    .000| 413.33    .000
    64.17     .003| 151.67    .001| 239.17    .000| 326.67    .000| 414.16    .000
    65.00     .003| 152.50    .001| 240.00    .000| 327.50    .000| 414.99    .000
    65.83     .003| 153.33    .001| 240.84    .000| 328.33    .000| 415.83    .000
    66.67     .003| 154.17    .001| 241.67    .000| 329.17    .000| 416.66    .000
    67.50     .003| 155.00    .001| 242.50    .000| 330.00    .000| 417.49    .000
    68.33     .003| 155.83    .001| 243.34    .000| 330.83    .000| 418.33    .000
    69.17     .003| 156.67    .001| 244.17    .000| 331.67    .000| 419.16    .000
    70.00     .003| 157.50    .001| 245.00    .000| 332.50    .000| 419.99    .000
    70.83     .003| 158.33    .001| 245.84    .000| 333.33    .000| 420.83    .000
    71.67     .003| 159.17    .001| 246.67    .000| 334.17    .000| 421.66    .000
    72.50     .003| 160.00    .001| 247.50    .000| 335.00    .000| 422.49    .000
    73.33     .003| 160.83    .001| 248.34    .000| 335.83    .000| 423.33    .000
    74.17     .003| 161.67    .001| 249.17    .000| 336.66    .000| 424.16    .000
    75.00     .003| 162.50    .001| 250.00    .000| 337.50    .000| 424.99    .000
    75.83     .003| 163.33    .001| 250.84    .000| 338.33    .000| 425.83    .000
    76.67     .003| 164.17    .001| 251.67    .000| 339.16    .000| 426.66    .000
    77.50     .003| 165.00    .001| 252.50    .000| 340.00    .000| 427.49    .000
    78.33     .003| 165.83    .001| 253.34    .000| 340.83    .000| 428.33    .000
    79.17     .002| 166.67    .001| 254.17    .000| 341.66    .000| 429.16    .000
    80.00     .002| 167.50    .001| 255.00    .000| 342.50    .000| 429.99    .000
    80.83     .002| 168.33    .001| 255.84    .000| 343.33    .000| 430.83    .000
    81.67     .002| 169.17    .001| 256.67    .000| 344.16    .000| 431.66    .000
    82.50     .002| 170.00    .001| 257.50    .000| 345.00    .000| 432.49    .000
    83.33     .002| 170.83    .001| 258.34    .000| 345.83    .000| 433.33    .000
    84.17     .002| 171.67    .001| 259.17    .000| 346.66    .000|
    85.00     .002| 172.50    .001| 260.00    .000| 347.50    .000|
    85.83     .002| 173.33    .001| 260.84    .000| 348.33    .000|
    86.67     .002| 174.17    .001| 261.67    .000| 349.16    .000|
-----------------------------------------------------------------------------
001:0016---------------------------------------------------------------------
*#
*#   Catchment SA6 (Strittmatter A6, 1.04 hectares)
*#
---------------------
| DESIGN STANDHYD    |   Area    (ha)=     1.04
| 05:000306 DT=10.00 |   Total Imp(%)=    20.00   Dir. Conn.(%)=    10.00
---------------------
                               IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=         .21          .83
    Dep. Storage      (mm)=         .80         1.50
    Average Slope      (%)=        3.00         3.00
    Length             (m)=       83.27        40.00
    Mannings n            =        .013         .250

    Max.eff.Inten.(mm/hr)=        98.93        25.21
               over (min)        10.00        10.00
    Storage Coeff.  (min)=         1.65 (ii)   12.50 (ii)
    Unit Hyd. Tpeak (min)=        10.00        10.00
    Unit Hyd. peak  (cms)=          .17          .09
```

```
                                                       *TOTALS*
     PEAK FLOW         (cms)=        .03          .04          .063 (iii)
     TIME TO PEAK      (hrs)=       1.00         1.17         1.000
     RUNOFF VOLUME      (mm)=      49.34        13.55        17.126
     TOTAL RAINFALL     (mm)=      50.14        50.14        50.135
     RUNOFF COEFFICIENT    =        .98          .27          .342
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0017------------------------------------------------------------------------
*#   Add hydrographs from Strittmatter A5 (McMurchy Property) to A6
--------------------
| ADD HYD (000420) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)      (cms)   (hrs)   (mm)    (cms)
                 ID1 05:000306     1.04      .063    1.00   17.13    .000
                +ID2 02:000101    22.40      .008    4.50    8.46    .000
                 ===================================================
                 SUM 06:000420    23.44      .063    1.00    8.85    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0018------------------------------------------------------------------------
*#   Add OVERFLOW hydrograph from McMurchy Pond
--------------------
| ADD HYD (000421) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)      (cms)   (hrs)   (mm)    (cms)
                 ID1 08:000150      .00      .000     .00     .00    .000 **DRY**
                +ID2 06:000420    23.44      .063    1.00    8.85    .000
                 ===================================================
                 SUM 05:000421    23.44      .063    1.00    8.85    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0019------------------------------------------------------------------------
--------------------
| ADD HYD (000405) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)      (cms)   (hrs)   (mm)    (cms)
                 ID1 05:000421    23.44      .063    1.00    8.85    .000
                +ID2 04:000403     1.89      .161    1.00   20.84    .000
                 ===================================================
                 SUM 01:000405    25.33      .224    1.00    9.74    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0020------------------------------------------------------------------------
*#
*#   Catchment SA10 (Strittmatter A10, 0.36 hectares)
*#       --- Area Increased May 2000
*#
----------------------
| DESIGN STANDHYD     |    Area    (ha)=      .36
| 05:000310 DT=10.00  |    Total Imp(%)=    30.00    Dir. Conn.(%)=    20.00
```

```
----------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         .11          .25
     Dep. Storage      (mm)=         .80         1.50
     Average Slope      (%)=       13.00        13.00
     Length             (m)=       48.99        40.00
     Mannings n            =        .013         .250

     Max.eff.Inten.(mm/hr)=        98.93        25.97
                over (min)         10.00        10.00
     Storage Coeff.  (min)=          .77 (ii)     7.68 (ii)
     Unit Hyd. Tpeak (min)=        10.00        10.00
     Unit Hyd. peak  (cms)=          .17          .12
                                                              *TOTALS*
     PEAK FLOW       (cms)=          .02          .01            .034 (iii)
     TIME TO PEAK    (hrs)=         1.00         1.00           1.000
     RUNOFF VOLUME    (mm)=        49.34        13.71          20.836
     TOTAL RAINFALL   (mm)=        50.14        50.14          50.135
     RUNOFF COEFFICIENT   =          .98          .27            .416
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  64.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0021------------------------------------------------------------------------
*#
*#   Catchment SA11 (Strittmatter A11, Pond Surface, 0.12 hecatares)
*#
----------------------
| DESIGN STANDHYD     |   Area     (ha)=      .35
| 06:000311 DT=10.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
----------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         .35          .00
     Dep. Storage      (mm)=         .80         1.50
     Average Slope      (%)=         .10          .10
     Length             (m)=       48.30        40.00
     Mannings n            =        .013         .250

     Max.eff.Inten.(mm/hr)=        98.93        67.48
                over (min)         10.00        20.00
     Storage Coeff.  (min)=         3.31 (ii)    23.60 (ii)
     Unit Hyd. Tpeak (min)=        10.00        20.00
     Unit Hyd. peak  (cms)=          .16          .05
                                                              *TOTALS*
     PEAK FLOW       (cms)=          .09          .00            .092 (iii)
     TIME TO PEAK    (hrs)=         1.00         1.17           1.000
     RUNOFF VOLUME    (mm)=        49.34        43.95          49.281
     TOTAL RAINFALL   (mm)=        50.14        50.14          50.135
     RUNOFF COEFFICIENT   =          .98          .88            .983
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  98.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
```

```
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0022---------------------------------------------------------------------
*#   Add hydrograph from Strittmatter A10 and pond (A11) to hydrograph #405
*#
--------------------
| ADD HYD (000409) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                ID1 01:000405    25.33      .224    1.00   9.74    .000
               +ID2 05:000310      .36      .034    1.00  20.84    .000
               +ID3 06:000311      .35      .092    1.00  49.28    .000
                    ==================================================
                SUM 02:000409    26.04      .350    1.00  10.43    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0023---------------------------------------------------------------------
*#
*#   Add in Areas A1, A2 and A3 from the County Road
*#   and route total flow through proposed SWM area
*#
*#
*#   Catchment A1 from Triton Study  (2.4 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=    2.40
| 01:000101 DT=10.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .96         1.44
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      5.00         5.00
     Length            (m)=    126.49        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=     98.93        20.18
               over (min)     10.00        10.00
     Storage Coeff.  (min)=      1.82 (ii)   11.99 (ii)
     Unit Hyd. Tpeak (min)=     10.00        10.00
     Unit Hyd. peak  (cms)=       .17          .10
                                                         *TOTALS*
     PEAK FLOW       (cms)=       .26          .05          .312 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.17         1.000
     RUNOFF VOLUME    (mm)=     49.34        12.35        27.145
     TOTAL RAINFALL   (mm)=     50.14        50.14        50.135
     RUNOFF COEFFICIENT   =       .98          .25          .541
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0024---------------------------------------------------------------------
*#
*#   Catchment A2 from Triton Study  (0.25 hectares, C= 0.5)
*#
```

```
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .25
| 04:000102 DT=10.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .10          .15
     Dep. Storage      (mm)=        .80         1.50
     Average Slope      (%)=       5.00         5.00
     Length             (m)=      40.82        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=      98.93        20.18
               over (min)        10.00        10.00
     Storage Coeff.  (min)=        .92 (ii)   11.10 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=        .17          .10
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .03          .01           .033 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17          1.000
     RUNOFF VOLUME    (mm)=      49.34        12.35         27.144
     TOTAL RAINFALL   (mm)=      50.14        50.14         50.135
     RUNOFF COEFFICIENT   =        .98          .25           .541
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0025------------------------------------------------------------------------
*#   Add hydrographs from Catchments A1 and A2
--------------------
| ADD HYD (000201) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)    (cms)
                  ID1 01:000101    2.40     .312    1.00  27.14    .000
                 +ID2 04:000102     .25     .033    1.00  27.14    .000
                  ====================================================
                  SUM 05:000201    2.65     .344    1.00  27.14    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0026------------------------------------------------------------------------
*#
*#   Catchment A3 from Triton Study  (0.68 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .68
| 01:000103 DT=10.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .27          .41
     Dep. Storage      (mm)=        .80         1.50
     Average Slope      (%)=       6.00         6.00
     Length             (m)=      67.33        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=      98.93        20.18
               over (min)        10.00        10.00
```

```
     Storage Coeff.  (min)=        1.18 (ii)   10.81 (ii)
     Unit Hyd. Tpeak (min)=       10.00        10.00
     Unit Hyd. peak  (cms)=         .17          .10
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .07          .01          .089 (iii)
     TIME TO PEAK    (hrs)=        1.00         1.17         1.000
     RUNOFF VOLUME    (mm)=       49.34        12.35        27.145
     TOTAL RAINFALL   (mm)=       50.14        50.14        50.135
     RUNOFF COEFFICIENT   =         .98          .25          .541
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0027------------------------------------------------------------------------
*#   Add hydrographs from Catchments A3 to hydrograph #201
*#   representing total highway flow to be routed through SWM facility
*#
--------------------
| ADD HYD (000202) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                  ID1 01:000103      .68      .089     1.00  27.14     .000
                 +ID2 05:000201     2.65      .344     1.00  27.14     .000
                  =======================================================
                  SUM 04:000202     3.33      .434     1.00  27.14     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0028------------------------------------------------------------------------
*#
*#   Direct minor system flows to SWM Area, major system stays on County Road
*#
----------------------
| COMPUTE DUALHYD    |   Average inlet capacities    [CINLET] =    .450  (cms)
| TotalHyd 04:000202 |   Number of inlets in system [NINLET] =      1
----------------------   Total minor system capacity          =    .450  (cms)
                         Total major system storage [TMJSTO] =      0.(cu.m.)

                  ID: NHYD         AREA      QPEAK      TPEAK      R.V.      DWF
                                    (ha)      (cms)      (hrs)      (mm)     (cms)
     TOTAL HYD.   04:000202        3.33       .434      1.000    27.145      .000
     =============================================================================
     MAJOR SYST   01:000412         .00       .000       .000      .000      .000
     MINOR SYST   05:000413        3.33       .434      1.000    27.145      .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0029------------------------------------------------------------------------
*#   Add minor highway drainage (hyd #202) to Strittmatter drainage (hyd #409)
--------------------
| ADD HYD (000203) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                  ID1 05:000413     3.33      .434     1.00  27.14     .000
                 +ID2 02:000409    26.04      .350     1.00  10.43     .000
                  =======================================================
```

```
                SUM 06:000203    29.37     .784     1.00  12.32    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------------
 001:0030--------------------------------------------------------------------
 *#   Strittmatter SWM Area
 *#   Original Rating Curve (February 1990) revised July 1999 - same storage
 *#   Low flow orifice modified Feb. 22, 2000 (from 150mm to 225mm)
 *#   Changed Rating Curve (April 2000) with pond redesign
 *#
 --------------------
 | ROUTE RESERVOIR    |    Requested routing time step = 10.0 min.
 |  IN>06:(000203)    |
 | OUT<02:(000406)    |    =========  OUTLFOW STORAGE TABLE  =========
 --------------------      OUTFLOW     STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)    |   (cms)     (ha.m.)
                             .000  .0000E+00     |     .246  .7330E-01
                             .040  .2600E-02     |     .318  .8780E-01
                             .090  .4500E-02     |     .345  .1032E+00
                             .121  .1070E-01     |     .378  .1256E+00
                             .146  .2100E-01     |     .428  .1786E+00
                             .202  .4640E-01     |     .448  .1940E+00
                             .239  .6870E-01     |     .467  .2188E+00

     ROUTING RESULTS               AREA     QPEAK     TPEAK       R.V.
     --------------------          (ha)     (cms)     (hrs)       (mm)
     INFLOW >06: (000203)         29.37      .784     1.000     12.323
     OUTFLOW<02: (000406)         29.37      .233     1.500     12.323
    OVERFLOW<05: (000408)           .00      .000      .000       .000

                  PEAK    FLOW    REDUCTION [Qout/Qin](%)=    29.726
                  TIME SHIFT OF PEAK FLOW          (min)=    30.00
                  MAXIMUM   STORAGE    USED      (ha.m.)=.6597E-01

 ----------------------------------------------------------------------------
 001:0031--------------------------------------------------------------------
 --------------------
 | PRINT HYD          |   AREA        (ha)=   29.370
 | ID=02  (000406)    |   QPEAK      (cms)=     .233 (i)
 | DT=10.00 PCYC= 5   |   TPEAK      (hrs)=    1.500
 --------------------     VOLUME      (mm)=   12.323

      (i)  PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
   TIME     FLOW |  TIME    FLOW |  TIME    FLOW |  TIME    FLOW |  TIME    FLOW
    hrs      cms |   hrs     cms |   hrs     cms |   hrs     cms |   hrs     cms
     .00    .000|  87.50   .002| 175.00   .001| 262.50   .000| 350.00   .000
     .83    .106|  88.33   .002| 175.83   .001| 263.34   .000| 350.83   .000
    1.67    .228|  89.17   .002| 176.67   .001| 264.17   .000| 351.66   .000
    2.50    .169|  90.00   .002| 177.50   .001| 265.00   .000| 352.50   .000
    3.33    .088|  90.83   .002| 178.33   .001| 265.84   .000| 353.33   .000
    4.17    .008|  91.67   .002| 179.17   .001| 266.67   .000| 354.16   .000
    5.00    .008|  92.50   .002| 180.00   .001| 267.50   .000| 355.00   .000
    5.83    .008|  93.33   .002| 180.83   .001| 268.34   .000| 355.83   .000
    6.67    .008|  94.17   .002| 181.67   .001| 269.17   .000| 356.66   .000
    7.50    .008|  95.00   .002| 182.50   .000| 270.00   .000| 357.50   .000
    8.33    .007|  95.83   .002| 183.33   .000| 270.84   .000| 358.33   .000
    9.17    .007|  96.67   .002| 184.17   .000| 271.67   .000| 359.16   .000
   10.00    .007|  97.50   .002| 185.00   .000| 272.50   .000| 360.00   .000
   10.83    .007|  98.33   .002| 185.83   .000| 273.34   .000| 360.83   .000
   11.67    .007|  99.17   .002| 186.67   .000| 274.17   .000| 361.66   .000
   12.50    .007| 100.00   .002| 187.50   .000| 275.00   .000| 362.50   .000
```

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  13.33     .007| 100.83     .002| 188.33     .000| 275.84     .000| 363.33     .000
  14.17     .007| 101.67     .002| 189.17     .000| 276.67     .000| 364.16     .000
  15.00     .007| 102.50     .002| 190.00     .000| 277.50     .000| 365.00     .000
  15.83     .007| 103.33     .002| 190.83     .000| 278.34     .000| 365.83     .000
  16.67     .007| 104.17     .002| 191.67     .000| 279.17     .000| 366.66     .000
  17.50     .006| 105.00     .002| 192.50     .000| 280.00     .000| 367.50     .000
  18.33     .006| 105.83     .002| 193.33     .000| 280.83     .000| 368.33     .000
  19.17     .006| 106.67     .002| 194.17     .000| 281.67     .000| 369.16     .000
  20.00     .006| 107.50     .002| 195.00     .000| 282.50     .000| 370.00     .000
  20.83     .006| 108.33     .002| 195.83     .000| 283.33     .000| 370.83     .000
  21.67     .006| 109.17     .002| 196.67     .000| 284.17     .000| 371.66     .000
  22.50     .006| 110.00     .002| 197.50     .000| 285.00     .000| 372.50     .000
  23.33     .006| 110.83     .002| 198.33     .000| 285.83     .000| 373.33     .000
  24.17     .006| 111.67     .001| 199.17     .000| 286.67     .000| 374.16     .000
  25.00     .006| 112.50     .001| 200.00     .000| 287.50     .000| 375.00     .000
  25.83     .006| 113.33     .001| 200.83     .000| 288.33     .000| 375.83     .000
  26.67     .006| 114.17     .001| 201.67     .000| 289.17     .000| 376.66     .000
  27.50     .006| 115.00     .001| 202.50     .000| 290.00     .000| 377.50     .000
  28.33     .005| 115.83     .001| 203.33     .000| 290.83     .000| 378.33     .000
  29.17     .005| 116.67     .001| 204.17     .000| 291.67     .000| 379.16     .000
  30.00     .005| 117.50     .001| 205.00     .000| 292.50     .000| 380.00     .000
  30.83     .005| 118.33     .001| 205.83     .000| 293.33     .000| 380.83     .000
  31.67     .005| 119.17     .001| 206.67     .000| 294.17     .000| 381.66     .000
  32.50     .005| 120.00     .001| 207.50     .000| 295.00     .000| 382.50     .000
  33.33     .005| 120.83     .001| 208.33     .000| 295.83     .000| 383.33     .000
  34.17     .005| 121.67     .001| 209.17     .000| 296.67     .000| 384.16     .000
  35.00     .005| 122.50     .001| 210.00     .000| 297.50     .000| 385.00     .000
  35.83     .005| 123.33     .001| 210.84     .000| 298.33     .000| 385.83     .000
  36.67     .005| 124.17     .001| 211.67     .000| 299.17     .000| 386.66     .000
  37.50     .005| 125.00     .001| 212.50     .000| 300.00     .000| 387.50     .000
  38.33     .005| 125.83     .001| 213.34     .000| 300.83     .000| 388.33     .000
  39.17     .005| 126.67     .001| 214.17     .000| 301.67     .000| 389.16     .000
  40.00     .005| 127.50     .001| 215.00     .000| 302.50     .000| 389.99     .000
  40.83     .005| 128.33     .001| 215.84     .000| 303.33     .000| 390.83     .000
  41.67     .004| 129.17     .001| 216.67     .000| 304.17     .000| 391.66     .000
  42.50     .004| 130.00     .001| 217.50     .000| 305.00     .000| 392.49     .000
  43.33     .004| 130.83     .001| 218.34     .000| 305.83     .000| 393.33     .000
  44.17     .004| 131.67     .001| 219.17     .000| 306.67     .000| 394.16     .000
  45.00     .004| 132.50     .001| 220.00     .000| 307.50     .000| 394.99     .000
  45.83     .004| 133.33     .001| 220.84     .000| 308.33     .000| 395.83     .000
  46.67     .004| 134.17     .001| 221.67     .000| 309.17     .000| 396.66     .000
  47.50     .004| 135.00     .001| 222.50     .000| 310.00     .000| 397.49     .000
  48.33     .004| 135.83     .001| 223.34     .000| 310.83     .000| 398.33     .000
  49.17     .004| 136.67     .001| 224.17     .000| 311.67     .000| 399.16     .000
  50.00     .004| 137.50     .001| 225.00     .000| 312.50     .000| 399.99     .000
  50.83     .004| 138.33     .001| 225.84     .000| 313.33     .000| 400.83     .000
  51.67     .004| 139.17     .001| 226.67     .000| 314.17     .000| 401.66     .000
  52.50     .004| 140.00     .001| 227.50     .000| 315.00     .000| 402.49     .000
  53.33     .004| 140.83     .001| 228.34     .000| 315.83     .000| 403.33     .000
  54.17     .004| 141.67     .001| 229.17     .000| 316.67     .000| 404.16     .000
  55.00     .004| 142.50     .001| 230.00     .000| 317.50     .000| 404.99     .000
  55.83     .004| 143.33     .001| 230.84     .000| 318.33     .000| 405.83     .000
  56.67     .004| 144.17     .001| 231.67     .000| 319.17     .000| 406.66     .000
  57.50     .003| 145.00     .001| 232.50     .000| 320.00     .000| 407.49     .000
  58.33     .003| 145.83     .001| 233.34     .000| 320.83     .000| 408.33     .000
  59.17     .003| 146.67     .001| 234.17     .000| 321.67     .000| 409.16     .000
  60.00     .003| 147.50     .001| 235.00     .000| 322.50     .000| 409.99     .000
  60.83     .003| 148.33     .001| 235.84     .000| 323.33     .000| 410.83     .000
  61.67     .003| 149.17     .001| 236.67     .000| 324.17     .000| 411.66     .000
  62.50     .003| 150.00     .001| 237.50     .000| 325.00     .000| 412.49     .000
  63.33     .003| 150.83     .001| 238.34     .000| 325.83     .000| 413.33     .000
  64.17     .003| 151.67     .001| 239.17     .000| 326.67     .000| 414.16     .000
```

```
    65.00     .003| 152.50     .001| 240.00     .000| 327.50     .000| 414.99     .000
    65.83     .003| 153.33     .001| 240.84     .000| 328.33     .000| 415.83     .000
    66.67     .003| 154.17     .001| 241.67     .000| 329.17     .000| 416.66     .000
    67.50     .003| 155.00     .001| 242.50     .000| 330.00     .000| 417.49     .000
    68.33     .003| 155.83     .001| 243.34     .000| 330.83     .000| 418.33     .000
    69.17     .003| 156.67     .001| 244.17     .000| 331.67     .000| 419.16     .000
    70.00     .003| 157.50     .001| 245.00     .000| 332.50     .000| 419.99     .000
    70.83     .003| 158.33     .001| 245.84     .000| 333.33     .000| 420.83     .000
    71.67     .003| 159.17     .001| 246.67     .000| 334.17     .000| 421.66     .000
    72.50     .003| 160.00     .001| 247.50     .000| 335.00     .000| 422.49     .000
    73.33     .003| 160.83     .001| 248.34     .000| 335.83     .000| 423.33     .000
    74.17     .003| 161.67     .001| 249.17     .000| 336.66     .000| 424.16     .000
    75.00     .003| 162.50     .001| 250.00     .000| 337.50     .000| 424.99     .000
    75.83     .003| 163.33     .001| 250.84     .000| 338.33     .000| 425.83     .000
    76.67     .003| 164.17     .001| 251.67     .000| 339.16     .000| 426.66     .000
    77.50     .003| 165.00     .001| 252.50     .000| 340.00     .000| 427.49     .000
    78.33     .003| 165.83     .001| 253.34     .000| 340.83     .000| 428.33     .000
    79.17     .002| 166.67     .001| 254.17     .000| 341.66     .000| 429.16     .000
    80.00     .002| 167.50     .001| 255.00     .000| 342.50     .000| 429.99     .000
    80.83     .002| 168.33     .001| 255.84     .000| 343.33     .000| 430.83     .000
    81.67     .002| 169.17     .001| 256.67     .000| 344.16     .000| 431.66     .000
    82.50     .002| 170.00     .001| 257.50     .000| 345.00     .000| 432.49     .000
    83.33     .002| 170.83     .001| 258.34     .000| 345.83     .000| 433.33     .000
    84.17     .002| 171.67     .001| 259.17     .000| 346.66     .000|
    85.00     .002| 172.50     .001| 260.00     .000| 347.50     .000|
    85.83     .002| 173.33     .001| 260.84     .000| 348.33     .000|
    86.67     .002| 174.17     .001| 261.67     .000| 349.16     .000|
---------------------------------------------------------------------------------------
001:0032-------------------------------------------------------------------------------
*#
*#   Catchment SA7 - Strittmatter road drainage d\s of SWM area - uncontrolled
*#   (Strittmatter A7, 0.32 hectares)
*#
----------------------
| DESIGN STANDHYD    |    Area     (ha)=      .32
| 06:000307 DT=10.00 |    Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         .10          .22
     Dep. Storage      (mm)=         .80         1.50
     Average Slope      (%)=        2.00         2.00
     Length             (m)=       46.19        40.00
     Mannings n           =         .013         .250

     Max.eff.Inten.(mm/hr)=        98.93        25.97
                over (min)         10.00        10.00
     Storage Coeff.  (min)=         1.31 (ii)   13.41 (ii)
     Unit Hyd. Tpeak (min)=        10.00        10.00
     Unit Hyd. peak  (cms)=          .17          .09
                                                              *TOTALS*
     PEAK FLOW       (cms)=          .02          .01           .027 (iii)
     TIME TO PEAK    (hrs)=         1.00         1.17          1.000
     RUNOFF VOLUME    (mm)=        49.34        13.71         20.836
     TOTAL RAINFALL   (mm)=        50.14        50.14         50.135
     RUNOFF COEFFICIENT   =          .98          .27           .416
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
```

```
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0033------------------------------------------------------------------------
*#
*#   Catchment SA8 (Strittmatter A8, 0.46 hectares)
*#   NOT ROUTED INTO POND>>>> FLOWS UNCONTROLLED DOWN ROAD
*#   --- Area decreased May 2000
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .46
| 05:000308 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14          .32
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      55.38        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      98.93        25.97
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       1.46 (ii)   13.57 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=        .17          .09
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .03          .01          .038 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17         1.000
     RUNOFF VOLUME    (mm)=      49.34        13.71        20.836
     TOTAL RAINFALL   (mm)=      50.14        50.14        50.135
     RUNOFF COEFFICIENT   =        .98          .27          .416
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
               CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0034------------------------------------------------------------------------
*#
*#   Catchment SA9 - Strittmatter road drainage d/s of SWM area
*#   NOT ROUTED INTO POND>>>> FLOWS UNCONTROLLED DOWN ROAD
*#   (Strittmatter A9, 0.08 hectares, C= 0.95)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .08
| 09:000410 DT=10.00 |   Total Imp(%)=   95.00   Dir. Conn.(%)=   95.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .08          .00
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      23.09        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      98.93        20.18
                over (min)       10.00        10.00
     Storage Coeff.  (min)=        .86 (ii)   14.25 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
```

```
     Unit Hyd. peak  (cms)=        .17          .09
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .02          .00           .021 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17          1.000
     RUNOFF VOLUME    (mm)=      49.34        12.35         47.486
     TOTAL RAINFALL   (mm)=      50.14        50.14         50.135
     RUNOFF COEFFICIENT   =        .98          .25           .947
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------------
001:0035-------------------------------------------------------------------------
*#    Add hydrograph #307 to hyd #410 to SWM area discharge for outflow from
*#    Strittmatter development (must be below diversion flow)
--------------------
| ADD HYD (000411) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
                 ID1 02:000406    29.37      .233    1.50  12.32     .000
                +ID2 06:000307      .32      .027    1.00  20.84     .000
                +ID3 05:000308      .46      .038    1.00  20.84     .000
                +ID4 09:000410      .08      .021    1.00  47.49     .000
                 =====================================================
                 SUM 04:000411    30.23      .269    1.17  12.64     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------------
001:0036-------------------------------------------------------------------------
*#
*#   Add major system overflow from diversion to County Road drainage
*#   below diversion (Areas A4 and A5)
*#
--------------------
| ADD HYD (000414) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
                 ID1 01:000412      .00      .000     .00    .00     .000 **DRY**
                +ID2 03:000204      .37      .049    1.00  27.14     .000
                 =====================================================
                 SUM 02:000414      .37      .049    1.00  27.14     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------------
001:0037-------------------------------------------------------------------------
*#   Church Street Intersection
*#
*#   Add hydrograph from Strittmatter Property (hyd #411)
*#   to County Road 24 Drainage at Church Street
*#
--------------------
| ADD HYD (000205) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
                 ID1 02:000414      .37      .049    1.00  27.14     .000
                +ID2 04:000411    30.23      .269    1.17  12.64     .000
                 =====================================================
                 SUM 01:000205    30.60      .301    1.00  12.81     .000
```

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

-----------------------------------------------------------------------------
001:0038---------------------------------------------------------------------
*#   Catchment A6 from Triton Study  (0.31 hectares, C= 0.6)
*#
----------------------
| DESIGN STANDHYD    |   Area     (ha)=      .31
| 02:000106 DT=10.00 |   Total  Imp(%)=   50.00   Dir. Conn.(%)=   50.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=        .16           .16
    Dep. Storage      (mm)=        .80          1.50
    Average Slope      (%)=       4.00          4.00
    Length             (m)=      45.46         40.00
    Mannings n            =       .013          .250

    Max.eff.Inten.(mm/hr)=       98.93         20.18
              over (min)        10.00         10.00
    Storage Coeff.  (min)=       1.05 (ii)    11.93 (ii)
    Unit Hyd. Tpeak (min)=      10.00         10.00
    Unit Hyd. peak  (cms)=        .17           .10
                                                          *TOTALS*
    PEAK FLOW        (cms)=        .04           .01           .048 (iii)
    TIME TO PEAK     (hrs)=       1.00          1.17          1.000
    RUNOFF VOLUME     (mm)=      49.34         12.35         30.843
    TOTAL RAINFALL    (mm)=      50.14         50.14         50.135
    RUNOFF COEFFICIENT   =        .98           .25           .615
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0039---------------------------------------------------------------------
*#   Add hydrograph from Catchments A6 to Upstream Hydrograph
--------------------
| ADD HYD (000206) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                 ID1 01:000205    30.60      .301    1.00  12.81    .000
                +ID2 02:000106      .31      .048    1.00  30.84    .000
                 ==================================================
                 SUM 03:000206    30.91      .348    1.00  12.99    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0040---------------------------------------------------------------------
*#
*#   Catchment A7 from Triton Study  (0.24 hectares, C= 0.7)
*#
----------------------
| DESIGN STANDHYD    |   Area     (ha)=      .24
| 01:000107 DT=10.00 |   Total  Imp(%)=   60.00   Dir. Conn.(%)=   60.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=        .14           .10
```

```
     Dep. Storage      (mm)=        .80          1.50
     Average Slope      (%)=       2.00          2.00
     Length             (m)=      40.00         40.00
     Mannings n           =        .013          .250

     Max.eff.Inten.(mm/hr)=       98.93         16.78
                over (min)        10.00         20.00
     Storage Coeff.  (min)=        1.20 (ii)    15.62 (ii)
     Unit Hyd. Tpeak (min)=       10.00         20.00
     Unit Hyd. peak  (cms)=         .17           .06
                                                              *TOTALS*
     PEAK FLOW       (cms)=         .04           .00           .041 (iii)
     TIME TO PEAK    (hrs)=        1.00          1.33          1.000
     RUNOFF VOLUME     (mm)=      49.34         12.35         34.542
     TOTAL RAINFALL    (mm)=      50.14         50.14         50.135
     RUNOFF COEFFICIENT   =         .98           .25           .689
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*   =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0041--------------------------------------------------------------------
*#
*#   Catchment A8 from Triton Study  (0.30 hectares, C= 0.7)
*#
----------------------
| DESIGN STANDHYD    |    Area    (ha)=     .30
| 02:000108 DT=10.00 |    Total Imp(%)=   60.00    Dir. Conn.(%)=   60.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .18           .12
     Dep. Storage      (mm)=        .80          1.50
     Average Slope      (%)=       4.00          4.00
     Length             (m)=      44.72         40.00
     Mannings n           =        .013          .250

     Max.eff.Inten.(mm/hr)=       98.93         20.18
                over (min)        10.00         10.00
     Storage Coeff.  (min)=        1.04 (ii)    11.92 (ii)
     Unit Hyd. Tpeak (min)=       10.00         10.00
     Unit Hyd. peak  (cms)=         .17           .10
                                                              *TOTALS*
     PEAK FLOW       (cms)=         .05           .00           .054 (iii)
     TIME TO PEAK    (hrs)=        1.00          1.17          1.000
     RUNOFF VOLUME     (mm)=      49.34         12.35         34.541
     TOTAL RAINFALL    (mm)=      50.14         50.14         50.135
     RUNOFF COEFFICIENT   =         .98           .25           .689
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*   =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

```
001:0042-----------------------------------------------------------------------
*#   Add hydrographs from Catchments A7 and A8
--------------------
| ADD HYD (000207) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)    (cms)
                ID1 02:000108      .30      .054    1.00  34.54     .000
               +ID2 01:000107      .24      .041    1.00  34.54     .000
                =====================================================
                SUM 04:000207      .54      .094    1.00  34.54     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0043-----------------------------------------------------------------------
*#   Add summed hydrographs from Catchments A7+A8 to Upstream Hydrograph
--------------------
| ADD HYD (000208) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)    (cms)
                ID1 03:000206    30.91      .348    1.00  12.99     .000
               +ID2 04:000207      .54      .094    1.00  34.54     .000
                =====================================================
                SUM 01:000208    31.45      .443    1.00  13.36     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0044-----------------------------------------------------------------------
*#
*#   Catchment A9 from Triton Study  (0.32 hectares, C= 0.7)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .32
| 02:000109 DT=10.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   60.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .19          .13
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=        .20          .20
     Length            (m)=      46.19        40.00
     Mannings n          =        .013         .250

     Max.eff.Inten.(mm/hr)=      98.93        13.92
               over (min)        10.00        30.00
     Storage Coeff.  (min)=       2.62 (ii)   33.60 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=        .17          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .05          .00          .053 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.50         1.000
     RUNOFF VOLUME    (mm)=      49.34        12.35        34.542
     TOTAL RAINFALL   (mm)=      50.14        50.14        50.135
     RUNOFF COEFFICIENT  =         .98          .25          .689
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  64.0    Ia = Dep. Storage  (Above)
       (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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001:0045----------------------------------------------------------------------
*#   Add hydrograph from Catchments A9 to upstream drainage
*#
**#   THIS IS THE FLOW AT MH 56 WHICH IS THE LIMITING CONSTRAINT....
*#   5 year - 0.68 cms
*#   100 year - 1.29 cms
*#
--------------------
| ADD HYD (000209) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)    (cms)
                 ID1 01:000208    31.45     .443    1.00  13.36     .000
                +ID2 02:000109      .32     .053    1.00  34.54     .000
                 ===================================================
                 SUM 03:000209    31.77     .495    1.00  13.57     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------
001:0046----------------------------------------------------------------------
*#
*#   Catchment A10 from Triton Study  (0.21 hectares, C= 0.7)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .21
| 04:000110 DT=10.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   60.00
----------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       .13          .08
    Dep. Storage     (mm)=       .80         1.50
    Average Slope     (%)=      1.00         1.00
    Length            (m)=     37.42        40.00
    Mannings n           =      .013         .250

    Max.eff.Inten.(mm/hr)=     98.93        16.78
              over (min)       10.00        20.00
    Storage Coeff.  (min)=      1.42 (ii)   19.17 (ii)
    Unit Hyd. Tpeak (min)=     10.00        20.00
    Unit Hyd. peak  (cms)=       .17          .06
                                                          *TOTALS*
    PEAK FLOW       (cms)=       .03          .00           .036 (iii)
    TIME TO PEAK    (hrs)=      1.00         1.33          1.000
    RUNOFF VOLUME    (mm)=     49.34        12.35         34.542
    TOTAL RAINFALL   (mm)=     50.14        50.14         50.135
    RUNOFF COEFFICIENT   =       .98          .25           .689
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------
001:0047----------------------------------------------------------------------
*#   Add hydrograph from Catchment A10 to Upstream Hydrograph
*#   represents total catchment flow to Credit River
--------------------
| ADD HYD (000204) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)    (cms)
                 ID1 03:000209    31.77     .495    1.00  13.57     .000
                +ID2 04:000110      .21     .036    1.00  34.54     .000
```

```
                          ======================================================
                          SUM 01:000204    31.98     .531    1.00  13.71    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0048------------------------------------------------------------------------
      FINISH
--------------------------------------------------------------------------------
********************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
 0003 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0004 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0006 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0007 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0009 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0011 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0016 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0020 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0021 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0023 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0024 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0026 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0032 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0033 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0034 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0038 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0040 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
```

```
                    Use a smaller DT or a larger area.
 0041 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0044 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0046 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
   Simulation ended on 2000-06-01     at 10:47:55
==============================================================================
```

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

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999   55555 =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  5     =========
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  5     Ver.  3.1
     S   W W   M   M  H   H    Y    M   M  O   O       9999  5555  Oct. 1997
 SSSSS   W W   M   M  H   H    Y    M   M   OOO           9     5 =========
                                                      9   9     5 # 3877524
      StormWater Management HYdrologic Model           999   5555  =========

 ***************************************************************************
 *************************** SWMHYMO-95w Ver/3.1 ***************************
 *******  A single event and continuous hydrologic simulation model  *******
 *******     based on the principles of HYMO and its successors      *******
 *******                 OTTHYMO-83 and OTTHYMO-89.                  *******
 ***************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.           *******
 *******                 Ottawa,  Ontario: (613) 727-5199            *******
 *******                 Gatineau, Quebec: (819) 243-6858            *******
 *******                 E-Mail: swmhymo@jfsa.Com                    *******
 ***************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: R.J. Burnside & Associates Ltd.              +++++++
 +++++++               Brampton              SERIAL#:3877524         +++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ***************************************************************************
 *******            ++++++ PROGRAM ARRAY DIMENSIONS ++++++           *******
 *******            Maximum value for ID numbers  :     10           *******
 *******            Max. number of rainfall points:   5000           *******
 *******            Max. number of flow points    :   5000           *******
 ***************************************************************************


 ********************   D E T A I L E D   O U T P U T   *******************
 ***************************************************************************
 *       DATE: 2000-06-01     TIME: 10:48:22     RUN COUNTER: 001104       *
 ***************************************************************************
 * Input   filename: I:\LORENA\S-405\CORREC~1\MAY00\STRIT100.DAT           *
 * Output  filename: I:\LORENA\S-405\CORREC~1\MAY00\STRIT100.out           *
 * Summary filename: I:\LORENA\S-405\CORREC~1\MAY00\STRIT100.sum           *
 * User comments:                                                          *
 * 1:______________________________________________________________________*
 * 2:______________________________________________________________________*
 * 3:______________________________________________________________________*
 ***************************************************************************

-------------------------------------------------------------------------------
001:0001-----------------------------------------------------------------------
*#******************************************************************************
*#  Project Name: [ Strittmatter Development, Hillsburgh] Project Number: [S-405
*#  Date        : 04-18-2000
*#  Modeller    : [LD]
*#  Company     : R. J. Burnside & Associates Ltd.
*#  License #   :  3877524
*#******************************************************************************
*#  Hydrologic analysis of County Road 24 stormsewer system combined with
*#  Strittmatter Development at the north end of the village of Hillsburgh.
*#
*#  McMurchy Berm added May '99
*#
```

```
*#  100 year storm event
*#
*#  Data from County Rd. 24 Stormsewer Analysis (Triton) used
*#  for Road Catchments. Strittmatter Development discharge
*#  includes stormwater controls
*#
*#  Made modifications to this file to route the road portion or upper canada SA
*#  into the pond and let the external property SA8 flow uncontrolled.  This fil
*#  was run to obtain volume requirements for the pond to store & throttle the
*#  100 year flows of the Strittmatter Development.  Lot 1 was made available
*#  as pond area so SA10 decreased 0.32 ha and SA11 increased the same amount.
*#
*# File was further modified to let SA9 flow uncontrolled off site
*#
*# File was further modified to collect some of the drainage from SA8 at the
*# south end of Lot 1.  SA8 area decreased to 0.46 ha and SA10 area increased
*# to 0.36 ha.  Change in response to Triton comments May 19, 2000
*#
--------------------
| START             |  Project  dir.: I:\LORENA\S-405\CORREC~1\MAY00\
--------------------  Rainfall dir.: I:\LORENA\S-405\CORREC~1\MAY00\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
--------------------------------------------------------------------------------
001:0002------------------------------------------------------------------------
*READ STORM          STORM_FILENAME=["c:\S-405\swmhymo\hazel.stm"
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=3113.230
| Ptotal= 98.95 mm |                          B=  21.416
--------------------                          C=    .857
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm   =  3.00 hrs
                        Storm time step     = 10.00 min
                        Time to peak ratio  =   .33

                 TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                  hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
                  .17    9.785 |  1.00  162.238 |  1.83   20.114 |  2.67    9.361
                  .33   12.748 |  1.17   85.475 |  2.00   16.483 |  2.83    8.425
                  .50   18.030 |  1.33   50.208 |  2.17   13.904 |  3.00    7.655
                  .67   29.523 |  1.50   34.281 |  2.33   11.990 |
                  .83   67.430 |  1.67   25.529 |  2.50   10.521 |

--------------------------------------------------------------------------------
001:0003------------------------------------------------------------------------
*#
*#   Catchment A4 from Triton Study  (0.09 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .09
| 01:000104 DT=10.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                                    IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=           .04           .05
     Dep. Storage      (mm)=           .80          1.50
     Average Slope      (%)=          6.00          6.00
     Length             (m)=         24.49         40.00
     Mannings n           =          .013          .250
```

```
     Max.eff.Inten.(mm/hr)=     162.24         56.88
               over (min)       10.00         10.00
     Storage Coeff.  (min)=       .53 (ii)     6.89 (ii)
     Unit Hyd. Tpeak (min)=     10.00         10.00
     Unit Hyd. peak  (cms)=       .17           .13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       .02           .01          .023 (iii)
     TIME TO PEAK    (hrs)=      1.00          1.00         1.000
     RUNOFF VOLUME    (mm)=     98.15         39.52        62.969
     TOTAL RAINFALL   (mm)=     98.95         98.95        98.950
     RUNOFF COEFFICIENT   =       .99           .40          .636
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0004-----------------------------------------------------------------------
*#
*#   Catchment A5 from Triton Study  (0.28 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .28
| 02:000105 DT=10.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .11           .17
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      6.00          6.00
     Length            (m)=     43.20         40.00
     Mannings n           =      .013          .250

     Max.eff.Inten.(mm/hr)=     162.24         56.88
               over (min)       10.00         10.00
     Storage Coeff.  (min)=       .74 (ii)     7.10 (ii)
     Unit Hyd. Tpeak (min)=     10.00         10.00
     Unit Hyd. peak  (cms)=       .17           .13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       .05           .02          .072 (iii)
     TIME TO PEAK    (hrs)=      1.00          1.00         1.000
     RUNOFF VOLUME    (mm)=     98.15         39.52        62.969
     TOTAL RAINFALL   (mm)=     98.95         98.95        98.950
     RUNOFF COEFFICIENT   =       .99           .40          .636
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0005-----------------------------------------------------------------------
*#  Add summed hydrographs from Catchments A5 to A4
--------------------
| ADD HYD (000204) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)    (cms)
```

```
                  ID1 01:000104       .09      .023    1.00  62.97    .000
                 +ID2 02:000105       .28      .072    1.00  62.97    .000
                  ==================================================
                  SUM 03:000204       .37      .095    1.00  62.97    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0006------------------------------------------------------------------------
*#
*#   Proposed Strittmatter Development
*#
*#   Catchment SA1 (Strittmatter A1, 0.54 hectares)
*#
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .54
| 01:000301 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         .16          .38
     Dep. Storage      (mm)=         .80         1.50
     Average Slope      (%)=        3.00         3.00
     Length             (m)=       60.00        40.00
     Mannings n           =         .013         .250

     Max.eff.Inten.(mm/hr)=      162.24        71.61
                over (min)        10.00        10.00
     Storage Coeff.   (min)=       1.11 (ii)    8.26 (ii)
     Unit Hyd. Tpeak  (min)=      10.00        10.00
     Unit Hyd. peak   (cms)=        .17          .12
                                                            *TOTALS*
     PEAK FLOW        (cms)=        .05          .06          .105 (iii)
     TIME TO PEAK     (hrs)=       1.00         1.00         1.000
     RUNOFF VOLUME     (mm)=      98.15        42.82        53.883
     TOTAL RAINFALL    (mm)=      98.95        98.95        98.950
     RUNOFF COEFFICIENT   =         .99          .43          .545
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0007------------------------------------------------------------------------
*#
*#   Catchment SA2 (Strittmatter A2, 0.53 hectares)
*#
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .53
| 02:000302 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         .16          .37
     Dep. Storage      (mm)=         .80         1.50
     Average Slope      (%)=        3.00         3.00
     Length             (m)=       59.44        40.00
     Mannings n           =         .013         .250

     Max.eff.Inten.(mm/hr)=      162.24        71.61
```

```
               over (min)       10.00         10.00
     Storage Coeff.  (min)=      1.11 (ii)     8.25 (ii)
     Unit Hyd. Tpeak (min)=     10.00         10.00
     Unit Hyd. peak  (cms)=       .17           .12
                                                           *TOTALS*
     PEAK FLOW       (cms)=       .05           .06           .103 (iii)
     TIME TO PEAK    (hrs)=      1.00          1.00          1.000
     RUNOFF VOLUME    (mm)=     98.15         42.82         53.883
     TOTAL RAINFALL   (mm)=     98.95         98.95         98.950
     RUNOFF COEFFICIENT   =       .99           .43           .545
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0008------------------------------------------------------------------------
*#   Add hydrographs from Strittmatter A1 and A2
--------------------
| ADD HYD (000401) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)    (cms)
                  ID1 01:000301    .54      .105    1.00   53.88    .000
                 +ID2 02:000302    .53      .103    1.00   53.88    .000
                  ==================================================
                  SUM 04:000401   1.07      .209    1.00   53.88    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0009------------------------------------------------------------------------
*#
*#   Catchment SA3 (Strittmatter A3, 0.41 hectares)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .41
| 01:000303 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .12           .29
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      3.00          3.00
     Length            (m)=     52.28         40.00
     Mannings n           =      .013          .250

     Max.eff.Inten.(mm/hr)=    162.24         71.61
               over (min)       10.00         10.00
     Storage Coeff.  (min)=      1.03 (ii)     8.17 (ii)
     Unit Hyd. Tpeak (min)=     10.00         10.00
     Unit Hyd. peak  (cms)=       .17           .12
                                                           *TOTALS*
     PEAK FLOW       (cms)=       .04           .04           .080 (iii)
     TIME TO PEAK    (hrs)=      1.00          1.00          1.000
     RUNOFF VOLUME    (mm)=     98.15         42.82         53.883
     TOTAL RAINFALL   (mm)=     98.95         98.95         98.950
     RUNOFF COEFFICIENT   =       .99           .43           .545
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
```

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0010------------------------------------------------------------------------
*#   Add hydrographs from Strittmatter A3 to Strittmatter (A1+A2)
--------------------
| ADD HYD (000402) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)    (cms)
                 ID1 01:000303     .41      .080    1.00  53.88     .000
                +ID2 04:000401    1.07      .209    1.00  53.88     .000
                =======================================================
                 SUM 02:000402    1.48      .289    1.00  53.88     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0011------------------------------------------------------------------------
*#
*#   Catchment SA4 (Strittmatter A4, 0.41 hectares)
*#
----------------------
| DESIGN STANDHYD     |   Area    (ha)=     .41
| 01:000304 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=          .12          .29
     Dep. Storage      (mm)=          .80         1.50
     Average Slope      (%)=         3.00         3.00
     Length             (m)=        52.28        40.00
     Mannings n           =          .013         .250

     Max.eff.Inten.(mm/hr)=       162.24        71.61
                over (min)         10.00        10.00
     Storage Coeff.  (min)=         1.03 (ii)    8.17 (ii)
     Unit Hyd. Tpeak (min)=        10.00        10.00
     Unit Hyd. peak  (cms)=          .17          .12
                                                             *TOTALS*
     PEAK FLOW       (cms)=          .04          .04          .080 (iii)
     TIME TO PEAK    (hrs)=         1.00         1.00         1.000
     RUNOFF VOLUME    (mm)=        98.15        42.82        53.883
     TOTAL RAINFALL   (mm)=        98.95        98.95        98.950
     RUNOFF COEFFICIENT   =          .99          .43          .545
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0012------------------------------------------------------------------------
*#   Add hydrographs from Strittmatter A4 to Strittmatter Upstream Drainage
--------------------
| ADD HYD (000403) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)    (cms)
                 ID1 01:000304     .41      .080    1.00  53.88     .000
```

```
                +ID2 02:000402     1.48     .289    1.00   53.88    .000
                 ======================================================
                 SUM 04:000403     1.89     .369    1.00   53.88    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0013------------------------------------------------------------------------
*#
*#   Catchment SA5 (Strittmatter A5, 22.4 hectares of upstream
*#   agricultural drainage)
*#
----------------------
| DESIGN NASHYD       |   Area     (ha)=   22.40   Curve Number   (CN)=58.00
| 01:000305 DT=15.00  |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=     .750

     Unit Hyd Qpeak  (cms)=    1.141

     PEAK FLOW       (cms)=    1.028 (i)
     TIME TO PEAK    (hrs)=    2.000
     RUNOFF VOLUME    (mm)=   28.013
     TOTAL RAINFALL   (mm)=   98.950
     RUNOFF COEFFICIENT   =     .283

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

--------------------------------------------------------------------------------
001:0014------------------------------------------------------------------------
---------------------
| ROUTE RESERVOIR    |    Requested routing time step = 15.0 min.
|  IN>01:(000305)    |
| OUT<02:(000101)    |    =========  OUTLFOW STORAGE TABLE  =========
---------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |   (cms)     (ha.m.)
                            .000  .0000E+00    |     .014  .8700E+00
                            .008  .1850E+00    |     .016  .1270E+01
                            .012  .4800E+00    |    2.000  .1300E+01

     ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
     --------------------         (ha)      (cms)      (hrs)        (mm)
     INFLOW >01: (000305)        22.40      1.028      2.000      28.013
     OUTFLOW<02: (000101)        22.40       .013      4.833      28.003
    OVERFLOW<08: (000150)          .00       .000       .000        .000

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=     1.233
                    TIME SHIFT OF PEAK FLOW          (min)=   170.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.6114E+00

--------------------------------------------------------------------------------
001:0015------------------------------------------------------------------------
--------------------
| PRINT HYD          |   AREA       (ha)=   22.400
| ID=02 (000101)     |   QPEAK     (cms)=     .013 (i)
| DT=10.00 PCYC= 5   |   TPEAK     (hrs)=    4.833
--------------------     VOLUME     (mm)=   28.003

     (i)  PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
  TIME     FLOW |  TIME     FLOW |  TIME     FLOW |  TIME     FLOW |  TIME     FLOW
   hrs      cms |   hrs      cms |   hrs      cms |   hrs      cms |   hrs      cms
    .00     .000| 110.00     .008| 220.00     .002| 330.00     .000| 439.99     .000
    .83     .000| 110.83     .008| 220.84     .002| 330.83     .000| 440.83     .000
```

```
   1.67     .006| 111.67     .008| 221.67     .002| 331.67     .000| 441.66     .000
   2.50     .011| 112.50     .008| 222.50     .002| 332.50     .000| 442.49     .000
   3.33     .012| 113.33     .008| 223.34     .002| 333.33     .000| 443.33     .000
   4.17     .013| 114.17     .008| 224.17     .002| 334.17     .000| 444.16     .000
   5.00     .013| 115.00     .008| 225.00     .002| 335.00     .000| 444.99     .000
   5.83     .013| 115.83     .008| 225.84     .001| 335.83     .000| 445.82     .000
   6.67     .013| 116.67     .008| 226.67     .001| 336.66     .000| 446.66     .000
   7.50     .013| 117.50     .008| 227.50     .001| 337.50     .000| 447.49     .000
   8.33     .013| 118.33     .008| 228.34     .001| 338.33     .000| 448.32     .000
   9.17     .013| 119.17     .008| 229.17     .001| 339.16     .000| 449.16     .000
  10.00     .013| 120.00     .008| 230.00     .001| 340.00     .000| 449.99     .000
  10.83     .013| 120.83     .008| 230.84     .001| 340.83     .000| 450.82     .000
  11.67     .013| 121.67     .008| 231.67     .001| 341.66     .000| 451.66     .000
  12.50     .013| 122.50     .007| 232.50     .001| 342.50     .000| 452.49     .000
  13.33     .012| 123.33     .007| 233.34     .001| 343.33     .000| 453.32     .000
  14.17     .012| 124.17     .007| 234.17     .001| 344.16     .000| 454.16     .000
  15.00     .012| 125.00     .007| 235.00     .001| 345.00     .000| 454.99     .000
  15.83     .012| 125.83     .007| 235.84     .001| 345.83     .000| 455.82     .000
  16.67     .012| 126.67     .007| 236.67     .001| 346.66     .000| 456.66     .000
  17.50     .012| 127.50     .007| 237.50     .001| 347.50     .000| 457.49     .000
  18.33     .012| 128.33     .007| 238.34     .001| 348.33     .000| 458.32     .000
  19.17     .012| 129.17     .007| 239.17     .001| 349.16     .000| 459.16     .000
  20.00     .012| 130.00     .007| 240.00     .001| 350.00     .000| 459.99     .000
  20.83     .012| 130.83     .007| 240.84     .001| 350.83     .000| 460.82     .000
  21.67     .012| 131.67     .006| 241.67     .001| 351.66     .000| 461.66     .000
  22.50     .012| 132.50     .006| 242.50     .001| 352.50     .000| 462.49     .000
  23.33     .012| 133.33     .006| 243.34     .001| 353.33     .000| 463.32     .000
  24.17     .012| 134.17     .006| 244.17     .001| 354.16     .000| 464.16     .000
  25.00     .012| 135.00     .006| 245.00     .001| 355.00     .000| 464.99     .000
  25.83     .012| 135.83     .006| 245.84     .001| 355.83     .000| 465.82     .000
  26.67     .012| 136.67     .006| 246.67     .001| 356.66     .000| 466.66     .000
  27.50     .012| 137.50     .006| 247.50     .001| 357.50     .000| 467.49     .000
  28.33     .012| 138.33     .006| 248.34     .001| 358.33     .000| 468.32     .000
  29.17     .012| 139.17     .006| 249.17     .001| 359.16     .000| 469.16     .000
  30.00     .012| 140.00     .006| 250.00     .001| 360.00     .000| 469.99     .000
  30.83     .012| 140.83     .006| 250.84     .001| 360.83     .000| 470.82     .000
  31.67     .012| 141.67     .006| 251.67     .001| 361.66     .000| 471.66     .000
  32.50     .012| 142.50     .005| 252.50     .001| 362.50     .000| 472.49     .000
  33.33     .012| 143.33     .005| 253.34     .001| 363.33     .000| 473.32     .000
  34.17     .012| 144.17     .005| 254.17     .001| 364.16     .000| 474.16     .000
  35.00     .012| 145.00     .005| 255.00     .001| 365.00     .000| 474.99     .000
  35.83     .012| 145.83     .005| 255.84     .001| 365.83     .000| 475.82     .000
  36.67     .012| 146.67     .005| 256.67     .001| 366.66     .000| 476.66     .000
  37.50     .012| 147.50     .005| 257.50     .001| 367.50     .000| 477.49     .000
  38.33     .012| 148.33     .005| 258.34     .001| 368.33     .000| 478.32     .000
  39.17     .012| 149.17     .005| 259.17     .001| 369.16     .000| 479.16     .000
  40.00     .012| 150.00     .005| 260.00     .001| 370.00     .000| 479.99     .000
  40.83     .012| 150.83     .005| 260.84     .001| 370.83     .000| 480.82     .000
  41.67     .012| 151.67     .005| 261.67     .001| 371.66     .000| 481.66     .000
  42.50     .012| 152.50     .005| 262.50     .001| 372.50     .000| 482.49     .000
  43.33     .012| 153.33     .005| 263.34     .001| 373.33     .000| 483.32     .000
  44.17     .011| 154.17     .005| 264.17     .001| 374.16     .000| 484.16     .000
  45.00     .011| 155.00     .004| 265.00     .001| 375.00     .000| 484.99     .000
  45.83     .011| 155.83     .004| 265.84     .001| 375.83     .000| 485.82     .000
  46.67     .011| 156.67     .004| 266.67     .001| 376.66     .000| 486.66     .000
  47.50     .011| 157.50     .004| 267.50     .001| 377.50     .000| 487.49     .000
  48.33     .011| 158.33     .004| 268.34     .001| 378.33     .000| 488.32     .000
  49.17     .011| 159.17     .004| 269.17     .001| 379.16     .000| 489.16     .000
  50.00     .011| 160.00     .004| 270.00     .001| 380.00     .000| 489.99     .000
  50.83     .011| 160.83     .004| 270.84     .001| 380.83     .000| 490.82     .000
  51.67     .011| 161.67     .004| 271.67     .001| 381.66     .000| 491.66     .000
  52.50     .011| 162.50     .004| 272.50     .001| 382.50     .000| 492.49     .000
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   53.33    .011| 163.33    .004| 273.34    .001| 383.33    .000| 493.32    .000
   54.17    .011| 164.17    .004| 274.17    .001| 384.16    .000| 494.16    .000
   55.00    .011| 165.00    .004| 275.00    .001| 385.00    .000| 494.99    .000
   55.83    .011| 165.83    .004| 275.84    .001| 385.83    .000| 495.82    .000
   56.67    .011| 166.67    .004| 276.67    .001| 386.66    .000| 496.66    .000
   57.50    .011| 167.50    .004| 277.50    .001| 387.50    .000| 497.49    .000
   58.33    .011| 168.33    .004| 278.34    .001| 388.33    .000| 498.32    .000
   59.17    .011| 169.17    .004| 279.17    .001| 389.16    .000| 499.15    .000
   60.00    .011| 170.00    .004| 280.00    .001| 389.99    .000| 499.99    .000
   60.83    .011| 170.83    .004| 280.83    .001| 390.83    .000| 500.82    .000
   61.67    .011| 171.67    .003| 281.67    .001| 391.66    .000| 501.65    .000
   62.50    .010| 172.50    .003| 282.50    .001| 392.49    .000| 502.49    .000
   63.33    .010| 173.33    .003| 283.33    .001| 393.33    .000| 503.32    .000
   64.17    .010| 174.17    .003| 284.17    .001| 394.16    .000| 504.15    .000
   65.00    .010| 175.00    .003| 285.00    .001| 394.99    .000| 504.99    .000
   65.83    .010| 175.83    .003| 285.83    .001| 395.83    .000| 505.82    .000
   66.67    .010| 176.67    .003| 286.67    .001| 396.66    .000| 506.65    .000
   67.50    .010| 177.50    .003| 287.50    .001| 397.49    .000| 507.49    .000
   68.33    .010| 178.33    .003| 288.33    .001| 398.33    .000| 508.32    .000
   69.17    .010| 179.17    .003| 289.17    .001| 399.16    .000| 509.15    .000
   70.00    .010| 180.00    .003| 290.00    .001| 399.99    .000| 509.99    .000
   70.83    .010| 180.83    .003| 290.83    .001| 400.83    .000| 510.82    .000
   71.67    .010| 181.67    .003| 291.67    .001| 401.66    .000| 511.65    .000
   72.50    .010| 182.50    .003| 292.50    .001| 402.49    .000| 512.49    .000
   73.33    .010| 183.33    .003| 293.33    .001| 403.33    .000| 513.32    .000
   74.17    .010| 184.17    .003| 294.17    .001| 404.16    .000| 514.15    .000
   75.00    .010| 185.00    .003| 295.00    .001| 404.99    .000| 514.99    .000
   75.83    .010| 185.83    .003| 295.83    .001| 405.83    .000| 515.82    .000
   76.67    .010| 186.67    .003| 296.67    .000| 406.66    .000| 516.65    .000
   77.50    .010| 187.50    .003| 297.50    .000| 407.49    .000| 517.49    .000
   78.33    .010| 188.33    .003| 298.33    .000| 408.33    .000| 518.32    .000
   79.17    .010| 189.17    .003| 299.17    .000| 409.16    .000| 519.16    .000
   80.00    .010| 190.00    .003| 300.00    .000| 409.99    .000| 519.99    .000
   80.83    .010| 190.83    .003| 300.83    .000| 410.83    .000| 520.82    .000
   81.67    .010| 191.67    .003| 301.67    .000| 411.66    .000| 521.66    .000
   82.50    .010| 192.50    .003| 302.50    .000| 412.49    .000| 522.49    .000
   83.33    .009| 193.33    .002| 303.33    .000| 413.33    .000| 523.32    .000
   84.17    .009| 194.17    .002| 304.17    .000| 414.16    .000| 524.16    .000
   85.00    .009| 195.00    .002| 305.00    .000| 414.99    .000| 524.99    .000
   85.83    .009| 195.83    .002| 305.83    .000| 415.83    .000| 525.82    .000
   86.67    .009| 196.67    .002| 306.67    .000| 416.66    .000| 526.66    .000
   87.50    .009| 197.50    .002| 307.50    .000| 417.49    .000| 527.49    .000
   88.33    .009| 198.33    .002| 308.33    .000| 418.33    .000| 528.32    .000
   89.17    .009| 199.17    .002| 309.17    .000| 419.16    .000| 529.16    .000
   90.00    .009| 200.00    .002| 310.00    .000| 419.99    .000| 529.99    .000
   90.83    .009| 200.83    .002| 310.83    .000| 420.83    .000| 530.82    .000
   91.67    .009| 201.67    .002| 311.67    .000| 421.66    .000| 531.66    .000
   92.50    .009| 202.50    .002| 312.50    .000| 422.49    .000| 532.49    .000
   93.33    .009| 203.33    .002| 313.33    .000| 423.33    .000| 533.32    .000
   94.17    .009| 204.17    .002| 314.17    .000| 424.16    .000| 534.16    .000
   95.00    .009| 205.00    .002| 315.00    .000| 424.99    .000| 534.99    .000
   95.83    .009| 205.83    .002| 315.83    .000| 425.83    .000| 535.82    .000
   96.67    .009| 206.67    .002| 316.67    .000| 426.66    .000| 536.66    .000
   97.50    .009| 207.50    .002| 317.50    .000| 427.49    .000| 537.49    .000
   98.33    .009| 208.33    .002| 318.33    .000| 428.33    .000| 538.32    .000
   99.17    .009| 209.17    .002| 319.17    .000| 429.16    .000| 539.16    .000
  100.00    .009| 210.00    .002| 320.00    .000| 429.99    .000| 539.99    .000
  100.83    .009| 210.84    .002| 320.83    .000| 430.83    .000| 540.82    .000
  101.67    .009| 211.67    .002| 321.67    .000| 431.66    .000| 541.66    .000
  102.50    .009| 212.50    .002| 322.50    .000| 432.49    .000| 542.49    .000
  103.33    .009| 213.34    .002| 323.33    .000| 433.33    .000| 543.32    .000
  104.17    .009| 214.17    .002| 324.17    .000| 434.16    .000| 544.16    .000
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 105.00     .009| 215.00     .002| 325.00     .000| 434.99     .000| 544.99     .000
 105.83     .008| 215.84     .002| 325.83     .000| 435.83     .000| 545.82     .000
 106.67     .008| 216.67     .002| 326.67     .000| 436.66     .000| 546.66     .000
 107.50     .008| 217.50     .002| 327.50     .000| 437.49     .000|
 108.33     .008| 218.34     .002| 328.33     .000| 438.33     .000|
 109.17     .008| 219.17     .002| 329.17     .000| 439.16     .000|
-----------------------------------------------------------------------------------
001:0016---------------------------------------------------------------------------
*#
*#   Catchment SA6 (Strittmatter A6, 1.04 hectares)
*#
----------------------
| DESIGN STANDHYD     |    Area     (ha)=    1.04
| 05:000306 DT=10.00  |    Total Imp(%)=   20.00    Dir. Conn.(%)=   10.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .21          .83
     Dep. Storage      (mm)=        .80         1.50
     Average Slope      (%)=       3.00         3.00
     Length             (m)=      83.27        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=     162.24        69.71
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       1.36 (ii)    8.58 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=        .17          .12
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .05          .12          .166 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00         1.000
     RUNOFF VOLUME    (mm)=      98.15        42.42        47.996
     TOTAL RAINFALL   (mm)=      98.95        98.95        98.950
     RUNOFF COEFFICIENT   =        .99          .43          .485
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*   =  64.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------------
001:0017---------------------------------------------------------------------------
*#   Add hydrographs from Strittmatter A5 (McMurchy Property) to A6
--------------------
| ADD HYD (000420) | ID: NHYD      AREA      QPEAK    TPEAK    R.V.      DWF
--------------------               (ha)      (cms)    (hrs)    (mm)     (cms)
                  ID1 05:000306     1.04       .166     1.00   48.00      .000
                 +ID2 02:000101    22.40       .013     4.83   28.00      .000
                  ===================================================
                  SUM 06:000420    23.44       .167     1.00   28.89      .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------------
001:0018---------------------------------------------------------------------------
*#   Add OVERFLOW hydrograph from McMurchy Pond
--------------------
| ADD HYD (000421) | ID: NHYD      AREA      QPEAK    TPEAK    R.V.      DWF
--------------------               (ha)      (cms)    (hrs)    (mm)     (cms)
                  ID1 08:000150      .00       .000      .00     .00      .000 **DRY**
```

```
                   +ID2 06:000420     23.44      .167     1.00  28.89     .000
                    ===================================================
                    SUM 05:000421     23.44      .167     1.00  28.89     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0019-----------------------------------------------------------------------
--------------------
| ADD HYD (000405) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)      (cms)   (hrs)   (mm)   (cms)
                    ID1 05:000421    23.44      .167    1.00   28.89    .000
                   +ID2 04:000403     1.89      .369    1.00   53.88    .000
                    ===================================================
                    SUM 01:000405    25.33      .536    1.00   30.75    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0020-----------------------------------------------------------------------
*#
*#    Catchment SA10 (Strittmatter A10, 0.36 hectares)
*#       --- Area Increased May 2000
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .36
| 05:000310 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .11          .25
     Dep. Storage     (mm)=         .80         1.50
     Average Slope     (%)=       13.00        13.00
     Length            (m)=       48.99        40.00
     Mannings n          =         .013         .250

     Max.eff.Inten.(mm/hr)=      162.24        71.61
                over (min)        10.00        10.00
     Storage Coeff.  (min)=         .64 (ii)     5.24 (ii)
     Unit Hyd. Tpeak (min)=       10.00        10.00
     Unit Hyd. peak  (cms)=         .17          .14
                                                             *TOTALS*
     PEAK FLOW       (cms)=         .03          .04           .077 (iii)
     TIME TO PEAK    (hrs)=        1.00         1.00          1.000
     RUNOFF VOLUME    (mm)=       98.15        42.82         53.883
     TOTAL RAINFALL   (mm)=       98.95        98.95         98.950
     RUNOFF COEFFICIENT   =         .99          .43           .545
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
               CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
               THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0021-----------------------------------------------------------------------
*#
*#    Catchment SA11 (Strittmatter A11, Pond Surface, 0.12 hecatares)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .35
```

```
| 06:000311 DT=10.00 |    Total Imp(%)=    99.00   Dir. Conn.(%)=    99.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=        .35          .00
    Dep. Storage      (mm)=        .80         1.50
    Average Slope      (%)=        .10          .10
    Length             (m)=      48.30        40.00
    Mannings n            =       .013         .250

    Max.eff.Inten.(mm/hr)=     162.24       122.01
               over (min)      10.00        20.00
    Storage Coeff.  (min)=       2.71 (ii)   18.73 (ii)
    Unit Hyd. Tpeak (min)=      10.00        20.00
    Unit Hyd. peak  (cms)=        .17          .06
                                                          *TOTALS*
    PEAK FLOW       (cms)=        .15          .00          .154 (iii)
    TIME TO PEAK    (hrs)=       1.00         1.17         1.000
    RUNOFF VOLUME    (mm)=      98.15        92.53        98.094
    TOTAL RAINFALL   (mm)=      98.95        98.95        98.950
    RUNOFF COEFFICIENT   =        .99          .94          .991
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  98.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0022-----------------------------------------------------------------------
*#   Add hydrograph from Strittmatter A10 and pond (A11) to hydrograph #405
*#
--------------------
| ADD HYD (000409) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
              ID1 01:000405      25.33      .536    1.00   30.75    .000
             +ID2 05:000310        .36      .077    1.00   53.88    .000
             +ID3 06:000311        .35      .154    1.00   98.09    .000
             ==========================================================
              SUM 02:000409      26.04      .767    1.00   31.98    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0023-----------------------------------------------------------------------
*#
*#   Add in Areas A1, A2 and A3 from the County Road
*#   and route total flow through proposed SWM area
*#
*#
*#   Catchment A1 from Triton Study  (2.4 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD    |    Area     (ha)=     2.40
| 01:000101 DT=10.00 |    Total Imp(%)=    40.00   Dir. Conn.(%)=    40.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=        .96         1.44
    Dep. Storage      (mm)=        .80         1.50
    Average Slope      (%)=       5.00         5.00
    Length             (m)=     126.49        40.00
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```
     Mannings n          =       .013         .250

     Max.eff.Inten.(mm/hr)=     162.24        56.88
               over (min)       10.00        10.00
     Storage Coeff.  (min)=      1.50 (ii)    8.21 (ii)
     Unit Hyd. Tpeak (min)=     10.00        10.00
     Unit Hyd. peak  (cms)=       .17          .12
                                                       *TOTALS*
     PEAK FLOW       (cms)=       .43          .17        .604 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.00       1.000
     RUNOFF VOLUME    (mm)=     98.15        39.52      62.969
     TOTAL RAINFALL   (mm)=     98.95        98.95      98.950
     RUNOFF COEFFICIENT   =       .99          .40        .636
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (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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001:0024------------------------------------------------------------------------
*#
*#   Catchment A2 from Triton Study  (0.25 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD     |   Area    (ha)=     .25
| 04:000102 DT=10.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .10          .15
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       5.00         5.00
     Length            (m)=      40.82        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     162.24        56.88
               over (min)       10.00        10.00
     Storage Coeff.  (min)=       .76 (ii)    7.48 (ii)
     Unit Hyd. Tpeak (min)=     10.00        10.00
     Unit Hyd. peak  (cms)=       .17          .13
                                                       *TOTALS*
     PEAK FLOW       (cms)=       .05          .02        .064 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.00       1.000
     RUNOFF VOLUME    (mm)=     98.15        39.52      62.969
     TOTAL RAINFALL   (mm)=     98.95        98.95      98.950
     RUNOFF COEFFICIENT   =       .99          .40        .636
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0025------------------------------------------------------------------------
*#   Add hydrographs from Catchments A1 and A2
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| ADD HYD (000201) | ID: NHYD      AREA      QPEAK    TPEAK    R.V.      DWF
--------------------                (ha)      (cms)    (hrs)    (mm)    (cms)
                 ID1 01:000101      2.40       .604     1.00   62.97     .000
                +ID2 04:000102       .25       .064     1.00   62.97     .000
                 ==================================================
                 SUM 05:000201      2.65       .668     1.00   62.97     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0026-----------------------------------------------------------------------
*#
*#   Catchment A3 from Triton Study  (0.68 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .68
| 01:000103 DT=10.00 |   Total  Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .27          .41
     Dep. Storage      (mm)=        .80         1.50
     Average Slope      (%)=       6.00         6.00
     Length             (m)=      67.33        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=      162.24        56.88
                over (min)       10.00        10.00
     Storage Coeff.  (min)=        .97 (ii)     7.33 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=        .17          .13
                                                             *TOTALS*
     PEAK FLOW       (cms)=        .12          .05             .173 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00            1.000
     RUNOFF VOLUME    (mm)=      98.15        39.52           62.969
     TOTAL RAINFALL   (mm)=      98.95        98.95           98.950
     RUNOFF COEFFICIENT   =        .99          .40             .636
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0027-----------------------------------------------------------------------
*#   Add hydrographs from Catchments A3 to hydrograph #201
*#   representing total highway flow to be routed through SWM facility
*#
--------------------
| ADD HYD (000202) | ID: NHYD      AREA      QPEAK    TPEAK    R.V.      DWF
--------------------                (ha)      (cms)    (hrs)    (mm)    (cms)
                 ID1 01:000103       .68       .173     1.00   62.97     .000
                +ID2 05:000201      2.65       .668     1.00   62.97     .000
                 ==================================================
                 SUM 04:000202      3.33       .841     1.00   62.97     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0028-----------------------------------------------------------------------
```

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*#
*#   Direct minor system flows to SWM Area, major system stays on County Road
*#
----------------------
| COMPUTE DUALHYD    |   Average inlet capacities    [CINLET] =    .450  (cms)
| TotalHyd 04:000202 |   Number of inlets in system [NINLET] =      1
----------------------   Total minor system capacity          =    .450  (cms)
                         Total major system storage [TMJSTO] =      0.(cu.m.)

              ID: NHYD          AREA      QPEAK      TPEAK      R.V.      DWF
                                (ha)      (cms)      (hrs)      (mm)     (cms)
    TOTAL HYD.   04:000202      3.33       .841      1.000    62.969      .000
    ========================================================================
    MAJOR SYST   01:000412       .47       .391      1.000    62.969      .000
    MINOR SYST   05:000413      2.86       .450      1.000    62.969      .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0029------------------------------------------------------------------------
*#   Add minor highway drainage (hyd #202) to Strittmatter drainage (hyd #409)
--------------------
| ADD HYD (000203) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
--------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 05:000413     2.86     .450     1.00  62.97    .000
                 +ID2 02:000409    26.04     .767     1.00  31.98    .000
                  ===================================================
                  SUM 06:000203    28.90    1.217     1.00  35.05    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0030------------------------------------------------------------------------
*#   Strittmatter SWM Area
*#   Original Rating Curve (February 1990) revised July 1999 - same storage
*#   Low flow orifice modified Feb. 22, 2000 (from 150mm to 225mm)
*#   Changed Rating Curve (April 2000) with pond redesign
*#
---------------------
| ROUTE RESERVOIR   |    Requested routing time step = 10.0 min.
|  IN>06:(000203)   |
| OUT<02:(000406)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE    | OUTFLOW    STORAGE
                          (cms)     (ha.m.)    |  (cms)     (ha.m.)
                           .000  .0000E+00     |    .246  .7330E-01
                           .040  .2600E-02     |    .318  .8780E-01
                           .090  .4500E-02     |    .345  .1032E+00
                           .121  .1070E-01     |    .378  .1256E+00
                           .146  .2100E-01     |    .428  .1786E+00
                           .202  .4640E-01     |    .448  .1940E+00
                           .239  .6870E-01     |    .467  .2188E+00

    ROUTING RESULTS             AREA     QPEAK     TPEAK        R.V.
    --------------------        (ha)     (cms)     (hrs)        (mm)
    INFLOW >06: (000203)       28.90     1.217     1.000      35.050
    OUTFLOW<02: (000406)       28.90      .412     1.667      35.050
   OVERFLOW<05: (000408)         .00      .000      .000        .000

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   33.864
                   TIME SHIFT OF PEAK FLOW         (min)=    40.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.1620E+00
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001:0031------------------------------------------------------------------------
--------------------
| PRINT HYD          |   AREA       (ha)=   28.904
| ID=02 (000406)     |   QPEAK      (cms)=     .412 (i)
| DT=10.00 PCYC= 5 |   TPEAK      (hrs)=    1.667
--------------------     VOLUME      (mm)=   35.050

    (i)  PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
  TIME     FLOW |  TIME     FLOW |  TIME     FLOW |  TIME     FLOW |  TIME     FLOW
   hrs      cms |   hrs      cms |   hrs      cms |   hrs      cms |   hrs      cms
    .00    .000| 110.00    .008| 220.00    .002| 330.00    .000| 439.99    .000
    .83    .153| 110.83    .008| 220.84    .002| 330.83    .000| 440.83    .000
   1.67    .412| 111.67    .008| 221.67    .002| 331.67    .000| 441.66    .000
   2.50    .370| 112.50    .008| 222.50    .002| 332.50    .000| 442.49    .000
   3.33    .226| 113.33    .008| 223.34    .002| 333.33    .000| 443.33    .000
   4.17    .126| 114.17    .008| 224.17    .002| 334.17    .000| 444.16    .000
   5.00    .014| 115.00    .008| 225.00    .002| 335.00    .000| 444.99    .000
   5.83    .013| 115.83    .008| 225.84    .001| 335.83    .000| 445.82    .000
   6.67    .013| 116.67    .008| 226.67    .001| 336.66    .000| 446.66    .000
   7.50    .013| 117.50    .008| 227.50    .001| 337.50    .000| 447.49    .000
   8.33    .013| 118.33    .008| 228.34    .001| 338.33    .000| 448.32    .000
   9.17    .013| 119.17    .008| 229.17    .001| 339.16    .000| 449.16    .000
  10.00    .013| 120.00    .008| 230.00    .001| 340.00    .000| 449.99    .000
  10.83    .013| 120.83    .008| 230.84    .001| 340.83    .000| 450.82    .000
  11.67    .013| 121.67    .008| 231.67    .001| 341.66    .000| 451.66    .000
  12.50    .013| 122.50    .007| 232.50    .001| 342.50    .000| 452.49    .000
  13.33    .012| 123.33    .007| 233.34    .001| 343.33    .000| 453.32    .000
  14.17    .012| 124.17    .007| 234.17    .001| 344.16    .000| 454.16    .000
  15.00    .012| 125.00    .007| 235.00    .001| 345.00    .000| 454.99    .000
  15.83    .012| 125.83    .007| 235.84    .001| 345.83    .000| 455.82    .000
  16.67    .012| 126.67    .007| 236.67    .001| 346.66    .000| 456.66    .000
  17.50    .012| 127.50    .007| 237.50    .001| 347.50    .000| 457.49    .000
  18.33    .012| 128.33    .007| 238.34    .001| 348.33    .000| 458.32    .000
  19.17    .012| 129.17    .007| 239.17    .001| 349.16    .000| 459.16    .000
  20.00    .012| 130.00    .007| 240.00    .001| 350.00    .000| 459.99    .000
  20.83    .012| 130.83    .007| 240.84    .001| 350.83    .000| 460.82    .000
  21.67    .012| 131.67    .006| 241.67    .001| 351.66    .000| 461.66    .000
  22.50    .012| 132.50    .006| 242.50    .001| 352.50    .000| 462.49    .000
  23.33    .012| 133.33    .006| 243.34    .001| 353.33    .000| 463.32    .000
  24.17    .012| 134.17    .006| 244.17    .001| 354.16    .000| 464.16    .000
  25.00    .012| 135.00    .006| 245.00    .001| 355.00    .000| 464.99    .000
  25.83    .012| 135.83    .006| 245.84    .001| 355.83    .000| 465.82    .000
  26.67    .012| 136.67    .006| 246.67    .001| 356.66    .000| 466.66    .000
  27.50    .012| 137.50    .006| 247.50    .001| 357.50    .000| 467.49    .000
  28.33    .012| 138.33    .006| 248.34    .001| 358.33    .000| 468.32    .000
  29.17    .012| 139.17    .006| 249.17    .001| 359.16    .000| 469.16    .000
  30.00    .012| 140.00    .006| 250.00    .001| 360.00    .000| 469.99    .000
  30.83    .012| 140.83    .006| 250.84    .001| 360.83    .000| 470.82    .000
  31.67    .012| 141.67    .006| 251.67    .001| 361.66    .000| 471.66    .000
  32.50    .012| 142.50    .005| 252.50    .001| 362.50    .000| 472.49    .000
  33.33    .012| 143.33    .005| 253.34    .001| 363.33    .000| 473.32    .000
  34.17    .012| 144.17    .005| 254.17    .001| 364.16    .000| 474.16    .000
  35.00    .012| 145.00    .005| 255.00    .001| 365.00    .000| 474.99    .000
  35.83    .012| 145.83    .005| 255.84    .001| 365.83    .000| 475.82    .000
  36.67    .012| 146.67    .005| 256.67    .001| 366.66    .000| 476.66    .000
  37.50    .012| 147.50    .005| 257.50    .001| 367.50    .000| 477.49    .000
  38.33    .012| 148.33    .005| 258.34    .001| 368.33    .000| 478.32    .000
  39.17    .012| 149.17    .005| 259.17    .001| 369.16    .000| 479.16    .000
  40.00    .012| 150.00    .005| 260.00    .001| 370.00    .000| 479.99    .000
  40.83    .012| 150.83    .005| 260.84    .001| 370.83    .000| 480.82    .000
  41.67    .012| 151.67    .005| 261.67    .001| 371.66    .000| 481.66    .000
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  42.50     .012| 152.50     .005| 262.50     .001| 372.50     .000| 482.49     .000
  43.33     .012| 153.33     .005| 263.34     .001| 373.33     .000| 483.32     .000
  44.17     .011| 154.17     .005| 264.17     .001| 374.16     .000| 484.16     .000
  45.00     .011| 155.00     .005| 265.00     .001| 375.00     .000| 484.99     .000
  45.83     .011| 155.83     .004| 265.84     .001| 375.83     .000| 485.82     .000
  46.67     .011| 156.67     .004| 266.67     .001| 376.66     .000| 486.66     .000
  47.50     .011| 157.50     .004| 267.50     .001| 377.50     .000| 487.49     .000
  48.33     .011| 158.33     .004| 268.34     .001| 378.33     .000| 488.32     .000
  49.17     .011| 159.17     .004| 269.17     .001| 379.16     .000| 489.16     .000
  50.00     .011| 160.00     .004| 270.00     .001| 380.00     .000| 489.99     .000
  50.83     .011| 160.83     .004| 270.84     .001| 380.83     .000| 490.82     .000
  51.67     .011| 161.67     .004| 271.67     .001| 381.66     .000| 491.66     .000
  52.50     .011| 162.50     .004| 272.50     .001| 382.50     .000| 492.49     .000
  53.33     .011| 163.33     .004| 273.34     .001| 383.33     .000| 493.32     .000
  54.17     .011| 164.17     .004| 274.17     .001| 384.16     .000| 494.16     .000
  55.00     .011| 165.00     .004| 275.00     .001| 385.00     .000| 494.99     .000
  55.83     .011| 165.83     .004| 275.84     .001| 385.83     .000| 495.82     .000
  56.67     .011| 166.67     .004| 276.67     .001| 386.66     .000| 496.66     .000
  57.50     .011| 167.50     .004| 277.50     .001| 387.50     .000| 497.49     .000
  58.33     .011| 168.33     .004| 278.34     .001| 388.33     .000| 498.32     .000
  59.17     .011| 169.17     .004| 279.17     .001| 389.16     .000| 499.15     .000
  60.00     .011| 170.00     .004| 280.00     .001| 389.99     .000| 499.99     .000
  60.83     .011| 170.83     .004| 280.83     .001| 390.83     .000| 500.82     .000
  61.67     .011| 171.67     .003| 281.67     .001| 391.66     .000| 501.65     .000
  62.50     .010| 172.50     .003| 282.50     .001| 392.49     .000| 502.49     .000
  63.33     .010| 173.33     .003| 283.33     .001| 393.33     .000| 503.32     .000
  64.17     .010| 174.17     .003| 284.17     .001| 394.16     .000| 504.15     .000
  65.00     .010| 175.00     .003| 285.00     .001| 394.99     .000| 504.99     .000
  65.83     .010| 175.83     .003| 285.83     .001| 395.83     .000| 505.82     .000
  66.67     .010| 176.67     .003| 286.67     .001| 396.66     .000| 506.65     .000
  67.50     .010| 177.50     .003| 287.50     .001| 397.49     .000| 507.49     .000
  68.33     .010| 178.33     .003| 288.33     .001| 398.33     .000| 508.32     .000
  69.17     .010| 179.17     .003| 289.17     .001| 399.16     .000| 509.15     .000
  70.00     .010| 180.00     .003| 290.00     .001| 399.99     .000| 509.99     .000
  70.83     .010| 180.83     .003| 290.83     .001| 400.83     .000| 510.82     .000
  71.67     .010| 181.67     .003| 291.67     .001| 401.66     .000| 511.65     .000
  72.50     .010| 182.50     .003| 292.50     .001| 402.49     .000| 512.49     .000
  73.33     .010| 183.33     .003| 293.33     .001| 403.33     .000| 513.32     .000
  74.17     .010| 184.17     .003| 294.17     .001| 404.16     .000| 514.15     .000
  75.00     .010| 185.00     .003| 295.00     .001| 404.99     .000| 514.99     .000
  75.83     .010| 185.83     .003| 295.83     .001| 405.83     .000| 515.82     .000
  76.67     .010| 186.67     .003| 296.67     .000| 406.66     .000| 516.65     .000
  77.50     .010| 187.50     .003| 297.50     .000| 407.49     .000| 517.49     .000
  78.33     .010| 188.33     .003| 298.33     .000| 408.33     .000| 518.32     .000
  79.17     .010| 189.17     .003| 299.17     .000| 409.16     .000| 519.16     .000
  80.00     .010| 190.00     .003| 300.00     .000| 409.99     .000| 519.99     .000
  80.83     .010| 190.83     .003| 300.83     .000| 410.83     .000| 520.82     .000
  81.67     .010| 191.67     .003| 301.67     .000| 411.66     .000| 521.66     .000
  82.50     .010| 192.50     .003| 302.50     .000| 412.49     .000| 522.49     .000
  83.33     .009| 193.33     .002| 303.33     .000| 413.33     .000| 523.32     .000
  84.17     .009| 194.17     .002| 304.17     .000| 414.16     .000| 524.16     .000
  85.00     .009| 195.00     .002| 305.00     .000| 414.99     .000| 524.99     .000
  85.83     .009| 195.83     .002| 305.83     .000| 415.83     .000| 525.82     .000
  86.67     .009| 196.67     .002| 306.67     .000| 416.66     .000| 526.66     .000
  87.50     .009| 197.50     .002| 307.50     .000| 417.49     .000| 527.49     .000
  88.33     .009| 198.33     .002| 308.33     .000| 418.33     .000| 528.32     .000
  89.17     .009| 199.17     .002| 309.17     .000| 419.16     .000| 529.16     .000
  90.00     .009| 200.00     .002| 310.00     .000| 419.99     .000| 529.99     .000
  90.83     .009| 200.83     .002| 310.83     .000| 420.83     .000| 530.82     .000
  91.67     .009| 201.67     .002| 311.67     .000| 421.66     .000| 531.66     .000
  92.50     .009| 202.50     .002| 312.50     .000| 422.49     .000| 532.49     .000
  93.33     .009| 203.33     .002| 313.33     .000| 423.33     .000| 533.32     .000
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   94.17    .009| 204.17    .002| 314.17    .000| 424.16    .000| 534.16    .000
   95.00    .009| 205.00    .002| 315.00    .000| 424.99    .000| 534.99    .000
   95.83    .009| 205.83    .002| 315.83    .000| 425.83    .000| 535.82    .000
   96.67    .009| 206.67    .002| 316.67    .000| 426.66    .000| 536.66    .000
   97.50    .009| 207.50    .002| 317.50    .000| 427.49    .000| 537.49    .000
   98.33    .009| 208.33    .002| 318.33    .000| 428.33    .000| 538.32    .000
   99.17    .009| 209.17    .002| 319.17    .000| 429.16    .000| 539.16    .000
  100.00    .009| 210.00    .002| 320.00    .000| 429.99    .000| 539.99    .000
  100.83    .009| 210.84    .002| 320.83    .000| 430.83    .000| 540.82    .000
  101.67    .009| 211.67    .002| 321.67    .000| 431.66    .000| 541.66    .000
  102.50    .009| 212.50    .002| 322.50    .000| 432.49    .000| 542.49    .000
  103.33    .009| 213.34    .002| 323.33    .000| 433.33    .000| 543.32    .000
  104.17    .009| 214.17    .002| 324.17    .000| 434.16    .000| 544.16    .000
  105.00    .009| 215.00    .002| 325.00    .000| 434.99    .000| 544.99    .000
  105.83    .008| 215.84    .002| 325.83    .000| 435.83    .000| 545.82    .000
  106.67    .008| 216.67    .002| 326.67    .000| 436.66    .000| 546.66    .000
  107.50    .008| 217.50    .002| 327.50    .000| 437.49    .000|
  108.33    .008| 218.34    .002| 328.33    .000| 438.33    .000|
  109.17    .008| 219.17    .002| 329.17    .000| 439.16    .000|
-----------------------------------------------------------------------------
001:0032---------------------------------------------------------------------
*#
*#   Catchment SA7 - Strittmatter road drainage d\s of SWM area - uncontrolled
*#   (Strittmatter A7, 0.32 hectares)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .32
| 06:000307 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       .10          .22
    Dep. Storage     (mm)=       .80         1.50
    Average Slope     (%)=      2.00         2.00
    Length            (m)=     46.19        40.00
    Mannings n           =      .013         .250

    Max.eff.Inten.(mm/hr)=    162.24        71.61
              over (min)      10.00        10.00
    Storage Coeff.  (min)=      1.08 (ii)    9.14 (ii)
    Unit Hyd. Tpeak (min)=     10.00        10.00
    Unit Hyd. peak  (cms)=       .17          .11
                                                       *TOTALS*
    PEAK FLOW       (cms)=       .03          .03        .061 (iii)
    TIME TO PEAK    (hrs)=      1.00         1.00       1.000
    RUNOFF VOLUME    (mm)=     98.15        42.82      53.883
    TOTAL RAINFALL   (mm)=     98.95        98.95      98.950
    RUNOFF COEFFICIENT   =       .99          .43        .545
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  64.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0033---------------------------------------------------------------------
*#
*#   Catchment SA8 (Strittmatter A8, 0.46 hectares)
*#   NOT ROUTED INTO POND>>>> FLOWS UNCONTROLLED DOWN ROAD
*#   --- Area decreased May 2000
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*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .46
| 05:000308 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      .14         .32
    Dep. Storage     (mm)=      .80        1.50
    Average Slope     (%)=     2.00        2.00
    Length            (m)=    55.38       40.00
    Mannings n           =     .013        .250

    Max.eff.Inten.(mm/hr)=   162.24       71.61
               over (min)     10.00       10.00
    Storage Coeff.  (min)=     1.20 (ii)   9.27 (ii)
    Unit Hyd. Tpeak (min)=    10.00       10.00
    Unit Hyd. peak  (cms)=      .17         .11
                                                     *TOTALS*
    PEAK FLOW       (cms)=      .04         .05         .087 (iii)
    TIME TO PEAK    (hrs)=     1.00        1.00        1.000
    RUNOFF VOLUME    (mm)=    98.15       42.82       53.883
    TOTAL RAINFALL   (mm)=    98.95       98.95       98.950
    RUNOFF COEFFICIENT   =      .99         .43         .545
     *** WARNING: Storage Coefficient is smaller than DT!
                 Use a smaller DT or a larger area.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------
001:0034--------------------------------------------------------
*#
*#   Catchment SA9 - Strittmatter road drainage d/s of SWM area
*#   NOT ROUTED INTO POND>>>> FLOWS UNCONTROLLED DOWN ROAD
*#   (Strittmatter A9, 0.08 hectares, C= 0.95)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .08
| 09:000410 DT=10.00 |   Total Imp(%)=   95.00   Dir. Conn.(%)=   95.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      .08         .00
    Dep. Storage     (mm)=      .80        1.50
    Average Slope     (%)=     2.00        2.00
    Length            (m)=    23.09       40.00
    Mannings n           =     .013        .250

    Max.eff.Inten.(mm/hr)=   162.24       56.88
               over (min)     10.00       10.00
    Storage Coeff.  (min)=      .71 (ii)   9.55 (ii)
    Unit Hyd. Tpeak (min)=    10.00       10.00
    Unit Hyd. peak  (cms)=      .17         .11
                                                     *TOTALS*
    PEAK FLOW       (cms)=      .03         .00         .035 (iii)
    TIME TO PEAK    (hrs)=     1.00        1.17        1.000
    RUNOFF VOLUME    (mm)=    98.15       39.49       95.217
    TOTAL RAINFALL   (mm)=    98.95       98.95       98.950
    RUNOFF COEFFICIENT   =      .99         .40         .962
     *** WARNING: Storage Coefficient is smaller than DT!
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                  Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0035-----------------------------------------------------------------------
*#    Add hydrograph #307 to hyd #410 to SWM area discharge for outflow from
*#    Strittmatter development (must be below diversion flow)
--------------------
| ADD HYD (000411) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                 ID1 02:000406    28.90     .412    1.67  35.05    .000
                +ID2 06:000307      .32     .061    1.00  53.88    .000
                +ID3 05:000308      .46     .087    1.00  53.88    .000
                +ID4 09:000410      .08     .035    1.00  95.22    .000
                    ===================================================
                 SUM 04:000411    29.76     .495    1.17  35.71    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0036-----------------------------------------------------------------------
*#
*#   Add major system overflow from diversion to County Road drainage
*#   below diversion (Areas A4 and A5)
*#
--------------------
| ADD HYD (000414) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                 ID1 01:000412      .47     .391    1.00  62.97    .000
                +ID2 03:000204      .37     .095    1.00  62.97    .000
                    ===================================================
                 SUM 02:000414      .84     .486    1.00  62.97    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0037-----------------------------------------------------------------------
*#   Church Street Intersection
*#
*#   Add hydrograph from Strittmatter Property (hyd #411)
*#   to County Road 24 Drainage at Church Street
*#
--------------------
| ADD HYD (000205) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                 ID1 02:000414      .84     .486    1.00  62.97    .000
                +ID2 04:000411    29.76     .495    1.17  35.71    .000
                    ===================================================
                 SUM 01:000205    30.60     .902    1.00  36.45    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0038-----------------------------------------------------------------------
*#   Catchment A6 from Triton Study  (0.31 hectares, C= 0.6)
*#
----------------------
```

```
| DESIGN STANDHYD     |   Area     (ha)=      .31
| 02:000106 DT=10.00 |   Total Imp(%)=    50.00   Dir. Conn.(%)=   50.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .16          .16
     Dep. Storage      (mm)=        .80         1.50
     Average Slope      (%)=       4.00         4.00
     Length             (m)=      45.46        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=     162.24        56.88
               over (min)       10.00        10.00
     Storage Coeff.  (min)=        .87 (ii)     8.05 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=        .17          .12
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .07          .02            .088 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.000
     RUNOFF VOLUME    (mm)=      98.15        39.51          68.833
     TOTAL RAINFALL   (mm)=      98.95        98.95          98.950
     RUNOFF COEFFICIENT   =        .99          .40            .696
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0039------------------------------------------------------------------------
*#   Add hydrograph from Catchments A6 to Upstream Hydrograph
--------------------
| ADD HYD (000206) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------               (ha)      (cms)    (hrs)   (mm)    (cms)
                   ID1 01:000205    30.60      .902     1.00  36.45     .000
                  +ID2 02:000106      .31      .088     1.00  68.83     .000
                   =====================================================
                   SUM 03:000206    30.91      .991     1.00  36.78     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0040------------------------------------------------------------------------
*#
*#   Catchment A7 from Triton Study  (0.24 hectares, C= 0.7)
*#
----------------------
| DESIGN STANDHYD     |   Area     (ha)=      .24
| 01:000107 DT=10.00 |   Total Imp(%)=    60.00   Dir. Conn.(%)=   60.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .14          .10
     Dep. Storage      (mm)=        .80         1.50
     Average Slope      (%)=       2.00         2.00
     Length             (m)=      40.00        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=     162.24        56.88
               over (min)       10.00        10.00
     Storage Coeff.  (min)=        .99 (ii)     9.83 (ii)
```

```
     Unit Hyd. Tpeak (min)=      10.00         10.00
     Unit Hyd. peak  (cms)=        .17           .11
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .06           .01           .075 (iii)
     TIME TO PEAK    (hrs)=       1.00          1.17          1.000
     RUNOFF VOLUME    (mm)=      98.15         39.51         74.696
     TOTAL RAINFALL   (mm)=      98.95         98.95         98.950
     RUNOFF COEFFICIENT   =        .99           .40           .755
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
               CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0041---------------------------------------------------------------------
*#
*#   Catchment A8 from Triton Study  (0.30 hectares, C= 0.7)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .30
| 02:000108 DT=10.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   60.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .18           .12
     Dep. Storage     (mm)=        .80          1.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=      44.72         40.00
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=     162.24         56.88
               over (min)       10.00         10.00
     Storage Coeff.  (min)=        .86 (ii)     8.04 (ii)
     Unit Hyd. Tpeak (min)=      10.00         10.00
     Unit Hyd. peak  (cms)=        .17           .12
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .08           .01           .096 (iii)
     TIME TO PEAK    (hrs)=       1.00          1.00          1.000
     RUNOFF VOLUME    (mm)=      98.15         39.51         74.696
     TOTAL RAINFALL   (mm)=      98.95         98.95         98.950
     RUNOFF COEFFICIENT   =        .99           .40           .755
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
               CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0042---------------------------------------------------------------------
*#  Add hydrographs from Catchments A7 and A8
--------------------
| ADD HYD (000207) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 02:000108      .30      .096    1.00  74.70    .000
                 +ID2 01:000107      .24      .075    1.00  74.70    .000
                 ==================================================
```

```
                  SUM 04:000207      .54      .171     1.00  74.70     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0043----------------------------------------------------------------------
 *#   Add summed hydrographs from Catchments A7+A8 to Upstream Hydrograph
 --------------------
 | ADD HYD (000208) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
 --------------------               (ha)     (cms)    (hrs)    (mm)    (cms)
                  ID1 03:000206    30.91      .991     1.00  36.78     .000
                 +ID2 04:000207      .54      .171     1.00  74.70     .000
                  =====================================================
                  SUM 01:000208    31.45     1.162     1.00  37.43     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0044----------------------------------------------------------------------
 *#
 *#   Catchment A9 from Triton Study  (0.32 hectares, C= 0.7)
 *#
 ----------------------
 | DESIGN STANDHYD    |   Area    (ha)=     .32
 | 02:000109 DT=10.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   60.00
 ----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .19          .13
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=        .20          .20
     Length            (m)=      46.19        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     162.24        49.00
               over (min)       10.00        20.00
     Storage Coeff.  (min)=       2.15 (ii)    20.88 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=        .17          .05
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .09          .01              .091 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.33             1.000
     RUNOFF VOLUME    (mm)=      98.15        39.52            74.696
     TOTAL RAINFALL   (mm)=      98.95        98.95            98.950
     RUNOFF COEFFICIENT   =        .99          .40              .755
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0045----------------------------------------------------------------------
 *#   Add hydrograph from Catchments A9 to upstream drainage
 *#
 **#   THIS IS THE FLOW AT MH 56 WHICH IS THE LIMITING CONSTRAINT....
 *#   5 year - 0.68 cms
 *#   100 year - 1.29 cms
 *#
 --------------------
```

```
| ADD HYD (000209) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.      DWF
--------------------               (ha)      (cms)    (hrs)   (mm)     (cms)
                 ID1 01:000208     31.45     1.162     1.00   37.43     .000
                +ID2 02:000109       .32      .091     1.00   74.70     .000
                 ==========================================================
                 SUM 03:000209     31.77     1.253     1.00   37.80     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------
001:0046-------------------------------------------------------------------
*#
*#   Catchment A10 from Triton Study  (0.21 hectares, C= 0.7)
*#
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .21
| 04:000110 DT=10.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   60.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .13          .08
     Dep. Storage     (mm)=         .80         1.50
     Average Slope     (%)=        1.00         1.00
     Length            (m)=       37.42        40.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=      162.24        56.88
               over (min)         10.00        10.00
     Storage Coeff.  (min)=        1.17 (ii)   12.06 (ii)
     Unit Hyd. Tpeak (min)=       10.00        10.00
     Unit Hyd. peak  (cms)=         .17          .10
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .06          .01           .065 (iii)
     TIME TO PEAK    (hrs)=        1.00         1.17          1.000
     RUNOFF VOLUME    (mm)=       98.15        39.51         74.696
     TOTAL RAINFALL   (mm)=       98.95        98.95         98.950
     RUNOFF COEFFICIENT   =         .99          .40           .755
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
001:0047-------------------------------------------------------------------
*#   Add hydrograph from Catchment A10 to Upstream Hydrograph
*#   represents total catchment flow to Credit River
--------------------
| ADD HYD (000204) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.      DWF
--------------------               (ha)      (cms)    (hrs)   (mm)     (cms)
                 ID1 03:000209     31.77     1.253     1.00   37.80     .000
                +ID2 04:000110       .21      .065     1.00   74.70     .000
                 ==========================================================
                 SUM 01:000204     31.98     1.318     1.00   38.04     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------
001:0048-------------------------------------------------------------------
      FINISH
```

```
--------------------------------------------------------------------------------
********************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
 0003 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0004 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0006 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0007 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0009 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0011 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0016 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0020 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0021 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0023 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0024 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0026 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0032 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0033 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0034 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0038 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0040 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0041 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0044 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0046 DESIGN STANDHYD
```

```
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
   Simulation ended on 2000-06-01     at 10:48:27
===============================================================================
```

APPENDIX B

POST MCMURCHY DEVELOPMENT (ULTIMATE CONDITION)
SWMHYMO MODELLING RESULTS

STORM SEWER DESIGN SHEET
ULTIMATE CONDITION (McMURCHY DEV.)

R.J. BURNSIDE & ASSOCIATES LIMITED
ENGINEERS-HYDROGEOLIGISTS-ENVIRONMENTAL CONSULTANTS

8500 TORBRAM ROAD, SUITE 56, BRAMPTON, ONTARIO L6T5C6
TELEPHONE: 905-793-9239 FAX: 905-793-5018

Date : 01-Jun-00
Project : Strittmatter Property
Municipality : Township of Erin
Designer : LD
Checker :

Q = 2.778 CIA
Q: Peak Flow(l/sec)
C: Runoff coeficient
A : Area(Ha)
I: Rainfall Intensity (mm/hr) I =A/(B+Tc)^c
Manning's 0.013

Township of Erin Rainfall I.D.F. 5 yr. storm
(Standards based on Malton I.D.F. curves)
A= 820.0
B= 4.6
C= 0.780

Location										Sewer Data					
Street Name	From	To	AREA A ha	COEF C	Individual 2.78AC	Accumulated 2.78AC	Time of Concentration (mins)	Rainfall Intensity (mm/hr)	Peak Flow (l/s)	Diameter (mm)	Slope (%)	Length (m)	Capacity (l/s)	Velocity (m/s)	Time of Flow (mins)
Upper Canada Drive	MHCB 5	MHCB 4	0.54	0.4	0.60	0.60	10.00	101.30	61	300	7.85	75.0	283	3.87	0.32
	MHCB 4	MHCB 3	0.53	0.4	0.59	1.19	10.32	99.59	118	300	7.81	64.0	282	3.86	0.28
	MHCB 3	MH B	0.41	0.4	0.46	1.65	10.60	98.18	162	300	8	22.5	285	3.91	0.10
Street C	MHCB 7	DCBMH 6	22.4	0.3	18.68	18.68	10.00	(see note 1)	59	450	1.5	39.5	364	2.22	0.30
	DCBMH 6	MH B	1.04	0.4	1.16	1.16	10.30	99.73	174	450	1.5	38.0	364	2.22	0.29
Upper Canada Drive	MH B	headwall					10.69	(see note 3)	336	525	1	27.5	449	2.01	0.23
	DICB (RT)	DIMH C					11.70		142	375	1	10.0	183	1.60	0.10
	DIMH C	headwall					11.80	(see note 4)	283	450	1	12.8	297	1.81	0.12
	pond	DICB J	(see note 5)	Refer to R.J. Burnside SWM Report					271	375	0.71	4.5	154	1.35	0.06
	DICB J	MH A				"			271	750	0.85	15.0	1071	2.35	0.11
	MH A	MH D				"			271	750	0.85	19.5	1071	2.35	0.14
	MH D	MH E				"			271	750	0.37	33.0	707	1.55	0.35
	MH E	MH F				"			302	750	2	22.5	1643	3.60	0.10
Diversion from County Rd. 24 (Triton study)	DICB 70	DICB 69	2.4	0.5	3.34	3.34	10.00	101.30	338	525	5.6	78.0	1062	4.75	0.27
	DICB 69	DICB 67	0.25	0.5	0.35	3.68	10.27	99.85	368	525	5.79	73.0	1080	4.83	0.25
	DICB 67	DCB 66	0.68	0.5	0.95	4.63	10.53	98.55	456	525	7.23	28.0	1207	5.40	0.09
New Diversion System	DCB 66	MH G				(No further inflow)			456	525	4.27	21.5	927	4.15	0.09
	MH G	MH H							456	525	1.25	53.5	502	2.25	0.40
	MH H	MH I							456	525	6.2	10.0	1117	5.00	0.03
	MH I	headwall							456	525	1	15.0	449	2.01	0.12

NOTES:

1) **The peak flow of 59 l/s for the storm sewer from MHCB 7 to DCBMH 6 represents the 5 year routed flow from the developed McMurchy ponding area.**

2) **The flow from DCBMH 6 to MH B was determined using a combined flow from MHCB 7 to DCBMH 6 (5 yr. SWMHYMO), and DCBMH 6 to MH B using the rational method (5 yr. storm). The sewers on Strittmatter's line will have a 5 year flow restraint.**

3) **The peak flow from MH B to headwall (in the pond) is the combined flow from Street C and Upper Canada Drive to MC B.**

4) The peak flow from DIMH C to pond is the 100 year storm flows from catchment SA4 as well as the carryover flow from the upstream catchments (SA1, SA2, and SA3) This sewer must have the capacity to convey all of the runoff from the 100 year event to the pond (see Catchbasin Design Sheet).

5) **5 year outflow from Strittmatter pond (271 l\s) spills partly through the high flow outlet**

Post McMurchy Development (Ultimate Condition)

Summary of Peak Flows									
Outlet	Pre-Development			Post Strittmatter Development			Ultimate Condition		
	2 Year	5 Year	100 Year	2 Year	5 Year	100 Year	2 Year	5 Year	100 Year
A	.637	.806	2.344	.186	.269	.495	.187	.302	.499

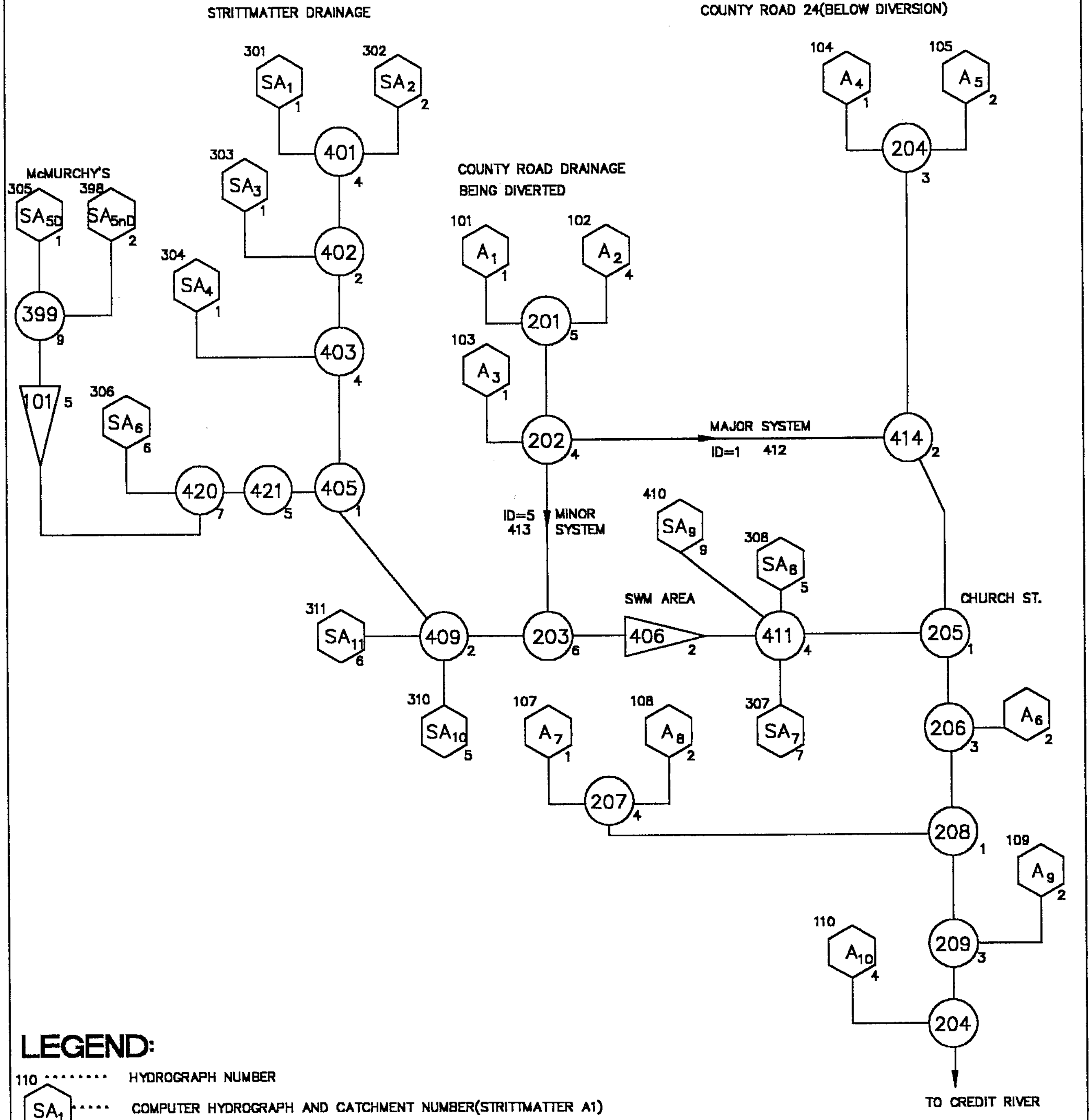
Note: I) Changes in the flows from McMurchy's Pond only affect the peak flows at Outlet A.

Ultimate Condition (Post McMurchy Development) Pond Performance					
Rainfall Event	Pond #1			McMurchy Pond	
	Outflow, m^3/s	Depth, m	Volume, m^3	Outflow m^3/s	Volume, m^3
25 mm	0.135	0.47	170	0.024	880
2 Year	0.167	0.62	310	0.035	1300
5 Year	0.271	1.04	670	0.058	2600
100 Year	0.434	2.00	1780	0.157	7300

Note: I) Pond 2 is not affected by changes in McMurchy flows so it is not included in the above table.

SWMHYMO SCHEMATIC
STRITTMATTER DEVELOPMENT, HILLSBURGH
ULTIMATE CONDITION (POST McMURCHY DEV.)

- ROUTE HWY DRAINAGE (3.3ha) THRU STRITTMATTER POND
- REVISED MAY/17/99–ADDED McMURCHY LANDS & BERM
- REVISED MARCH/20/00–MODIFIED MODELLING SUBCATCHMENTS



LEGEND:

110 .... HYDROGRAPH NUMBER

SA1 ..... COMPUTER HYDROGRAPH AND CATCHMENT NUMBER(STRITTMATTER A1)

4 ..... CELL STORAGE ID (SWMHYMO PROGRAM)

207 ..... ADD HYDROGRAPH (HYDROGRAPH NUMBER INSIDE)

4 ..... CELL STORAGE ID

406 ... ROUTE RESERVOIR (HYDROGRAPH NUMBER INSIDE)

2 ... CELL STORAGE ID

BURNSIDE DEVELOPMENT SERVICES
A DIVISION OF R.J. BURNSIDE AND ASSOCIATES LIMITED
DEVELOPMENT ENGINEERING & MANAGEMENT,
STORMWATER MANAGEMENT & COMMUNAL SYSTEMS
8500 TORBRAM ROAD, SUITE 56, BRAMPTON, ONTARIO L6T 5C6
TELEPHONE: 905-793-9239 FAX: 905-793-5018

S405INT2.DWG

01-Jun-00

Strittmatter Development, Village of Hillsburgh
Town of Erin

Summary of Hydrologic Analysis for Ultimate Development Conditions
Drainage Area to County Road 24 Only

Catchment ID	Drainage Area	5 Year Flows, m^3/s				100 Year Flows, m^3/s			
		Local Runoff	Combined Runoff	Controlled Runoff	Storage Used	Local Runoff	Combined Runoff	Controlled Runoff	Storage Used (m^3)
Strittmatter Drainage									
SA1	0.54	0.046	0.046	0.046	-	0.105	0.105	0.105	-
SA2	0.53	0.045	0.091	0.091	-	0.103	0.209	0.209	-
SA3	0.41	0.035	0.126	0.126	-	0.080	0.289	0.289	-
SA4	0.41	0.035	0.161	0.161	-	0.080	0.369	0.369	-
SA5 D*	12.40	0.957	0.957		-	0.744	0.744		-
SA5 nD**	10.00	0.235	1.068	0.058	2598.00	2.150	2.511	0.157	7312.00
SA6	1.04	0.063	0.240	0.240	-	0.166	0.576	0.576	-
SA10	0.36	0.034	0.274	0.274	-	0.070	0.646	0.646	-
SA11	0.35	0.092	0.366	0.366	-	0.154	0.801	0.801	
County Road 24 Drainage Being Diverted (Data from Triton Study (1998)									
A1	2.40	0.312	0.312	0.312	-	0.604	0.604	0.604	-
A2	0.25	0.033	0.344	0.344	-	0.064	0.668	0.668	-
A3	0.68	0.089	0.434	0.434	(minor system)	0.173	0.841	0.450	(minor system)
				-	(major system)			0.391	(major system)
County Road + Strittmatter Drainage Routed Through Strittmatter SWM Area			0.80	0.27	676.00		1.25	0.43	1784.00
SA7	0.32	0.027	0.027	0.027	-	0.061	0.061	0.061	-
SA8	0.46	0.038	0.038	0.038	-	0.087	0.087	0.087	-
SA9	0.08	0.021	0.302	0.302	-	0.035	0.499	0.499	-
A4	0.09	0.012	0.012	0.012	-	0.023	0.023	0.023	-
A5	0.28	0.037	0.049	0.049	-	0.072	0.095	0.095	-
A6	0.31	0.048	0.351	0.351	-	0.088	1.027	1.027	-
A7	0.24	0.041	0.041	0.041	-	0.075	0.075	0.075	-
A8	0.30	0.054	0.443	0.443	-	0.096	1.198	1.198	-
A9	0.32	0.053	0.495	0.495	-	0.091	1.289	1.289	-
A10	0.21	0.036	0.531	0.531	-	0.065	1.354	1.354	-
Total	31.98	Total Flows to Credit River		0.531				1.354	

* SA5 represents the McMurchy Property . Drainage from these lands is controlled on-site in temporary facility.

28-Apr-00

Strittmatter Development, Village of Hillsburgh
Town of Erin

Stage-Storage-Discharge Relationship for Pond #1 (revised April 2000)
Ultimate Condition -- Post McMurchy

Low Flow Outlet :	Conc. Pipe, diameter (m):	0.45
	Orifice, diameter (m):	0.35
	Invert Elevation (m):	442.95
Major Flow Outlet:	Conc. Pipe, diameter (m):	0.2
	Opening Elevation (m):	443.8
Centre of Low Flow Orifice, m		443.13
Centre of Low Flow Pipe, m		443.18
Elevation of Major Flow Pipe, m		443.80

Depth,m	Elevation, m	Low Flow Outlet	Major Flow Outlet	Total Flow, m^3/s	Total Storage, m^3
0.00	442.95	0.000	0.000	0.000	0.00
0.25	443.20	0.070	0.000	0.070	26.25
0.30	443.25	0.090	0.000	0.090	45.36
0.40	443.35	0.121	0.000	0.121	107.52
0.50	443.45	0.146	0.000	0.146	210.00
0.80	443.75	0.202	0.000	0.202	464.39
1.05	444.00	0.239	0.037	0.277	686.89
1.10	444.05	0.246	0.042	0.288	733.38
1.25	444.20	0.265	0.053	0.318	878.13
1.40	444.35	0.283	0.062	0.345	1032.38
1.60	444.55	0.305	0.072	0.378	1256.39
2.00	444.95	0.345	0.090	0.435	1786.41
2.10	445.05	0.355	0.093	0.448	1939.84
2.20	445.15	0.364	0.097	0.461	2103.02
2.30	445.25	0.373	0.101	0.473	2276.62

file: i:\Lorena\s-405\Pond_newpm.wk4

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

 SSSSS  W    W  M    M  H    H  Y    Y  M    M   OOO       999   55555 =========
 S       W W W  MM MM   H    H   Y Y    MM MM   O   O     9   9  5     =========
 SSSSS  W W W   M M M   HHHHH     Y     M M M   O   O  ## 9   9  5     Ver.  3.1
     S   W W    M    M  H    H    Y     M    M  O   O      9999  5555  Oct. 1997
 SSSSS   W W    M    M  H    H    Y     M    M   OOO          9      5 =========
                                                          9   9      5 # 3877524
      StormWater Management HYdrologic Model               999   5555  =========

 **************************************************************************
 ************************** SWMHYMO-95w Ver/3.1 **************************
 *******  A single event and continuous hydrologic simulation model  *******
 *******     based on the principles of HYMO and its successors      *******
 *******                 OTTHYMO-83 and OTTHYMO-89.                  *******
 **************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.           *******
 *******                 Ottawa,  Ontario: (613) 727-5199            *******
 *******                 Gatineau, Quebec: (819) 243-6858            *******
 *******                 E-Mail: swmhymo@jfsa.Com                    *******
 **************************************************************************

 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: R.J. Burnside & Associates Ltd.              +++++++
 +++++++                Brampton             SERIAL#:3877524         +++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 **************************************************************************
 *******            ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *******
 *******            Maximum value for ID numbers  :    10            *******
 *******            Max. number of rainfall points:  5000            *******
 *******            Max. number of flow points    :  5000            *******
 **************************************************************************


 ********************   D E T A I L E D   O U T P U T   ******************
 **************************************************************************
 *      DATE: 2000-06-01     TIME: 10:47:02     RUN COUNTER: 001097      *
 **************************************************************************
 * Input   filename: I:\LORENA\S-405\CORREC~1\MAY00\ULT5.DAT              *
 * Output  filename: I:\LORENA\S-405\CORREC~1\MAY00\ULT5.out              *
 * Summary filename: I:\LORENA\S-405\CORREC~1\MAY00\ULT5.sum              *
 * User comments:                                                         *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 **************************************************************************

--------------------------------------------------------------------------------
001:0001------------------------------------------------------------------------
*#******************************************************************************
*#  Project Name: [ Strittmatter Development, Hillsburgh] Project Number: [S-405
*#  Date        : 12-17-1998
*#  Modeller    : [LD]
*#  Company     : R. J. Burnside & Associates Ltd.
*#  License #   :  3877524
*#******************************************************************************
*#  Hydrologic analysis of County Road 24 stormsewer system combined with
*#  Strittmatter Development at the north end of the village of Hillsburgh.
*#
*#  McMurchy Berm added May '99
*#
```

```
*#  5 year storm event
*#
*#  Data from County Rd. 24 Stormsewer Analysis (Triton) used
*#  for Road Catchments. Strittmatter Development discharge
*#  includes stormwater controls
*#
*#  Made modifications to this file to route the road portion or upper canada SA
*#  into the pond and let the external property SA8 flow uncontrolled.  This fil
*#  was run to obtain volume requirements for the pond to store throttle the 100
*#  year flows of the ultimate condition.  Lot 1 was made available as pond area
*#  so SA10 decreased 0.32 ha and SA11 increased the same amount.
*#
*# File was further modified to let SA9 flow uncontrolled off site
*#
*# File was further modified to collect some of the drainage from SA8 at the
*# south end of Lot 1.  SA8 area decreased to 0.46 ha and SA10 area increased
*# to 0.36 ha.  Change in response to Triton comments May 19, 2000
*#
--------------------
| START            |  Project  dir.: I:\LORENA\S-405\CORREC~1\MAY00\
--------------------  Rainfall dir.: I:\LORENA\S-405\CORREC~1\MAY00\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
-------------------------------------------------------------------------------
001:0002-----------------------------------------------------------------------
*READ STORM          STORM_FILENAME=["c:\S-405\swmhymo\hazel.stm"
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1439.371
| Ptotal= 50.14 mm |                          B=  13.688
--------------------                          C=    .846
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm   =  3.00 hrs
                        Storm time step     = 10.00 min
                        Time to peak ratio  =   .33

                 TIME    RAIN |  TIME    RAIN  |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr  |   hrs   mm/hr |   hrs   mm/hr
                  .17   4.466 |  1.00  98.929  |  1.83   8.962 |  2.67   4.283
                  .33   5.747 |  1.17  42.990  |  2.00   7.369 |  2.83   3.877
                  .50   8.048 |  1.33  23.232  |  2.17   6.247 |  3.00   3.543
                  .67  13.224 |  1.50  15.419  |  2.33   5.419 |
                  .83  32.890 |  1.67  11.382  |  2.50   4.784 |

-------------------------------------------------------------------------------
001:0003-----------------------------------------------------------------------
*#   Catchment A4 from Triton Study  (0.09 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .09
| 01:000104 DT=10.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .04          .05
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       6.00         6.00
     Length            (m)=      24.49        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      98.93        20.18
```

```
                over (min)       10.00        10.00
     Storage Coeff.  (min)=        .64 (ii)   10.27 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=        .17          .11
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .01          .00          .012 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17         1.000
     RUNOFF VOLUME    (mm)=      49.34        12.35        27.144
     TOTAL RAINFALL   (mm)=      50.14        50.14        50.135
     RUNOFF COEFFICIENT  =         .98          .25          .541
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0004---------------------------------------------------------------------
*#
*#   Catchment A5 from Triton Study  (0.28 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .28
| 02:000105 DT=10.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .11          .17
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       6.00         6.00
     Length            (m)=      43.20        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      98.93        20.18
                over (min)       10.00        10.00
     Storage Coeff.  (min)=        .91 (ii)   10.53 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=        .17          .10
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .03          .01          .037 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17         1.000
     RUNOFF VOLUME    (mm)=      49.34        12.35        27.145
     TOTAL RAINFALL   (mm)=      50.14        50.14        50.135
     RUNOFF COEFFICIENT  =         .98          .25          .541
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0005---------------------------------------------------------------------
*#   Add summed hydrographs from Catchments A5 to A4
--------------------
| ADD HYD (000204) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
                  ID1 01:000104      .09     .012    1.00   27.14    .000
```

```
                +ID2 02:000105      .28     .037    1.00  27.14    .000
                 ==================================================
                 SUM 03:000204      .37     .049    1.00  27.14    .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------
001:0006-----------------------------------------------------------------
*#
*#   Proposed Strittmatter Development
*#
*#   Catchment SA1 (Strittmatter A1, 0.54 hectares)
*#
---------------------
| DESIGN STANDHYD    |   Area    (ha)=     .54
| 01:000301 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
---------------------
                                 IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=          .16          .38
    Dep. Storage      (mm)=          .80         1.50
    Average Slope      (%)=         3.00         3.00
    Length             (m)=        60.00        40.00
    Mannings n            =         .013         .250

    Max.eff.Inten.(mm/hr)=         98.93        25.97
              over (min)           10.00        10.00
    Storage Coeff.  (min)=          1.36 (ii)   12.08 (ii)
    Unit Hyd. Tpeak (min)=         10.00        10.00
    Unit Hyd. peak  (cms)=           .17          .10
                                                            *TOTALS*
    PEAK FLOW       (cms)=           .03          .02          .046 (iii)
    TIME TO PEAK    (hrs)=          1.00         1.17         1.000
    RUNOFF VOLUME    (mm)=         49.34        13.71        20.836
    TOTAL RAINFALL   (mm)=         50.14        50.14        50.135
    RUNOFF COEFFICIENT   =           .98          .27          .416
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*   =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------
001:0007-----------------------------------------------------------------
*#
*#   Catchment SA2 (Strittmatter A2, 0.53 hectares)
*#
---------------------
| DESIGN STANDHYD    |   Area    (ha)=     .53
| 02:000302 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
---------------------
                                 IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=          .16          .37
    Dep. Storage      (mm)=          .80         1.50
    Average Slope      (%)=         3.00         3.00
    Length             (m)=        59.44        40.00
    Mannings n            =         .013         .250

    Max.eff.Inten.(mm/hr)=         98.93        25.97
              over (min)           10.00        10.00
```

```
     Storage Coeff.  (min)=       1.35 (ii)   12.07 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=        .17          .10
                                                         *TOTALS*
     PEAK FLOW       (cms)=        .03          .02         .045 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17        1.000
     RUNOFF VOLUME    (mm)=      49.34        13.71       20.836
     TOTAL RAINFALL   (mm)=      50.14        50.14       50.135
     RUNOFF COEFFICIENT   =        .98          .27         .416
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0008------------------------------------------------------------------------
*#   Add hydrographs from Strittmatter A1 and A2
--------------------
| ADD HYD (000401) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                 ID1 01:000301      .54     .046    1.00   20.84    .000
                +ID2 02:000302      .53     .045    1.00   20.84    .000
                 ==================================================
                 SUM 04:000401     1.07     .091    1.00   20.84    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0009------------------------------------------------------------------------
*#
*#   Catchment SA3 (Strittmatter A3, 0.41 hectares)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .41
| 01:000303 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       .12          .29
     Dep. Storage      (mm)=       .80         1.50
     Average Slope      (%)=      3.00         3.00
     Length             (m)=     52.28        40.00
     Mannings n            =      .013         .250

     Max.eff.Inten.(mm/hr)=      98.93        25.97
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       1.25 (ii)   11.97 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=        .17          .10
                                                         *TOTALS*
     PEAK FLOW       (cms)=        .02          .01         .035 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17        1.000
     RUNOFF VOLUME    (mm)=      49.34        13.71       20.836
     TOTAL RAINFALL   (mm)=      50.14        50.14       50.135
     RUNOFF COEFFICIENT   =        .98          .27         .416
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```

```
          CN*   =  64.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0010------------------------------------------------------------------------
*#   Add hydrographs from Strittmatter A3 to Strittmatter (A1+A2)
--------------------
| ADD HYD (000402) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)      (cms)   (hrs)   (mm)    (cms)
                  ID1 01:000303      .41      .035    1.00   20.84     .000
                 +ID2 04:000401     1.07      .091    1.00   20.84     .000
                 ======================================================
                  SUM 02:000402     1.48      .126    1.00   20.84     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0011------------------------------------------------------------------------
*#
*#   Catchment SA4 (Strittmatter A4, 0.41 hectares)
*#
----------------------
| DESIGN STANDHYD    |    Area    (ha)=     .41
| 01:000304 DT=10.00 |    Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=          .12           .29
     Dep. Storage      (mm)=          .80          1.50
     Average Slope      (%)=         3.00          3.00
     Length             (m)=        52.28         40.00
     Mannings n            =         .013          .250

     Max.eff.Inten.(mm/hr)=         98.93         25.97
                over (min)          10.00         10.00
     Storage Coeff.  (min)=          1.25 (ii)    11.97 (ii)
     Unit Hyd. Tpeak (min)=         10.00         10.00
     Unit Hyd. peak  (cms)=           .17           .10
                                                               *TOTALS*
     PEAK FLOW       (cms)=           .02           .01          .035 (iii)
     TIME TO PEAK    (hrs)=          1.00          1.17         1.000
     RUNOFF VOLUME    (mm)=         49.34         13.71        20.836
     TOTAL RAINFALL   (mm)=         50.14         50.14        50.135
     RUNOFF COEFFICIENT   =           .98           .27          .416
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*   =  64.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0012------------------------------------------------------------------------
*#   Add hydrographs from Strittmatter A4 to Strittmatter Upstream Drainage
--------------------
| ADD HYD (000403) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)      (cms)   (hrs)   (mm)    (cms)
                  ID1 01:000304      .41      .035    1.00   20.84     .000
                 +ID2 02:000402     1.48      .126    1.00   20.84     .000
```

```
                 ==================================================
                 SUM 04:000403     1.89      .161     1.00  20.84     .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0013----------------------------------------------------------------------
*#
*#   Catchment SA5 (Strittmatter A5, 22.4 hectares of upstream
*#   agricultural drainage)
*#
*#
*#   Dec.1,1999: This area, known as the McMurchy Property is assumed to be
*#   developed for the purpose of sizing a PRELIMINARY stormwater facility.
*#
*#   Total Area: 22.4 hectares
*#   Assume:     10.0 hectares non-developable
*#               12.4 hectares developable (30% impervious)
*#
*#   Note: Although site exhibits extremely high infiltration capacity, average
*#   runoff potential is assumed for the purpose of sizing future stormwater
*#   facility.  It is expected that at-source runoff controls (ie. infiltration
*#   facilities)will be implemented to reduce runoff potential for the developme
*#
--------------------
| DESIGN NASHYD      |   Area     (ha)=    10.00   Curve Number   (CN)=58.00
| 01:000305 DT=15.00 |   Ia       (mm)=    1.500   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=      .320

    Unit Hyd Qpeak  (cms)=    1.194

    PEAK FLOW       (cms)=     .235 (i)
    TIME TO PEAK    (hrs)=    1.333
    RUNOFF VOLUME    (mm)=    8.474
    TOTAL RAINFALL   (mm)=   50.135
    RUNOFF COEFFICIENT   =     .169

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

     *** WARNING: Time step is too large for value of TP.
                  R.V. may be ok.  Peak flow could be off.
------------------------------------------------------------------------------
001:0014----------------------------------------------------------------------
--------------------
| DESIGN STANDHYD    |   Area     (ha)=    12.40
| 02:000398 DT=15.00 |   Total Imp(%)=    30.00   Dir. Conn.(%)=    20.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=      3.72         8.68
    Dep. Storage      (mm)=       .80         1.50
    Average Slope      (%)=      5.00         5.00
    Length             (m)=    287.52        40.00
    Mannings n            =      .013         .250

    Max.eff.Inten.(mm/hr)=      98.93        21.06
               over (min)       10.00        10.00
    Storage Coeff.  (min)=       2.98 (ii)   12.98 (ii)
    Unit Hyd. Tpeak (min)=      10.00        10.00
    Unit Hyd. peak  (cms)=        .16          .09
                                                          *TOTALS*
    PEAK FLOW       (cms)=        .67          .32          .957 (iii)
    TIME TO PEAK    (hrs)=       1.00         1.17         1.000
```

```
     RUNOFF VOLUME     (mm)=       44.64          9.50           16.526
     TOTAL RAINFALL    (mm)=       50.14         50.14           50.135
     RUNOFF COEFFICIENT    =         .89           .19             .330
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0015------------------------------------------------------------------------
--------------------
| ADD HYD (000399) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
               ID1 01:000305      10.00      .235    1.33    8.47    .000
              +ID2 02:000398      12.40      .957    1.00   16.53    .000
               ==========================================================
               SUM 09:000399      22.40     1.068    1.00   12.93    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0016------------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR  |    Requested routing time step = 15.0 min.
|  IN>09:(000399)  |
| OUT<05:(000101)  |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                         (cms)    (ha.m.)   |   (cms)    (ha.m.)
                          .000   .0000E+00  |     .200  .8700E+00
                          .050   .1850E+00  |     .250  .1270E+01
                          .080   .4800E+00  |    2.000  .1300E+01

     ROUTING RESULTS               AREA     QPEAK     TPEAK        R.V.
     --------------------          (ha)     (cms)     (hrs)        (mm)
     INFLOW >09: (000399)         22.40     1.068     1.000      12.931
     OUTFLOW<05: (000101)         22.40      .058     2.333      12.930
    OVERFLOW<08: (000150)           .00      .000      .000        .000

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=     5.391
                  TIME SHIFT OF PEAK FLOW          (min)=    80.00
                  MAXIMUM   STORAGE   USED       (ha.m.)=.2598E+00

--------------------------------------------------------------------------------
001:0017------------------------------------------------------------------------
--------------------
| PRINT HYD        |    AREA        (ha)=    22.400
| ID=05 (000101)   |    QPEAK      (cms)=      .058 (i)
| DT=10.00 PCYC= 5 |    TPEAK      (hrs)=     2.333
--------------------    VOLUME      (mm)=    12.930

     (i)   PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
   TIME     FLOW |  TIME     FLOW |  TIME     FLOW |  TIME     FLOW |  TIME     FLOW
    hrs      cms |   hrs      cms |   hrs      cms |   hrs      cms |   hrs      cms
    .00     .000|  19.17     .015|  38.33     .002|  57.50     .000|  76.67     .000
    .83     .005|  20.00     .013|  39.17     .002|  58.33     .000|  77.50     .000
   1.67     .053|  20.83     .012|  40.00     .002|  59.17     .000|  78.33     .000
   2.50     .058|  21.67     .011|  40.83     .002|  60.00     .000|  79.17     .000
   3.33     .056|  22.50     .011|  41.67     .002|  60.83     .000|  80.00     .000
```

```
   4.17     .054|  23.33     .010|  42.50     .002|  61.67     .000|  80.83     .000
   5.00     .053|  24.17     .009|  43.33     .001|  62.50     .000|  81.67     .000
   5.83     .051|  25.00     .008|  44.17     .001|  63.33     .000|  82.50     .000
   6.67     .049|  25.83     .008|  45.00     .001|  64.17     .000|  83.33     .000
   7.50     .045|  26.67     .007|  45.83     .001|  65.00     .000|  84.17     .000
   8.33     .042|  27.50     .006|  46.67     .001|  65.83     .000|  85.00     .000
   9.17     .039|  28.33     .006|  47.50     .001|  66.67     .000|  85.83     .000
  10.00     .036|  29.17     .006|  48.33     .001|  67.50     .000|  86.67     .000
  10.83     .033|  30.00     .005|  49.17     .001|  68.33     .000|  87.50     .000
  11.67     .030|  30.83     .005|  50.00     .001|  69.17     .000|  88.33     .000
  12.50     .028|  31.67     .004|  50.83     .001|  70.00     .000|  89.17     .000
  13.33     .026|  32.50     .004|  51.67     .001|  70.83     .000|  90.00     .000
  14.17     .024|  33.33     .004|  52.50     .001|  71.67     .000|  90.83     .000
  15.00     .022|  34.17     .003|  53.33     .001|  72.50     .000|  91.67     .000
  15.83     .020|  35.00     .003|  54.17     .000|  73.33     .000|  92.50     .000
  16.67     .019|  35.83     .003|  55.00     .000|  74.17     .000|  93.33     .000
  17.50     .017|  36.67     .003|  55.83     .000|  75.00     .000|
  18.33     .016|  37.50     .002|  56.67     .000|  75.83     .000|
-------------------------------------------------------------------------------
001:0018-----------------------------------------------------------------------
*#
*#   Catchment SA6 (Strittmatter A6, 1.04 hectares)
*#
----------------------
| DESIGN STANDHYD     |   Area     (ha)=    1.04
| 06:000306 DT=10.00 |   Total Imp(%)=   20.00   Dir. Conn.(%)=   10.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=        .21          .83
    Dep. Storage      (mm)=        .80         1.50
    Average Slope      (%)=       3.00         3.00
    Length             (m)=      83.27        40.00
    Mannings n            =       .013         .250

    Max.eff.Inten.(mm/hr)=       98.93        25.21
               over (min)        10.00        10.00
    Storage Coeff.  (min)=        1.65 (ii)   12.50 (ii)
    Unit Hyd. Tpeak (min)=       10.00        10.00
    Unit Hyd. peak  (cms)=         .17          .09
                                                          *TOTALS*
    PEAK FLOW       (cms)=         .03          .04          .063 (iii)
    TIME TO PEAK    (hrs)=        1.00         1.17         1.000
    RUNOFF VOLUME    (mm)=       49.34        13.55        17.126
    TOTAL RAINFALL   (mm)=       50.14        50.14        50.135
    RUNOFF COEFFICIENT   =         .98          .27          .342
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0019-----------------------------------------------------------------------
*#   Add routed hydrograph from Strittmatter A5 (McMurchy Property) to A6
--------------------
| ADD HYD (000420) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
                  ID1 05:000101    22.40     .058     2.33   12.93     .000
                 +ID2 06:000306     1.04     .063     1.00   17.13     .000
```

```
                    =====================================================
                    SUM 07:000420    23.44      .080     1.17  13.12     .000

        NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0020-----------------------------------------------------------------------
*#   Add OVERFLOW hydrograph from McMurchy Pond
--------------------
| ADD HYD (000421) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)     (cms)   (hrs)   (mm)    (cms)
                   ID1 08:000150     .00      .000     .00    .00     .000 **DRY**
                  +ID2 07:000420   23.44      .080    1.17  13.12     .000
                    =====================================================
                    SUM 05:000421    23.44      .080     1.17  13.12     .000

        NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0021-----------------------------------------------------------------------
--------------------
| ADD HYD (000405) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)     (cms)   (hrs)   (mm)    (cms)
                   ID1 05:000421   23.44      .080    1.17  13.12     .000
                  +ID2 04:000403    1.89      .161    1.00  20.84     .000
                    =====================================================
                    SUM 01:000405    25.33      .240     1.00  13.69     .000

        NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0022-----------------------------------------------------------------------
*#
*#   Catchment SA10 (Strittmatter A10, 0.36 hectares)
*#   --- Area increased May 2000
*#
----------------------
| DESIGN STANDHYD     |   Area     (ha)=     .36
| 05:000310 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       .11          .25
     Dep. Storage      (mm)=       .80         1.50
     Average Slope      (%)=     13.00        13.00
     Length             (m)=     48.99        40.00
     Mannings n            =      .013         .250

     Max.eff.Inten.(mm/hr)=      98.93        25.97
               over (min)        10.00        10.00
     Storage Coeff.  (min)=        .77 (ii)    7.68 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=        .17          .12
                                                         *TOTALS*
     PEAK FLOW       (cms)=        .02          .01          .034 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00         1.000
     RUNOFF VOLUME    (mm)=      49.34        13.71        20.836
     TOTAL RAINFALL   (mm)=      50.14        50.14        50.135
     RUNOFF COEFFICIENT   =        .98          .27          .416
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```

```
           CN*   =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 --------------------------------------------------------------------------------
 001:0023------------------------------------------------------------------------
 *#
 *#   Catchment SA11 (Strittmatter A11, Pond Surface, 0.35 hecatares)
 *#
 ---------------------
 | DESIGN STANDHYD     |   Area    (ha)=     .35
 | 06:000311 DT=10.00  |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
 ---------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .35          .00
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=        .10          .10
     Length            (m)=      48.30        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      98.93        67.48
               over (min)        10.00        20.00
     Storage Coeff.  (min)=       3.31 (ii)   23.60 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=        .16          .05
                                                             *TOTALS*
     PEAK FLOW       (cms)=        .09          .00            .092 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17           1.000
     RUNOFF VOLUME    (mm)=      49.34        43.95          49.281
     TOTAL RAINFALL   (mm)=      50.14        50.14          50.135
     RUNOFF COEFFICIENT   =        .98          .88            .983
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*   =  98.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 --------------------------------------------------------------------------------
 001:0024------------------------------------------------------------------------
 *#   Add hydrograph from Strittmatter A10 and A11 to hydrograph #405
 *#
 -------------------
 | ADD HYD (000409) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
 -------------------                 (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:000405   25.33     .240    1.00   13.69    .000
                   +ID2 05:000310     .36     .034    1.00   20.84    .000
                   +ID3 06:000311     .35     .092    1.00   49.28    .000
                    ===================================================
                    SUM 02:000409   26.04     .366    1.00   14.27    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 --------------------------------------------------------------------------------
 001:0025------------------------------------------------------------------------
 *#
 *#   Add in Areas A1, A2 and A3 from the County Road
 *#   and route total flow through proposed SWM area
 *#
```

```
*#
*#   Catchment A1 from Triton Study  (2.4 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD     |   Area     (ha)=    2.40
| 01:000101 DT=10.00 |   Total  Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .96          1.44
     Dep. Storage     (mm)=         .80          1.50
     Average Slope     (%)=        5.00          5.00
     Length            (m)=      126.49         40.00
     Mannings n           =        .013          .250

     Max.eff.Inten.(mm/hr)=       98.93         20.18
                over (min)        10.00         10.00
     Storage Coeff.  (min)=        1.82 (ii)    11.99 (ii)
     Unit Hyd. Tpeak (min)=       10.00         10.00
     Unit Hyd. peak  (cms)=         .17           .10
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .26           .05           .312 (iii)
     TIME TO PEAK    (hrs)=        1.00          1.17          1.000
     RUNOFF VOLUME    (mm)=       49.34         12.35         27.145
     TOTAL RAINFALL   (mm)=       50.14         50.14         50.135
     RUNOFF COEFFICIENT   =         .98           .25           .541
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0026------------------------------------------------------------------------
*#
*#   Catchment A2 from Triton Study  (0.25 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD     |   Area     (ha)=     .25
| 04:000102 DT=10.00 |   Total  Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .10           .15
     Dep. Storage     (mm)=         .80          1.50
     Average Slope     (%)=        5.00          5.00
     Length            (m)=       40.82         40.00
     Mannings n           =        .013          .250

     Max.eff.Inten.(mm/hr)=       98.93         20.18
                over (min)        10.00         10.00
     Storage Coeff.  (min)=         .92 (ii)    11.10 (ii)
     Unit Hyd. Tpeak (min)=       10.00         10.00
     Unit Hyd. peak  (cms)=         .17           .10
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .03           .01           .033 (iii)
     TIME TO PEAK    (hrs)=        1.00          1.17          1.000
     RUNOFF VOLUME    (mm)=       49.34         12.35         27.144
     TOTAL RAINFALL   (mm)=       50.14         50.14         50.135
     RUNOFF COEFFICIENT   =         .98           .25           .541
      *** WARNING: Storage Coefficient is smaller than DT!
```

```
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
               CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0027----------------------------------------------------------------------
*#   Add hydrographs from Catchments A1 and A2
--------------------
| ADD HYD (000201) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                 ID1 01:000101     2.40     .312    1.00  27.14    .000
                +ID2 04:000102      .25     .033    1.00  27.14    .000
                 ===================================================
                 SUM 05:000201     2.65     .344    1.00  27.14    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0028----------------------------------------------------------------------
*#
*#   Catchment A3 from Triton Study  (0.68 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .68
| 01:000103 DT=10.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .27          .41
     Dep. Storage     (mm)=         .80         1.50
     Average Slope     (%)=        6.00         6.00
     Length            (m)=       67.33        40.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=       98.93        20.18
                over (min)        10.00        10.00
     Storage Coeff.  (min)=        1.18 (ii)   10.81 (ii)
     Unit Hyd. Tpeak (min)=       10.00        10.00
     Unit Hyd. peak  (cms)=         .17          .10
                                                           *TOTALS*
     PEAK FLOW       (cms)=         .07          .01          .089 (iii)
     TIME TO PEAK    (hrs)=        1.00         1.17         1.000
     RUNOFF VOLUME    (mm)=       49.34        12.35        27.145
     TOTAL RAINFALL   (mm)=       50.14        50.14        50.135
     RUNOFF COEFFICIENT   =         .98          .25          .541
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
               CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0029----------------------------------------------------------------------
*#   Add hydrographs from Catchments A3 to hydrograph #201
*#   representing total highway flow to be routed through SWM facility
*#
```

```
--------------------
| ADD HYD (000202) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)    (cms)   (hrs)   (mm)   (cms)
                 ID1 01:000103       .68     .089    1.00  27.14    .000
                +ID2 05:000201      2.65     .344    1.00  27.14    .000
                 ==================================================
                 SUM 04:000202      3.33     .434    1.00  27.14    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0030------------------------------------------------------------------------
*#
*#   Direct minor system flows to SWM Area, major system stays on County Road
*#
----------------------
| COMPUTE DUALHYD     |   Average inlet capacities   [CINLET] =    .450  (cms)
| TotalHyd 04:000202 |   Number of inlets in system [NINLET] =      1
----------------------   Total minor system capacity         =    .450  (cms)
                          Total major system storage [TMJSTO] =       0.(cu.m.)

                   ID: NHYD         AREA     QPEAK      TPEAK      R.V.      DWF
                                    (ha)     (cms)      (hrs)      (mm)    (cms)
     TOTAL HYD.    04:000202        3.33      .434      1.000    27.145     .000
     ==========================================================================
     MAJOR SYST    01:000412         .00      .000       .000      .000     .000
     MINOR SYST    05:000413        3.33      .434      1.000    27.145     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0031------------------------------------------------------------------------
*#   Add minor highway drainage (hyd #202) to Strittmatter drainage (hyd #409)
--------------------
| ADD HYD (000203) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)    (cms)   (hrs)   (mm)   (cms)
                 ID1 05:000413      3.33     .434    1.00  27.14    .000
                +ID2 02:000409     26.04     .366    1.00  14.27    .000
                 ==================================================
                 SUM 06:000203     29.37     .800    1.00  15.73    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0032------------------------------------------------------------------------
*#   Strittmatter SWM Area
*#   Original Rating Curve (February 1990) revised July 1999 - same storage
*#
*#   Changed Low Flow Outlet Dec. 1, 1999 (from 150mm to 450mm)
*#   Changed Rating Curve (April 2000) with pond redesign
*#
---------------------
| ROUTE RESERVOIR    |    Requested routing time step = 10.0 min.
|  IN>06:(000203)    |
| OUT<02:(000406)    |    =========  OUTLFOW STORAGE TABLE  =========
---------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)    (ha.m.)   |   (cms)     (ha.m.)
                             .000  .0000E+00   |     .288  .7330E-01
                             .070  .2600E-02   |     .318  .8780E-01
                             .090  .4500E-02   |     .345  .1032E+00
                             .121  .1070E-01   |     .378  .1256E+00
                             .146  .2100E-01   |     .428  .1713E+00
```

```
                             .202  .4640E-01   |      .448  .1940E+00
                             .277  .6870E-01   |      .467  .2188E+00

    ROUTING RESULTS                AREA      QPEAK      TPEAK        R.V.
    --------------------           (ha)      (cms)      (hrs)        (mm)
    INFLOW >06: (000203)          29.37       .800      1.000      15.729
    OUTFLOW<02: (000406)          29.37       .271      1.500      15.729
   OVERFLOW<05: (000408)            .00       .000       .000        .000

                        PEAK   FLOW   REDUCTION [Qout/Qin](%)=   33.937
                        TIME SHIFT OF PEAK FLOW          (min)=   30.00
                        MAXIMUM  STORAGE   USED       (ha.m.)=.6759E-01

--------------------------------------------------------------------------------
001:0033------------------------------------------------------------------------
--------------------
| PRINT HYD          |   AREA       (ha)=   29.370
| ID=02 (000406)     |   QPEAK      (cms)=     .271 (i)
| DT=10.00 PCYC= 5   |   TPEAK      (hrs)=    1.500
--------------------     VOLUME      (mm)=   15.729

    (i)  PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
  TIME     FLOW |  TIME     FLOW |  TIME     FLOW |  TIME     FLOW |  TIME     FLOW
   hrs      cms |   hrs      cms |   hrs      cms |   hrs      cms |   hrs      cms
   .00     .000|  19.17     .015|  38.33     .002|  57.50     .000|  76.67     .000
   .83     .103|  20.00     .014|  39.17     .002|  58.33     .000|  77.50     .000
  1.67     .264|  20.83     .013|  40.00     .002|  59.17     .000|  78.33     .000
  2.50     .193|  21.67     .012|  40.83     .002|  60.00     .000|  79.17     .000
  3.33     .144|  22.50     .011|  41.67     .002|  60.83     .000|  80.00     .000
  4.17     .076|  23.33     .010|  42.50     .002|  61.67     .000|  80.83     .000
  5.00     .053|  24.17     .009|  43.33     .001|  62.50     .000|  81.67     .000
  5.83     .051|  25.00     .008|  44.17     .001|  63.33     .000|  82.50     .000
  6.67     .050|  25.83     .008|  45.00     .001|  64.17     .000|  83.33     .000
  7.50     .046|  26.67     .007|  45.83     .001|  65.00     .000|  84.17     .000
  8.33     .042|  27.50     .007|  46.67     .001|  65.83     .000|  85.00     .000
  9.17     .039|  28.33     .006|  47.50     .001|  66.67     .000|  85.83     .000
 10.00     .036|  29.17     .006|  48.33     .001|  67.50     .000|  86.67     .000
 10.83     .033|  30.00     .005|  49.17     .001|  68.33     .000|  87.50     .000
 11.67     .031|  30.83     .005|  50.00     .001|  69.17     .000|  88.33     .000
 12.50     .028|  31.67     .004|  50.83     .001|  70.00     .000|  89.17     .000
 13.33     .026|  32.50     .004|  51.67     .001|  70.83     .000|  90.00     .000
 14.17     .024|  33.33     .004|  52.50     .001|  71.67     .000|  90.83     .000
 15.00     .022|  34.17     .003|  53.33     .001|  72.50     .000|  91.67     .000
 15.83     .020|  35.00     .003|  54.17     .000|  73.33     .000|  92.50     .000
 16.67     .019|  35.83     .003|  55.00     .000|  74.17     .000|  93.33     .000
 17.50     .017|  36.67     .003|  55.83     .000|  75.00     .000|
 18.33     .016|  37.50     .002|  56.67     .000|  75.83     .000|
--------------------------------------------------------------------------------
001:0034------------------------------------------------------------------------
*#
*#
*#    Catchment SA7 - Strittmatter road drainage d\s of SWM area - uncontrolled
*#    (Strittmatter A7, 0.32 hectares)
*#
----------------------
| DESIGN STANDHYD     |   Area     (ha)=      .32
| 07:000307 DT=10.00  |   Total Imp(%)=    30.00    Dir. Conn.(%)=    20.00
----------------------
                                IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=         .10           .22
    Dep. Storage      (mm)=         .80          1.50
    Average Slope      (%)=        2.00          2.00
```

```
     Length            (m)=       46.19         40.00
     Mannings n           =        .013          .250

     Max.eff.Inten.(mm/hr)=       98.93         25.97
                over (min)        10.00         10.00
     Storage Coeff.  (min)=        1.31 (ii)    13.41 (ii)
     Unit Hyd. Tpeak (min)=       10.00         10.00
     Unit Hyd. peak  (cms)=         .17           .09
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .02           .01          .027 (iii)
     TIME TO PEAK    (hrs)=        1.00          1.17         1.000
     RUNOFF VOLUME     (mm)=      49.34         13.71        20.836
     TOTAL RAINFALL    (mm)=      50.14         50.14        50.135
     RUNOFF COEFFICIENT   =         .98           .27          .416
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0035---------------------------------------------------------------------
*#   Catchment SA8 (Strittmatter A8, 0.46 hectares)
*#   NOT ROUTED INTO POND>>>> FLOWS UNCONTROLLED DOWN ROAD
*#   --- Area changed May 2000
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .46
| 05:000308 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .14           .32
     Dep. Storage      (mm)=        .80          1.50
     Average Slope      (%)=       2.00          2.00
     Length             (m)=      55.38         40.00
     Mannings n           =        .013          .250

     Max.eff.Inten.(mm/hr)=       98.93         25.97
                over (min)        10.00         10.00
     Storage Coeff.  (min)=        1.46 (ii)    13.57 (ii)
     Unit Hyd. Tpeak (min)=       10.00         10.00
     Unit Hyd. peak  (cms)=         .17           .09
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .03           .01          .038 (iii)
     TIME TO PEAK    (hrs)=        1.00          1.17         1.000
     RUNOFF VOLUME     (mm)=      49.34         13.71        20.836
     TOTAL RAINFALL    (mm)=      50.14         50.14        50.135
     RUNOFF COEFFICIENT   =         .98           .27          .416
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0036---------------------------------------------------------------------
```

```
*#
*#   Catchment SA9 - Strittmatter road drainage d\s of SWM area
*#   NOT ROUTED INTO POND>>>> FLOWS UNCONTROLLED DOWN ROAD
*#   (Strittmatter A9, 0.08 hectares, C= 0.95)
*#
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .08
| 09:000410 DT=10.00 |   Total Imp(%)=   95.00   Dir. Conn.(%)=   95.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .08          .00
     Dep. Storage      (mm)=        .80         1.50
     Average Slope      (%)=       2.00         2.00
     Length             (m)=      23.09        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=       98.93        20.18
               over (min)         10.00        10.00
     Storage Coeff.  (min)=         .86 (ii)   14.25 (ii)
     Unit Hyd. Tpeak (min)=       10.00        10.00
     Unit Hyd. peak  (cms)=         .17          .09
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .02          .00          .021 (iii)
     TIME TO PEAK    (hrs)=        1.00         1.17         1.000
     RUNOFF VOLUME    (mm)=       49.34        12.35        47.486
     TOTAL RAINFALL   (mm)=       50.14        50.14        50.135
     RUNOFF COEFFICIENT   =         .98          .25          .947
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*   =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0037----------------------------------------------------------------------
*#   Add SWM area discharge to uncontrolled road drainage (hyd #410)
--------------------
| ADD HYD (000411) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
--------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                ID1 05:000308       .46      .038     1.00  20.84     .000
               +ID2 07:000307       .32      .027     1.00  20.84     .000
               +ID3 02:000406     29.37      .271     1.50  15.73     .000
               +ID4 09:000410       .08      .021     1.00  47.49     .000
               ==========================================================
                SUM 04:000411     30.23      .302     1.33  15.94     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0038----------------------------------------------------------------------
*#
*#   Add major system overflow from diversion to County Road drainage
*#   below diversion (Areas A4 and A5)
*#
--------------------
| ADD HYD (000414) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
--------------------               (ha)     (cms)    (hrs)   (mm)    (cms)
                ID1 01:000412       .00      .000      .00    .00     .000 **DRY**
               +ID2 03:000204       .37      .049     1.00  27.14     .000
```

```
                ===================================================
                SUM 02:000414       .37      .049    1.00  27.14     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0039------------------------------------------------------------------------
*#   Church Street Intersection
*#
*#   Add hydrograph from Strittmatter Property (hyd #411)
*#   to County Road 24 Drainage at Church Street
*#
--------------------
| ADD HYD (000205) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                ID1 02:000414       .37      .049    1.00  27.14     .000
               +ID2 04:000411     30.23      .302    1.33  15.94     .000
                ===================================================
                SUM 01:000205     30.60      .317    1.33  16.08     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0040------------------------------------------------------------------------
*#   Catchment A6 from Triton Study  (0.31 hectares, C= 0.6)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=      .31
| 02:000106 DT=10.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   50.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .16          .16
     Dep. Storage      (mm)=        .80         1.50
     Average Slope      (%)=       4.00         4.00
     Length             (m)=      45.46        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=       98.93        20.18
                over (min)        10.00        10.00
     Storage Coeff.  (min)=        1.05 (ii)   11.93 (ii)
     Unit Hyd. Tpeak (min)=       10.00        10.00
     Unit Hyd. peak  (cms)=         .17          .10
                                                          *TOTALS*
     PEAK FLOW        (cms)=        .04          .01         .048 (iii)
     TIME TO PEAK     (hrs)=       1.00         1.17        1.000
     RUNOFF VOLUME     (mm)=      49.34        12.35       30.843
     TOTAL RAINFALL    (mm)=      50.14        50.14       50.135
     RUNOFF COEFFICIENT   =         .98          .25         .615
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  64.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0041------------------------------------------------------------------------
*#   Add hydrograph from Catchments A6 to Upstream Hydrograph
--------------------
| ADD HYD (000206) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
```

```
--------------------            (ha)      (cms)    (hrs)    (mm)    (cms)
                ID1 01:000205   30.60      .317     1.33   16.08     .000
               +ID2 02:000106     .31      .048     1.00   30.84     .000
                ===================================================
                SUM 03:000206   30.91      .348     1.00   16.23     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0042-----------------------------------------------------------------------
*#
*#   Catchment A7 from Triton Study  (0.24 hectares, C= 0.7)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .24
| 01:000107 DT=10.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   60.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .14          .10
     Dep. Storage     (mm)=         .80         1.50
     Average Slope     (%)=        2.00         2.00
     Length            (m)=       40.00        40.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=       98.93        16.78
                over (min)        10.00        20.00
     Storage Coeff.  (min)=        1.20 (ii)   15.62 (ii)
     Unit Hyd. Tpeak (min)=       10.00        20.00
     Unit Hyd. peak  (cms)=         .17          .06
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .04          .00          .041 (iii)
     TIME TO PEAK    (hrs)=        1.00         1.33         1.000
     RUNOFF VOLUME    (mm)=       49.34        12.35        34.542
     TOTAL RAINFALL   (mm)=       50.14        50.14        50.135
     RUNOFF COEFFICIENT   =         .98          .25          .689
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0043-----------------------------------------------------------------------
*#
*#   Catchment A8 from Triton Study  (0.30 hectares, C= 0.7)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .30
| 02:000108 DT=10.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   60.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .18          .12
     Dep. Storage     (mm)=         .80         1.50
     Average Slope     (%)=        4.00         4.00
     Length            (m)=       44.72        40.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=       98.93        20.18
                over (min)        10.00        10.00
```

```
     Storage Coeff.  (min)=       1.04 (ii)    11.92 (ii)
     Unit Hyd. Tpeak (min)=      10.00         10.00
     Unit Hyd. peak  (cms)=        .17           .10
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .05           .00          .054 (iii)
     TIME TO PEAK    (hrs)=       1.00          1.17         1.000
     RUNOFF VOLUME    (mm)=      49.34         12.35        34.541
     TOTAL RAINFALL   (mm)=      50.14         50.14        50.135
     RUNOFF COEFFICIENT   =        .98           .25          .689
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -------------------------------------------------------------------------------
 001:0044-----------------------------------------------------------------------
 *#   Add hydrographs from Catchments A7 and A8
 --------------------
 | ADD HYD (000207) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 02:000108      .30     .054    1.00  34.54    .000
                 +ID2 01:000107      .24     .041    1.00  34.54    .000
                  ===============================================
                  SUM 04:000207      .54     .094    1.00  34.54    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0045-----------------------------------------------------------------------
 *#   Add summed hydrographs from Catchments A7+A8 to Upstream Hydrograph
 --------------------
 | ADD HYD (000208) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
 --------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 03:000206    30.91     .348    1.00  16.23    .000
                 +ID2 04:000207      .54     .094    1.00  34.54    .000
                  ===============================================
                  SUM 01:000208    31.45     .443    1.00  16.54    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0046-----------------------------------------------------------------------
 *#
 *#   Catchment A9 from Triton Study  (0.32 hectares, C= 0.7)
 *#
 ----------------------
 | DESIGN STANDHYD     |   Area    (ha)=     .32
 | 02:000109 DT=10.00  |   Total Imp(%)=   60.00   Dir. Conn.(%)=   60.00
 ----------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        .19          .13
      Dep. Storage     (mm)=        .80         1.50
      Average Slope     (%)=        .20          .20
      Length            (m)=      46.19        40.00
      Mannings n           =       .013         .250

      Max.eff.Inten.(mm/hr)=      98.93        13.92
                 over (min)       10.00        30.00
```

```
     Storage Coeff.  (min)=       2.62 (ii)    33.60 (ii)
     Unit Hyd. Tpeak (min)=      10.00         30.00
     Unit Hyd. peak  (cms)=        .17           .03
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .05           .00          .053 (iii)
     TIME TO PEAK    (hrs)=       1.00          1.50         1.000
     RUNOFF VOLUME    (mm)=      49.34         12.35        34.542
     TOTAL RAINFALL   (mm)=      50.14         50.14        50.135
     RUNOFF COEFFICIENT   =        .98           .25          .689
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0047-----------------------------------------------------------------------
*#   Add hydrograph from Catchments A9 to upstream drainage
*#
*#   THIS IS THE FLOW AT MH 56 WHICH IS THE LIMITING CONSTRAINT....
*#   5 year - 0.68 cms
*#   100 year - 1.29 cms
*#
--------------------
| ADD HYD (000209) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 01:000208   31.45     .443    1.00  16.54    .000
                  +ID2 02:000109     .32     .053    1.00  34.54    .000
                   =====================================================
                   SUM 03:000209   31.77     .495    1.00  16.72    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0048-----------------------------------------------------------------------
*#
*#   Catchment A10 from Triton Study  (0.21 hectares, C= 0.7)
*#
----------------------
| DESIGN STANDHYD     |   Area    (ha)=     .21
| 04:000110 DT=10.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   60.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .13           .08
     Dep. Storage      (mm)=        .80          1.50
     Average Slope      (%)=       1.00          1.00
     Length             (m)=      37.42         40.00
     Mannings n            =       .013          .250

     Max.eff.Inten.(mm/hr)=       98.93         16.78
               over (min)         10.00         20.00
     Storage Coeff.  (min)=        1.42 (ii)    19.17 (ii)
     Unit Hyd. Tpeak (min)=       10.00         20.00
     Unit Hyd. peak  (cms)=         .17           .06
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .03           .00          .036 (iii)
     TIME TO PEAK    (hrs)=        1.00          1.33         1.000
     RUNOFF VOLUME    (mm)=       49.34         12.35        34.542
     TOTAL RAINFALL   (mm)=       50.14         50.14        50.135
```

```
     RUNOFF COEFFICIENT   =        .98          .25           .689
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0049-----------------------------------------------------------------------
*#   Add hydrograph from Catchment A10 to Upstream Hydrograph
*#   represents total catchment flow to Credit River
--------------------
| ADD HYD (000204) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                 ID1 03:000209    31.77     .495    1.00  16.72    .000
                +ID2 04:000110      .21     .036    1.00  34.54    .000
                 =====================================================
                 SUM 01:000204    31.98     .531    1.00  16.84    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0050-----------------------------------------------------------------------
      FINISH
-------------------------------------------------------------------------------
*******************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
 0003 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0004 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0006 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0007 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0009 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0011 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0013 DESIGN NASHYD
      *** WARNING: Time step is too large for value of TP.
                   R.V. may be ok.  Peak flow could be off.
 0014 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0018 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0022 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0023 DESIGN STANDHYD
```

```
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0025 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0026 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0028 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0034 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0035 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0036 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0040 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0042 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0043 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0046 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0048 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
   Simulation ended on 2000-06-01     at 10:47:07
===============================================================================
```

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

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999   55555 =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  5     =========
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ## 9   9  5       Ver. 3.1
     S   W W   M   M  H   H    Y    M   M  O   O      9999  5555    Oct. 1997
 SSSSS   W W   M   M  H   H    Y    M   M   OOO          9      5  =========
                                                     9   9      5 # 3877524
      StormWater Management HYdrologic Model           999   5555  =========

 ***************************************************************************
 ************************** SWMHYMO-95w Ver/3.1 ****************************
 *******  A single event and continuous hydrologic simulation model  *******
 *******     based on the principles of HYMO and its successors      *******
 *******                OTTHYMO-83 and OTTHYMO-89.                   *******
 ***************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.           *******
 *******                  Ottawa,  Ontario: (613) 727-5199            *******
 *******                  Gatineau, Quebec: (819) 243-6858            *******
 *******                  E-Mail: swmhymo@jfsa.Com                    *******
 ***************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: R.J. Burnside & Associates Ltd.              +++++++
 +++++++                Brampton                SERIAL#:3877524      +++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ***************************************************************************
 *******           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *******
 *******           Maximum value for ID numbers  :     10             *******
 *******           Max. number of rainfall points:   5000             *******
 *******           Max. number of flow points    :   5000             *******
 ***************************************************************************


 ********************   D E T A I L E D   O U T P U T   ******************
 ***************************************************************************
 *       DATE: 2000-06-01     TIME: 10:47:39     RUN COUNTER: 001100       *
 ***************************************************************************
 * Input   filename: I:\LORENA\S-405\CORREC~1\MAY00\ULT100.DAT             *
 * Output  filename: I:\LORENA\S-405\CORREC~1\MAY00\ULT100.out             *
 * Summary filename: I:\LORENA\S-405\CORREC~1\MAY00\ULT100.sum             *
 * User comments:                                                          *
 * 1:______________________________________________________________________*
 * 2:______________________________________________________________________*
 * 3:______________________________________________________________________*
 ***************************************************************************

-------------------------------------------------------------------------------
001:0001-----------------------------------------------------------------------
*#******************************************************************************
*#  Project Name: [ Strittmatter Development, Hillsburgh] Project Number: [S-405
*#  Date          : 12-17-1998
*#  Modeller      : [LD]
*#  Company       : R. J. Burnside & Associates Ltd.
*#  License #     :  3877524
*#******************************************************************************
*#  Hydrologic analysis of County Road 24 stormsewer system combined with
*#  Strittmatter Development at the north end of the village of Hillsburgh.
*#
*#  McMurchy Berm added May '99
*#
```

```
*#  100 year storm event
*#
*#  Data from County Rd. 24 Stormsewer Analysis (Triton) used
*#  for Road Catchments. Strittmatter Development discharge
*#  includes stormwater controls
*#
*#  Made modifications to this file to route the road portion or upper canada SA
*#  into the pond and let the external property SA8 flow uncontrolled.  This fil
*#  was run to obtain volume requirements for the pond to store throttle the 100
*#  year flows of the ultimate condition.  Lot 1 was made available as pond area
*#  so SA10 decreased 0.32 ha and SA11 increased the same amount.
*#
*# File was further modified to let SA9 flow uncontrolled off site
*#
*# File was further modified to collect some of the drainage from SA8 at the
*# south end of Lot 1.  SA8 area decreased to 0.46 ha and SA10 area increased
*# to 0.36 ha.  Change in response to Triton comments May 19, 2000
*#
--------------------
| START             |  Project  dir.: I:\LORENA\S-405\CORREC~1\MAY00\
--------------------  Rainfall dir.: I:\LORENA\S-405\CORREC~1\MAY00\
    TZERO =    .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
-------------------------------------------------------------------------------
001:0002-----------------------------------------------------------------------
*READ STORM           STORM_FILENAME=["c:\S-405\swmhymo\hazel.stm"
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=3113.230
| Ptotal= 98.95 mm |                          B=  21.416
--------------------                          C=    .857
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm   =  3.00 hrs
                        Storm time step     = 10.00 min
                        Time to peak ratio  =   .33

                  TIME    RAIN |  TIME    RAIN  |  TIME    RAIN  |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr  |   hrs   mm/hr  |   hrs   mm/hr
                   .17   9.785 |  1.00 162.238  |  1.83  20.114  |  2.67   9.361
                   .33  12.748 |  1.17  85.475  |  2.00  16.483  |  2.83   8.425
                   .50  18.030 |  1.33  50.208  |  2.17  13.904  |  3.00   7.655
                   .67  29.523 |  1.50  34.281  |  2.33  11.990  |
                   .83  67.430 |  1.67  25.529  |  2.50  10.521  |

-------------------------------------------------------------------------------
001:0003-----------------------------------------------------------------------
*#   Catchment A4 from Triton Study  (0.09 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .09
| 01:000104 DT=10.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .04          .05
     Dep. Storage      (mm)=        .80         1.50
     Average Slope      (%)=       6.00         6.00
     Length             (m)=      24.49        40.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=      162.24        56.88
```

```
                over (min)       10.00         10.00
    Storage Coeff.  (min)=         .53 (ii)     6.89 (ii)
    Unit Hyd. Tpeak (min)=       10.00         10.00
    Unit Hyd. peak  (cms)=         .17           .13
                                                            *TOTALS*
    PEAK FLOW       (cms)=         .02           .01          .023 (iii)
    TIME TO PEAK    (hrs)=        1.00          1.00         1.000
    RUNOFF VOLUME    (mm)=       98.15         39.52        62.969
    TOTAL RAINFALL   (mm)=       98.95         98.95        98.950
    RUNOFF COEFFICIENT   =         .99           .40          .636
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0004------------------------------------------------------------------------
*#
*#   Catchment A5 from Triton Study  (0.28 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .28
| 02:000105 DT=10.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=         .11           .17
    Dep. Storage     (mm)=         .80          1.50
    Average Slope     (%)=        6.00          6.00
    Length            (m)=       43.20         40.00
    Mannings n           =        .013          .250

    Max.eff.Inten.(mm/hr)=      162.24         56.88
                over (min)       10.00         10.00
    Storage Coeff.  (min)=         .74 (ii)     7.10 (ii)
    Unit Hyd. Tpeak (min)=       10.00         10.00
    Unit Hyd. peak  (cms)=         .17           .13
                                                            *TOTALS*
    PEAK FLOW       (cms)=         .05           .02          .072 (iii)
    TIME TO PEAK    (hrs)=        1.00          1.00         1.000
    RUNOFF VOLUME    (mm)=       98.15         39.52        62.969
    TOTAL RAINFALL   (mm)=       98.95         98.95        98.950
    RUNOFF COEFFICIENT   =         .99           .40          .636
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0005------------------------------------------------------------------------
*#   Add summed hydrographs from Catchments A5 to A4
--------------------
| ADD HYD (000204) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
                ID1 01:000104       .09      .023    1.00  62.97     .000
```

```
                +ID2 02:000105      .28     .072    1.00  62.97    .000
                 =====================================================
                 SUM 03:000204      .37     .095    1.00  62.97    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0006----------------------------------------------------------------------
*#
*#   Proposed Strittmatter Development
*#
*#   Catchment SA1 (Strittmatter A1, 0.54 hectares)
*#
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .54
| 01:000301 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .16          .38
     Dep. Storage     (mm)=         .80         1.50
     Average Slope     (%)=        3.00         3.00
     Length            (m)=       60.00        40.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=      162.24        71.61
                over (min)        10.00        10.00
     Storage Coeff.  (min)=        1.11 (ii)    8.26 (ii)
     Unit Hyd. Tpeak (min)=       10.00        10.00
     Unit Hyd. peak  (cms)=         .17          .12
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .05          .06          .105 (iii)
     TIME TO PEAK    (hrs)=        1.00         1.00         1.000
     RUNOFF VOLUME    (mm)=       98.15        42.82        53.883
     TOTAL RAINFALL   (mm)=       98.95        98.95        98.950
     RUNOFF COEFFICIENT   =         .99          .43          .545
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
               CN*   =  64.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0007----------------------------------------------------------------------
*#
*#   Catchment SA2 (Strittmatter A2, 0.53 hectares)
*#
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .53
| 02:000302 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .16          .37
     Dep. Storage     (mm)=         .80         1.50
     Average Slope     (%)=        3.00         3.00
     Length            (m)=       59.44        40.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=      162.24        71.61
                over (min)        10.00        10.00
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```
     Storage Coeff.   (min)=       1.11 (ii)     8.25 (ii)
     Unit Hyd. Tpeak  (min)=      10.00         10.00
     Unit Hyd. peak   (cms)=        .17           .12
                                                             *TOTALS*
     PEAK FLOW        (cms)=        .05           .06           .103 (iii)
     TIME TO PEAK     (hrs)=       1.00          1.00          1.000
     RUNOFF VOLUME     (mm)=      98.15         42.82         53.883
     TOTAL RAINFALL    (mm)=      98.95         98.95         98.950
     RUNOFF COEFFICIENT   =         .99           .43           .545
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0008------------------------------------------------------------------------
*#   Add hydrographs from Strittmatter A1 and A2
--------------------
| ADD HYD (000401) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
                 ID1 01:000301      .54      .105    1.00   53.88     .000
                +ID2 02:000302      .53      .103    1.00   53.88     .000
                 ===================================================
                 SUM 04:000401     1.07      .209    1.00   53.88     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0009------------------------------------------------------------------------
*#
*#   Catchment SA3 (Strittmatter A3, 0.41 hectares)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .41
| 01:000303 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .12           .29
     Dep. Storage     (mm)=        .80          1.50
     Average Slope     (%)=       3.00          3.00
     Length            (m)=      52.28         40.00
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=     162.24         71.61
               over (min)       10.00         10.00
     Storage Coeff.   (min)=       1.03 (ii)     8.17 (ii)
     Unit Hyd. Tpeak  (min)=      10.00         10.00
     Unit Hyd. peak   (cms)=        .17           .12
                                                             *TOTALS*
     PEAK FLOW        (cms)=        .04           .04           .080 (iii)
     TIME TO PEAK     (hrs)=       1.00          1.00          1.000
     RUNOFF VOLUME     (mm)=      98.15         42.82         53.883
     TOTAL RAINFALL    (mm)=      98.95         98.95         98.950
     RUNOFF COEFFICIENT   =         .99           .43           .545
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```

```
          CN*   =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0010------------------------------------------------------------------------
*#   Add hydrographs from Strittmatter A3 to Strittmatter (A1+A2)
--------------------
| ADD HYD (000402) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 01:000303     .41      .080    1.00  53.88    .000
                 +ID2 04:000401    1.07      .209    1.00  53.88    .000
                  ===================================================
                  SUM 02:000402    1.48      .289    1.00  53.88    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0011------------------------------------------------------------------------
*#
*#   Catchment SA4 (Strittmatter A4, 0.41 hectares)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .41
| 01:000304 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .12          .29
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       3.00         3.00
     Length            (m)=      52.28        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     162.24        71.61
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       1.03 (ii)    8.17 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=        .17          .12
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .04          .04           .080 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00          1.000
     RUNOFF VOLUME    (mm)=      98.15        42.82         53.883
     TOTAL RAINFALL   (mm)=      98.95        98.95         98.950
     RUNOFF COEFFICIENT   =        .99          .43           .545
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*   =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0012------------------------------------------------------------------------
*#   Add hydrographs from Strittmatter A4 to Strittmatter Upstream Drainage
--------------------
| ADD HYD (000403) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 01:000304     .41      .080    1.00  53.88    .000
                 +ID2 02:000402    1.48      .289    1.00  53.88    .000
```

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                  ===================================================
                  SUM 04:000403     1.89     .369    1.00  53.88    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0013------------------------------------------------------------------------
*#
*#   Catchment SA5 (Strittmatter A5, 22.4 hectares of upstream
*#   agricultural drainage)
*#
*#
*#   Dec.1,1999: This area, known as the McMurchy Property is assumed to be
*#   developed for the purpose of sizing a PRELIMINARY stormwater facility.
*#
*#   Total Area: 22.4 hectares
*#   Assume:     10.0 hectares non-developable
*#               12.4 hectares developable (30% impervious)
*#
*#   Note: Although site exhibits extremely high infiltration capacity, average
*#   runoff potential is assumed for the purpose of sizing future stormwater
*#   facility.  It is expected that at-source runoff controls (ie. infiltration
*#   facilities)will be implemented to reduce runoff potential for the developme
*#
----------------------
| DESIGN NASHYD       |   Area     (ha)=    10.00   Curve Number   (CN)=58.00
| 01:000305 DT=15.00 |   Ia       (mm)=    1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=      .320

     Unit Hyd Qpeak  (cms)=     1.194

     PEAK FLOW       (cms)=      .744 (i)
     TIME TO PEAK    (hrs)=     1.333
     RUNOFF VOLUME    (mm)=    28.013
     TOTAL RAINFALL   (mm)=    98.950
     RUNOFF COEFFICIENT   =      .283

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

      *** WARNING: Time step is too large for value of TP.
                   R.V. may be ok.  Peak flow could be off.
--------------------------------------------------------------------------------
001:0014------------------------------------------------------------------------
----------------------
| DESIGN STANDHYD     |   Area     (ha)=    12.40
| 02:000398 DT=15.00 |   Total Imp(%)=    30.00   Dir. Conn.(%)=    20.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        3.72         8.68
     Dep. Storage     (mm)=         .80         1.50
     Average Slope     (%)=        5.00         5.00
     Length            (m)=      287.52        40.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=      162.24        59.89
                over (min)        10.00        10.00
     Storage Coeff.  (min)=        2.45 (ii)     9.03 (ii)
     Unit Hyd. Tpeak (min)=       10.00        10.00
     Unit Hyd. peak  (cms)=         .17          .11
                                                         *TOTALS*
     PEAK FLOW       (cms)=        1.11         1.05       2.150 (iii)
     TIME TO PEAK    (hrs)=        1.00         1.17       1.000
```

```
     RUNOFF VOLUME     (mm)=       87.84        30.72         42.142
     TOTAL RAINFALL    (mm)=       98.95        98.95         98.950
     RUNOFF COEFFICIENT   =          .89          .31           .426
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0015-----------------------------------------------------------------------
--------------------
| ADD HYD (000399) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                 ID1 01:000305     10.00     .744    1.33  28.01    .000
                +ID2 02:000398     12.40    2.150    1.00  42.14    .000
                 ======================================================
                 SUM 09:000399     22.40    2.511    1.00  35.83    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0016-----------------------------------------------------------------------
---------------------
| ROUTE RESERVOIR    |    Requested routing time step = 15.0 min.
|  IN>09:(000399)    |
| OUT<05:(000101)    |    =========  OUTLFOW STORAGE TABLE  =========
---------------------     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)    |   (cms)     (ha.m.)
                            .000   .0000E+00    |     .200   .8700E+00
                            .050   .1850E+00    |     .250   .1270E+01
                            .080   .4800E+00    |    2.000   .1300E+01

     ROUTING RESULTS              AREA     QPEAK     TPEAK        R.V.
     --------------------         (ha)     (cms)     (hrs)        (mm)
     INFLOW >09: (000399)        22.40     2.511     1.000      35.835
     OUTFLOW<05: (000101)        22.40      .157     2.333      35.833
    OVERFLOW<08: (000150)          .00      .000      .000        .000

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=    6.249
                   TIME SHIFT OF PEAK FLOW          (min)=   80.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.7312E+00

-------------------------------------------------------------------------------
001:0017-----------------------------------------------------------------------
--------------------
| PRINT HYD          |   AREA        (ha)=   22.400
| ID=05 (000101)     |   QPEAK      (cms)=     .157 (i)
| DT=10.00 PCYC= 5   |   TPEAK      (hrs)=    2.333
--------------------     VOLUME      (mm)=   35.833

     (i)  PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
  TIME     FLOW |  TIME     FLOW |  TIME     FLOW |  TIME     FLOW |  TIME     FLOW
   hrs      cms |   hrs      cms |   hrs      cms |   hrs      cms |   hrs      cms
   .00     .000|  22.50     .046|  45.00     .005|  67.50     .001|  90.00     .000
   .83     .015|  23.33     .042|  45.83     .005|  68.33     .001|  90.83     .000
  1.67     .114|  24.17     .039|  46.67     .004|  69.17     .000|  91.67     .000
  2.50     .157|  25.00     .036|  47.50     .004|  70.00     .000|  92.50     .000
  3.33     .145|  25.83     .033|  48.33     .004|  70.83     .000|  93.33     .000
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```
    4.17     .133|  26.67    .030|  49.17    .003|  71.67    .000|  94.17    .000
    5.00     .121|  27.50    .028|  50.00    .003|  72.50    .000|  95.00    .000
    5.83     .110|  28.33    .026|  50.83    .003|  73.33    .000|  95.83    .000
    6.67     .101|  29.17    .024|  51.67    .003|  74.17    .000|  96.67    .000
    7.50     .092|  30.00    .022|  52.50    .002|  75.00    .000|  97.50    .000
    8.33     .084|  30.83    .020|  53.33    .002|  75.83    .000|  98.33    .000
    9.17     .079|  31.67    .019|  54.17    .002|  76.67    .000|  99.17    .000
   10.00     .076|  32.50    .017|  55.00    .002|  77.50    .000| 100.00    .000
   10.83     .074|  33.33    .016|  55.83    .002|  78.33    .000| 100.83    .000
   11.67     .072|  34.17    .015|  56.67    .002|  79.17    .000| 101.67    .000
   12.50     .070|  35.00    .014|  57.50    .002|  80.00    .000| 102.50    .000
   13.33     .068|  35.83    .012|  58.33    .001|  80.83    .000| 103.33    .000
   14.17     .066|  36.67    .012|  59.17    .001|  81.67    .000| 104.17    .000
   15.00     .064|  37.50    .011|  60.00    .001|  82.50    .000| 105.00    .000
   15.83     .062|  38.33    .010|  60.83    .001|  83.33    .000| 105.83    .000
   16.67     .060|  39.17    .009|  61.67    .001|  84.17    .000| 106.67    .000
   17.50     .058|  40.00    .008|  62.50    .001|  85.00    .000| 107.50    .000
   18.33     .056|  40.83    .008|  63.33    .001|  85.83    .000| 108.33    .000
   19.17     .055|  41.67    .007|  64.17    .001|  86.67    .000|
   20.00     .053|  42.50    .007|  65.00    .001|  87.50    .000|
   20.83     .051|  43.33    .006|  65.83    .001|  88.33    .000|
   21.67     .050|  44.17    .006|  66.67    .001|  89.17    .000|
-------------------------------------------------------------------------------
001:0018-----------------------------------------------------------------------
*#
*#   Catchment SA6 (Strittmatter A6, 1.04 hectares)
*#
----------------------
| DESIGN STANDHYD    |    Area    (ha)=    1.04
| 06:000306 DT=10.00 |    Total Imp(%)=   20.00   Dir. Conn.(%)=   10.00
----------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=          .21          .83
     Dep. Storage     (mm)=          .80         1.50
     Average Slope     (%)=         3.00         3.00
     Length            (m)=        83.27        40.00
     Mannings n          =          .013         .250

     Max.eff.Inten.(mm/hr)=       162.24        69.71
                over (min)         10.00        10.00
     Storage Coeff.  (min)=         1.36 (ii)    8.58 (ii)
     Unit Hyd. Tpeak (min)=        10.00        10.00
     Unit Hyd. peak  (cms)=          .17          .12
                                                               *TOTALS*
     PEAK FLOW       (cms)=          .05          .12             .166 (iii)
     TIME TO PEAK    (hrs)=         1.00         1.00            1.000
     RUNOFF VOLUME    (mm)=        98.15        42.42           47.996
     TOTAL RAINFALL   (mm)=        98.95        98.95           98.950
     RUNOFF COEFFICIENT  =           .99          .43             .485
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  64.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0019-----------------------------------------------------------------------
*#   Add routed hydrograph from Strittmatter A5 (McMurchy Property) to A6
--------------------
```

```
| ADD HYD (000420) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                 ID1 05:000101    22.40     .157    2.33  35.83    .000
                +ID2 06:000306     1.04     .166    1.00  48.00    .000
                 ======================================================
                 SUM 07:000420    23.44     .207    1.00  36.37    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0020-----------------------------------------------------------------------
*#   Add OVERFLOW hydrograph from McMurchy Pond
--------------------
| ADD HYD (000421) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                 ID1 08:000150      .00     .000     .00    .00    .000 **DRY**
                +ID2 07:000420    23.44     .207    1.00  36.37    .000
                 ======================================================
                 SUM 05:000421    23.44     .207    1.00  36.37    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0021-----------------------------------------------------------------------
--------------------
| ADD HYD (000405) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                 ID1 05:000421    23.44     .207    1.00  36.37    .000
                +ID2 04:000403     1.89     .369    1.00  53.88    .000
                 ======================================================
                 SUM 01:000405    25.33     .576    1.00  37.68    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0022-----------------------------------------------------------------------
*#
*#   Catchment SA10 (Strittmatter A10, 0.36 hectares)
*#   --- Area increased May 2000
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .36
| 05:000310 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .11           .25
     Dep. Storage     (mm)=        .80          1.50
     Average Slope     (%)=      13.00         13.00
     Length            (m)=      48.99         40.00
     Mannings n          =        .013          .250

     Max.eff.Inten.(mm/hr)=     162.24         71.61
                over (min)       10.00         10.00
     Storage Coeff.  (min)=        .64 (ii)     5.24 (ii)
     Unit Hyd. Tpeak (min)=      10.00         10.00
     Unit Hyd. peak  (cms)=        .17           .14
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .03           .04          .077 (iii)
     TIME TO PEAK    (hrs)=       1.00          1.00         1.000
     RUNOFF VOLUME    (mm)=      98.15         42.82        53.883
     TOTAL RAINFALL   (mm)=      98.95         98.95        98.950
     RUNOFF COEFFICIENT   =        .99           .43          .545
```

```
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
               CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0023------------------------------------------------------------------------
*#
*#   Catchment SA11 (Strittmatter A11, Pond Surface, 0.35 hecatares)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .35
| 06:000311 DT=10.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .35          .00
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=        .10          .10
     Length            (m)=      48.30        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     162.24       122.01
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       2.71 (ii)   18.73 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=        .17          .06
                                                         *TOTALS*
     PEAK FLOW       (cms)=        .15          .00          .154 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17         1.000
     RUNOFF VOLUME     (mm)=      98.15        92.53        98.094
     TOTAL RAINFALL    (mm)=      98.95        98.95        98.950
     RUNOFF COEFFICIENT   =        .99          .94          .991
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
               CN*  =  98.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0024------------------------------------------------------------------------
*#   Add hydrograph from Strittmatter A10 and A11 to hydrograph #405
*#
--------------------
| ADD HYD (000409) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                 ID1 01:000405     25.33     .576    1.00   37.68    .000
                +ID2 05:000310       .36     .077    1.00   53.88    .000
                +ID3 06:000311       .35     .154    1.00   98.09    .000
                =====================================================
                 SUM 02:000409     26.04     .807    1.00   38.72    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0025------------------------------------------------------------------------
```

```
*#
*#   Add in Areas A1, A2 and A3 from the County Road
*#   and route total flow through proposed SWM area
*#
*#
*#   Catchment A1 from Triton Study  (2.4 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=    2.40
| 01:000101 DT=10.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .96        1.44
     Dep. Storage     (mm)=        .80        1.50
     Average Slope     (%)=       5.00        5.00
     Length            (m)=     126.49       40.00
     Mannings n           =       .013        .250

     Max.eff.Inten.(mm/hr)=     162.24       56.88
                over (min)      10.00       10.00
     Storage Coeff.  (min)=       1.50 (ii)    8.21 (ii)
     Unit Hyd. Tpeak (min)=      10.00       10.00
     Unit Hyd. peak  (cms)=        .17         .12
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .43         .17           .604 (iii)
     TIME TO PEAK    (hrs)=       1.00        1.00          1.000
     RUNOFF VOLUME    (mm)=      98.15       39.52         62.969
     TOTAL RAINFALL   (mm)=      98.95       98.95         98.950
     RUNOFF COEFFICIENT   =        .99         .40           .636
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0026-----------------------------------------------------------------------
*#
*#   Catchment A2 from Triton Study  (0.25 hectares, C= 0.5)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .25
| 04:000102 DT=10.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   40.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .10         .15
     Dep. Storage     (mm)=        .80        1.50
     Average Slope     (%)=       5.00        5.00
     Length            (m)=      40.82       40.00
     Mannings n           =       .013        .250

     Max.eff.Inten.(mm/hr)=     162.24       56.88
                over (min)      10.00       10.00
     Storage Coeff.  (min)=        .76 (ii)    7.48 (ii)
     Unit Hyd. Tpeak (min)=      10.00       10.00
     Unit Hyd. peak  (cms)=        .17         .13
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .05         .02           .064 (iii)
     TIME TO PEAK    (hrs)=       1.00        1.00          1.000
```

```
          RUNOFF VOLUME     (mm)=       98.15          39.52          62.969
          TOTAL RAINFALL    (mm)=       98.95          98.95          98.950
          RUNOFF COEFFICIENT   =          .99            .40            .636
           *** WARNING: Storage Coefficient is smaller than DT!
                        Use a smaller DT or a larger area.

             (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
                  CN*  =  64.0    Ia = Dep. Storage  (Above)
            (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
                 THAN THE STORAGE COEFFICIENT.
           (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

     ------------------------------------------------------------------------------
     001:0027----------------------------------------------------------------------
     *#   Add hydrographs from Catchments A1 and A2
     --------------------
     | ADD HYD (000201) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
     --------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:000101      2.40      .604    1.00  62.97    .000
                    +ID2 04:000102       .25      .064    1.00  62.97    .000
                     ==================================================
                     SUM 05:000201      2.65      .668    1.00  62.97    .000

        NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

     ------------------------------------------------------------------------------
     001:0028----------------------------------------------------------------------
     *#
     *#   Catchment A3 from Triton Study  (0.68 hectares, C= 0.5)
     *#
     ----------------------
     | DESIGN STANDHYD    |   Area    (ha)=     .68
     | 01:000103 DT=10.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   40.00
     ----------------------
                                      IMPERVIOUS    PERVIOUS (i)
          Surface Area      (ha)=         .27          .41
          Dep. Storage      (mm)=         .80         1.50
          Average Slope      (%)=        6.00         6.00
          Length             (m)=       67.33        40.00
          Mannings n            =        .013         .250

          Max.eff.Inten.(mm/hr)=      162.24        56.88
                     over (min)        10.00        10.00
          Storage Coeff.  (min)=         .97 (ii)     7.33 (ii)
          Unit Hyd. Tpeak (min)=       10.00        10.00
          Unit Hyd. peak  (cms)=         .17          .13
                                                                 *TOTALS*
          PEAK FLOW        (cms)=         .12          .05           .173 (iii)
          TIME TO PEAK     (hrs)=        1.00         1.00          1.000
          RUNOFF VOLUME     (mm)=       98.15        39.52         62.969
          TOTAL RAINFALL    (mm)=       98.95        98.95         98.950
          RUNOFF COEFFICIENT   =          .99          .40           .636
           *** WARNING: Storage Coefficient is smaller than DT!
                        Use a smaller DT or a larger area.

             (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
                  CN*  =  64.0    Ia = Dep. Storage  (Above)
            (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
                 THAN THE STORAGE COEFFICIENT.
           (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

```
001:0029-----------------------------------------------------------------------
*#   Add hydrographs from Catchments A3 to hydrograph #201
*#   representing total highway flow to be routed through SWM facility
*#
--------------------
| ADD HYD (000202) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)      (cms)    (hrs)   (mm)   (cms)
               ID1 01:000103         .68       .173     1.00   62.97    .000
              +ID2 05:000201        2.65       .668     1.00   62.97    .000
               =======================================================
               SUM 04:000202        3.33       .841     1.00   62.97    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0030-----------------------------------------------------------------------
*#
*#   Direct minor system flows to SWM Area, major system stays on County Road
*#
----------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .450  (cms)
| TotalHyd 04:000202 |   Number of inlets in system [NINLET] =      1
----------------------   Total minor system capacity          =    .450  (cms)
                         Total major system storage [TMJSTO] =       0.(cu.m.)

                ID: NHYD         AREA      QPEAK      TPEAK      R.V.      DWF
                                 (ha)      (cms)      (hrs)      (mm)     (cms)
     TOTAL HYD.   04:000202      3.33       .841      1.000     62.969     .000
     ========================================================================
     MAJOR SYST   01:000412       .47       .391      1.000     62.969     .000
     MINOR SYST   05:000413      2.86       .450      1.000     62.969     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0031-----------------------------------------------------------------------
*#   Add minor highway drainage (hyd #202) to Strittmatter drainage (hyd #409)
--------------------
| ADD HYD (000203) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)      (cms)    (hrs)   (mm)   (cms)
               ID1 05:000413        2.86       .450     1.00   62.97    .000
              +ID2 02:000409       26.04       .807     1.00   38.72    .000
               =======================================================
               SUM 06:000203       28.90      1.257     1.00   41.12    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0032-----------------------------------------------------------------------
*#   Strittmatter SWM Area
*#   Original Rating Curve (February 1990) revised July 1999 - same storage
*#
*#   Changed Low Flow Outlet Dec. 1, 1999 (from 150mm to 450mm)
*#   Changed Rating Curve (April 2000) with pond redesign
*#
---------------------
| ROUTE RESERVOIR   |    Requested routing time step = 10.0 min.
|  IN>06:(000203)   |
| OUT<02:(000406)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .288   .7330E-01
```

```
                                 .070   .2600E-02   |      .318   .8780E-01
                                 .090   .4500E-02   |      .345   .1032E+00
                                 .121   .1070E-01   |      .378   .1256E+00
                                 .146   .2100E-01   |      .428   .1713E+00
                                 .202   .4640E-01   |      .448   .1940E+00
                                 .277   .6870E-01   |      .467   .2188E+00

     ROUTING RESULTS                 AREA     QPEAK     TPEAK        R.V.
     --------------------            (ha)     (cms)     (hrs)        (mm)
     INFLOW >06: (000203)           28.90     1.257     1.000      41.118
     OUTFLOW<02: (000406)           28.90      .435     1.833      41.118
    OVERFLOW<05: (000408)             .00      .000      .000        .000

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   34.587
                   TIME SHIFT OF PEAK FLOW          (min)=    50.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.1794E+00

--------------------------------------------------------------------------------
001:0033------------------------------------------------------------------------
--------------------
| PRINT HYD         |    AREA       (ha)=   28.904
| ID=02 (000406)    |    QPEAK     (cms)=     .435 (i)
| DT=10.00 PCYC= 5  |    TPEAK     (hrs)=    1.833
--------------------     VOLUME     (mm)=   41.118

     (i)  PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
   TIME     FLOW |  TIME     FLOW |  TIME     FLOW |  TIME     FLOW |  TIME     FLOW
    hrs      cms |   hrs      cms |   hrs      cms |   hrs      cms |   hrs      cms
     .00    .000|  22.50    .046|  45.00    .005|  67.50    .001|  90.00    .000
     .83    .154|  23.33    .043|  45.83    .005|  68.33    .001|  90.83    .000
    1.67    .433|  24.17    .039|  46.67    .004|  69.17    .000|  91.67    .000
    2.50    .421|  25.00    .036|  47.50    .004|  70.00    .000|  92.50    .000
    3.33    .370|  25.83    .033|  48.33    .004|  70.83    .000|  93.33    .000
    4.17    .268|  26.67    .031|  49.17    .003|  71.67    .000|  94.17    .000
    5.00    .185|  27.50    .028|  50.00    .003|  72.50    .000|  95.00    .000
    5.83    .151|  28.33    .026|  50.83    .003|  73.33    .000|  95.83    .000
    6.67    .127|  29.17    .024|  51.67    .003|  74.17    .000|  96.67    .000
    7.50    .104|  30.00    .022|  52.50    .002|  75.00    .000|  97.50    .000
    8.33    .091|  30.83    .021|  53.33    .002|  75.83    .000|  98.33    .000
    9.17    .080|  31.67    .019|  54.17    .002|  76.67    .000|  99.17    .000
   10.00    .077|  32.50    .017|  55.00    .002|  77.50    .000| 100.00    .000
   10.83    .075|  33.33    .016|  55.83    .002|  78.33    .000| 100.83    .000
   11.67    .073|  34.17    .015|  56.67    .002|  79.17    .000| 101.67    .000
   12.50    .070|  35.00    .014|  57.50    .002|  80.00    .000| 102.50    .000
   13.33    .068|  35.83    .013|  58.33    .001|  80.83    .000| 103.33    .000
   14.17    .066|  36.67    .012|  59.17    .001|  81.67    .000| 104.17    .000
   15.00    .064|  37.50    .011|  60.00    .001|  82.50    .000| 105.00    .000
   15.83    .062|  38.33    .010|  60.83    .001|  83.33    .000| 105.83    .000
   16.67    .060|  39.17    .009|  61.67    .001|  84.17    .000| 106.67    .000
   17.50    .058|  40.00    .008|  62.50    .001|  85.00    .000| 107.50    .000
   18.33    .057|  40.83    .008|  63.33    .001|  85.83    .000| 108.33    .000
   19.17    .055|  41.67    .007|  64.17    .001|  86.67    .000|
   20.00    .053|  42.50    .007|  65.00    .001|  87.50    .000|
   20.83    .052|  43.33    .006|  65.83    .001|  88.33    .000|
   21.67    .050|  44.17    .006|  66.67    .001|  89.17    .000|
--------------------------------------------------------------------------------
001:0034------------------------------------------------------------------------
*#
*#
*#   Catchment SA7 - Strittmatter road drainage d\s of SWM area - uncontrolled
*#   (Strittmatter A7, 0.32 hectares)
*#
```

```
----------------------
| DESIGN STANDHYD     |   Area     (ha)=     .32
| 07:000307 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         .10          .22
     Dep. Storage      (mm)=         .80         1.50
     Average Slope      (%)=        2.00         2.00
     Length             (m)=       46.19        40.00
     Mannings n            =        .013         .250

     Max.eff.Inten.(mm/hr)=      162.24        71.61
                over (min)        10.00        10.00
     Storage Coeff.  (min)=        1.08 (ii)    9.14 (ii)
     Unit Hyd. Tpeak (min)=       10.00        10.00
     Unit Hyd. peak  (cms)=         .17          .11
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .03          .03           .061 (iii)
     TIME TO PEAK    (hrs)=        1.00         1.00          1.000
     RUNOFF VOLUME     (mm)=      98.15        42.82         53.883
     TOTAL RAINFALL    (mm)=      98.95        98.95         98.950
     RUNOFF COEFFICIENT   =         .99          .43           .545
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0035------------------------------------------------------------------------
*#   Catchment SA8 (Strittmatter A8, 0.46 hectares)
*#   NOT ROUTED INTO POND>>>> FLOWS UNCONTROLLED DOWN ROAD
*#   --- Area changed May 2000
*#
----------------------
| DESIGN STANDHYD     |   Area     (ha)=     .46
| 05:000308 DT=10.00 |   Total Imp(%)=   30.00   Dir. Conn.(%)=   20.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         .14          .32
     Dep. Storage      (mm)=         .80         1.50
     Average Slope      (%)=        2.00         2.00
     Length             (m)=       55.38        40.00
     Mannings n            =        .013         .250

     Max.eff.Inten.(mm/hr)=      162.24        71.61
                over (min)        10.00        10.00
     Storage Coeff.  (min)=        1.20 (ii)    9.27 (ii)
     Unit Hyd. Tpeak (min)=       10.00        10.00
     Unit Hyd. peak  (cms)=         .17          .11
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .04          .05           .087 (iii)
     TIME TO PEAK    (hrs)=        1.00         1.00          1.000
     RUNOFF VOLUME     (mm)=      98.15        42.82         53.883
     TOTAL RAINFALL    (mm)=      98.95        98.95         98.950
     RUNOFF COEFFICIENT   =         .99          .43           .545
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
```

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0036-----------------------------------------------------------------------
*#
*#   Catchment SA9 - Strittmatter road drainage d\s of SWM area
*#   NOT ROUTED INTO POND>>>> FLOWS UNCONTROLLED DOWN ROAD
*#   (Strittmatter A9, 0.08 hectares, C= 0.95)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .08
| 09:000410 DT=10.00 |   Total Imp(%)=   95.00   Dir. Conn.(%)=   95.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .08          .00
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      23.09        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     162.24        56.88
                over (min)      10.00        10.00
     Storage Coeff.  (min)=        .71 (ii)     9.55 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=        .17          .11
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .03          .00           .035 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17          1.000
     RUNOFF VOLUME    (mm)=      98.15        39.49         95.217
     TOTAL RAINFALL   (mm)=      98.95        98.95         98.950
     RUNOFF COEFFICIENT   =        .99          .40           .962
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0037-----------------------------------------------------------------------
*#   Add SWM area discharge to uncontrolled road drainage (hyd #410)
--------------------
| ADD HYD (000411) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)    (cms)
               ID1 05:000308        .46      .087    1.00   53.88     .000
              +ID2 07:000307        .32      .061    1.00   53.88     .000
              +ID3 02:000406      28.90      .435    1.83   41.12     .000
              +ID4 09:000410        .08      .035    1.00   95.22     .000
               ==================================================
               SUM 04:000411      29.76      .499    1.17   41.60     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0038-----------------------------------------------------------------------
*#
```

```
*#   Add major system overflow from diversion to County Road drainage
*#   below diversion (Areas A4 and A5)
*#
--------------------
| ADD HYD (000414) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)      (cms)   (hrs)   (mm)   (cms)
                  ID1 01:000412      .47       .391    1.00  62.97    .000
                 +ID2 03:000204      .37       .095    1.00  62.97    .000
                  ======================================================
                  SUM 02:000414      .84       .486    1.00  62.97    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0039------------------------------------------------------------------------
*#   Church Street Intersection
*#
*#   Add hydrograph from Strittmatter Property (hyd #411)
*#   to County Road 24 Drainage at Church Street
*#
--------------------
| ADD HYD (000205) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)      (cms)   (hrs)   (mm)   (cms)
                  ID1 02:000414      .84       .486    1.00  62.97    .000
                 +ID2 04:000411    29.76       .499    1.17  41.60    .000
                  ======================================================
                  SUM 01:000205    30.60       .938    1.00  42.18    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0040------------------------------------------------------------------------
*#   Catchment A6 from Triton Study  (0.31 hectares, C= 0.6)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .31
| 02:000106 DT=10.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   50.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       .16          .16
     Dep. Storage      (mm)=       .80         1.50
     Average Slope      (%)=      4.00         4.00
     Length             (m)=     45.46        40.00
     Mannings n            =      .013         .250

     Max.eff.Inten.(mm/hr)=     162.24        56.88
                over (min)       10.00        10.00
     Storage Coeff.  (min)=        .87 (ii)     8.05 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=        .17          .12
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .07          .02          .088 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00         1.000
     RUNOFF VOLUME    (mm)=      98.15        39.51        68.833
     TOTAL RAINFALL   (mm)=      98.95        98.95        98.950
     RUNOFF COEFFICIENT   =        .99          .40          .696
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```

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

------------------------------------------------------------------------
001:0041----------------------------------------------------------------
*#   Add hydrograph from Catchments A6 to Upstream Hydrograph
--------------------
| ADD HYD (000206) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
               ID1 01:000205      30.60      .938    1.00  42.18    .000
              +ID2 02:000106        .31      .088    1.00  68.83    .000
               ==================================================
               SUM 03:000206      30.91     1.027    1.00  42.45    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
001:0042----------------------------------------------------------------
*#
*#   Catchment A7 from Triton Study  (0.24 hectares, C= 0.7)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .24
| 01:000107 DT=10.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   60.00
----------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       .14          .10
    Dep. Storage     (mm)=       .80         1.50
    Average Slope     (%)=      2.00         2.00
    Length            (m)=     40.00        40.00
    Mannings n          =       .013         .250

    Max.eff.Inten.(mm/hr)=    162.24        56.88
              over (min)      10.00        10.00
    Storage Coeff.  (min)=       .99 (ii)    9.83 (ii)
    Unit Hyd. Tpeak (min)=     10.00        10.00
    Unit Hyd. peak  (cms)=       .17          .11
                                                      *TOTALS*
    PEAK FLOW       (cms)=       .06          .01          .075 (iii)
    TIME TO PEAK    (hrs)=      1.00         1.17         1.000
    RUNOFF VOLUME    (mm)=     98.15        39.51        74.696
    TOTAL RAINFALL   (mm)=     98.95        98.95        98.950
    RUNOFF COEFFICIENT   =       .99          .40          .755
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------
001:0043----------------------------------------------------------------
*#
*#   Catchment A8 from Triton Study  (0.30 hectares, C= 0.7)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .30
| 02:000108 DT=10.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   60.00
----------------------
                            IMPERVIOUS    PERVIOUS (i)
```

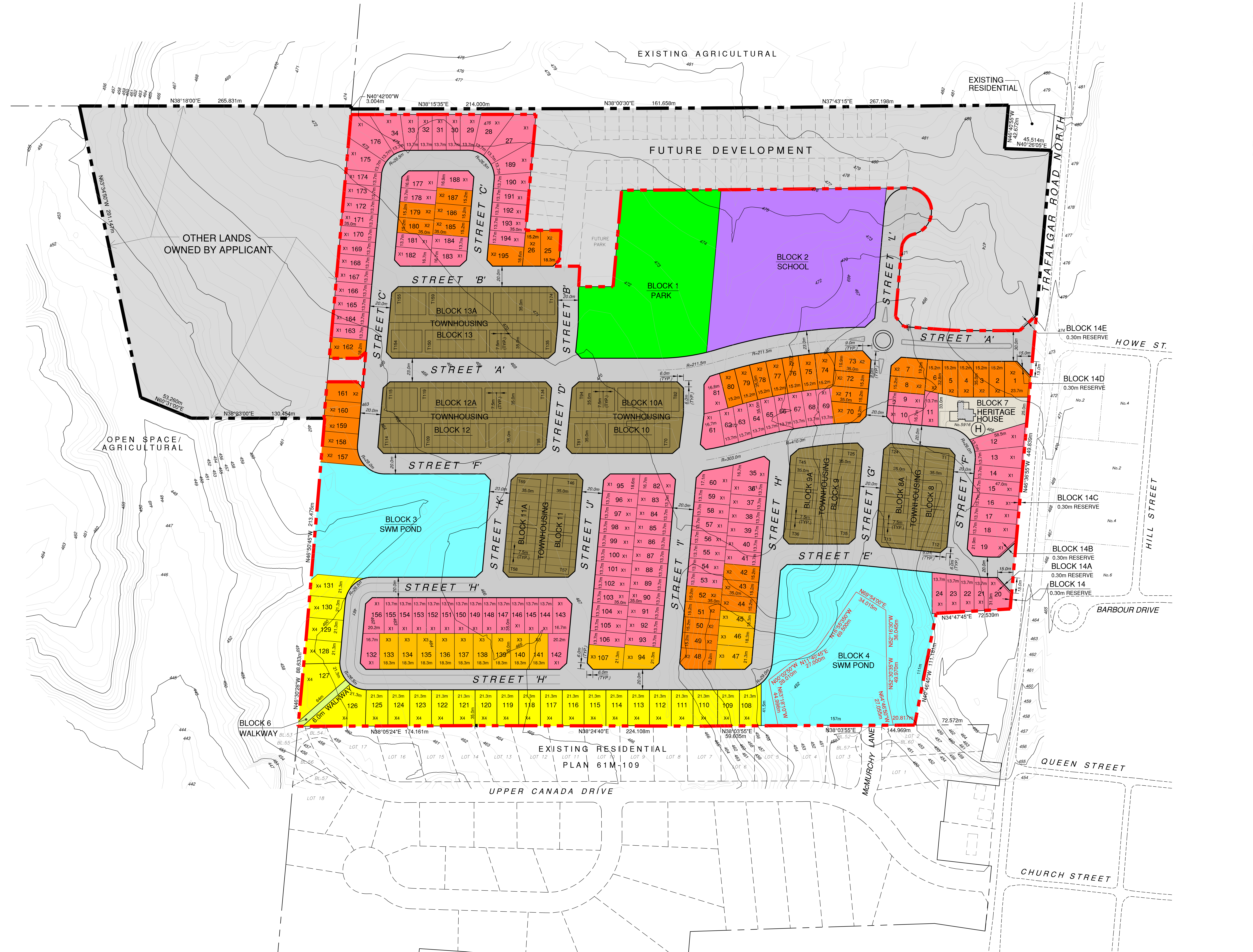
```
     Surface Area     (ha)=        .18          .12
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       4.00         4.00
     Length            (m)=      44.72        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     162.24        56.88
               over  (min)      10.00        10.00
     Storage Coeff.  (min)=        .86 (ii)     8.04 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=        .17          .12
                                                         *TOTALS*
     PEAK FLOW       (cms)=        .08          .01         .096 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00        1.000
     RUNOFF VOLUME    (mm)=      98.15        39.51       74.696
     TOTAL RAINFALL   (mm)=      98.95        98.95       98.950
     RUNOFF COEFFICIENT   =        .99          .40         .755
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------
001:0044---------------------------------------------------------------
*#   Add hydrographs from Catchments A7 and A8
--------------------
| ADD HYD (000207) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                 ID1 02:000108      .30      .096    1.00  74.70    .000
                +ID2 01:000107      .24      .075    1.00  74.70    .000
                 ======================================================
                 SUM 04:000207      .54      .171    1.00  74.70    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------
001:0045---------------------------------------------------------------
*#   Add summed hydrographs from Catchments A7+A8 to Upstream Hydrograph
--------------------
| ADD HYD (000208) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                 ID1 03:000206    30.91     1.027    1.00  42.45    .000
                +ID2 04:000207      .54      .171    1.00  74.70    .000
                 ======================================================
                 SUM 01:000208    31.45     1.198    1.00  43.00    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------
001:0046---------------------------------------------------------------
*#
*#   Catchment A9 from Triton Study  (0.32 hectares, C= 0.7)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .32
| 02:000109 DT=10.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   60.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
```

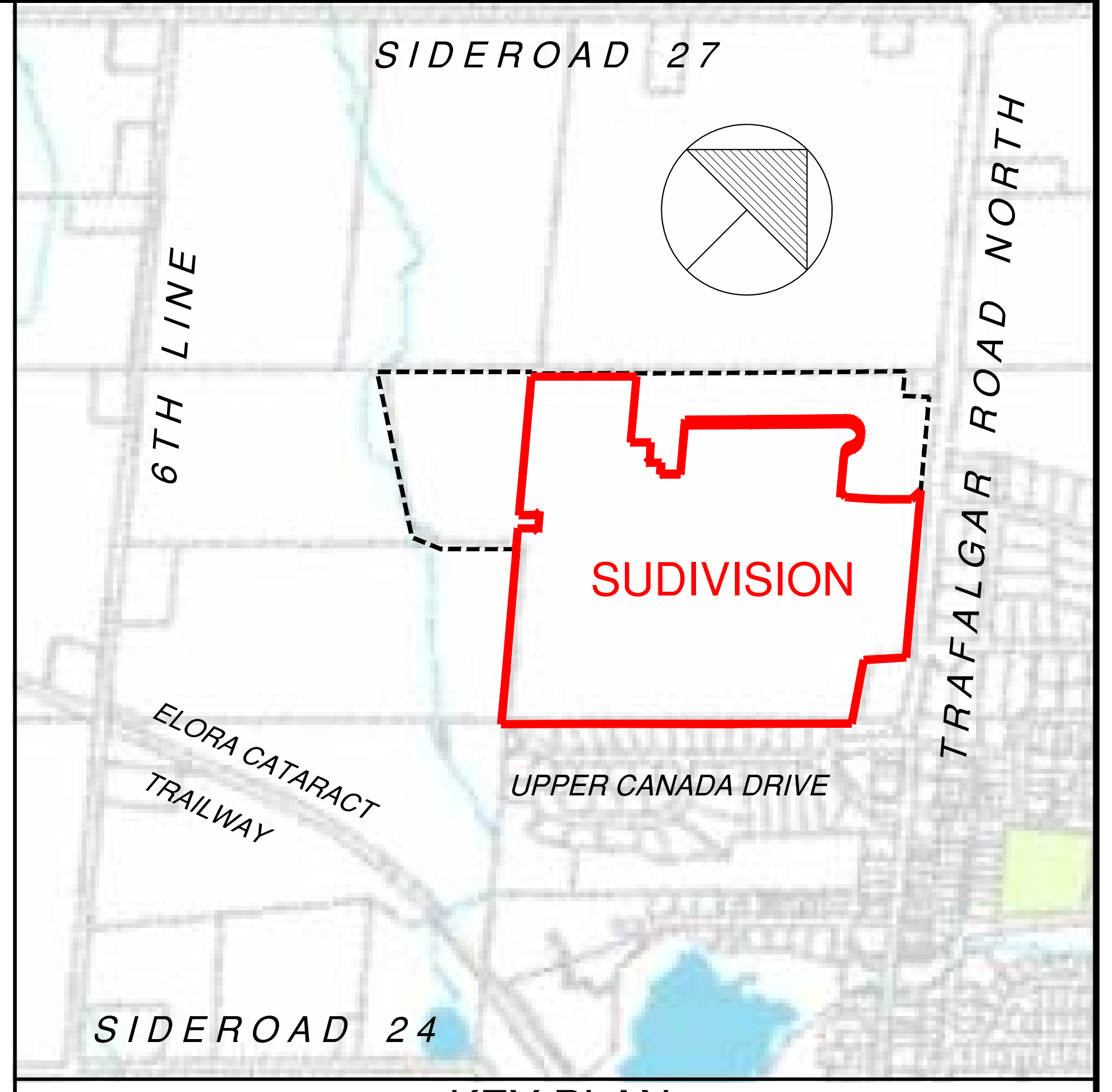
```
     Surface Area     (ha)=        .19          .13
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=        .20          .20
     Length            (m)=      46.19        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     162.24        49.00
               over (min)       10.00        20.00
     Storage Coeff.  (min)=      2.15 (ii)    20.88 (ii)
     Unit Hyd. Tpeak (min)=     10.00        20.00
     Unit Hyd. peak  (cms)=       .17          .05
                                                          *TOTALS*
     PEAK FLOW        (cms)=       .09          .01          .091 (iii)
     TIME TO PEAK     (hrs)=      1.00         1.33         1.000
     RUNOFF VOLUME     (mm)=     98.15        39.52        74.696
     TOTAL RAINFALL    (mm)=     98.95        98.95        98.950
     RUNOFF COEFFICIENT   =       .99          .40          .755
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0047---------------------------------------------------------------------
*#   Add hydrograph from Catchments A9 to upstream drainage
*#
*#   THIS IS THE FLOW AT MH 56 WHICH IS THE LIMITING CONSTRAINT....
*#   5 year - 0.68 cms
*#   100 year - 1.29 cms
*#
--------------------
| ADD HYD (000209) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)    (cms)   (hrs)   (mm)   (cms)
                ID1 01:000208     31.45    1.198    1.00  43.00    .000
               +ID2 02:000109       .32     .091    1.00  74.70    .000
                ==================================================
                SUM 03:000209     31.77    1.289    1.00  43.32    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0048---------------------------------------------------------------------
*#
*#   Catchment A10 from Triton Study  (0.21 hectares, C= 0.7)
*#
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .21
| 04:000110 DT=10.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   60.00
----------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .13          .08
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       1.00         1.00
     Length            (m)=      37.42        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     162.24        56.88
               over (min)       10.00        10.00
```

```
     Storage Coeff.  (min)=      1.17 (ii)   12.06 (ii)
     Unit Hyd. Tpeak (min)=     10.00        10.00
     Unit Hyd. peak  (cms)=       .17          .10
                                                        *TOTALS*
     PEAK FLOW       (cms)=       .06          .01         .065 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.17        1.000
     RUNOFF VOLUME    (mm)=     98.15        39.51       74.696
     TOTAL RAINFALL   (mm)=     98.95        98.95       98.950
     RUNOFF COEFFICIENT   =       .99          .40         .755
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  64.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------
001:0049---------------------------------------------------------------
*#   Add hydrograph from Catchment A10 to Upstream Hydrograph
*#   represents total catchment flow to Credit River
------------------
| ADD HYD (000204) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 03:000209  31.77    1.289    1.00  43.32    .000
                 +ID2 04:000110    .21     .065    1.00  74.70    .000
                  ===================================================
                  SUM 01:000204  31.98    1.354    1.00  43.53    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------
001:0050---------------------------------------------------------------
     FINISH
-----------------------------------------------------------------------
***********************************************************************
    WARNINGS / ERRORS / NOTES
    -----------------------
 0003 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0004 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0006 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0007 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0009 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0011 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 0013 DESIGN NASHYD
      *** WARNING: Time step is too large for value of TP.
                   R.V. may be ok.  Peak flow could be off.
 0014 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
```

```
                 Use a smaller DT or a larger area.
 0018 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                 Use a smaller DT or a larger area.
 0022 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                 Use a smaller DT or a larger area.
 0023 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                 Use a smaller DT or a larger area.
 0025 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                 Use a smaller DT or a larger area.
 0026 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                 Use a smaller DT or a larger area.
 0028 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                 Use a smaller DT or a larger area.
 0034 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                 Use a smaller DT or a larger area.
 0035 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                 Use a smaller DT or a larger area.
 0036 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                 Use a smaller DT or a larger area.
 0040 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                 Use a smaller DT or a larger area.
 0042 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                 Use a smaller DT or a larger area.
 0043 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                 Use a smaller DT or a larger area.
 0046 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                 Use a smaller DT or a larger area.
 0048 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                 Use a smaller DT or a larger area.
   Simulation ended on 2000-06-01     at 10:47:44
==============================================================================
```

DRAWINGS





KEY PLAN

1:10,000

LOT SCHEDULE

DESCRIPTION	TYPE	MINIMUM FRONTAGE	MINIMUM DEPTH	NUMBER OF LOTS	NUMBER OF UNITS
SINGLE DETACHED	X1	13.7m (45.0')	35.0m (114.8')	116	116
SINGLE DETACHED	X2	15.2m (50.0')	35.0m (114.8')	41	41
SINGLE DETACHED	X3	18.3m (60.0')	35.0m (114.8')	14	14
SINGLE DETACHED	X4	21.3m (70.0')	35.0m (114.8')	24	24
TOWNHOUSE	T	7.5m (24.6')	35.0m (114.8')	-	174
TOTAL				195	369

LAND USE	BLOCK / LOT	AREA
RESIDENTIAL	LOTS 1-195	11.63 ha. (28.74 Ac.)
PARK	BLOCK 1	1.75 ha. (4.32 Ac.)
SCHOOL	BLOCK 2	2.27 ha. (5.61 Ac.)
SWM POND	BLOCKS 3-4	4.09 ha. (10.11 Ac.)
	~~BLOCK 5~~	
ROADS	STREETS A-L	8.75 ha. (21.62 Ac.)
WALKWAY	BLOCK 6	0.04 ha. (0.10 Ac.)
HERITAGE HOUSE	BLOCK 7	0.29 ha. (0.72 Ac.)
TOWNHOUSING	BLOCKS 8-13A (174 UNITS)	5.13 ha. (12.68 Ac.)
0.30m RESERVE	BLOCKS 14-14E	0.01 ha. (0.02 Ac.)
TOTAL		33.96 ha. (83.92Ac.)

REVISIONS

NO.	DESCRIPTION	DATE	BY
7	LOTS 25 TO 34 RELOCATED TO NORTH OF STREETS 'B' AND 'C'	03.02.2023	D.K.H.
6	STREET 'A' REALIGNED AT TRAFALGAR ROAD NORTH; STREET 'L' ADDED; LOTS REVISED AND LAND USE AREAS UPDATED.	04.11.2022	D.K.H.
5	FUTURE DEVELOPMENT AREA DELETED FROM LIMIT OF SUBDIVISION	23.08.2022	D.K.H.
4	REVISIONS AS PER TOWN AND COUNTY COMMENTS	27.07.2022	D.K.H.
3	LIMIT OF PHASE 1 ADDED WITH FUTURE DEVELOPMENT BLOCKS 5-5A; TOWNHOUSE BLOCKS 11-14A ADDED AND LOT WIDTHS REVISED; ST. 'A' R.O.W. INCREASED AND WALKWAY BLOCK 7 WIDTH INCREASED.	17.06.2022	D.K.H.
2	DIMENSIONS ADDED TO STREETS AND BLOCKS.	04.02.2022	D.K.H.
1	BEARINGS AND DISTANCES ADDED AS PER BSR&D LAND SURVEYORS PLAN REF. No. 21-14-619-00, DATED JAN., 7th 2022	07.01.2022	D.K.H.

ADDITIONAL INFORMATION

AS REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT (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 LIMITED TO ACT ON OUR BEHALF AS AGENTS AND TO PREPARE AND SUBMIT A DRAFT PLAN OF SUBDIVISION FOR APPROVAL.

11/15/2021
DATE

HILLSBURGH HEIGHTS INC.
(BRIARWOOD DEVELOPMENTS GROUP)

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

RAYMOND J. SIBTHORP
ONTARIO LAND SURVEYORS
BLACK, SHOEMAKER, ROBINSON & DONALDSON LTD.
457 WOODLAWN ROAD WEST, UNIT 101 GUELPH ONTARIO
TEL.(519)822-1220 www.jdbarnes.com

DRAFT PLAN OF SUBDIVISION

5916 TRAFALGAR ROAD NORTH
(PLAN 61R-9590)
PART OF LOT 26, CONCESSION 7
TOWN OF ERIN
COUNTY OF WELLINGTON

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS

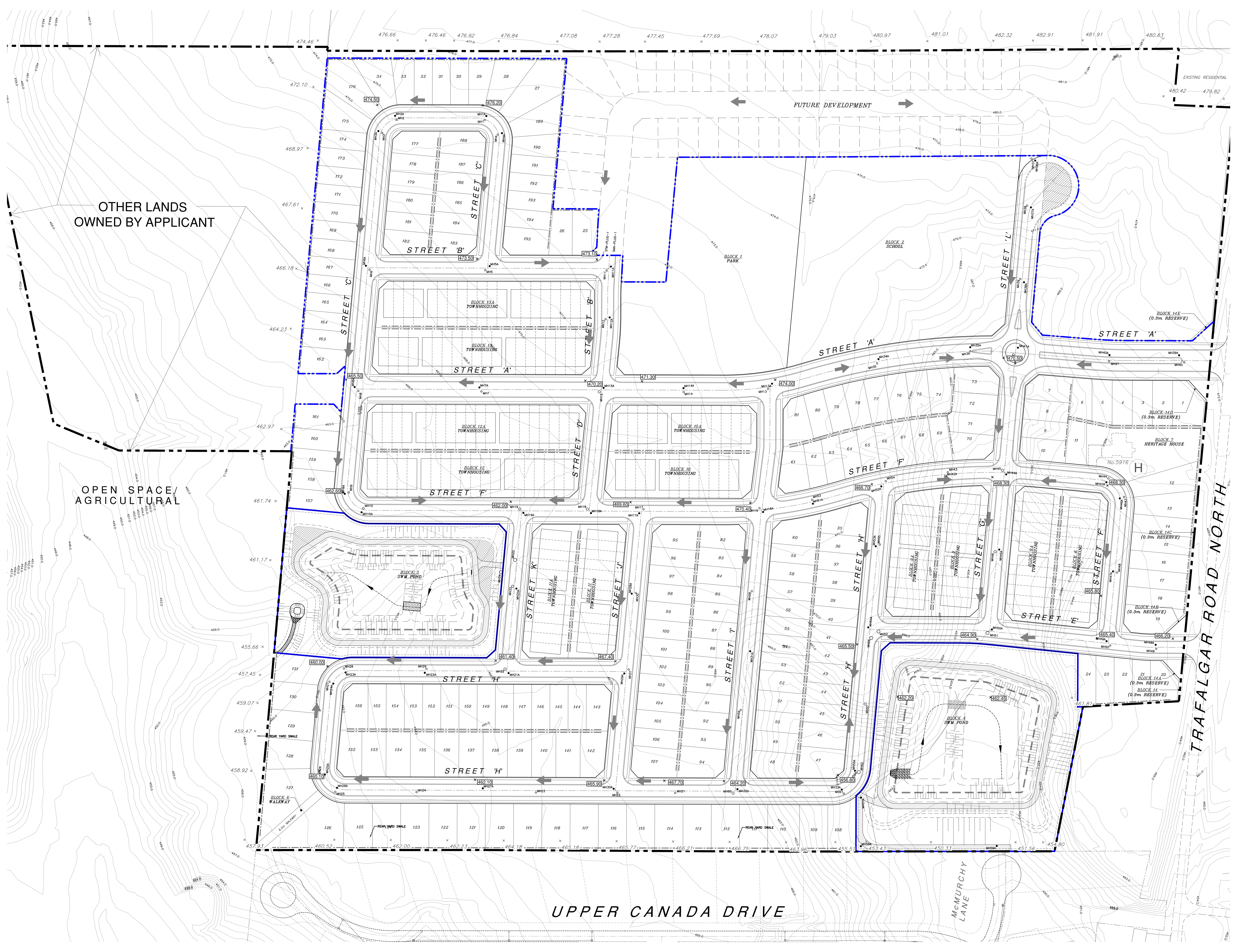
TEL. (905) 794-0600 FAX (905) 794-0611

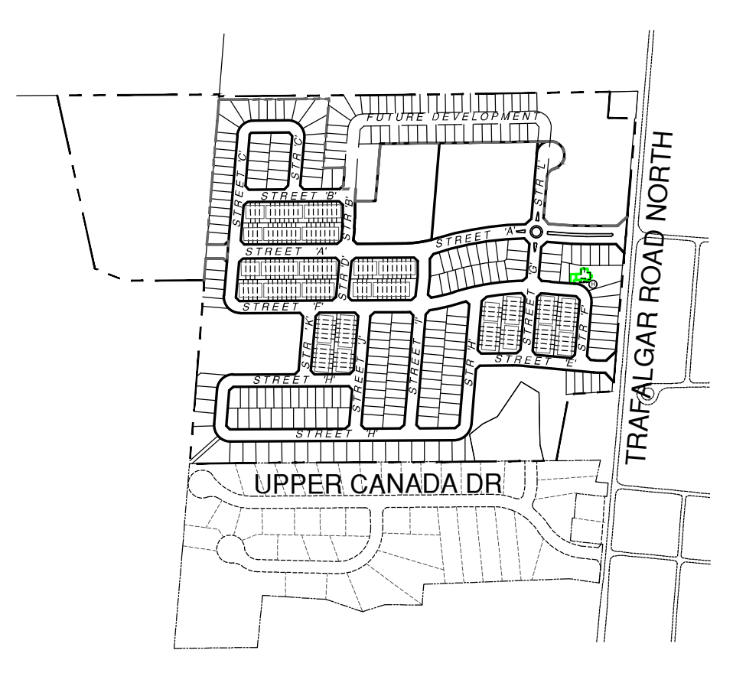
SCALE: 1:1500 0m 15 30 45 60

DWG. No. PL-1 7

DATE: NOV., 12th 2021

PROJECT No. W21081





KEY PLAN

LEGEND:

▬ ▪ ▪ ▬	LIMIT OF SUBDIVISION
▬ ▪ ▪ ▬	PHASING LIMIT
– – – –	EXISTING PROPERTY LINE
481.80	PROPOSED ELEVATIONS
455.51	EXISTING ELEVATIONS
▬ · ▬ · ▬	INFILTRATION TRENCH
– · – · –	REAR YARD SWALE
➡	OVERLAND FLOW ROUTE

REFERENCE DRAWINGS:

1. REFER TO DRAFT PLAN (PL–1) PREPARED BY CANDEVCON LIMITED FOR SUBDIVISION LAYOUT
2. REFER TO DRAWING PS–1 FOR INFORMATION ON STORM, SANITARY & FDC

NO.	DESCRIPTION	DATE	BY
5			
4			
3			
2	THIRD SUBMISSION	2023–02–15	SL
1	SECOND SUBMISSION	2022–07–29	SL

REVISIONS

CDC CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
TEL. (905) 794–0600
FAX (905) 794–0611

REGISTERED PROFESSIONAL ENGINEER
S. D. LANG
FEBRUARY15, 2023
PROVINCE OF ONTARIO

HILLSBURGH HEIGHTS INC.
RESIDENTIAL SUBDIVISION

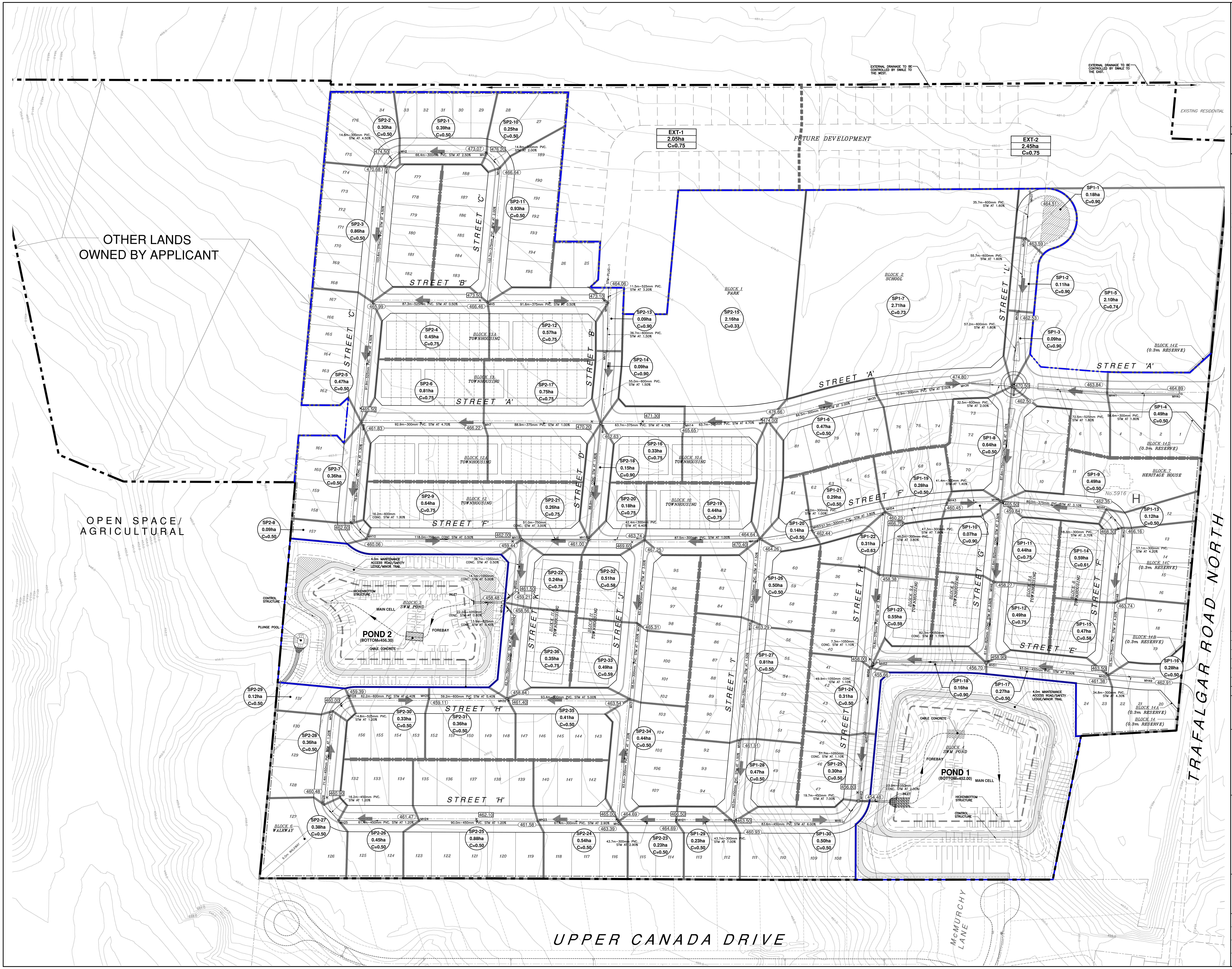
5616 TRAFALGAR ROAD NORTH
PART 1 OF PLAN 61R-9590
PART OF LOT 26, CONCESSION 7

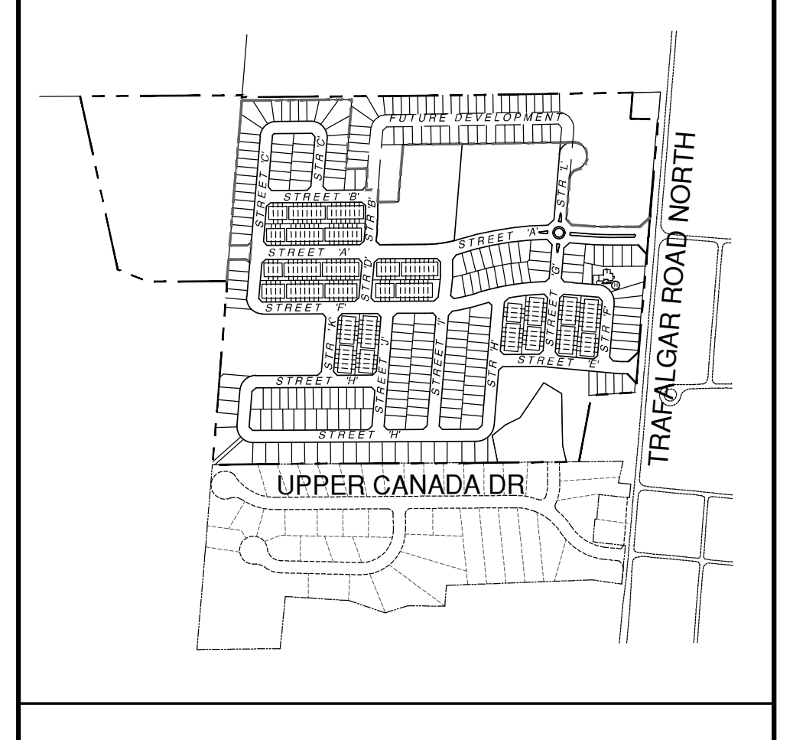
HILLSBURGH URBAN AREA
TOWN OF ERIN

SHEET TITLE:

PRELIMINARY GRADING PLAN

DRAWN BY: E.A.M
PROJECT No. W21081
CHECKED BY: S.L
DRAWING No. GR-1 2
SCALE: 1:1000
DATE: OCT 1st, 2021





KEY PLAN

LEGEND:

- LIMIT OF SUBDIVISION
- PHASING LIMIT
- EXISTING PROPERTY LINE
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- 481.80 PROPOSED ELEVATIONS
- 455.51 FUTURE ELEVATIONS
- (456.80) PROPOSED STORM SEWER OBVERT
- STORM DRAINAGE AREA BOUNDARY
- EXTERNAL STORM DRAINAGE AREA BOUNDARY
- INFILTRATION TRENCH
- OVERLAND FLOW ROUTE
- SP1-1 — DENOTES DRAINAGE NODE; 0.65ha — DENOTES AREA IN HECTARES; C=0.50 — DENOTES DRAINAGE COEFFICIENT
- EXT-1 — DENOTES EXTERNAL DRAINAGE NODE; 0.10ha — DENOTES AREA IN HECTARES

REFERENCE DRAWINGS:

1. REFER TO DRAFT PLAN (PL–1) PREPARED BY CANDEVCON LIMITED FOR SUBDIVISION LAYOUT
2. REFER TO DRAWING PS–1 FOR INFORMATION ON STORM & SANITARY

NO.	DESCRIPTION	DATE	BY
5			
4			
3			
2	THIRD SUBMISSION	2023–02–15	SL
1	SECOND SUBMISSION	2022–07–29	SL

REVISIONS

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
TEL. (905) 794–0600 FAX (905) 794–0611

S. D. LANG
FEBRUARY15, 2023

HILLSBURGH HEIGHTS INC.
RESIDENTIAL SUBDIVISION

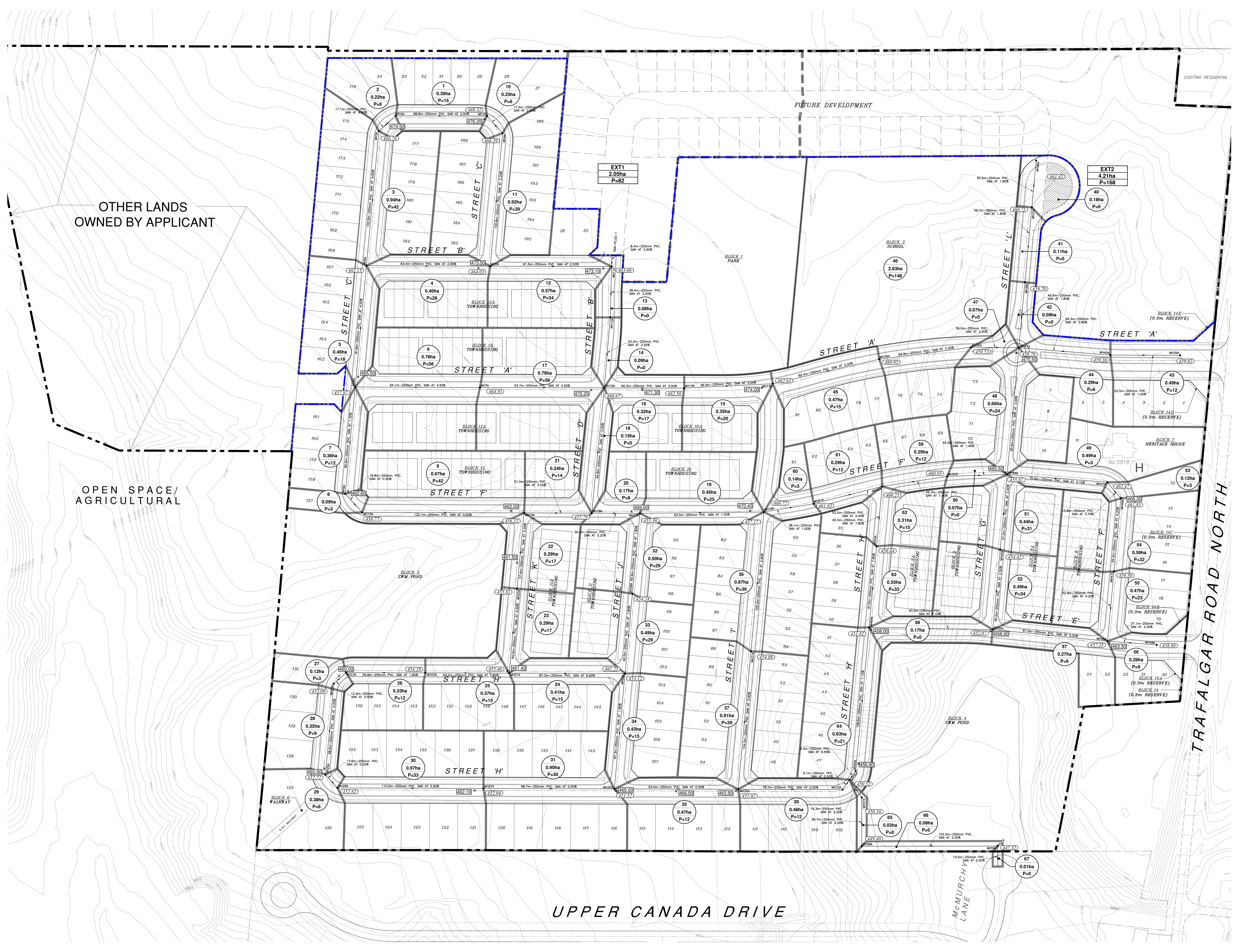
5616 TRAFALGAR ROAD NORTH
PART 1 OF PLAN 61R-9590
PART OF LOT 26, CONCESSION 7

HILLSBURGH URBAN AREA
TOWN OF ERIN

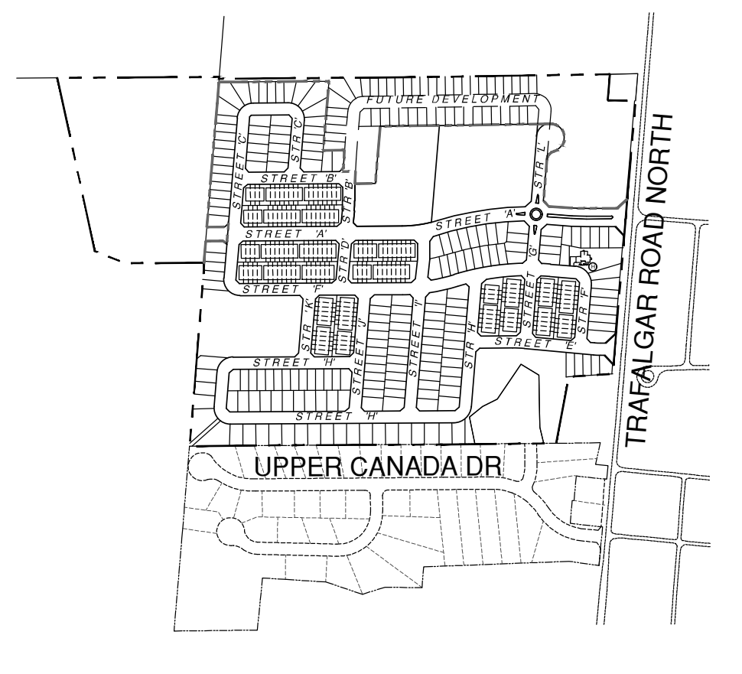
SHEET TITLE:

STORM DRAINAGE PLAN

DRAWN BY: E.A.M	PROJECT No. W21081
CHECKED BY: S.L	DRAWING No.
SCALE: 1:1000	**ST-1**
DATE: OCT 1st, 2021	2



KEY PLAN



LEGEND:

▬ ▪ ▪ ▬	LIMIT OF SUBDIVISION
▬ ▪▪ ▬ ▪▪ ▬	PHASING LIMIT
—▷—	PROPOSED SAN SEWER
– – – –	EXISTING SAN SEWER
481.80	PROPOSED ROAD GRADE
476.65	PROPOSED SAN SEWER INVERT
▬▬▬	SANITARY DRAINAGE AREA BOUNDARY
▬ ▬ ▬	EXTERNAL SANITARY DRAINAGE AREA BOUNDARY
1	DENOTES AREA NUMBER
0.56ha	DENOTES AREA IN HECTARES
P=22	DENOTES EQUIVALENT POPULATION

REFERENCE DRAWINGS:

1. REFER TO DRAFT PLAN (PL–1) PREPARED BY CANDEVCON LIMITED FOR SUBDIVISION LAYOUT
2. REFER TO DRAWING PS–1 FOR INFORMATION ON STORM & SANITARY.

NO.	DESCRIPTION	DATE	BY
5			
4			
3			
2	THIRD SUBMISSION	2023–02–15	SL
1	SECOND SUBMISSION	2022–07–29	SL

REVISIONS

CDC CANDEVCON LIMITED
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S. D. LANG
FEBRUARY15, 2023

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RESIDENTIAL SUBDIVISION

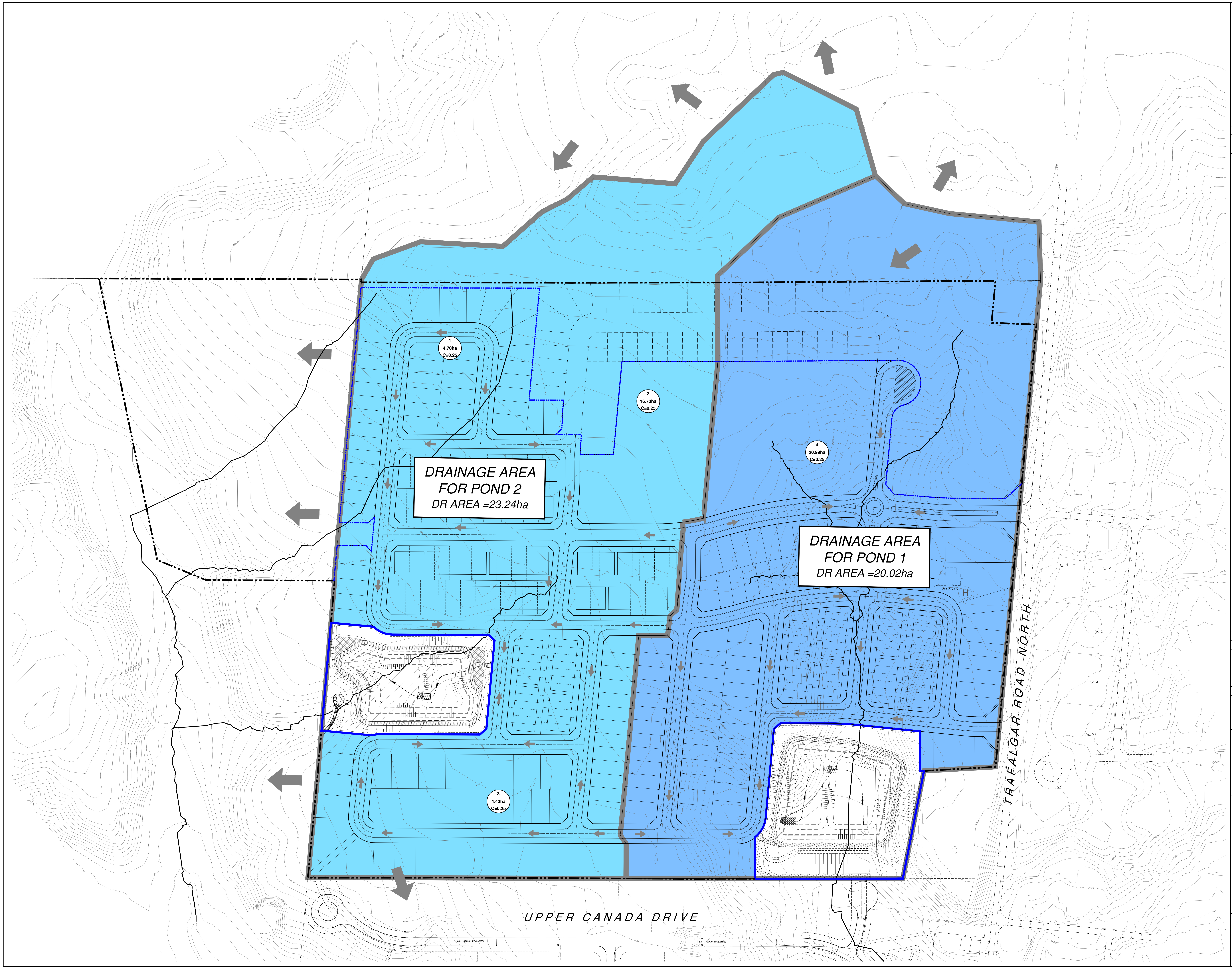
5616 TRAFALGAR ROAD NORTH
PART 1 OF PLAN 61R-9590
PART OF LOT 26, CONCESSION 7

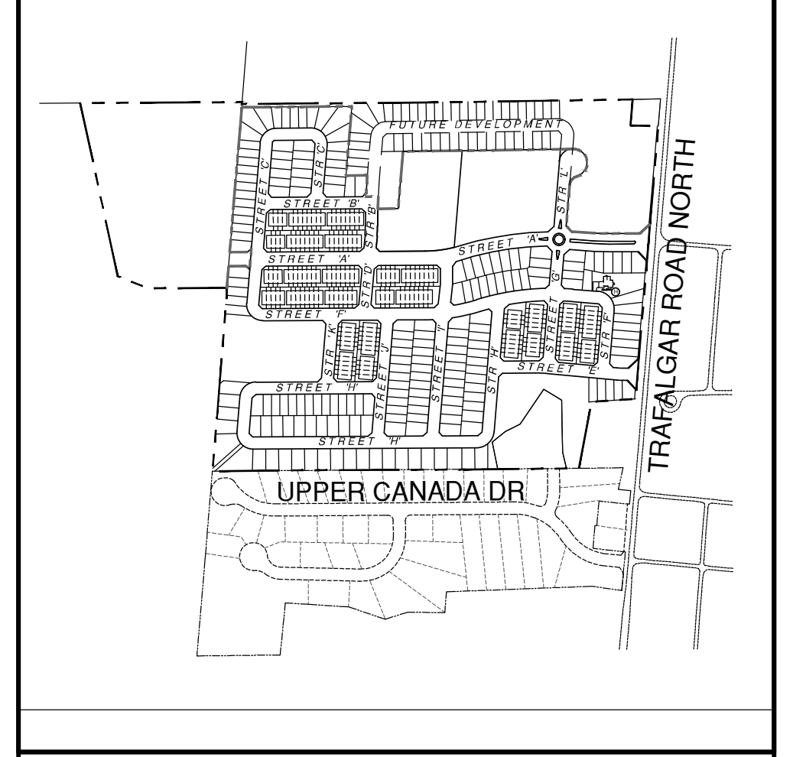
HILLSBURGH URBAN AREA
TOWN OF ERIN

SHEET TITLE:

SANITARY DRAINAGE PLAN

DRAWN BY: E.A.M
CHECKED BY: S.L
SCALE: 1:1000
DATE: OCT 1st, 2021
PROJECT No. W21081
DRAWING No. SA-1
2





KEY PLAN

LEGEND:

- LIMIT OF SUBDIVISION
- PHASING LIMIT
- PROPOSED SWM POND DRAINAGE AREA BOUNDARY
- → OVERLAND FLOW ROUTE

REFERENCE DRAWINGS:

1. REFER TO DRAFT PLAN (PL–1) PREPARED BY CANDEVCON LIMITED FOR SUBDIVISION LAYOUT
2. REFER TO DRAWING PS–1 FOR INFORMATION ON STORM, SANITARY & FDC

NO.	DESCRIPTION	DATE	BY
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3			
2	THIRD SUBMISSION	2023–02–15	SL
1	SECOND SUBMISSION	2022–07–29	SL

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S. D. LANG
FEBRUARY15, 2023

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RESIDENTIAL SUBDIVISION

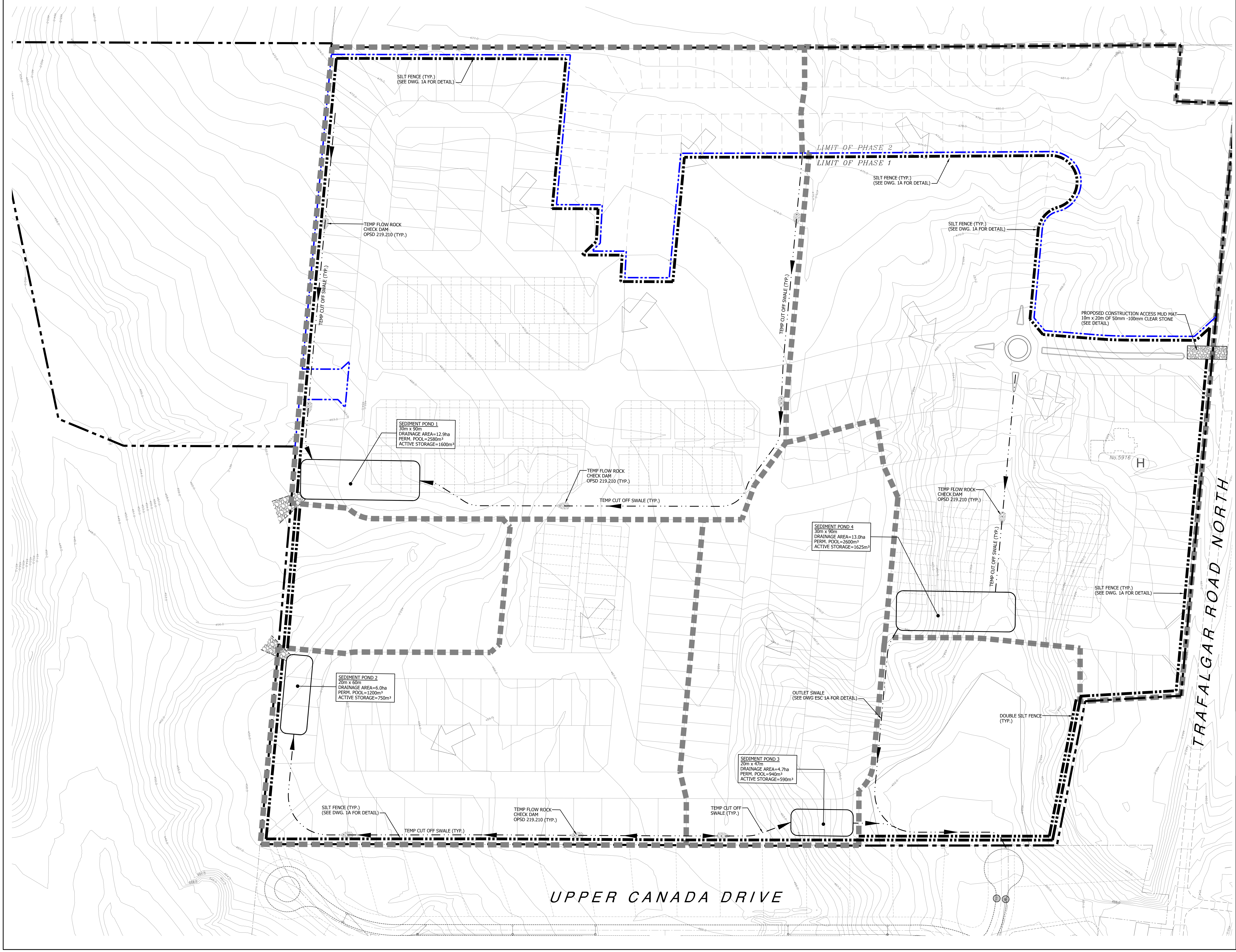
5616 TRAFALGAR ROAD NORTH
PART 1 OF PLAN 61R-9590
PART OF LOT 26, CONCESSION 7

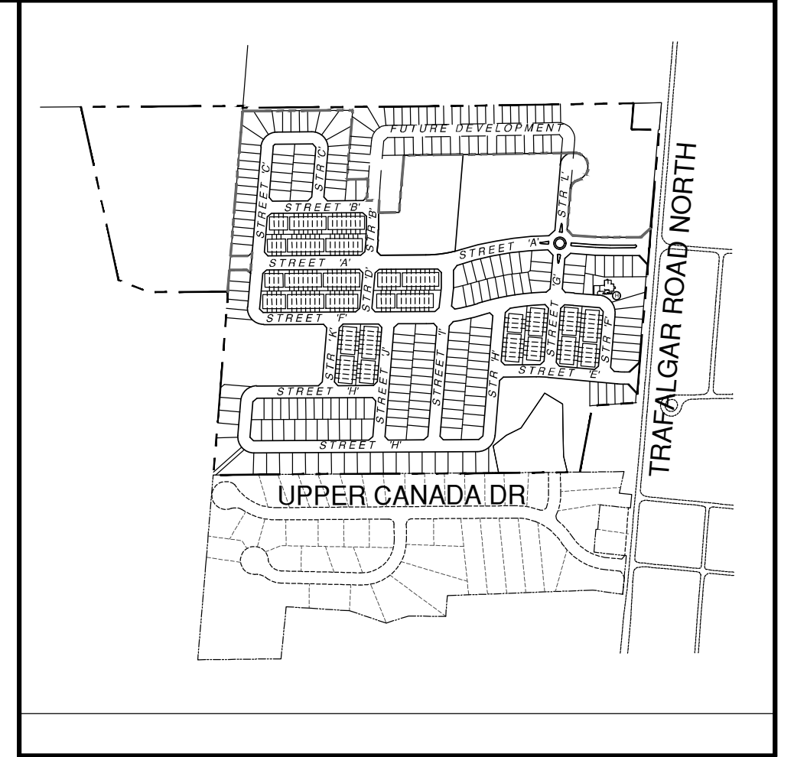
HILLSBURGH URBAN AREA
TOWN OF ERIN

SHEET TITLE:

PREDEVELOPMENT SWM POND DRAINAGE AREA PLAN

DRAWN BY: E.A.M
PROJECT No. W21081
CHECKED BY: S.L
DRAWING No. PDR-1
SCALE: 1:750
DATE: OCT 1st, 2021
2





KEY PLAN

LEGEND:

EX.MH1 ○	EXISTING STORM MAINTENANCE HOLE
EX.MH1A ●	EXISTING SANITARY MAINTENANCE HOLE
— - —	SUBDIVISION BOUNDARY
▬ ▪ ▬	SILT FENCE
☰ ⁞ ☰	DOUBLE SILT FENCE
·-·▶·-·	CUT-OFF SWALE
▬ ▬ ▬	DRAINAGE AREA BOUNDARY
▨	CONSTRUCTION ACCESS MUD MAT (10m WIDE c/w THE THICKNESS OF 300mm OF 50mm TO 100mm CLEAR STONE
▩	CATCHBASIN SEDIMENT CONTROL PROTECTION
⇨	FLOW ARROW

REFERENCE DRAWINGS:

1. REFER TO DRAFT PLAN (PL–1) PREPARED BY CANDEVCON LIMITED FOR SUBDIVISION LAYOUT
2. REFER TO DRAWING PS–1 FOR INFORMATION ON STORM, SANITARY & FDC

NO.	DESCRIPTION	DATE	BY
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2	THIRD SUBMISSION	2023–02–15	SL
1	SECOND SUBMISSION	2022–07–29	SL

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FEBRUARY15, 2023

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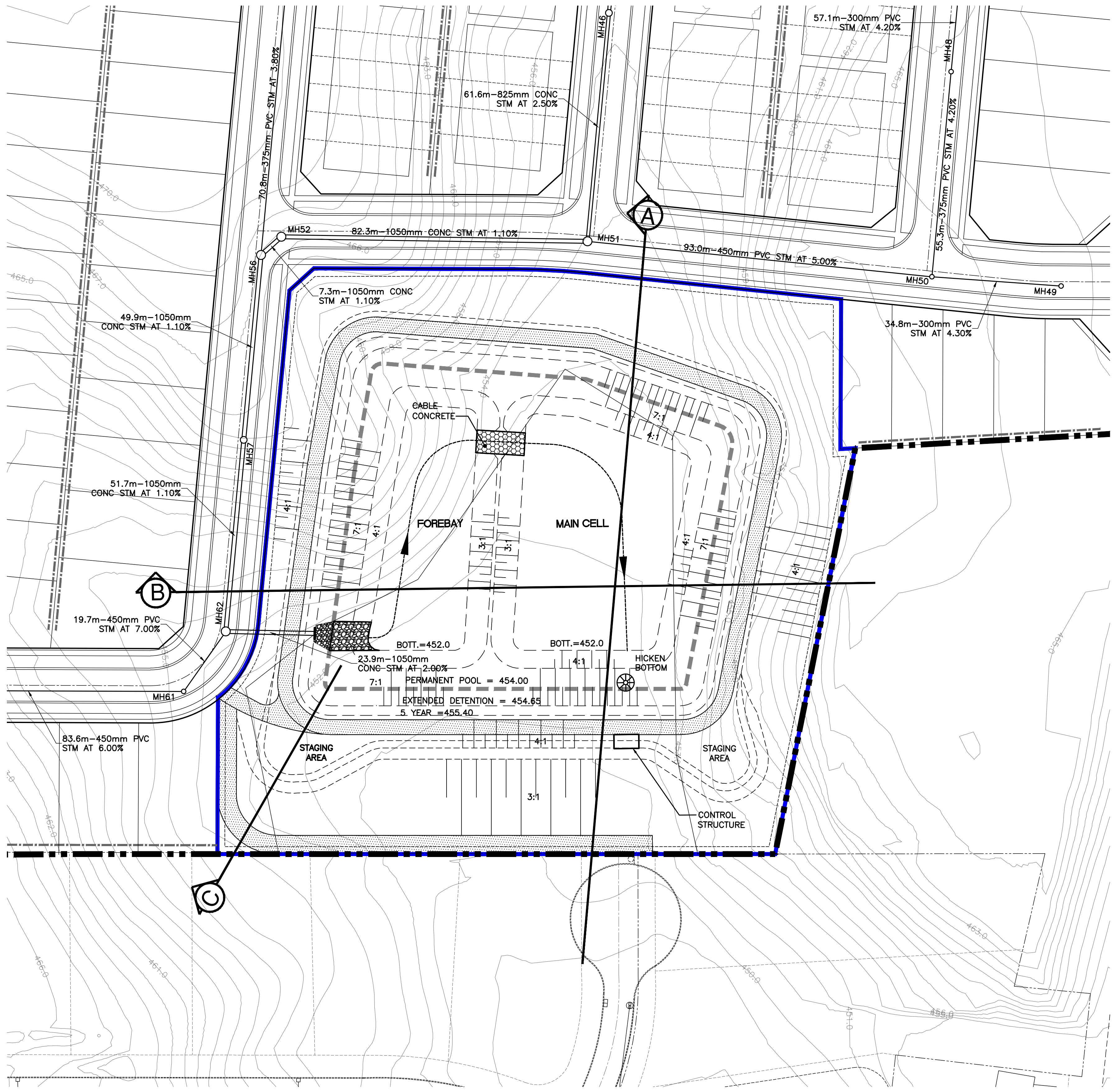
PART 1 OF PLAN 61R-9590
PART OF LOT 26, CONCESSION 7

HILLSBURGH URBAN AREA
TOWN OF ERIN

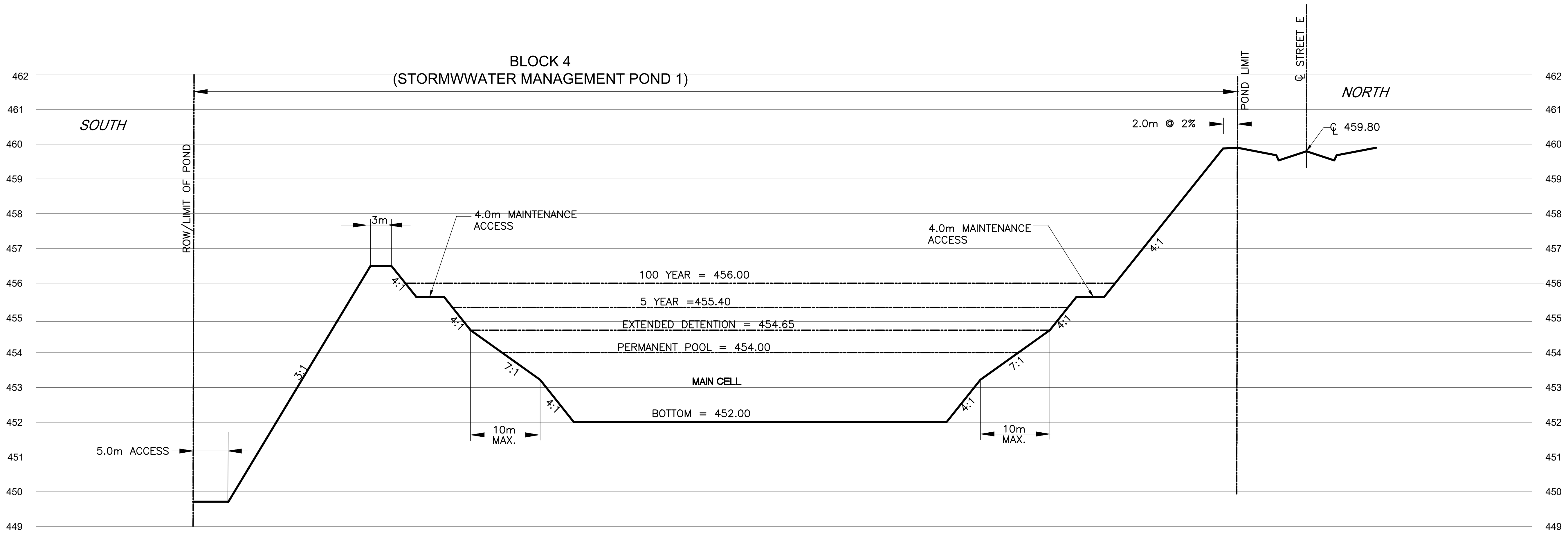
SHEET TITLE:

EROSION & SEDIMENT CONTROL PLAN

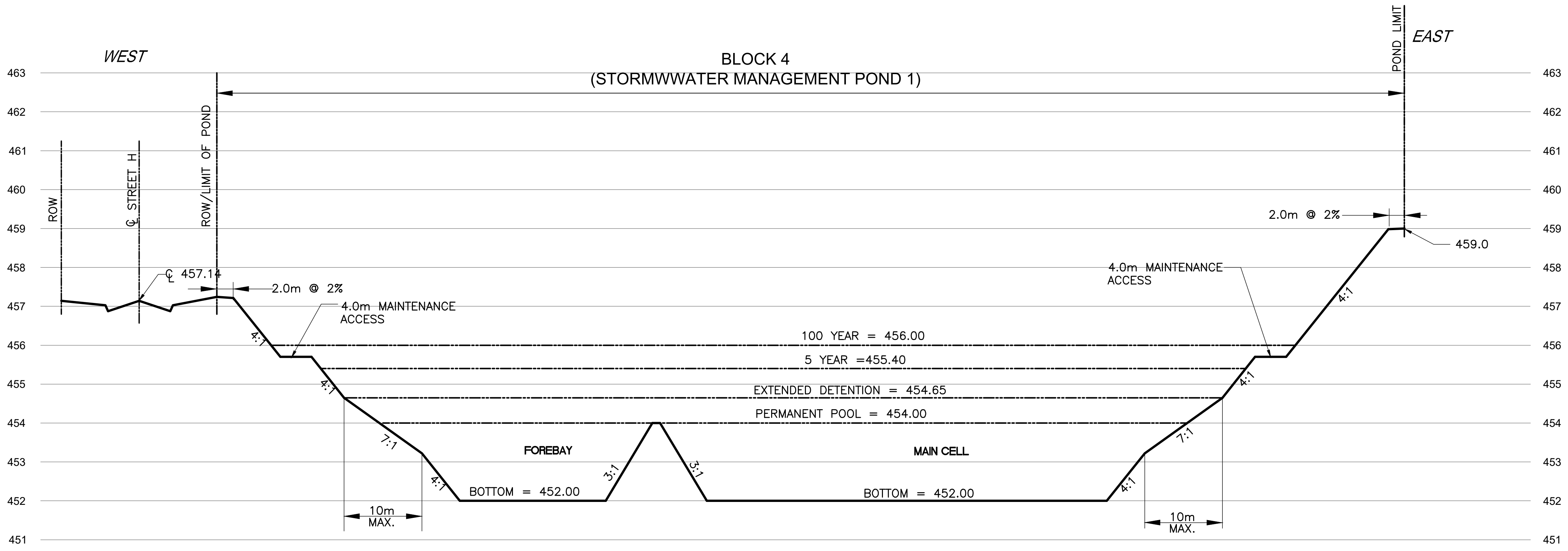
DRAWN BY: E.A.M
PROJECT No. W21081
CHECKED BY: S.L
DRAWING No. **ESC-1**
SCALE: 1:1000
DATE: OCT 1st, 2021
2



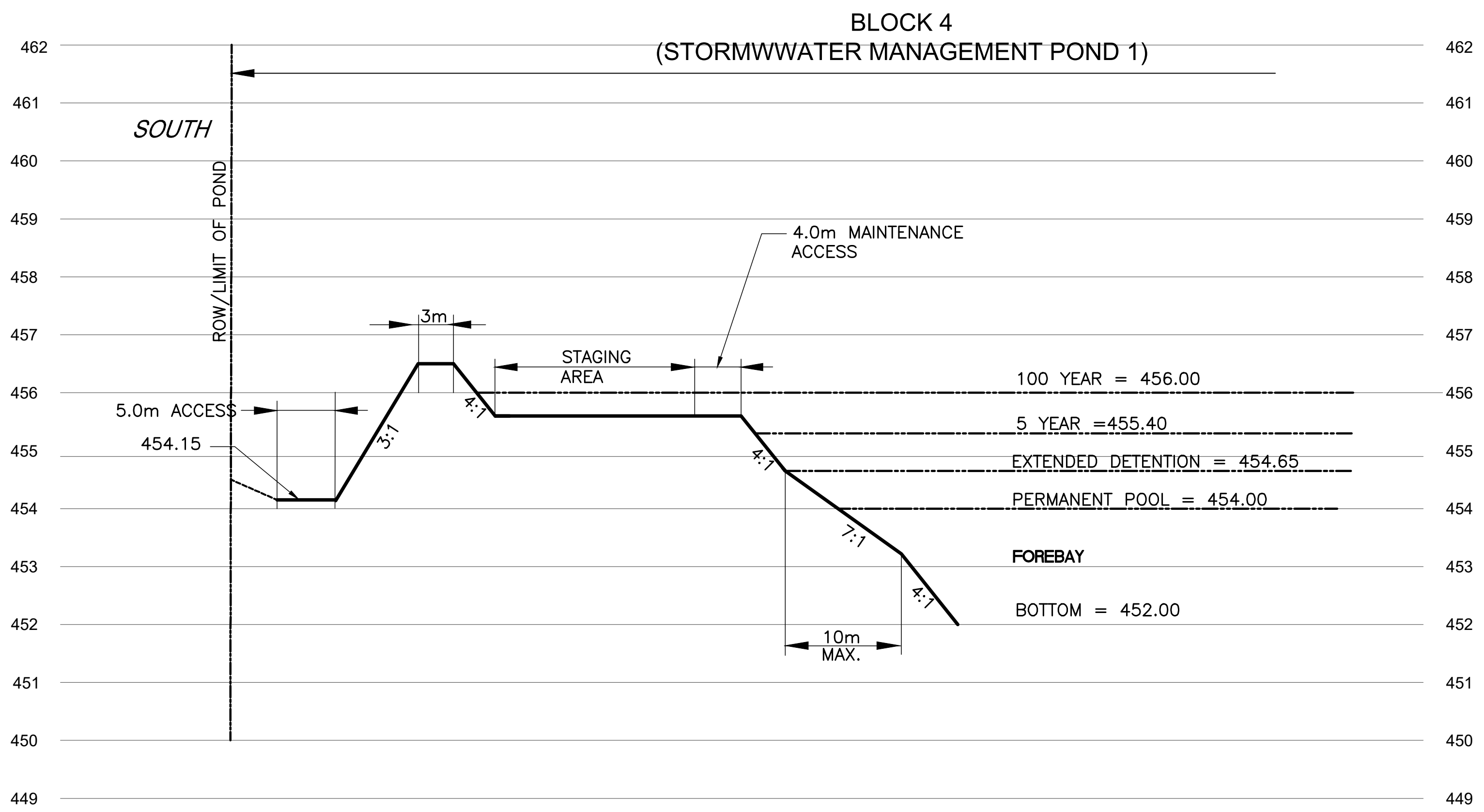
PLAN - POND 2
1:1000



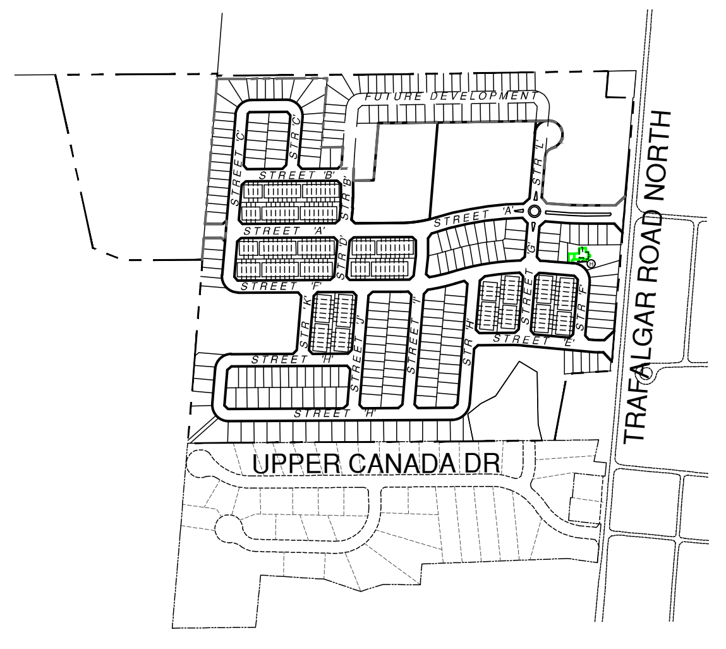
SECTION 'A' - NORTH-SOUTH
H-1:500 V-1:100



SECTION 'B' EAST-WEST
H-1:500 V-1:100



SECTION 'C'
H-1:500 V-1:100



KEY PLAN
1:15,000

LEGEND:

⇨ OVERLAND FLOW
— LIMIT OF POND
○ ○ ○ ○ REGIONAL FLOOD LINE (2015)

REFERENCE DRAWINGS:

1. REFER TO DRAFT PLAN (PL-1) PREPARED BY CANDEVCON LIMITED FOR SUBDIVISION LAYOUT
2. REFER TO DRAWING PS-1 FOR INFORMATION ON STORM, SANITARY & FDC.

NO.	DESCRIPTION	DATE	BY
5			
4			
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2	THIRD SUBMISSION	2023-02-15	SL
1	SECOND SUBMISSION	2022-07-29	SL

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S. D. LANG
FEBRUARY 15, 2

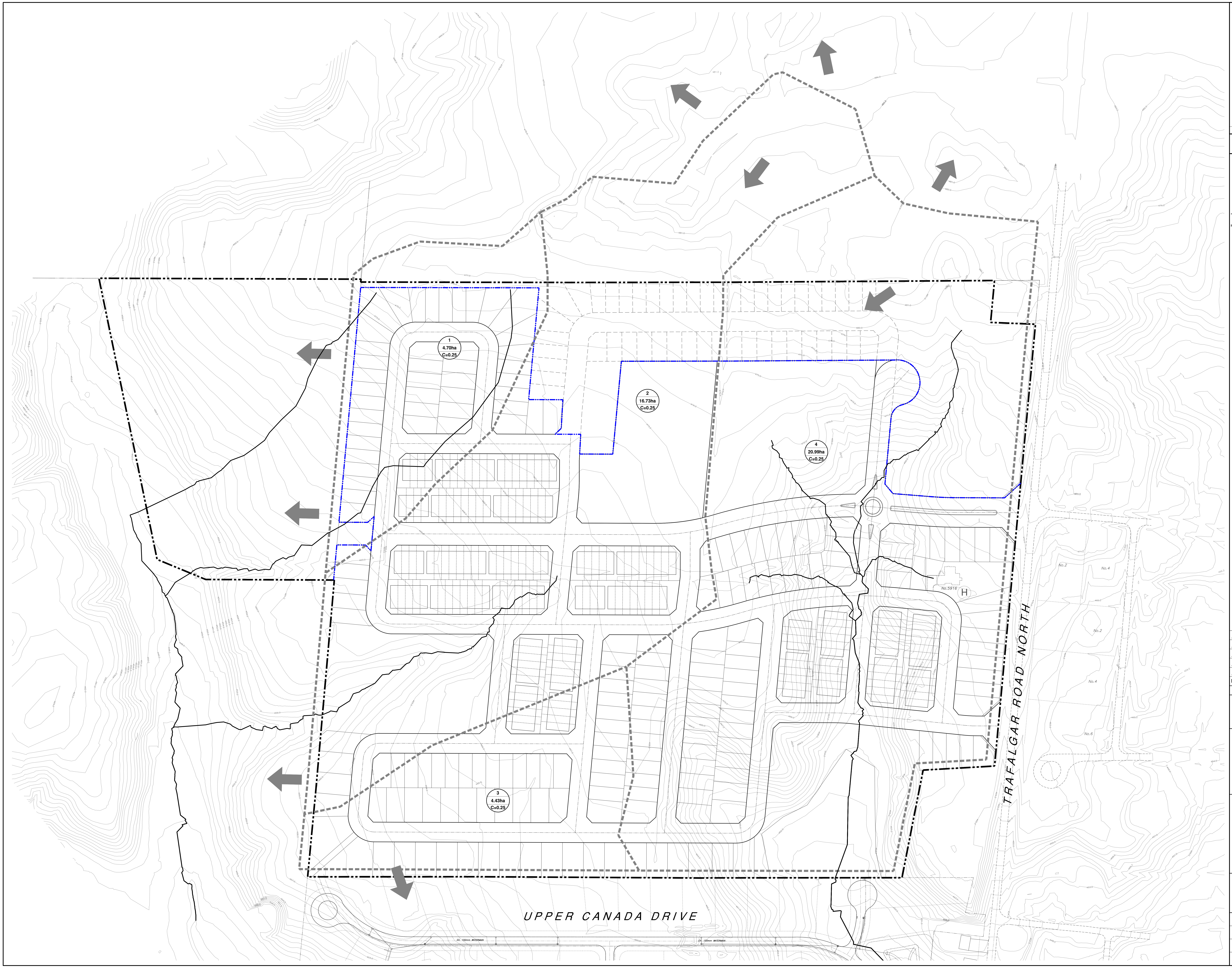
HILLSBURGH HEIGHTS INC.
RESIDENTIAL SUBDIVISION

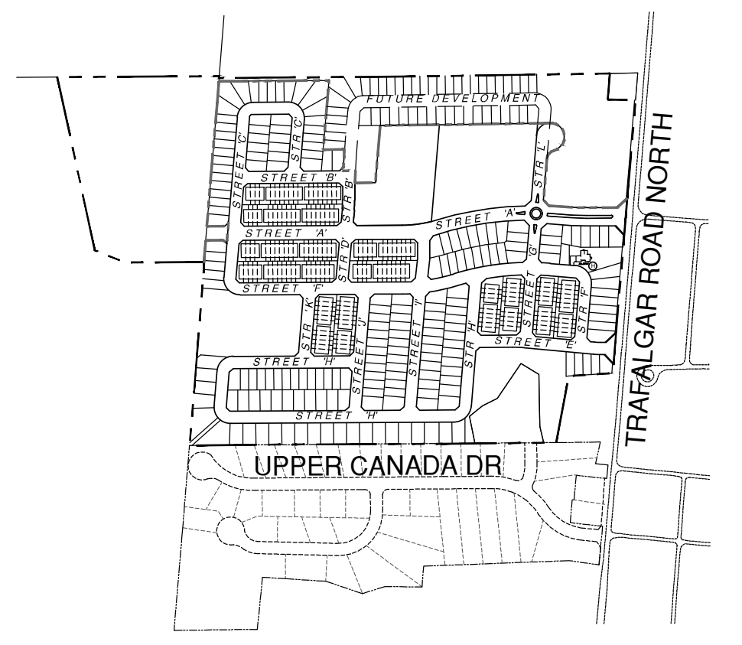
5616 TRAFALGAR ROAD NORTH
PART 1 OF PLAN 61R-9590
PART OF LOT 26, CONCESSION 7

HILLSBURGH URBAN AREA
TOWN OF ERIN

SHEET TITLE:
STORM WATER MANAGEMENT - POND 1 PLAN & SECTIONS

DRAWN BY: E.A.M
PROJECT No. W21081
CHECKED BY: S.L
DRAWING No. **SWM-1**
SCALE: AS NOTED
DATE: OCT 1st, 2021
2





KEY PLAN

LEGEND:

▬ ▪ ▪ ▬	LIMIT OF SUBDIVISION
▬ ▪ ▪ ▬	PHASING LIMIT
- - - -	EXISTING PROPERTY LINE
— — ➤ — —	EXISTING STORM SEWER
▬ ▬ ▬	EXISTINGDRAINAGE AREA BOUNDARY
➡	OVERLAND FLOW ROUTE
SP1-1	DENOTES DRAINAGE NODE
0.65ha	DENOTES AREA IN HECTARES
C=0.50	DENOTES DRAINAGE COEFFICIENT

REFERENCE DRAWINGS:

1. REFER TO DRAFT PLAN (PL–1) PREPARED BY CANDEVCON LIMITED FOR SUBDIVISION LAYOUT
2. REFER TO DRAWING PS–1 FOR INFORMATION ON STORM & SANITARY

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FEBRUARY15, 2023

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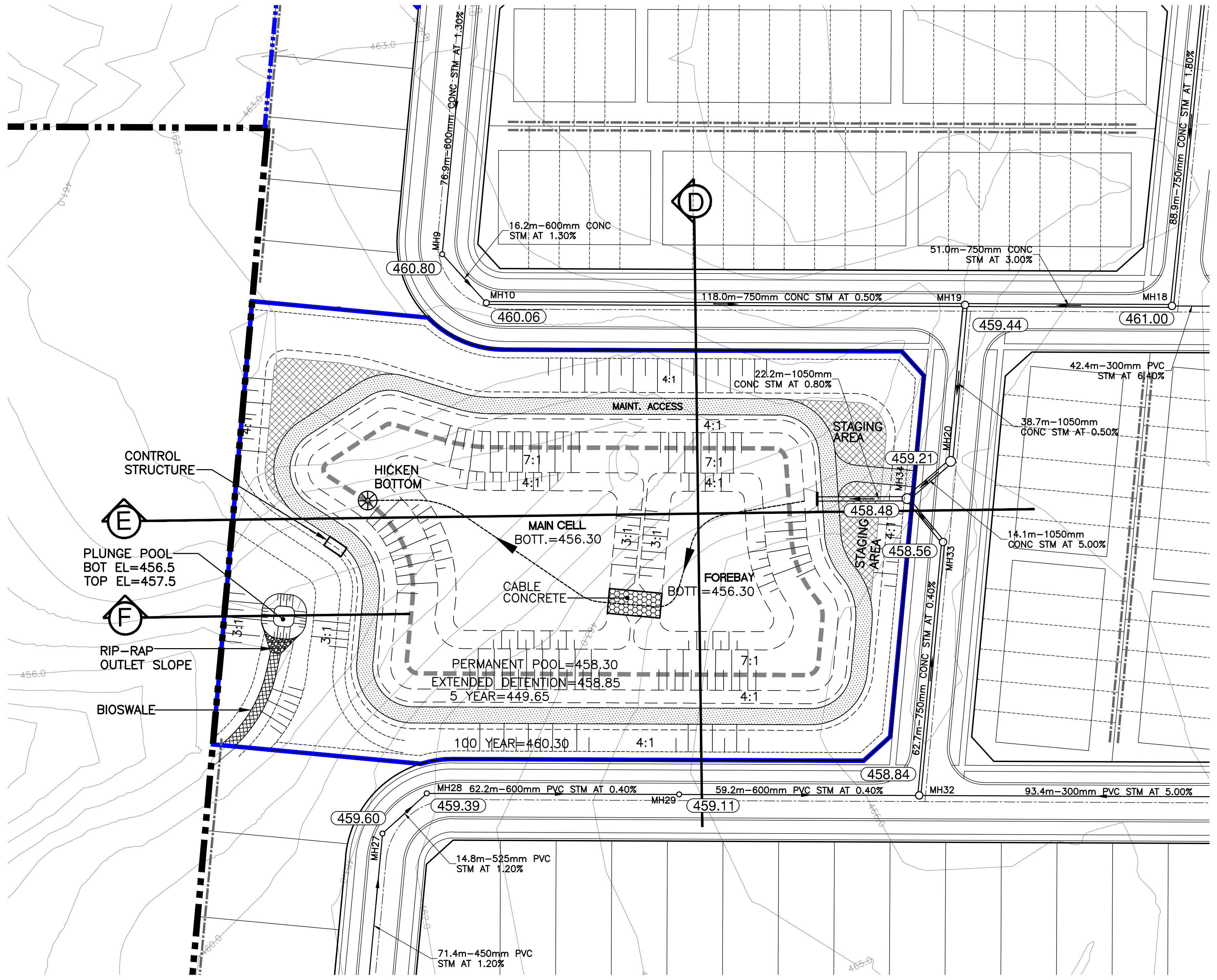
PART 1 OF PLAN 61R-9590
PART OF LOT 26, CONCESSION 7

HILLSBURGH URBAN AREA
TOWN OF ERIN

SHEET TITLE:

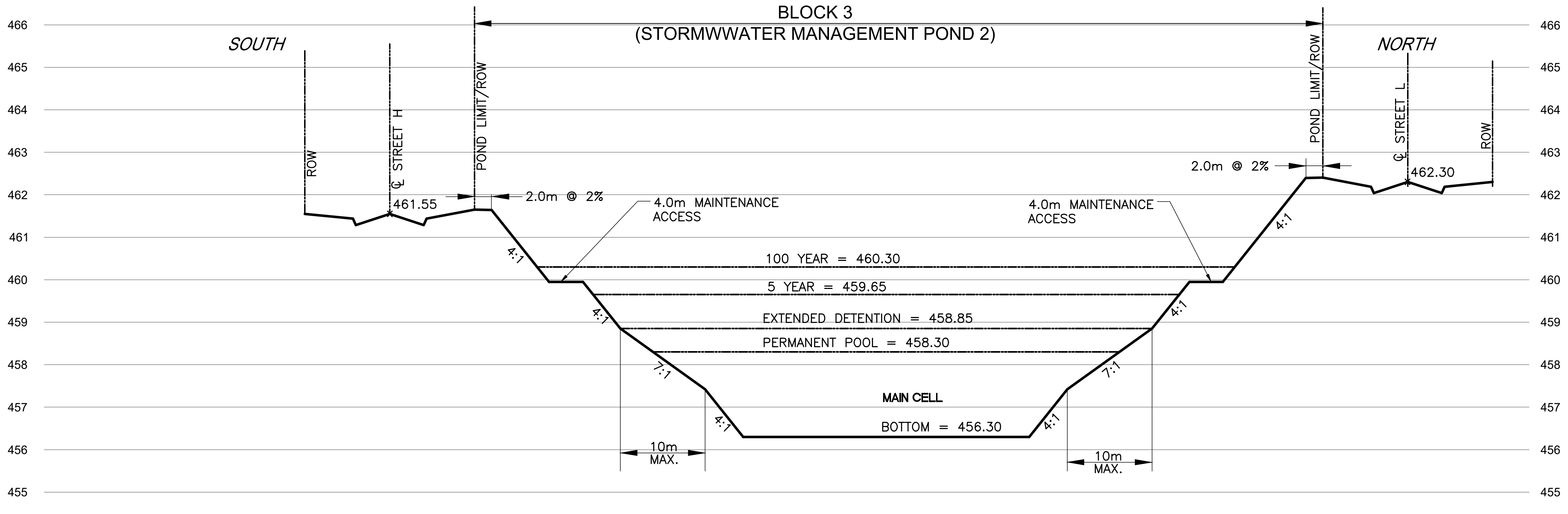
EXISTING DRAINAGE PLAN

DRAWN BY: E.A.M
PROJECT No. W21081
CHECKED BY: S.L
DRAWING No. **EX-DR-1**
SCALE: 1:750
DATE: OCT 1st, 2021
2



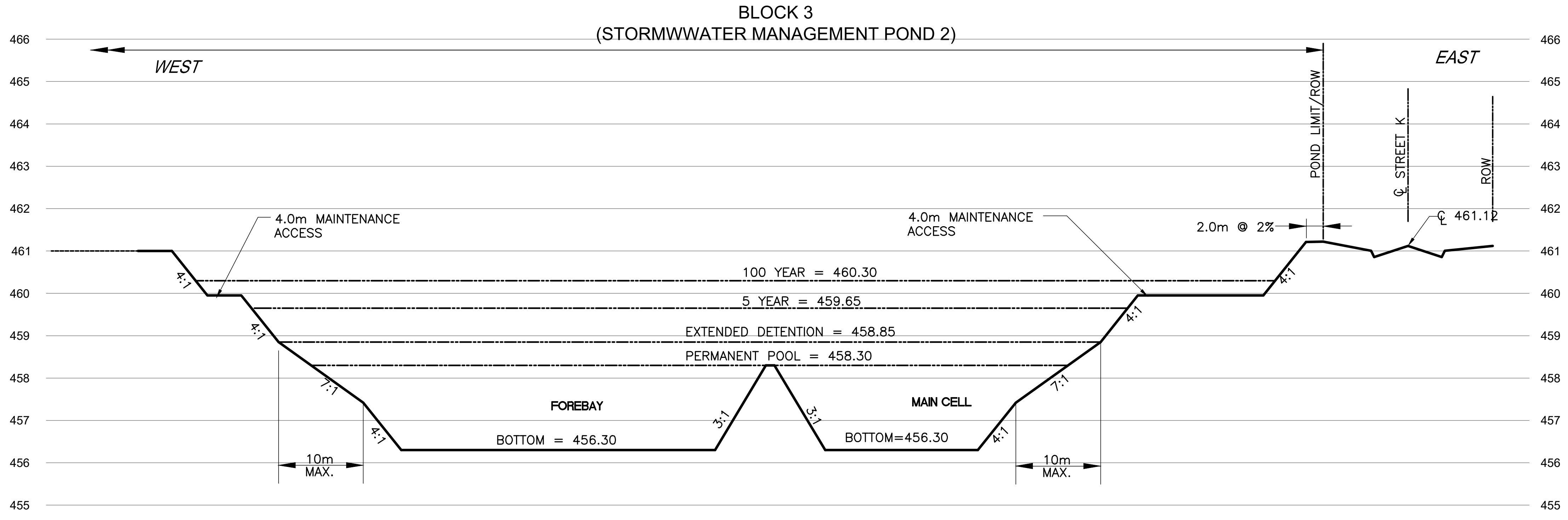
PLAN - POND 2

1:1000



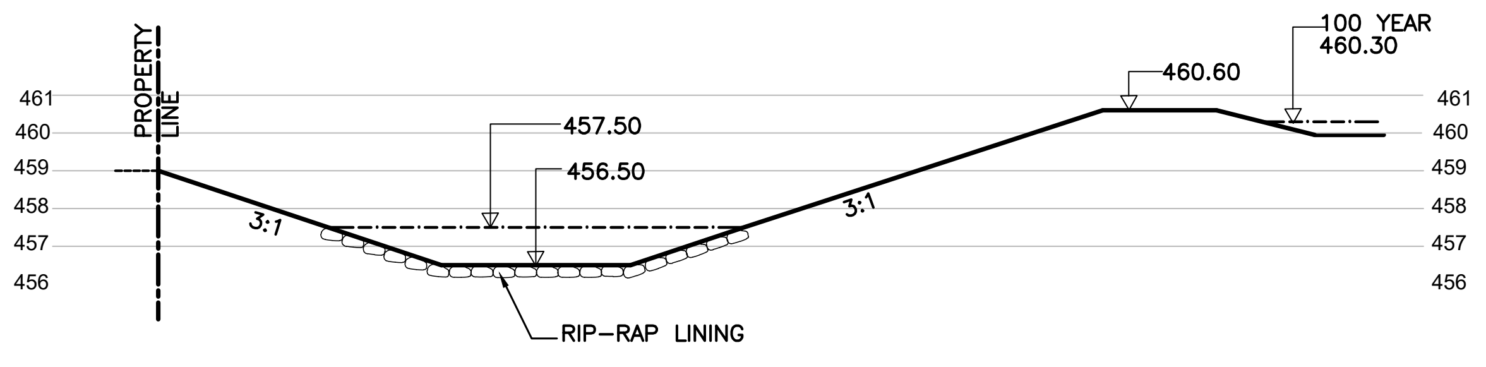
SECTION 'D' NORTH-SOUTH

H-1:500 V-1:100



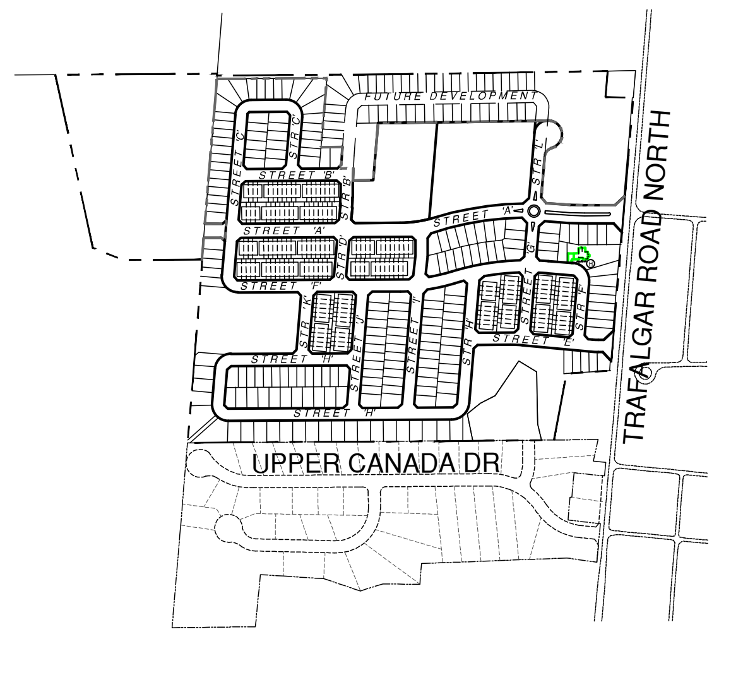
SECTION 'E' EAST-WEST

H-1:500 V-1:100



SECTION F

H-1:200 V-1:200



KEY PLAN

1:15,000

LEGEND:

⇨	OVERLAND FLOW
▬	LIMIT OF POND
○ ○ ○ ○	REGIONAL FLOOD LINE (2015)

REFERENCE DRAWINGS:

1. REFER TO DRAFT PLAN (PL-1) PREPARED BY CANDEVCON LIMITED FOR SUBDIVISION LAYOUT
2. REFER TO DRAWING PS-1 FOR INFORMATION ON STORM, SANITARY & FDC.

NO.	DESCRIPTION	DATE	BY
5			
4			
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2	THIRD SUBMISSION	2023-02-15	SL
1	SECOND SUBMISSION	2022-07-29	SL

REVISIONS

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REGISTERED PROFESSIONAL ENGINEER
S. D. LANG
FEBRUARY15, 2023
PROVINCE OF ONTARIO

HILLSBURGH HEIGHTS INC.
RESIDENTIAL SUBDIVISION

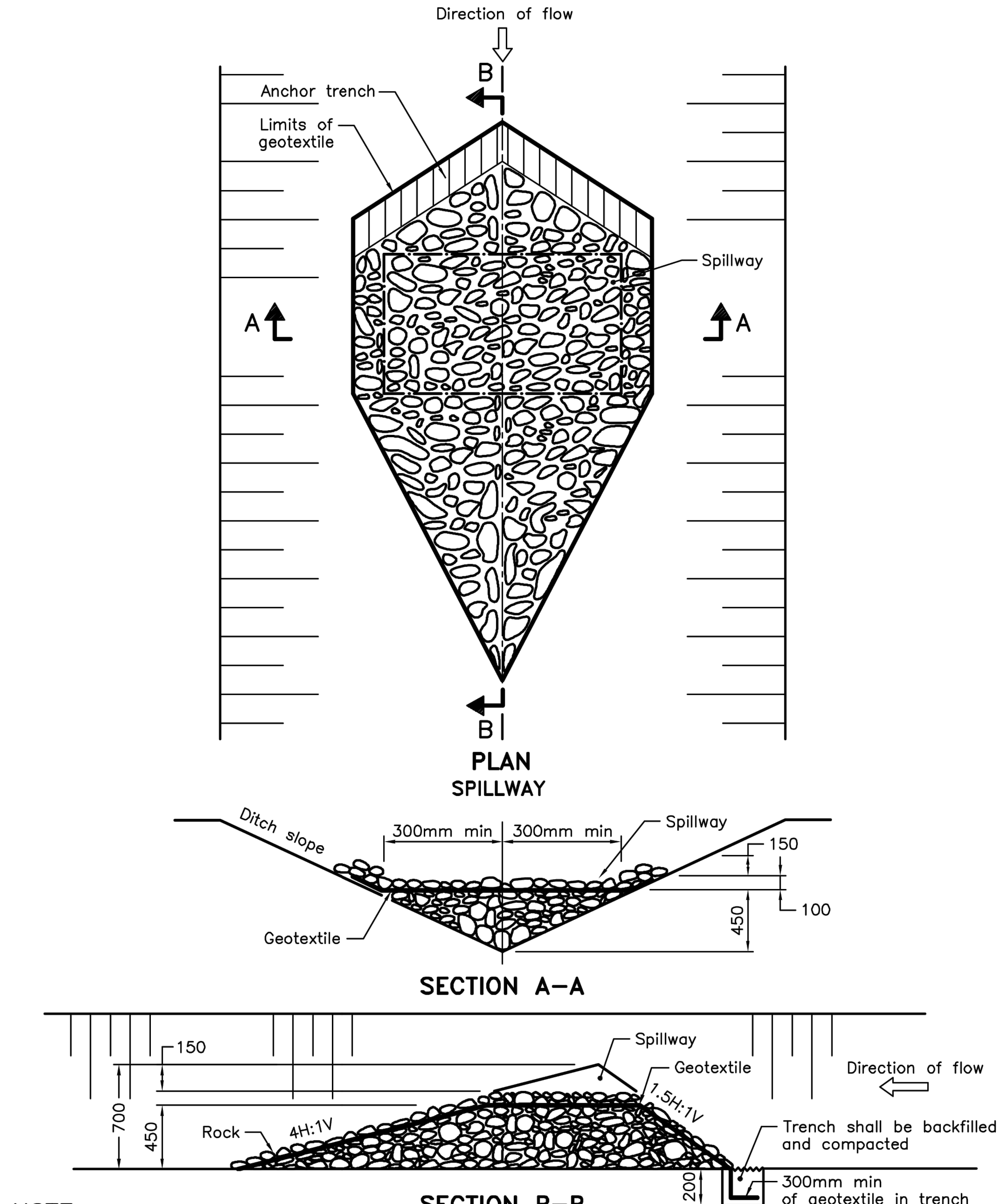
5616 TRAFALGAR ROAD NORTH
PART 1 OF PLAN 61R-9590
PART OF LOT 26, CONCESSION 7

HILLSBURGH URBAN AREA
TOWN OF ERIN

SHEET TITLE:

STORM WATER MANAGEMENT - POND 2 PLAN & SECTIONS

DRAWN BY: E.A.M	PROJECT No. W21081
CHECKED BY: S.L	DRAWING No.
SCALE: AS NOTED	
DATE: OCT 1st, 2021	2

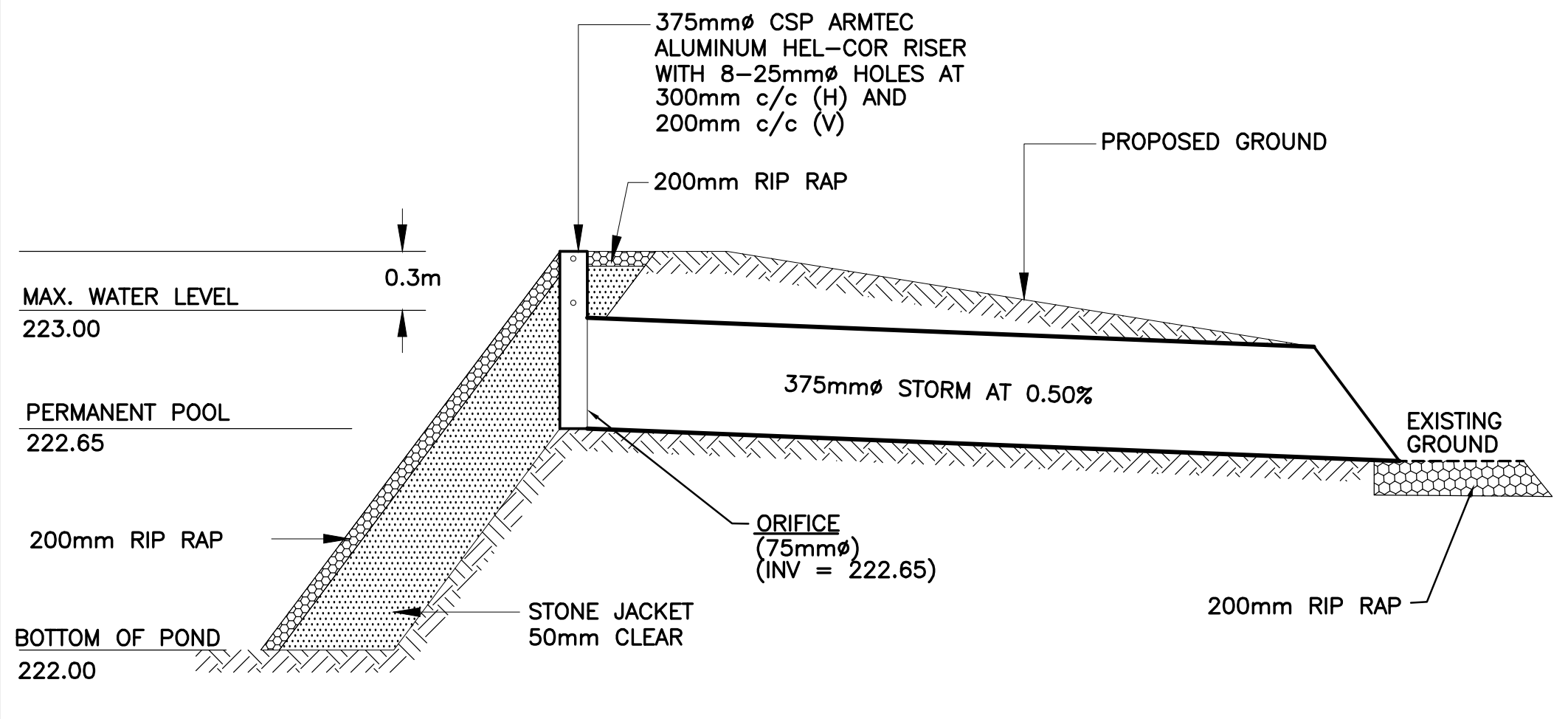


NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2015 | Rev 2

TEMPORARY
ROCK FLOW CHECK DAM
V–DITCH

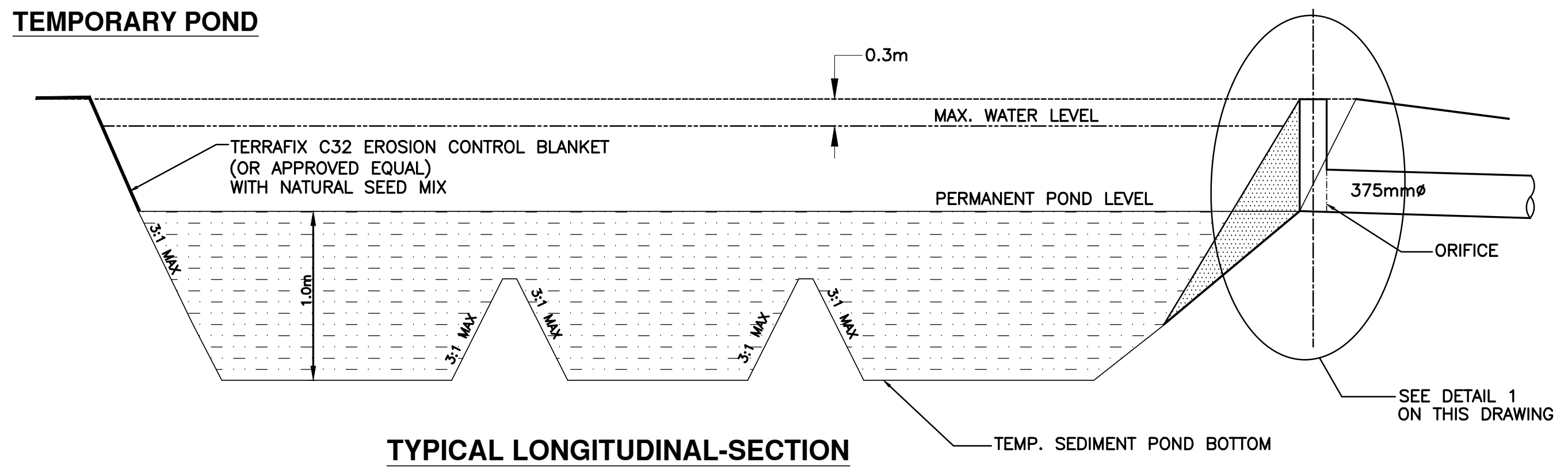
OPSD 219.210



DETAIL1 (TYPICAL OUTLET STRUCTURE)

SCALE N.T.S.

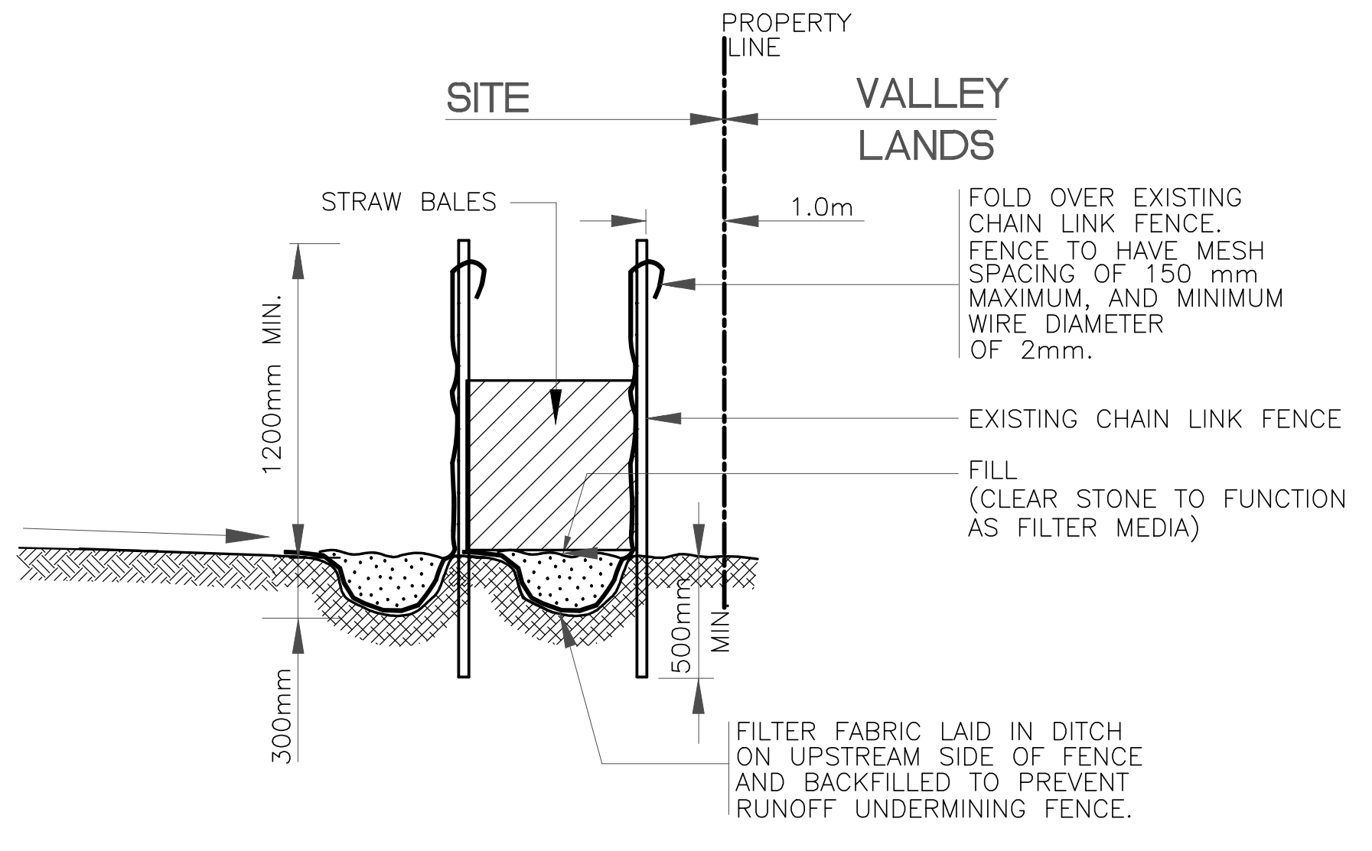
TEMPORARY POND



TYPICAL LONGITUDINAL-SECTION

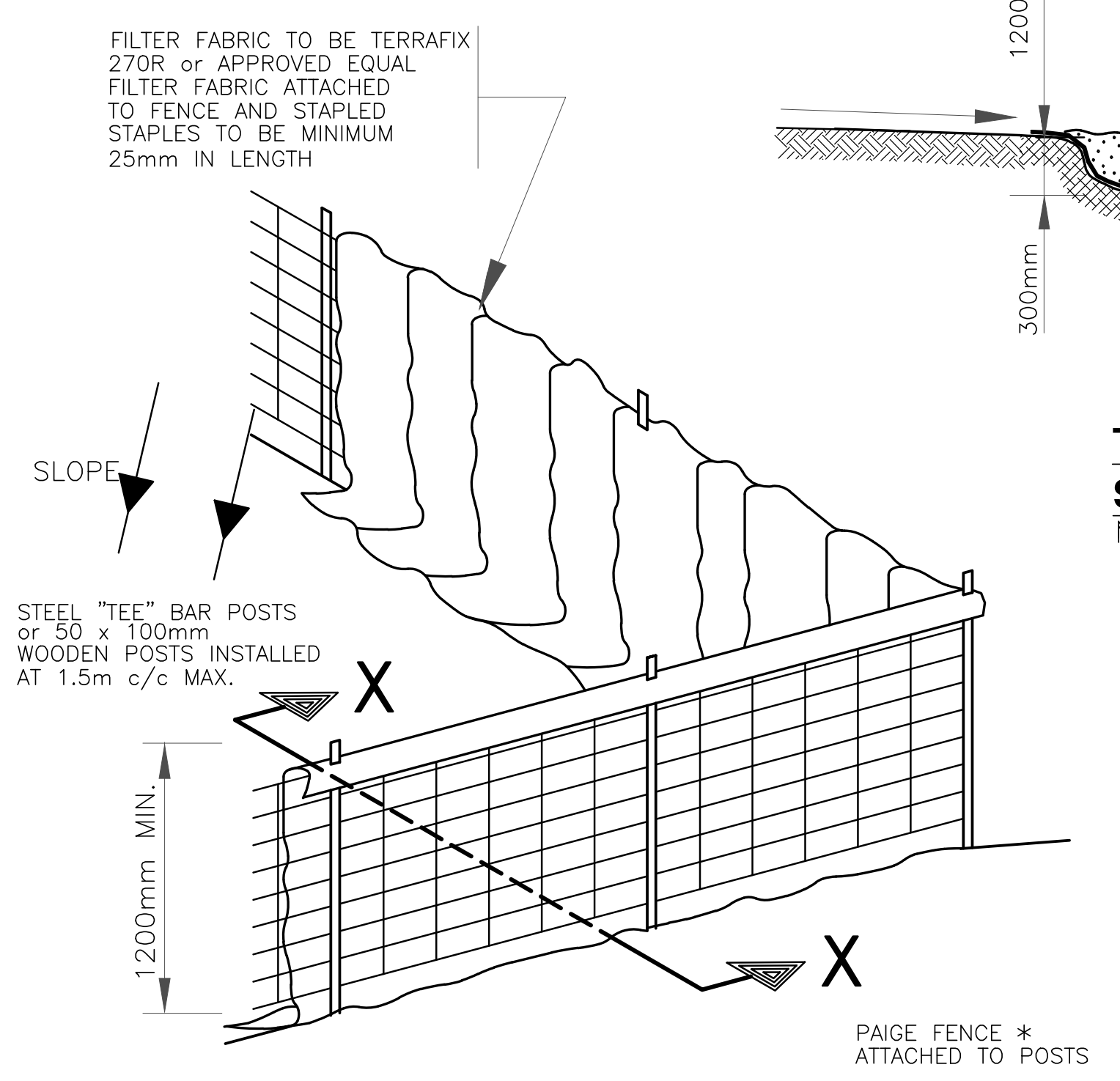
SCALE : N.T.S.

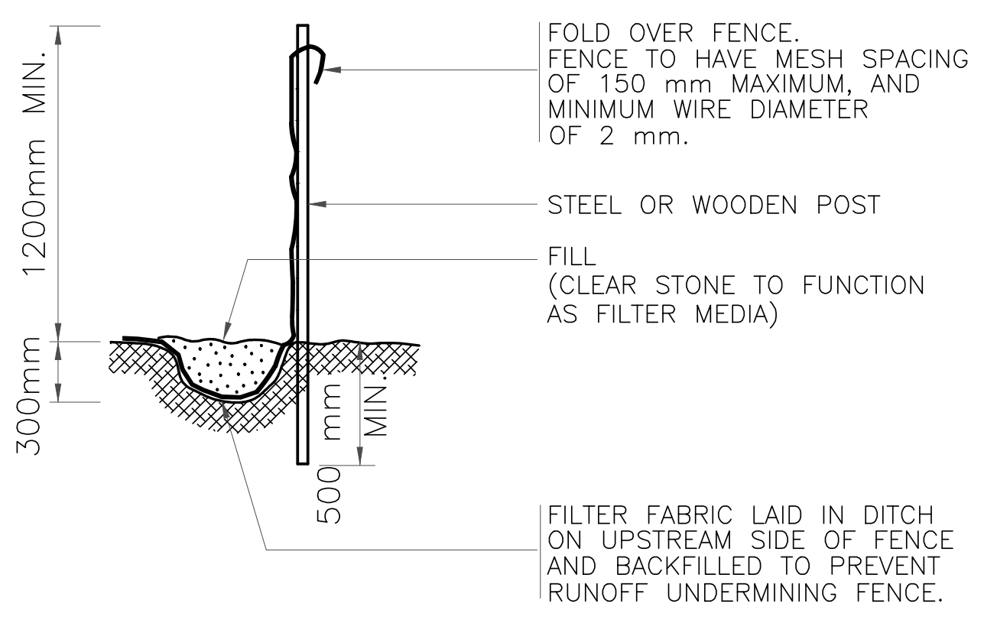
POND No./NAME	DRAINAGE AREA	PERMANENT POOL DEPTH	ACTIVE STORAGE DEPTH	PERMANENT POOL VOLUME REQUIRED	ACTIVE STORAGE REQUIRED
	(Ha.)	(m)	(m)	(m^3)	(m^3)
1	12.9	1.0	0.59	2580	1600
2	6.0	1.0	0.63	1200	750
3	4.7	1.0	0.62	940	590
4	13	1.0	0.60	2600	1625



TYPICAL SECTION OF DOUBLE SILT FENCE ADJACENT TO VALLEY

N.T.S.

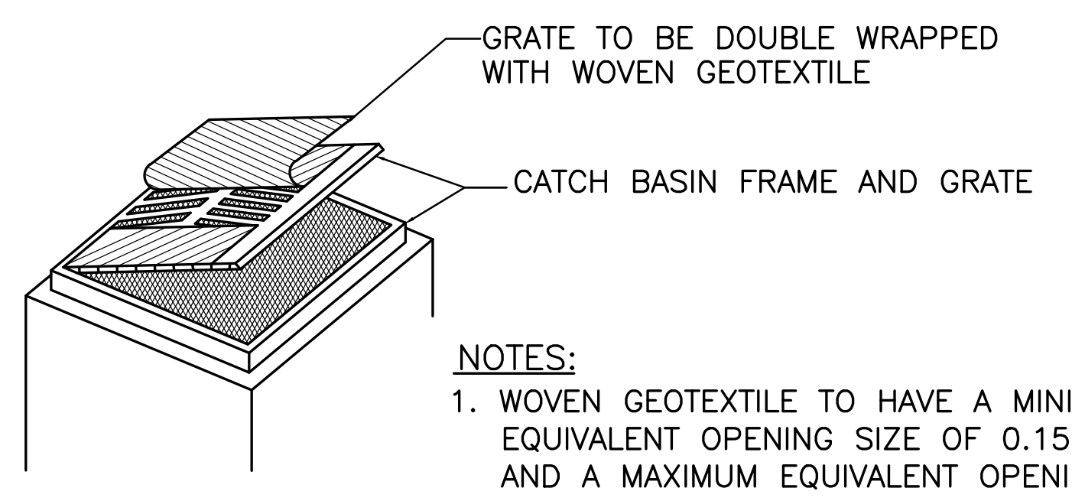




SILT FENCE DETAIL (CITY STD. 406 AS MODIFIED*)

N.T.S.

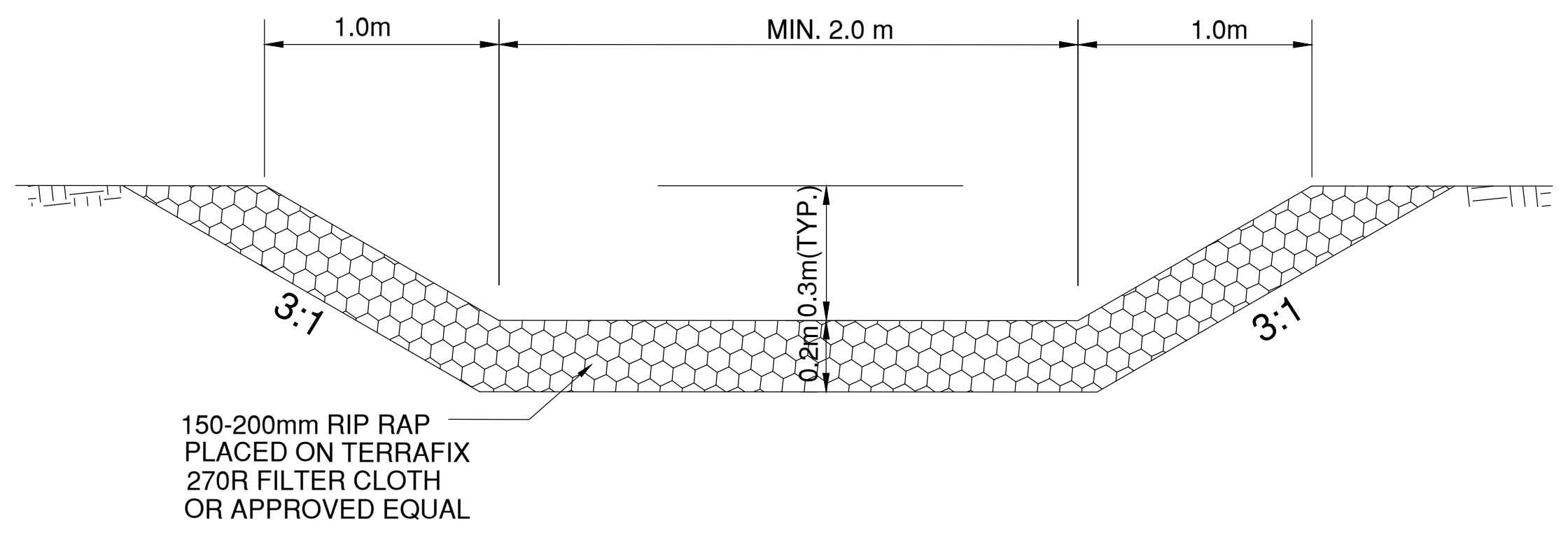
SECTION X-X



NOTES:
1. WOVEN GEOTEXTILE TO HAVE A MINIMUM EQUIVALENT OPENING SIZE OF 0.15mm AND A MAXIMUM EQUIVALENT OPENING SIZE OF 0.25mm.
2. WOVEN GEOTEXTILE TO BE REPLACED PERIODICALLY WHEN ACCUMULATED SEDIMENTS INTERFERES WITH DRAINAGE.

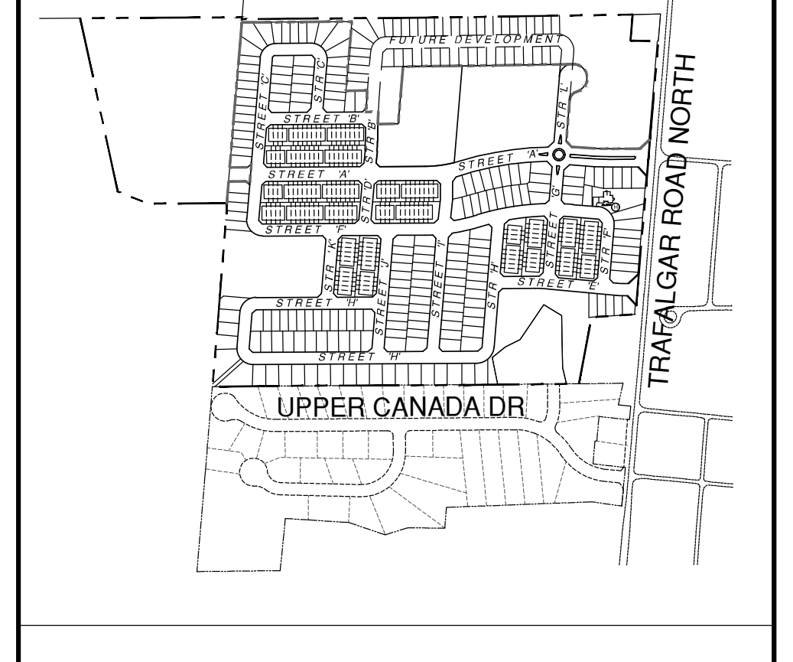
CATCH BASIN SEDIMENT CONTROL DETAIL

1:25



DETAIL "2", OUTLET SPILLWAY

N.T.S.



KEY PLAN

REFERENCE DRAWINGS:
1. REFER TO DRAFT PLAN (PL–1) PREPARED BY CANDEVCON LIMITED FOR SUBDIVISION LAYOUT
2. REFER TO DRAWING PS–1 FOR INFORMATION ON STORM, SANITARY & FDC

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1	SECOND SUBMISSION	2022–07–29	SL

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S. D. LANG
FEBRUARY15, 2023

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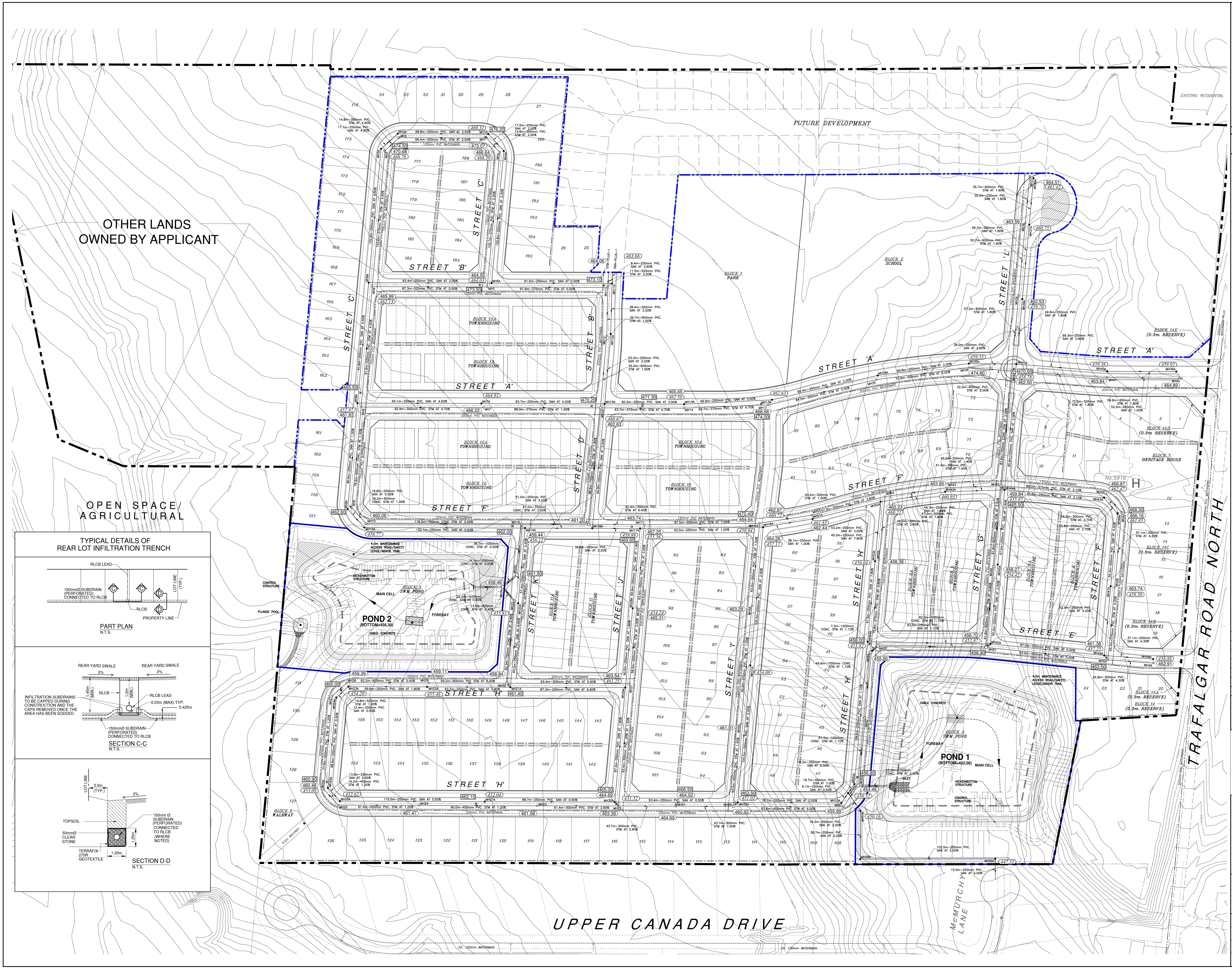
RESIDENTIAL SUBDIVISION

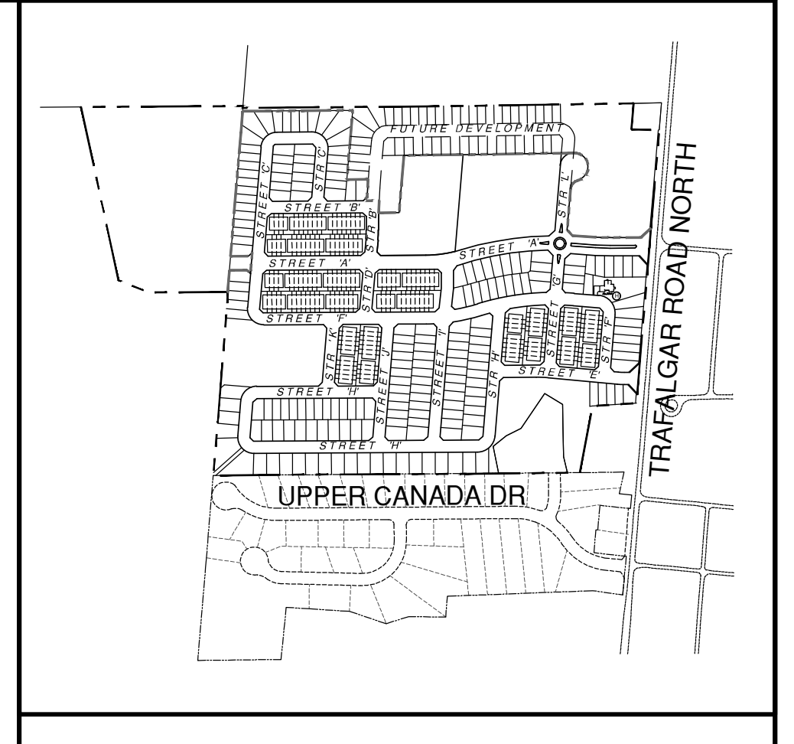
5616 TRAFALGAR ROAD NORTH
PART 1 OF PLAN 61R-9590
PART OF LOT 26, CONCESSION 7

HILLSBURGH URBAN AREA
TOWN OF ERIN

SHEET TITLE:
EROSION & SEDIMENT CONTROL DETAILS

DRAWN BY: E.A.M
PROJECT No. W21081
CHECKED BY: S.L
DRAWING No. ESC-1A
SCALE: 1:1000
DATE: OCT 1st, 2021
2





KEY PLAN

LEGEND:

- LIMIT OF SUBDIVISION
- PHASING LIMIT
- EXISTING PROPERTY LINE
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- PROPOSED SAN SEWER
- EXISTING SAN SEWER
- WATERMAIN
- EXISTING WATERMAIN
- INFILTRATION TRENCH
- x455.51 EXIST. GRADE
- 481.80 PROPOSED ROAD GRADE
- (476.65) PROPOSED SAN SEWER OBVERT
- (456.80) PROPOSED STORM SEWER OBVERT

REFERENCE DRAWINGS:

1. REFER TO DRAFT PLAN (PL-1) PREPARED BY CANDEVCON LIMITED 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
4. REFER TO DWG EXT-ST1 FOR EXTERNAL STORM DRAINAGE AREA PLAN

NO.	DESCRIPTION	DATE	BY
5			
4			
3			
2	THIRD SUBMISSION	2023-02-15	SL
1	SECOND SUBMISSION	2022-07-29	SL

REVISIONS

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
TEL. (905) 794-0600 FAX (905) 794-0611

REGISTERED PROFESSIONAL ENGINEER
S. D. LANG
FEBRUARY15, 2023
PROVINCE OF ONTARIO

HILLSBURGH HEIGHTS INC.
RESIDENTIAL SUBDIVISION

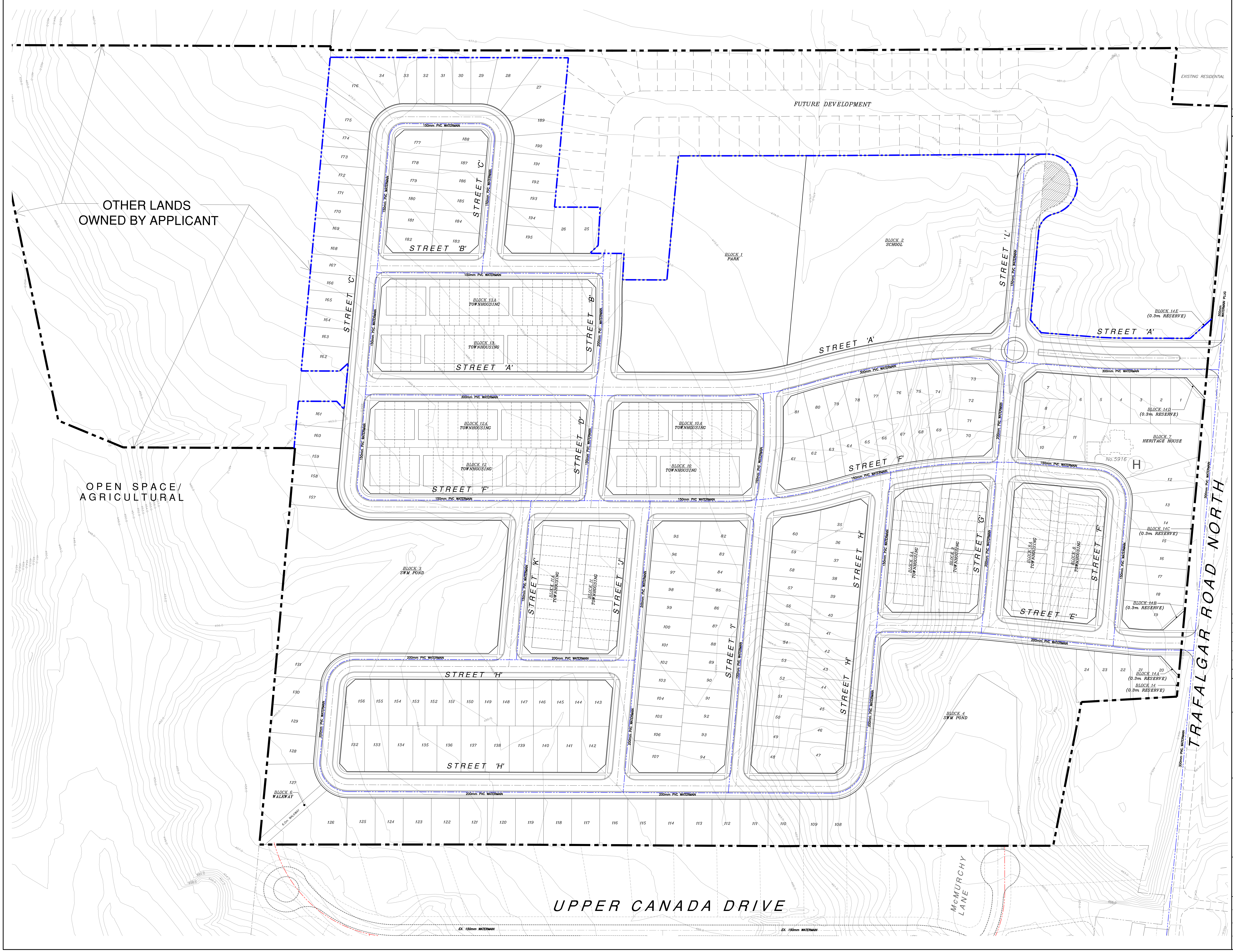
5616 TRAFALGAR ROAD NORTH
PART 1 OF PLAN 61R-9590
PART OF LOT 26, CONCESSION 7

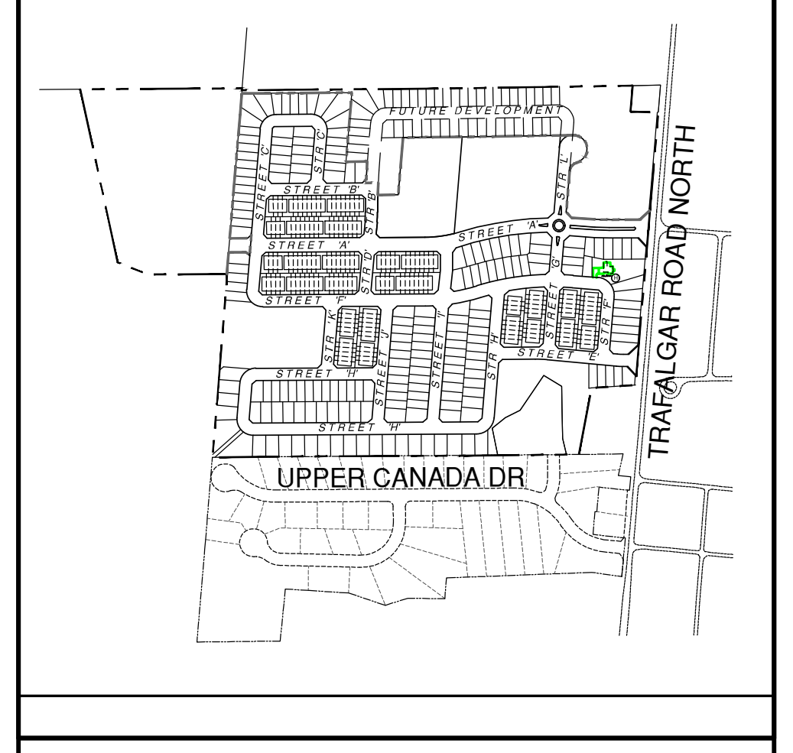
HILLSBURGH URBAN AREA
TOWN OF ERIN

SHEET TITLE:

PRELIMINARY SERVICING PLAN

DRAWN BY: E.A.M	PROJECT No. W21081
CHECKED BY: S.L	DRAWING No. PS-1
SCALE: 1:1000	2
DATE: OCT 1st, 2021	





KEY PLAN

LEGEND:

LIMIT OF SUBDIVISION
PHASING LIMIT
EXISTING PROPERTY LINE
PROPOSED WATERMAIN
FUTURE WATERMAIN
EXISTING WATERMAIN

REFERENCE DRAWINGS:

1. REFER TO DRAFT PLAN (PL-1) PREPARED BY CANDEVCON LIMITED FOR SUBDIVISION LAYOUT
2. REFER TO DRAWING PS-1 FOR INFORMATION ON STORM & SANITARY

NO.	DESCRIPTION	DATE	BY
5			
4			
3			
2	THIRD SUBMISSION	2023-02-15	SL
1	SECOND SUBMISSION	2022-07-29	SL

REVISIONS

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S. D. LANG
FEBRUARY15, 2023

HILLSBURGH HEIGHTS INC.
RESIDENTIAL SUBDIVISION

5616 TRAFALGAR ROAD NORTH
PART 1 OF PLAN 61R-9590
PART OF LOT 26, CONCESSION 7

HILLSBURGH URBAN AREA
TOWN OF ERIN

SHEET TITLE:

WATER DISTRIBUTION PLAN

DRAWN BY: E.A.M
CHECKED BY: S.L
SCALE: 1:1000
DATE: OCT 1st, 2021
PROJECT No. W21081
DRAWING No. **WM-1** 2