Preliminary
Stormwater Management Report

Heritage Line Subdivision
Keene, ON

Residential Subdivision Development

D.M. Wills Project No. 21-10985

D.M. Wills Associates Limited
Partners in Engineering, Planning &
Environmental Services
Peterborough

October 2022

Prepared for:
2564669/520039 Ontario Limited

WILLS

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1.0 Purpose

D.M. Wills Associates Limited (Wills) has been retained by 2564669/520039 Ontario Limited (Client) to prepare a Preliminary Stormwater Management (SWM) Report for the proposed residential subdivision located on Heritage Line in the Village of Keene, Ontario.

The purpose of this report is to evaluate the drainage characteristics of the existing site and proposed development, and to advance an integrated strategy for SWM that will permit the development to proceed with no adverse impacts to the receiving drainage system. A pre-consultation meeting was held March 4, 2021, to discuss the requirements for the Plan of Condominium and Zoning By-law Amendment for the development. It was determined that a Stormwater Management Plan would be required for review by the Otonabee Region Conservation Authority (ORCA) and the County of Peterborough (County).

2.0 Site Description

The subject property is located on Lot 14, Concession 6 in the municipality of Otonabee-South Monaghan, with frontage on Heritage Line in Keene, ON. The subject site is legally described as Parts of Lot 13 and 14, Concession 6 in the Township of Otonabee-South Monaghan within the County of Peterborough. The property is 5.64 ha in area and is bound by a private gravel road to the north, a provincially significant wetland to the east, residential lots and Heritage Line to the west, and residential lots and farmland type lots to the south. Indian River Mouth, a provincially significant wetland feature, abuts the east property boundary. The location of the site is shown on **Figure 1**.

The proposed plan of condominium consists of 16 single-family homes. The subject development will be accessed from Heritage Line to the west, with two cul-de-sacs. The proposed buildings and roadway will alter the existing drainage patterns, which may have adverse impact to the receiving drainage systems.

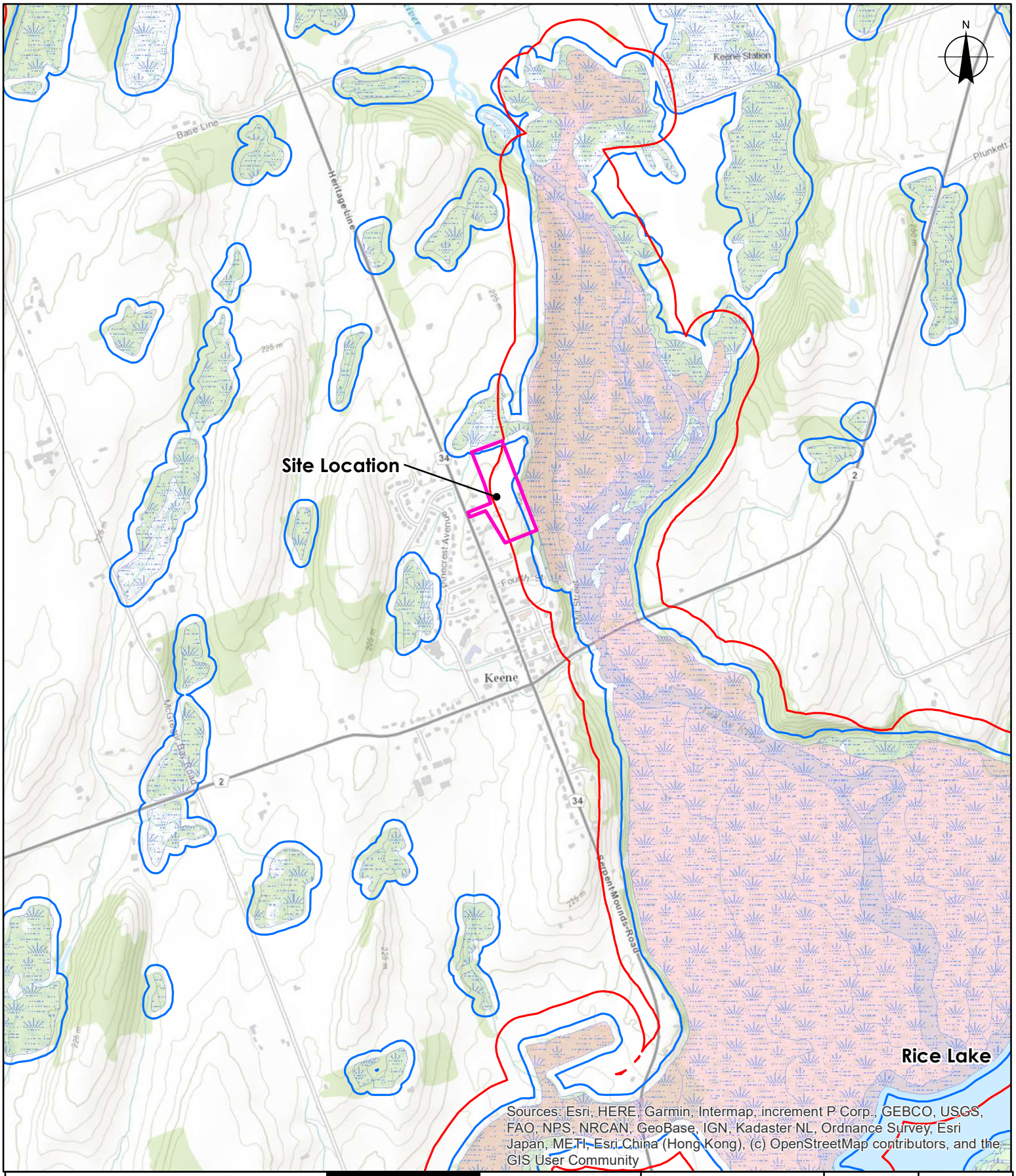

Figure - 01
Location Plan

NAD83 UTM Zone 18

0 155 310 620 930 1,24

Meters

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Legend

- Property Limits
- Wetland
- Provincial Significance
- UnEvaluated Wetland
- Non-Provincially Significant Wetland Evaluated
- Provincially Significant Wetland Evaluated
- Wetland_30mbuffer
- Wetland_120mbuffer

Drawn by: RC	Scale (Horz.) 1:20,000
Checked by: CPB	
Engineer: RC/CPB	Map Date June 2021
Project No. 19085	Map File No. 10985-DP01

According to the Soil Survey Complex of Ontario, the subject site is primarily composed of Otonabee Loam, a typical soil type observed in this region. This type of surficial soil corresponds to Hydrologic Soils Group B, according to the SCS method of classifying soils.

A topographic survey was completed by Elliot and Parr Ltd. in April 2021 (Reference No. 21-19-079-00) and was used to determine existing elevations and the location of drainage features on the site. The Indian River Mouth Wetland was designated as provincially significant in 1984 by MNR (Ministry of Natural Resources) and the wetland boundary was obtained from the Land Information Ontario (LIO) database.

2.1 Geotechnical Investigation

PRI Engineering (PRI) and Wills conducted a detailed hydrogeological study in August 2021, which summarizes the expected soil profile and seasonal groundwater levels at the time of drilling. As a part of this study, 21 boreholes were drilled and the soil column was investigated. Wills in coordination with PRI selected 3 boreholes within the property limits for in-situ infiltration testing. The seasonal groundwater levels varies from 0.7 m to 4.6 m within the property. The following table summarizes the key findings that may influence the stormwater management design.

Table 1 – In-situ Infiltration Testing Summary

Test Location ID	Borehole Depth (mbeg)	Infiltration Rate (mm/hr)	Groundwater Depth (m)	Groundwater Elevation (m)
MW-09	1.70	20	4.10	220.90
MW-16	1.75	30	1.75	221.06
BH-08	1.70	-	2.70	219.86

As such, the native soil possesses acceptable infiltration rates for infiltration-based features but considerations should be given for areas with shallow ground water levels. The preliminary grading plan considered the groundwater depths to ensure that a minimum of 1.0 m separation is achieved between the bottom of any proposed Low Impact Design (LID) feature and the seasonally high groundwater table.

3.0 Methodology

The present hierarchy of watershed planning in Ontario can be described by the following in descending order: Watershed Plans, Sub-watershed Plans and individual SWM Plans.

The subject site is not covered by any Watershed or Sub-watershed Plans; therefore, this report has been prepared as an individual SWM plan.

On-site SWM facilities are typically required to provide both stormwater quantity and quality control for developments in accordance with municipal and provincial guidelines. In order to ensure that the flooding potential to downstream properties is not increased, stormwater quantity controls are typically required to control post-development peak flows to existing condition levels. To ensure that the development does not adversely impact water quality, stormwater quality controls are typically required to remove suspended sediments and other contaminants from stormwater runoff.

Although not always required within individual SWM plans, the proposed SWM strategy includes consideration for nitrate dilution to support the proposed septic works. Infiltration facilities are proposed, both within and around the perimeter of the development, in order to meet nitrate concentration targets. These infiltration facilities were assessed based on considerations for annual loading, rather than storm-based events, in an approach that is similar to a water balance analysis.

Stormwater quality control can be achieved using lot level controls, conveyance controls and end-of-pipe SWM facilities. There are also opportunities for the implementation of LID measures. Examples of end-of-pipe systems include wet ponds, wetlands, dry ponds, infiltration basins, infiltration trenches, filter strips, sand filters, and Oil-Grit Separators (OGS). The effectiveness and maintenance requirements of each method will vary depending on the nature of the proposed development. Water quality features are designed to achieve MOE Enhanced (Level 1) protection. This level of protection requires that permanent stormwater retention be provided for volumes in keeping with Table 3.2 (Page 3-10) of the MOE 2003 SWM Planning and Design Manual. To ensure proper winter operation, the preliminary design included a minimum of double the values suggested in Table 3.2. The most likely method for stormwater quality control for this development will be LID infiltration measures within the roadside ditches.

3.1 Catchment Characterization

3.1.1 Existing Condition

The existing drainage patterns were determined based on the existing topographic survey prepared by Elliott and Parr Ltd. (Reference No. 21-19-079-00), and aerial photography. The site is delineated as three catchment areas for the existing condition as shown on **Figure 2**.

- Catchment **EX-100** is 2.18 ha in area and consists of the northern portion of the site. **EX-100** is conveyed as sheet flow to the north boundary of the site (OUT-1), discharging to a wetland area.
- Catchment **EX-200** is 1.76 ha in area and consists of the south-eastern portion of the site. **EX-200** is conveyed as sheet flow south-easterly to the Indian River Mouth Wetland (OUT-2).

- Catchment **EX-300** is 1.70 ha in area and consists of the central portion of the site. **EX-300** is conveyed as sheet flow to the south-west corner of the property (OUT-3).

3.1.2 Proposed Condition

The proposed condition has been delineated as five catchments as shown on **Figure 3**.

- Catchment **PR-100** is 0.24 ha in area and consists of the northern developed portion of the proposed development including the proposed roadway. In the proposed condition, stormwater runoff from **PR-100** will be collected and conveyed through an easement to **OUT-1**. Stormwater runoff from **PR-100** will be collected within the roadside ditches to meet quantity and quality targets and to support the nitrate concentration targets.
- Catchment **PR-101** is 1.28 ha in area and consists of the northern portion of the proposed development including the houses and northern uncontrolled landscape areas. In the proposed condition, stormwater runoff from **PR-101** will be collected and conveyed to **OUT-1**. Stormwater runoff from **PR-101** will be collected within perimeter swales and infiltration of common rainfall events will be facilitated to support the nitrate concentration targets only; no stormwater quantity or quality controls are proposed.
- Catchment **PR-200** is 2.14 ha in area and consists of the central portion of the proposed development. In the proposed condition, **PR-200** will be collected and conveyed through an easement into **PR-201** and **OUT-2**. Stormwater runoff from **PR-200** will be collected within the roadside ditches to meet quantity and quality targets and to support the nitrate concentration targets.
- Catchment **PR-201** is 0.74 ha in area and consists of the southern developed portion of the proposed development including the houses. In the proposed condition, stormwater runoff from PR-201 will be collected and conveyed to **OUT-2. PR-201** will receive controlled flows from **PR-200.** Stormwater runoff from **PR-201** will be collected within perimeter swales and infiltration of common rainfall events will be facilitated to support the nitrate concentration targets only; no stormwater quantity or quality controls are proposed.
- Catchment **PR-202** is 0.93 ha in area and consists of the southeast portion of the proposed development. In the proposed condition, **PR-202** will be conveyed as uncontrolled overland flow to **OUT-2**.
- Catchment **PR-300** is 0.31 ha in area and consists of the south-western portion of the proposed development as well as the entrance to Heritage Line. In the proposed condition, **PR-300** will be conveyed as uncontrolled overland flow to **OUT-3**.

The existing and proposed runoff characteristics were analyzed using individual sub-catchments. Hydrologic parameters, land use and runoff response were determined based on literature review and satellite images. Topographic mapping and AutoCAD Civil 3D 2019 software were used to establish sub-watershed areas, land use and slope.

On-site soils were assessed using the Ministry of Agriculture Agricultural Information Atlas. The site was identified as containing a mixture of Otonabee Loam with a Hydrologic Soil Group of B.

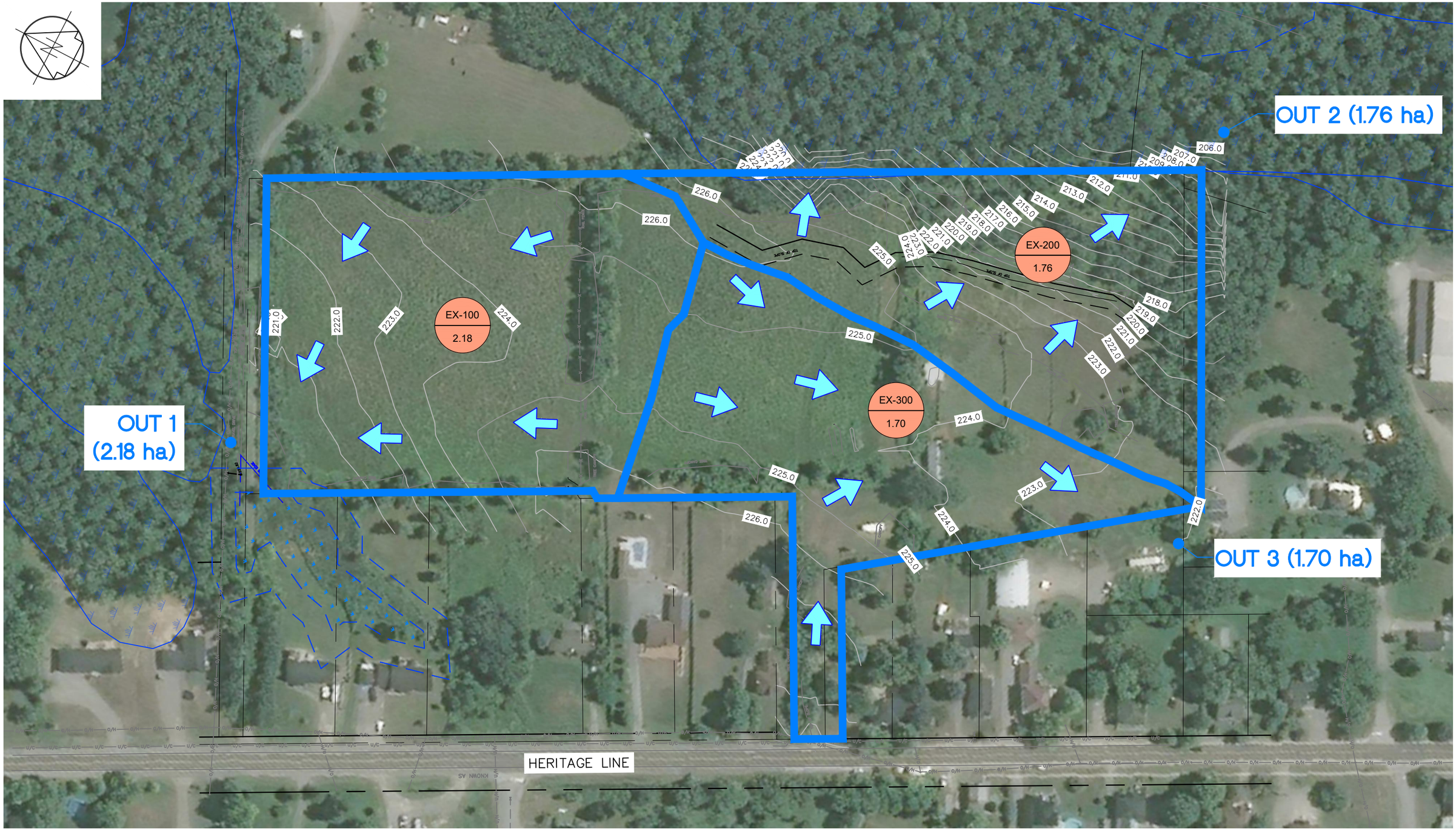
The hydrologic parameters for each catchment are summarized in **Table 2** and documented in **Appendix A**.

Table 2 – Existing and Proposed Hydrologic Parameters

Standhyd[1]								
Catchment ID	**Area (ha)**	**Impervious %**	**CN*[2]**	**Ia[3]**	**Pervious Length (m)**	**Pervious Slope (%)**	**Impervious Length (m)**	**Impervious Slope (%)**
PR-100	0.24	64	60.5	5.0	70	3.0	32	3.1
PR-200	2.14	43	60.5	5.0	215	0.3	10	1.5

Nashyd[1]					
Catchment ID	**Area (ha)**	**Impervious %**	**CN*[2]**	**Ia[3]**	**Tp[4] (hrs)**
EX-100	2.18	0.0	67.7	8.2	0.36
EX-200	1.76	0.0	64.3	8.9	0.12
EX-300	1.70	1.2	68.8	8.0	0.51
PR-101	1.28	10.2	65.1	4.7	0.44
PR-201	0.74	8.1	64.2	4.8	0.17
PR-202	0.93	0.0	61.6	10.0	0.17
PR-300	0.31	20.0	69.4	4.4	0.25

Notes:
1. Command Line refers to the unit hydrograph used in the VO6 hydrologic model for the respective catchment area.
2. CN* refers to the modified CN number adjusted to Antecedent Moisture Conditions II. Excludes Impervious Area for Standhyd.
3. Ia refers to Initial Abstraction. Excludes Impervious Area for Standhyd.
4. Tp refers to Time of Peak.



EX-100 — CATCHMENT ID
0.22 ha — CATCHMENT AREA
CATCHMENT BOUNDARY

OVERLAND FLOW DIRECTION
STORM SEWER FLOW DIRECTION

OUT — OUTLET LOCATION
WETLAND AREA

Sketch No.
FIGURE 2
HERITAGE LINE
PRE-DEVELOPMENT
DRAINAGE AREA PLAN

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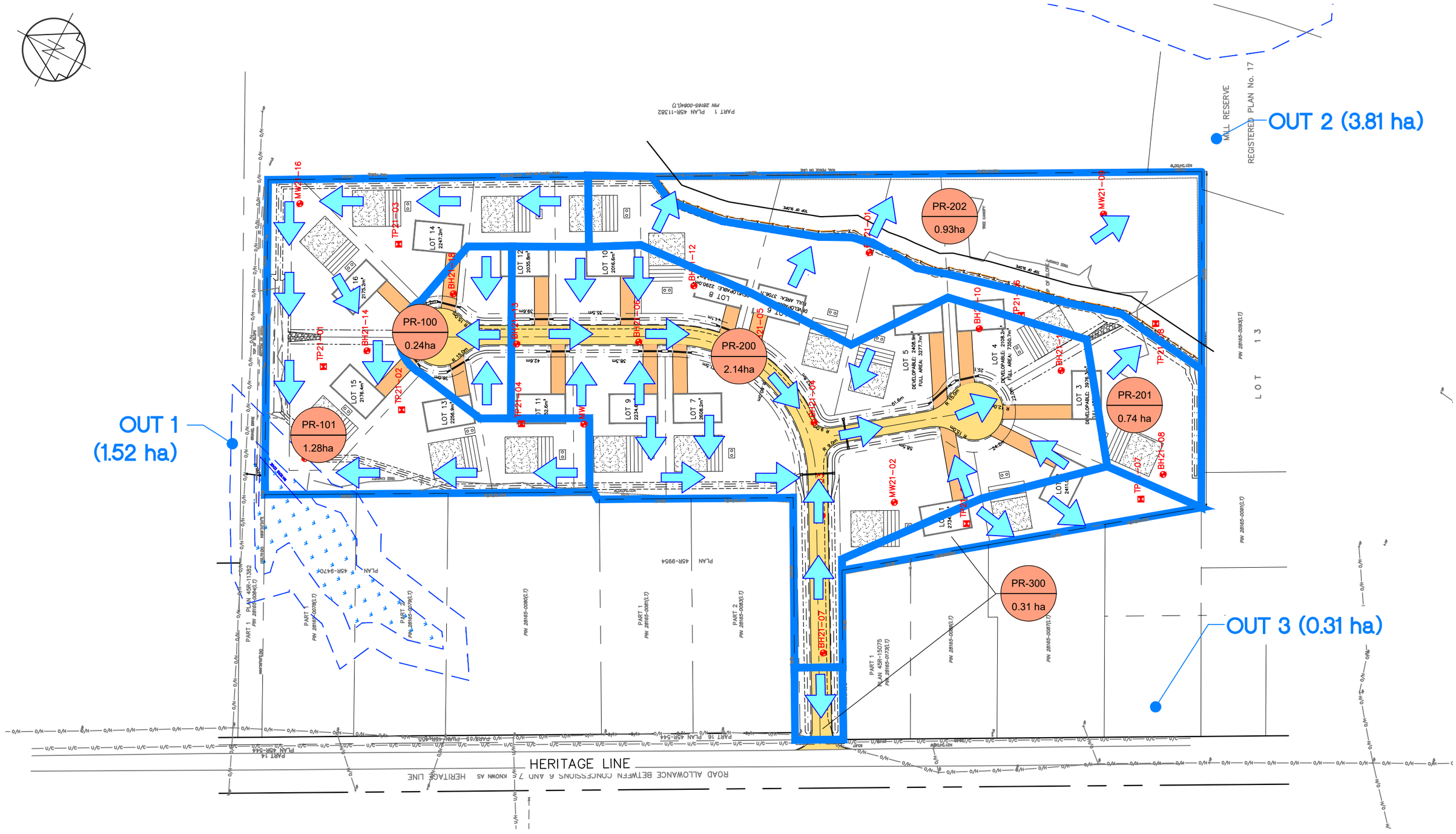
Drawn By: RC	Scale: 1:1500
Designed By: RC	Plot Date: SEPT 2021
Checked By: CPB	Project No.: 21-10985
Engineer: RC/CPB	Drawing File No.: SWM FIGURE 2



PR-100 — CATCHMENT ID
0.22 ha — CATCHMENT AREA
CATCHMENT BOUNDARY

OVERLAND FLOW DIRECTION

OUT — OUTLET LOCATION

WETLAND AREA

Sketch No.
FIGURE 3
HERITAGE LINE
POST-DEVELOPMENT
DRAINAGE AREA PLAN

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Drawn By: SO	Scale: 1:1500
Designed By: SO	Plot Date: MAR 2022
Checked By: KS	Project No.: 21-10985
Engineer: KS	Drawing File No.: SWM FIGURE 3

4.0 Stormwater Management

4.1 Low Impact Development Design

As the practice of SWM has evolved, increasing emphasis has been placed on utilizing a treatment train approach to manage runoff as close to the source as possible. This design philosophy is often referred to as LID, where the ultimate goal is to maintain and mimic the natural hydrologic conditions. LID designs accomplish this by reducing the runoff volume generated by a site and implementing features that infiltrate, filter, evaporate, harvest and detain runoff, while also preventing pollution. The conservation authority encourages the use of LID features as part of the water quality design for a site and, therefore, opportunities to utilize these features have been investigated.

For infiltration based LID features, a minimum separation of 1.0 m is required from the bottom of feature to the seasonally high groundwater level. A Hydrogeological investigation was completed by Wills (report dated September 2021), with 21 boreholes completed on site. Four of the boreholes were outfitted as monitoring wells to facilitate groundwater level monitoring. The Hydrogeological Investigation observed groundwater at depths ranging from 0.7 m to 3.99 m below existing grade. A digital groundwater elevation model was generated in AutoCAD Civil 3D 2019, and the preliminary grading ensured sufficient groundwater separation to consider the use of infiltration based LID features for the proposed development. The native site soils are generally described as silty sand topsoil variably underlain by silty sand, gravelly sand, and sandy silt, and a basal layer of gravelly to silty sand till material.

A variety of LID features were considered for the development and evaluated based on site constraints, capital cost, maintenance considerations and water quality benefits. The final design selected is the internal ditch network with stone filled infiltration trenches at the bottom for **PR-100** and **PR-200**. The provided volume of the stone trench was calculated, assuming the trench filled with 50 mm clear stone with at least 40% porosity. Supporting calculations are provided in **Appendix C**.

Additional infiltration facilities are proposed at the outside edges of **PR-101** and **PR-201** in order to increase runoff capture from all areas of development and to facilitate appropriate dilution for nitrate loading. The volume of annual runoff that would be captured in a given year was assessed based on historic climate data between 1981 and 2010. The summary of the expected performance, including total infiltration and nitrate dilution summaries, are included in **Appendix F.** The outcome of the assessment indicates that the total annual infiltration under developed conditions will exceed pre-development conditions, and that appropriate nitrate dilution is achieved for a development of 16 lots.

4.2 Stormwater Quality Control

The proposed industrial subdivision may cause additional pollutants to be conveyed off site. As such, the selection and sizing of the water quality measures are based on the procedures set out in the *Stormwater Management Planning and Design Manual* (MOE,

March 2003) for Enhanced (Level 1) protection. SWM measures should be assessed in the following order:

- Stormwater lot level controls
- Stormwater conveyance controls
- End-of-pipe SWM facilities

Stormwater lot level controls represent measures that are implemented on an individual lot basis such as soak-a-way pits, flatter grading and reduction of the impervious footprint. For the proposed development, lot level controls such as reduced grading will be used to supplement the proposed SWM strategy; however, these are not intended to become the primary means for stormwater quality control.

Stormwater conveyance controls represent the conveyance systems used to transport stormwater runoff from the lots to the receiving waters such as pervious pipes, catchbasin treatment and grassed swales.

End-of-pipe SWM facilities represent the common urban SWM measures used to service numerous lots or whole subdivisions including wet ponds, wetlands, dry ponds, infiltration based facilities, Oil and Grit separators and filter systems.

4.2.1 Quality Control Summary

Table 3.2 of the MOE SWM Planning and Design Manual provides storage volume requirements to ensure Level 1 (Enhanced) protection for a given area and degree of imperviousness. Infiltration facilities can be constructed to capture and infiltrate the required volume of stormwater runoff to further enhance stormwater quality for the site. The ideal location of a facility would be within the roadside ditches throughout the development and along the outside perimeter.

The storage volume required for infiltration at various levels of impervious, along with the resulting storage requirements, are shown in Table 3.

Table 3 – Stormwater Quality Volume Summary

Catchment	Area	% Imp	Volume Required m^3/ha	Total Volume Required (m^3)	Volume Provided (m^3)
PR-100	0.24	64.0	35	8.4	**28**
PR-101	1.28	10.2	25	32.0	**328**
PR-200	2.14	43.0	30	64.2	**170**
PR-201	0.74	8.1	25	18.5	**203**

A review of **Table 3** indicates that the total volume provided for infiltration exceeds the requirement of the MOE SWM Planning and Design Manual. Given that infiltration may not be available in early spring during snowmelt conditions, a minimum factor of safety of 2.0 is provided.

Based on the assumed infiltration rate of 30 mm/hr at **PR-100** and 20 mm/hr at **PR-200**, and with consideration to a factor of safety of 2.5, the infiltration trenches will drawdown in 25 hours and 37.5 hours, below the maximum of 48 hours as per the SWM Planning and Design Manual.

4.3 Stormwater Quantity Controls

4.4 Peak Flow Calculations

Peak flows were estimated using Visual Otthymo 6 (VO6) hydrologic modelling software for each of the 2, 5, 10, 25, 50 and 100-year storms at each outlet location (**OUT-1**, **OUT-2** and **OUT-3)**. These calculations consider the rainfall data for the City of Peterborough 6-hour SCS storm distribution. The rainfall data is included in **Appendix A.**

Hydrologic parameters such as soil infiltration properties and runoff response were determined based on literature review and watershed areas, land use and slope were determined based on the topographic survey data. The hydrologic parameters are provided in **Appendix A** and the peak flow calculations for the existing and proposed catchments are provided in **Appendix B**.

Table 4 – Existing and Proposed Uncontrolled Peak Flow Summary

Return Period	Peak Flow Rates (m^3/s)					
	OUT-1		OUT-2		OUT-3	
	EX[1]	UNC[2]	EX[1]	UNC[2]	EX[1]	UNC[2]
2-Year	0.028	**0.032**	0.040	**0.147**	0.018	0.007
5-Year	0.056	0.050	0.081	**0.220**	0.036	0.013
10-Year	0.079	0.062	0.114	**0.273**	0.050	0.017
25-Year	0.110	0.080	0.161	**0.344**	0.070	0.023
50-Year	0.136	0.094	0.199	**0.401**	0.086	0.028
100-Year	0.164	0.109	0.239	**0.459**	0.103	0.034

A review of **Table 4** indicates the uncontrolled peak flow rates are less than existing conditions at **OUT-1** and **OUT-3**, with the exception of the 2-year storm for OUT-1. This is due to the reduction in total drainage area to these outlets. However, uncontrolled peak flow rates discharging at **OUT-2** are increased in comparison to the existing condition due to the increase in drainage area (3.88 ha > 1.76 ha) and increase in impervious area. As a result, stormwater quantity controls are required for **OUT-1** and **OUT-2**.

4.5 Quantity Control Summary

A review of the preliminary hydrologic modelling indicates that quantity control will be required at **OUT-1** and **OUT-2.** In order to control the post-development peak flows to pre-development levels at **OUT-1** and **OUT-2,** flow control structures will be required within the roadside ditches in strategic locations. The preliminary layout of the outlet control structures are as follows:

- **OUT-1** – The outlet of the ditch system will connect to a swale located between the proposed residences at the north side of the development. At the outlet of the ditch to the swale, a raised berm will be constructed with a piped outlet control. The preliminary design of the outlet control envisions a 100 mm orifice plate within a short sewer pipe.
- **OUT-2** – The outlet of the ditch system will connect to a swale located between the proposed residences at the south side of the development. Due to the proposed grading around, the outlet control will be constructed adjacent to a driveway culvert at the mouth of the cul-de-sac. At this location, a raised berm will be constructed with perforated riser pipe. The riser will include four, 50mm orifices and will allow overflow at a depth of 0.30 m.

Other key consideration within the proposed quantity control strategy include:

- The maximum ponding within the ditch systems will be 0.60 m.
- The proposed roadside ditches will be flat. Nuisance ponding will be managed by the underground infiltration stone layer; most storm events will dissipate quickly into the stone.
- The estimated storage volumes within the ditches and stone infiltration layers are confirmed using Civil 3D software and are modelled as three-dimensional surfaces, upstream of the proposed outlet structure locations. These storage volumes also account for the loss of storage for the proposed entrances at each lot.
- The proposed infiltration component of the design was neglected when completing the hydrologic routing; given that the storage may be unavailable due to a previous rainfall event.

A review of preliminary grading plan determined a storage volume of 93 m^3 is available within **PR-100;** 68 m^3 is required as per the hydrologic modelling. A review of preliminary grading plan determined a storage volume of 614 m^3 is available within **PR-200;** 437 m^3 is

required as per the hydrologic modelling. The preliminary design exceeds the storage volume required for both outlets. Addition details pertaining to the outlet control structures will be provided during the detailed design phase.

4.6 Proposed Release Rates

The proposed peak flow rates to each outlet location, including the controlled flows from **OUT-1**, **OUT-2** and **OUT-3** are shown in **Table 5** below.

Table 5 – Existing and Proposed Peak Flow Summary

Return Period	Peak Flow Rates (m^3/s)					
	OUT-1		OUT-2		OUT-3	
	EX[1]	PR[2]	EX[1]	PR[2]	EX[1]	PR[2]
2-Year	0.028	0.025	0.040	0.040	0.018	0.007
5-Year	0.056	0.041	0.081	0.076	0.036	0.013
10-Year	0.079	0.053	0.114	0.106	0.050	0.017
25-Year	0.110	0.069	0.161	0.152	0.070	0.023
50-Year	0.136	0.083	0.199	0.189	0.086	0.028
100-Year	0.164	0.096	0.239	0.229	0.103	0.034

5.0 Conclusion

Without appropriate SWM controls, the development of the proposed Heritage Line Subdivision will alter existing drainage patterns, increase the impervious area of the site and increase off-site peak flow rates at **OUT-1** and **OUT-2.** As such, stormwater quality and quantity controls are necessary to mitigate potential adverse impacts to downstream properties and the natural environment.

Water quality controls have been provided in the form of a stone filled infiltration trenches to achieve "Enhanced" Level 1 protection as defined in the Stormwater Management Planning and Design Manual (March 2003).

Additional LID features are included at the perimeter of the development to promote infiltration and to achieve appropriate nitrate dilution targets to support the proposed septic design.

Water quantity controls are provided in the form of a grassed swale basins and the runoff leaving the site will be regulated by outlet control structures to match existing levels.

Respectfully submitted,

Chris Proctor-Bennett, P.Eng.
Group Leader, Stormwater Management Engineering

Sarah Ormel, EIT
Engineer in Training

CPB/KS/SO/jh

Statement of Limitations

This report has been prepared by D.M. Wills Associates Limited on behalf of 2564669/520039 Ontario Limited to provide a Preliminary Stormwater Management Plan for the proposed Heritage Line Subdivision.

The conclusions and recommendations in this report are based on available background documentation and discussions with applicable agencies at the time of preparation.

The report is intended to demonstrate the means whereby the existing site can be serviced with respect to stormwater management on a preliminary level. The report is applicable only to the project described in the text. The feasibility of this design has to be confirmed in accordance with appropriate studies and constructed substantially in accordance with the approved plans and details accompanying the storm water management report.

Any use which a third party makes of this report other than that of a preliminary stormwater management report for the Heritage Line subdivision development, is the responsibility of such third parties. D.M. Wills Associates Limited accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions taken based on using this report for purposes other than a preliminary stormwater management report for the Heritage Line Subdivision Development.

D.M. Wills Associates Limited is not responsible for any changes made to the stormwater management measures which are not in accordance with the design drawings. Any person(s) relying on the "as-constructed" stormwater measures should confirm that the field conditions are in accordance with the design drawings.

Appendix A

Rainfall Data and Hydrology

6 Hour SCS Type II Intensity Hyetographs
2006 Peterborough Airport Weather Station
(mm/hr)

Time (min.)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
0	0	0	0	0	0	0
15	1.6	2.1	2.5	2.9	3.3	3.6
30	1.6	2.1	2.5	2.9	3.3	3.6
45	2.3	3.2	3.7	4.4	4.9	5.4
60	2.3	3.2	3.7	4.4	4.9	5.4
75	2.3	3.2	3.7	4.4	4.9	5.4
90	2.3	3.2	3.7	4.4	4.9	5.4
105	3.9	5.2	6.2	7.3	8.1	9.0
120	3.9	5.2	6.2	7.3	8.1	9.0
135	4.6	6.3	7.4	8.8	9.8	10.8
150	4.6	6.3	7.4	8.8	9.8	10.8
165	23.2	31.4	36.9	43.7	48.9	53.9
180	60.4	81.78	95.9	113.7	127.0	140.2
195	8.5	11.5	13.5	16.0	17.9	19.8
210	8.5	11.5	13.5	16.0	17.9	19.8
225	3.9	5.2	6.2	7.3	8.1	9.0
240	3.9	5.2	6.2	7.3	8.1	9.0
255	3.1	4.2	4.9	5.8	6.5	7.2
270	3.1	4.2	4.9	5.8	6.5	7.2
285	2.3	3.2	3.7	4.4	4.9	5.4
300	2.3	3.2	3.7	4.4	4.9	5.4
315	1.6	2.1	2.5	2.9	3.3	3.6
330	1.6	2.1	2.5	2.9	3.3	3.6
345	1.6	2.1	2.5	2.9	3.3	3.6
360	1.6	2.1	2.5	2.9	3.3	3.6

Hydrologic Parameters for EX-100

Sheet 1 of 1

WILLS

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO/KS
Date: 10-May-22

Land Use

Agriculture	0.00	ha
Range	1.99	ha
Grass	0.00	ha
Woods	0.19	ha
Wetland	0.00	ha
Gravel	0.00	ha
Impervious	0.00	ha
SUM	**2.18**	

Hydrologic Soil Group[1]	B
Soil Type	Otonobee Loam
C	0.21
CN (Nashyd)	64.4

Rainfall Data

Gauging Station = Peterborough
12 hr, 100 Yr Rainfall = 90.4 mm

Drainage Area	**2.18**	ha
Impervious Area	**0.00**	ha
Percent Impervious	**0.0%**	
Connected Impervious	0.0%	

Pervious		
Length	230	m
US Elev	226.2	m
DS Elev	220.3	m
Slope	2.6	%
	Rolling	

Parameter	Soil Group	Land Use							Weighted Value	
		Agriculture	Range	Grass	Woods	Wetland	Gravel	Imperv.	Incl. Imperv. NASHYD	Not Incl. Imperv. STANDHYD
Runoff Coefficient[2]**, C**	B	0.32	0.22	0.13	0.11	0.05	0.76	0.90	0.21	n.a.
SCS Curve No.[3]**, CN**	B	74	65	61	58	50	85	98	64.4	64.4
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	8.2	8.2

Time of Concentration[6]

Total Length	230	m	
Average Slope	2.6	%	
Airport	**32.1**	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	10.0	min.	
Applicable Minimum[7]	10.0	min.	
Time to Peak	21.5	min.	
	0.36	**hr.**	

Composite Parameters

Drainage Area	2.18 ha	
Runoff Coefficient	0.21	
SCS Curve No.	64.4	64.4
Modified Curve No.[4]**, CN***	**67.7**	67.7
Initial Abstraction.	**8.2**	8.2

Notes:

1. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
2. Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
3. SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
4. The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents anticedent moisture conditions Type II
5. Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
6. Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
7. Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
8. All impervious areas have been assumed to be directly connected.

Hydrologic Parameters for EX-200

Sheet 1 of 1

WILLS

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO/KS
Date: 10-May-22

Land Use

Agriculture	0.00	ha
Range	0.99	ha
Grass	0.00	ha
Woods	0.77	ha
Wetland	0.00	ha
Gravel	0.00	ha
Impervious	0.00	ha
SUM	**1.76**	

Hydrologic Soil Group[1]	B
Soil Type	Otonobee Loam
C	0.32
CN (Nashyd)	61.9

Rainfall Data

Gauging Station = Peterborough
12 hr, 100 Yr Rainfall = 90.4 mm

Drainage Area	**1.76**	ha
Impervious Area	**0.00**	ha
Percent Impervious	**0.0%**	
Connected Impervious	0.0%	

Pervious		
Length	100	m
US Elev	225.3	m
DS Elev	210.9	m
Slope	14.3	%
	Steep	

Parameter	Soil Group	Land Use							Weighted Value	
		Agriculture	Range	Grass	Woods	Wetland	Gravel	Imperv.	Incl. Imperv. NASHYD	Not Incl. Imperv. STANDHYD
Runoff Coefficient[2]**, C**	**B**	0.57	0.35	0.19	0.29	0.05	0.76	0.90	0.32	n.a.
SCS Curve No.[3]**, CN**	**B**	74	65	61	58	50	85	98	61.9	61.9
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	8.9	8.9

Time of Concentration[6]

Total Length	100	m	
Average Slope	14.3	%	
Airport	**10.5**	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	3.2	min.	
Applicable Minimum[7]	10.0	min.	
Time to Peak	7.0	min.	
	0.12	**hr.**	

Composite Parameters

Drainage Area	1.76 ha	
Runoff Coefficient	0.32	
SCS Curve No.	61.9	61.9
Modified Curve No.[4]**, CN***	**64.3**	64.3
Initial Abstraction.	**8.9**	8.9

Notes:

1. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
2. Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
3. SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
4. The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents anticedent moisture conditions Type II
5. Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
6. Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
7. Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
8. All impervious areas have been assumed to be directly connected.

Hydrologic Parameters for EX-300

Sheet 1 of 1

WILLS

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO/KS
Date: 10-May-22

Land Use

Agriculture	0.00	ha
Range	1.63	ha
Grass	0.00	ha
Woods	0.05	ha
Wetland	0.00	ha
Gravel	0.00	ha
Impervious	0.02	ha
SUM	**1.70**	

Hydrologic Soil Group[1]	B
Soil Type	Otonobee Loam
C	0.15
CN (Nashyd)	65.2

Rainfall Data

Gauging Station = Peterborough
12 hr, 100 Yr Rainfall = 90.4 mm

Drainage Area	**1.70**	ha
Impervious Area	**0.02**	ha
Percent Impervious	**1.2%**	
Connected Impervious	1.2%	

Pervious

Length	270	m
US Elev	226.2	m
DS Elev	222.4	m
Slope	1.4	%
	Flat	

Parameter	Soil Group	Land Use							Weighted Value	
		Agriculture	Range	Grass	Woods	Wetland	Gravel	Imperv.	Incl. Imperv. NASHYD	Not Incl. Imperv. STANDHYD
Runoff Coefficient[2]**, C**	B	0.26	0.14	0.08	0.08	0.05	0.76	0.90	0.15	n.a.
SCS Curve No.[3]**, CN**	B	74	65	61	58	50	85	98	65.2	64.8
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	8.0	8.1

Time of Concentration[6]

Total Length	270	m	
Average Slope	1.4	%	
Airport	**45.8**	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	13.7	min.	
Applicable Minimum[7]	10.0	min.	
Time to Peak	30.7	min.	
	0.51	**hr.**	

Composite Parameters

Drainage Area	1.70 ha	
Runoff Coefficient	0.15	
SCS Curve No.	65.2	64.8
Modified Curve No.[4]**, CN***	**68.8**	68.2
Initial Abstraction.	**8.0**	8.1

Notes:

1. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
2. Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
3. SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
4. The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents anticedent moisture conditions Type II
5. Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
6. Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
7. Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
8. All impervious areas have been assumed to be directly connected.

Hydrologic Parameters for PR-100

Sheet 1 of 1

WILLS

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO/KS
Date: 10-May-22

Land Use

Agriculture	0.00	ha
Range	0.00	ha
Grass	0.09	ha
Woods	0.00	ha
Wetland	0.00	ha
Gravel	0.00	ha
Impervious	0.15	ha
SUM	**0.24**	

Hydrologic Soil Group[1]	B
Soil Type	Otonobee Loam
C	0.61
CN (Nashyd)	84.1

Rainfall Data

Gauging Station = Peterborough
12 hr, 100 Yr Rainfall = 90.4 mm

Drainage Area	**0.24**	ha
Impervious Area	**0.15**	ha
Percent Impervious	62.5%	Calculated
Connected Impervious	61.3%	Modelled
Percent Impervious	**64.0%**	**Modelled**

	Pervious	**Impervious**	
Length	70	32	m
US Elev	226.3	227.1	m
DS Elev	224.2	226.2	m
Slope	3.0	3.1	%
	Rolling	Rolling	

Parameter	**Soil Group**	**Land Use**							**Weighted Value**	
		Agriculture	**Range**	**Grass**	**Woods**	**Wetland**	**Gravel**	**Imperv.**	**Incl. Imperv. NASHYD**	**Not Incl. Imperv. STANDHYD**
Runoff Coefficient[2]**, C**	**B**	0.32	0.22	0.13	0.11	0.05	0.76	0.90	0.61	n.a.
SCS Curve No.[3]**, CN**	**B**	74	65	61	58	50	85	98	84.1	61.0
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	3.1	5.0

Time of Concentration[6]

Total Length	102	m	
Average Slope	3.0	%	
Airport	10.9	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	5.4	min.	
Applicable Minimum[7]	**10.0**	min.	
Time to Peak	6.7	min.	
	0.11	**hr.**	

Composite Parameters

Drainage Area	0.24 ha	
Runoff Coefficient	0.62	
SCS Curve No.	84.7	61.0
Modified Curve No.[4]**, CN***	85.1	**60.5**
Initial Abstraction.	3.1	**5.0**

Notes:

1. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
2. Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
3. SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
4. The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents anticedent moisture conditions Type II
5. Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
6. Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
7. Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
8. Connected Impervious does not include areas that discharge to pervious surfaces.

Hydrologic Parameters for PR-101

Sheet 1 of 1

WILLS

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO/KS
Date: 10-May-22

Land Use

Agriculture	0.00	ha
Range	0.00	ha
Grass	1.15	ha
Woods	0.00	ha
Wetland	0.00	ha
Gravel	0.00	ha
Impervious	0.13	ha
SUM	**1.28**	

Hydrologic Soil Group[1]	B
Soil Type	Otonobee Loam
C	0.21
CN (Nashyd)	64.8

Rainfall Data

Gauging Station = Peterborough
12 hr, 100 Yr Rainfall = 90.4 mm

Drainage Area	**1.28**	ha
Impervious Area	**0.13**	ha
Percent Impervious	**10.2%**	
Connected Impervious	1.9%	

Pervious		
Length	295	m
US Elev	226.2	m
DS Elev	220.2	m
Slope	2.0	%
	Rolling	

Parameter	Soil Group	Land Use							Weighted Value	
		Agriculture	Range	Grass	Woods	Wetland	Gravel	Imperv.	Incl. Imperv. NASHYD	Not Incl. Imperv. STANDHYD
Runoff Coefficient[2]**, C**	B	0.32	0.22	0.13	0.11	0.05	0.76	0.90	0.21	n.a.
SCS Curve No.[3]**, CN**	B	74	65	61	58	50	85	98	64.8	61.0
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	4.7	5.0

Time of Concentration[6]

Total Length	295	m	
Average Slope	2.0	%	
Airport	**39.4**	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	14.2	min.	
Applicable Minimum[7]	10.0	min.	
Time to Peak	26.4	min.	
	0.44	**hr.**	

Composite Parameters

Drainage Area	1.28 ha	
Runoff Coefficient	0.21	
SCS Curve No.	64.8	61.0
Modified Curve No.[4]**, CN***	**65.1**	60.5
Initial Abstraction.	**4.7**	5.0

Notes:

1. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
2. Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
3. SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
4. The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents anticedent moisture conditions Type II
5. Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
6. Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
7. Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
8. Connected Impervious does not include areas that discharge to pervious surfaces.

Hydrologic Parameters for PR-200

Sheet 1 of 1

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO/KS
Date: 10-May-22

Land Use

Agriculture	0.00	ha
Range	0.00	ha
Grass	1.25	ha
Woods	0.00	ha
Wetland	0.00	ha
Gravel	0.00	ha
Impervious	0.89	ha
SUM	**2.14**	

Hydrologic Soil Group[1]	B
Soil Type	Otonobee Loam
C	0.42
CN (Nashyd)	76.4

Rainfall Data

Gauging Station = Peterborough
12 hr, 100 Yr Rainfall = 90.4 mm

Drainage Area	**2.14**	ha
Impervious Area	**0.89**	ha
Percent Impervious	41.7%	Calculated
Connected Impervious	33.0%	Modelled
Percent Impervious	**43.0%**	**Modelled**

	Pervious	**Impervious**	
Length	215	10	m
US Elev	226.2	226.2	m
DS Elev	225.6	226.1	m
Slope	0.3	1.5	%
	Flat	Flat	

Parameter	Soil Group	Land Use							Weighted Value	
		Agriculture	Range	Grass	Woods	Wetland	Gravel	Imperv.	Incl. Imperv. NASHYD	Not Incl. Imperv. STANDHYD
Runoff Coefficient[2]**, C**	B	0.26	0.14	0.08	0.08	0.05	0.76	0.90	0.42	n.a.
SCS Curve No.[3]**, CN**	B	74	65	61	58	50	85	98	76.4	61.0
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	3.7	5.0

Time of Concentration[6]

Total Length	225	m	
Average Slope	0.3	%	
Airport	47.1	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	**14.8**	min.	
Applicable Minimum[7]	10.0	min.	
Time to Peak	9.9	min.	
	0.17	**hr.**	

Composite Parameters

Drainage Area	2.14 ha	
Runoff Coefficient	0.43	
SCS Curve No.	76.9	61.0
Modified Curve No.[4]**, CN***	77.1	**60.5**
Initial Abstraction.	3.7	**5.0**

Notes:

1. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
2. Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
3. SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
4. The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents anticedent moisture conditions Type II
5. Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
6. Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
7. Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
8. Connected Impervious does not include areas that discharge to pervious surfaces.

Hydrologic Parameters for PR-201

Sheet 1 of 1

WILLS

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO/KS
Date: 10-May-22

Land Use

Agriculture	0.00	ha
Range	0.00	ha
Grass	0.68	ha
Woods	0.00	ha
Wetland	0.00	ha
Gravel	0.00	ha
Impervious	0.06	ha
SUM	**0.74**	

Hydrologic Soil Group[1]	B
Soil Type	Otonobee Loam
C	0.25
CN (Nashyd)	64.0

Rainfall Data

Gauging Station = Peterborough
12 hr, 100 Yr Rainfall = 90.4 mm

Drainage Area	**0.74**	ha
Impervious Area	**0.06**	ha
Percent Impervious	**8.1%**	
Connected Impervious	0.0%	

	Pervious	
Length	160	m
US Elev	226.5	m
DS Elev	208.0	m
Slope	11.6	%
	Steep	

Parameter	Soil Group	Land Use							Weighted Value	
		Agriculture	Range	Grass	Woods	Wetland	Gravel	Imperv.	Incl. Imperv. NASHYD	Not Incl. Imperv. STANDHYD
Runoff Coefficient[2], C	B	0.57	0.35	0.19	0.29	0.05	0.76	0.90	0.25	n.a.
SCS Curve No.[3], CN	B	74	65	61	58	50	85	98	64.0	61.0
Initial Abstraction[5], mm		6.0	8.0	5.0	10.0	10.0	2.5	2.0	4.8	5.0

Time of Concentration[6]

Total Length	160	m	
Average Slope	11.6	%	
Airport	**15.7**	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	5.8	min.	
Applicable Minimum[7]	10.0	min.	
Time to Peak	10.5	min.	
	0.17	**hr.**	

Composite Parameters

Drainage Area	0.74 ha	
Runoff Coefficient	0.25	
SCS Curve No.	64.0	61.0
Modified Curve No.[4], CN*	**64.2**	60.5
Initial Abstraction.	**4.8**	5.0

Notes:

1. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
2. Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
3. SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
4. The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents anticedent moisture conditions Type II
5. Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
6. Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
7. Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
8. Connected Impervious does not include areas that discharge to pervious surfaces.

Hydrologic Parameters for PR-202

Sheet 1 of 1

WILLS

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO/KS
Date: 10-May-22

Land Use

Agriculture	0.00	ha
Range	0.00	ha
Grass	0.00	ha
Woods	0.93	ha
Wetland	0.00	ha
Gravel	0.00	ha
Impervious	0.00	ha
SUM	**0.93**	

Hydrologic Soil Group[1]	B
Soil Type	Otonobee Loam
C	0.14
CN (Nashyd)	58.0

Rainfall Data

Gauging Station = Peterborough
12 hr, 100 Yr Rainfall = 90.4 mm

Drainage Area	**0.93**	ha
Impervious Area	**0.00**	ha
Percent Impervious	**0.0%**	
Connected Impervious	0.0%	

Pervious		
Length	100	m
US Elev	220.0	m
DS Elev	210.9	m
Slope	9.1	%
	Hilly	

Parameter	Soil Group	Land Use							Weighted Value	
		Agriculture	Range	Grass	Woods	Wetland	Gravel	Imperv.	Incl. Imperv. NASHYD	Not Incl. Imperv. STANDHYD
Runoff Coefficient[2]**, C**	B	0.40	0.30	0.19	0.14	0.05	0.76	0.90	0.14	n.a.
SCS Curve No.[3]**, CN**	B	74	65	61	58	50	85	98	58.0	58.0
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	10.0	10.0

Time of Concentration[6]

Total Length	100	m	
Average Slope	9.1	%	
Airport	**15.1**	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	3.7	min.	
Applicable Minimum[7]	10.0	min.	
Time to Peak	10.1	min.	
	0.17	**hr.**	

Composite Parameters

Drainage Area	0.93 ha	
Runoff Coefficient	0.14	
SCS Curve No.	58.0	58.0
Modified Curve No.[4]**, CN***	**61.6**	61.6
Initial Abstraction.	**10.0**	10.0

Notes:

1. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
2. Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
3. SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
4. The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents anticedent moisture conditions Type II
5. Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
6. Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
7. Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
8. Connected Impervious does not include areas that discharge to pervious surfaces.

Hydrologic Parameters for PR-300

Sheet 1 of 1

WILLS

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO/KS
Date: 10-May-22

Land Use

Agriculture	0.00	ha
Range	0.00	ha
Grass	0.25	ha
Woods	0.00	ha
Wetland	0.00	ha
Gravel	0.00	ha
Impervious	0.06	ha
SUM	**0.31**	

Hydrologic Soil Group[1]	B
Soil Type	Otonobee Loam
C	0.24
CN (Nashyd)	68.4

Rainfall Data

Gauging Station = Peterborough
12 hr, 100 Yr Rainfall = 90.4 mm

Drainage Area	**0.31**	ha
Impervious Area	**0.06**	ha
Percent Impervious	**20.0%**	
Connected Impervious	0.0%	

Pervious

Length	55	m
US Elev	223.0	m
DS Elev	222.6	m
Slope	0.8	%
	Flat	

Parameter	Soil Group	Land Use							Weighted Value	
		Agriculture	Range	Grass	Woods	Wetland	Gravel	Imperv.	Incl. Imperv. NASHYD	Not Incl. Imperv. STANDHYD
Runoff Coefficient[2]**, C**	B	0.26	0.14	0.08	0.08	0.05	0.76	0.90	0.24	n.a.
SCS Curve No.[3]**, CN**	B	74	65	61	58	50	85	98	68.4	61.0
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	4.4	5.0

Time of Concentration[6]

Total Length	55	m	
Average Slope	0.8	%	
Airport	**22.3**	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	3.7	min.	
Applicable Minimum[7]	10.0	min.	
Time to Peak	14.9	min.	
	0.25	**hr.**	

Composite Parameters

Drainage Area	0.31 ha	
Runoff Coefficient	0.24	
SCS Curve No.	68.4	61.0
Modified Curve No.[4]**, CN***	**69.4**	60.5
Initial Abstraction.	**4.4**	5.0

Notes:

1. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
2. Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
3. SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
4. The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents anticedent moisture conditions Type II
5. Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
6. Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
7. Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
8. Connected Impervious does not include areas that discharge to pervious surfaces.

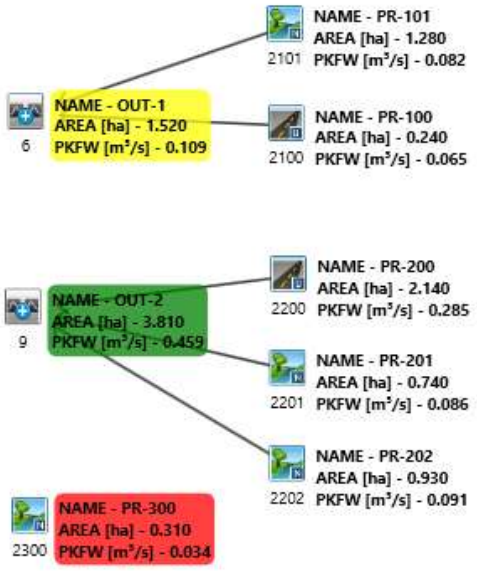
Appendix B

Hydrologic Modelling

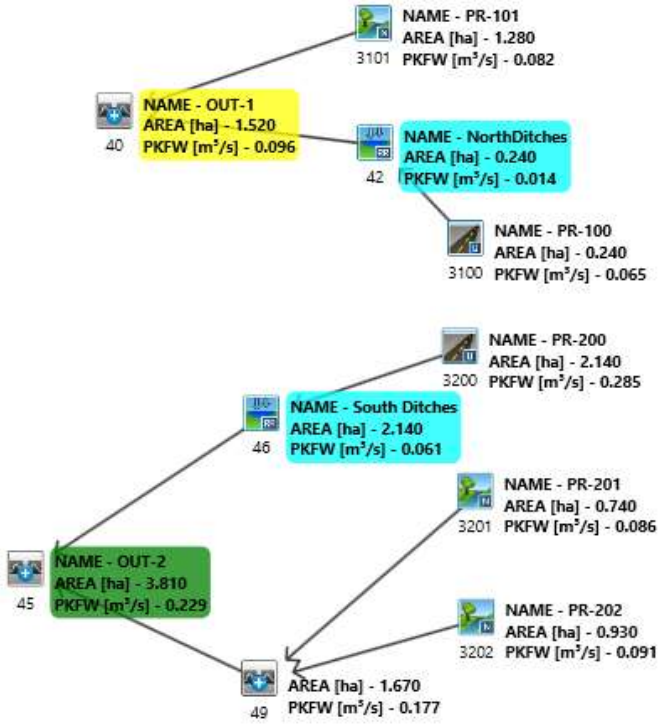
VO3 Model Schematic

Existing Conditions

Proposed Conditions - Uncontrolled



Proposed Conditions – Controlled



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

       V    V   I    SSSSS  U   U    A    L
       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)\VO Suite 3.0\VO2\voin.dat

  Output  filename: C:\Users\cproctorbennett\AppData\Local\Temp\018c0a16-af77-41ae-
a24b-cc941a5e1371\Scenario.out
  Summary filename: C:\Users\cproctorbennett\AppData\Local\Temp\018c0a16-af77-41ae-
a24b-cc941a5e1371\Scenario.sum


DATE: 11-21-2022                          TIME: 03:03:45

USER:


COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------
--------------------
  ***************************
  ** SIMULATION NUMBER:   1 **
  ***************************


--------------------
|    READ STORM    |    Filename: C:\Users\cproctorbennett\AppD
|                  |              ata\Local\Temp\
|                  |              018c0a16-af77-41ae-a24b-cc941a5e1371\62004386
| Ptotal= 38.75 mm |    Comments: 2-Year, 6 hour SCS Type II - City of Pet
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.25    1.60 |  1.75    3.90 |  3.25    8.50 |  4.75    2.30
                0.50    1.60 |  2.00    3.90 |  3.50    8.50 |  5.00    2.30
                0.75    2.30 |  2.25    4.60 |  3.75    3.90 |  5.25    1.60
                1.00    2.30 |  2.50    4.60 |  4.00    3.90 |  5.50    1.60
                1.25    2.30 |  2.75   23.20 |  4.25    3.10 |  5.75    1.60
                1.50    2.30 |  3.00   60.40 |  4.50    3.10 |  6.00    1.60
```



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

--------------------
| CALIB            |
| NASHYD    (1100) |   Area     (ha)=   2.18   Curve Number    (CN)= 67.7
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.20   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.36

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    1.60 | 1.583    3.90 | 3.083    8.50 |  4.58    2.30
               0.167    1.60 | 1.667    3.90 | 3.167    8.50 |  4.67    2.30
               0.250    1.60 | 1.750    3.90 | 3.250    8.50 |  4.75    2.30
               0.333    1.60 | 1.833    3.90 | 3.333    8.50 |  4.83    2.30
               0.417    1.60 | 1.917    3.90 | 3.417    8.50 |  4.92    2.30
               0.500    1.60 | 2.000    3.90 | 3.500    8.50 |  5.00    2.30
               0.583    2.30 | 2.083    4.60 | 3.583    3.90 |  5.08    1.60
               0.667    2.30 | 2.167    4.60 | 3.667    3.90 |  5.17    1.60
               0.750    2.30 | 2.250    4.60 | 3.750    3.90 |  5.25    1.60
               0.833    2.30 | 2.333    4.60 | 3.833    3.90 |  5.33    1.60
               0.917    2.30 | 2.417    4.60 | 3.917    3.90 |  5.42    1.60
               1.000    2.30 | 2.500    4.60 | 4.000    3.90 |  5.50    1.60
               1.083    2.30 | 2.583   23.20 | 4.083    3.10 |  5.58    1.60
               1.167    2.30 | 2.667   23.20 | 4.167    3.10 |  5.67    1.60
               1.250    2.30 | 2.750   23.20 | 4.250    3.10 |  5.75    1.60
               1.333    2.30 | 2.833   60.40 | 4.333    3.10 |  5.83    1.60
               1.417    2.30 | 2.917   60.40 | 4.417    3.10 |  5.92    1.60
               1.500    2.30 | 3.000   60.40 | 4.500    3.10 |  6.00    1.60

     Unit Hyd Qpeak  (cms)=   0.231

     PEAK FLOW       (cms)=   0.028 (i)
     TIME TO PEAK    (hrs)=   3.250
     RUNOFF VOLUME    (mm)=   6.149
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.159

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (1200) |   Area     (ha)=   1.76   Curve Number    (CN)= 64.3
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.12

     Unit Hyd Qpeak  (cms)=   0.560

     PEAK FLOW       (cms)=   0.040 (i)
     TIME TO PEAK    (hrs)=   3.000
     RUNOFF VOLUME    (mm)=   5.145
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.133

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

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (1300) |   Area     (ha)=   1.70   Curve Number    (CN)= 68.8
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.51

     Unit Hyd Qpeak  (cms)=   0.127

     PEAK FLOW       (cms)=   0.018 (i)
     TIME TO PEAK    (hrs)=   3.500
     RUNOFF VOLUME    (mm)=   6.478
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.167

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (2201) |   Area     (ha)=   0.74   Curve Number    (CN)= 64.2
|ID= 1 DT= 5.0 min |   Ia       (mm)=   4.80   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.166

     PEAK FLOW       (cms)=   0.017 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   6.540
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.169

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (2202) |   Area     (ha)=   0.93   Curve Number    (CN)= 61.6
|ID= 1 DT= 5.0 min |   Ia       (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.209

     PEAK FLOW       (cms)=   0.014 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   4.402
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.114

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (2200) |   Area     (ha)=   2.14
|ID= 1 DT= 5.0 min |   Total Imp(%)=  43.00   Dir. Conn.(%)=  33.00
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92         1.22
     Dep. Storage     (mm)=       1.00         5.00
```



```
     Average Slope     (%)=       1.50         0.27
     Length            (m)=     119.44       215.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      60.40         5.46
               over (min)         5.00       120.00
     Storage Coeff.  (min)=       3.08 (ii)  116.03 (ii)
     Unit Hyd. Tpeak (min)=       5.00       120.00
     Unit Hyd. peak  (cms)=       0.27         0.01
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.12         0.01          0.118 (iii)
     TIME TO PEAK    (hrs)=       3.00         4.92           3.00
     RUNOFF VOLUME    (mm)=      37.75         6.78          16.97
     TOTAL RAINFALL   (mm)=      38.75        38.75          38.75
     RUNOFF COEFFICIENT   =       0.97         0.17           0.44

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.5    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   (0009) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)     (cms)    (hrs)     (mm)
         ID1= 1 (2200):     2.14   0.118     3.00     16.97
       + ID2= 2 (2201):     0.74   0.017     3.08      6.54
         ================================================
         ID = 3 (0009):     2.88   0.135     3.00     14.29

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0009) |
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)     (cms)    (hrs)     (mm)
         ID1= 3 (0009):     2.88   0.135     3.00     14.29
       + ID2= 2 (2202):     0.93   0.014     3.08      4.40
         ================================================
         ID = 1 (0009):     3.81   0.147     3.00     11.87

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (2101) |   Area     (ha)=   1.28   Curve Number    (CN)= 65.1
|ID= 1 DT= 5.0 min |   Ia       (mm)=   4.70   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.44

     Unit Hyd Qpeak  (cms)=   0.111

     PEAK FLOW       (cms)=   0.016 (i)
```

```
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=   6.810
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.176

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (2100) |   Area    (ha)=   0.24
|ID= 1 DT= 5.0 min |   Total Imp(%)=  64.00   Dir. Conn.(%)=  61.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.09
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       3.06         3.04
     Length            (m)=      40.00        70.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      60.40         7.99
               over (min)        5.00        30.00
     Storage Coeff.  (min)=       1.29 (ii)   25.22 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=       0.33         0.04
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00          0.025 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.42           3.00
     RUNOFF VOLUME    (mm)=      37.75         6.22          25.39
     TOTAL RAINFALL   (mm)=      38.75        38.75          38.75
     RUNOFF COEFFICIENT   =       0.97         0.16           0.66

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.5    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   (0006) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)     (cms)    (hrs)      (mm)
          ID1= 1 (2100):     0.24   0.025     3.00    25.39
        + ID2= 2 (2101):     1.28   0.016     3.33     6.81
          ================================================
          ID = 3 (0006):     1.52   0.033     3.00     9.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (2300) |   Area    (ha)=   0.31   Curve Number   (CN)= 69.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.40   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.25
```



```
     Unit Hyd Qpeak  (cms)=   0.047

     PEAK FLOW       (cms)=   0.007 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=   8.055
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.208

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (3101) |   Area    (ha)=   1.28   Curve Number   (CN)= 65.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.44

     Unit Hyd Qpeak  (cms)=   0.111

     PEAK FLOW       (cms)=   0.016 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=   6.810
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.176

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (3100) |   Area    (ha)=   0.24
|ID= 1 DT= 5.0 min |   Total Imp(%)=  64.00   Dir. Conn.(%)=  61.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.09
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       3.06         3.04
     Length            (m)=      40.00        70.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      60.40         7.99
               over (min)        5.00        30.00
     Storage Coeff.  (min)=       1.29 (ii)   25.22 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=       0.33         0.04
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00          0.025 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.42           3.00
     RUNOFF VOLUME    (mm)=      37.75         6.22          25.39
     TOTAL RAINFALL   (mm)=      38.75        38.75          38.75
     RUNOFF COEFFICIENT   =       0.97         0.16           0.66

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.5    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.
```

```
--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0042) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |  0.0116      0.0040
                         0.0023     0.0003   |  0.0127      0.0051
                         0.0055     0.0008   |  0.0140      0.0068
                         0.0075     0.0014   |  0.0169      0.0073
                         0.0091     0.0021   |  0.0320      0.0086
                         0.0104     0.0030   |  0.0447      0.0093

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (3100)      0.240     0.025     3.00       25.39
     OUTFLOW: ID= 1 (0042)      0.240     0.009     3.08       25.27

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 37.06
                    TIME SHIFT OF PEAK FLOW          (min)=  5.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0023

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

--------------------
| ADD HYD   (0040) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)     (cms)    (hrs)     (mm)
          ID1= 1 (3101):     1.28   0.016     3.33     6.81
        + ID2= 2 (0042):     0.24   0.009     3.08    25.27
          ================================================
          ID = 3 (0040):     1.52   0.025     3.33     9.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (3201) |   Area     (ha)=   0.74   Curve Number    (CN)= 64.2
|ID= 1 DT= 5.0 min |   Ia       (mm)=   4.80   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.166

     PEAK FLOW       (cms)=   0.017 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   6.540
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.169

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (3202) |   Area     (ha)=   0.93   Curve Number    (CN)= 61.6
|ID= 1 DT= 5.0 min |   Ia       (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.209
```



```
     PEAK FLOW       (cms)=   0.014 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   4.402
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.114

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

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

--------------------
| ADD HYD   (0049) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)     (cms)    (hrs)     (mm)
          ID1= 1 (3201):     0.74   0.017     3.08     6.54
        + ID2= 2 (3202):     0.93   0.014     3.08     4.40
          ================================================
          ID = 3 (0049):     1.67   0.031     3.08     5.35

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (3200) |   Area     (ha)=   2.14
|ID= 1 DT= 5.0 min |   Total Imp(%)=  43.00   Dir. Conn.(%)=  33.00
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        0.92          1.22
     Dep. Storage      (mm)=        1.00          5.00
     Average Slope      (%)=        1.50          0.27
     Length             (m)=      119.44        215.00
     Mannings n            =       0.013         0.250

     Max.Eff.Inten.(mm/hr)=       60.40          5.46
               over (min)         5.00        120.00
     Storage Coeff.  (min)=        3.08 (ii)   116.03 (ii)
     Unit Hyd. Tpeak (min)=        5.00        120.00
     Unit Hyd. peak  (cms)=        0.27          0.01
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.12          0.01          0.118 (iii)
     TIME TO PEAK    (hrs)=        3.00          4.92           3.00
     RUNOFF VOLUME    (mm)=       37.75          6.78          16.97
     TOTAL RAINFALL   (mm)=       38.75         38.75          38.75
     RUNOFF COEFFICIENT   =        0.97          0.17           0.44

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  60.5    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.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0046) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
```

```
--------------------      (cms)      (ha.m.)    |   (cms)      (ha.m.)
                         0.0000      0.0000    |   0.0187      0.0264
                         0.0022      0.0020    |   0.0351      0.0338
                         0.0051      0.0052    |   0.0569      0.0421
                         0.0069      0.0093    |   0.0834      0.0512
                         0.0083      0.0141    |   0.1144      0.0614
                         0.0095      0.0199    |   0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (3200)       2.140     0.118      3.00      16.97
     OUTFLOW: ID= 1 (0046)       2.140     0.009      5.50      16.86

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.93
                    TIME SHIFT OF PEAK FLOW          (min)=150.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=  0.0195

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

--------------------
| ADD HYD   (0045) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
          ID1= 1 (0046):     2.14   0.009     5.50    16.86
        + ID2= 2 (0049):     1.67   0.031     3.08     5.35
          ================================================
          ID = 3 (0045):     3.81   0.040     3.08    11.81

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
  ***************************
  ** SIMULATION NUMBER:   2 **
  ***************************


--------------------
|    READ STORM    |    Filename: C:\Users\cproctorbennett\AppD
|                  |              ata\Local\Temp\
|                  |              018c0a16-af77-41ae-a24b-cc941a5e1371\c38723fa
| Ptotal= 52.45 mm |    Comments: 5-Year, 6 hour SCS Type II - City of Pet
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.25    2.10 |  1.75    5.20 |  3.25   11.50 |  4.75    3.20
                0.50    2.10 |  2.00    5.20 |  3.50   11.50 |  5.00    3.20
                0.75    3.20 |  2.25    6.30 |  3.75    5.20 |  5.25    2.10
                1.00    3.20 |  2.50    6.30 |  4.00    5.20 |  5.50    2.10
                1.25    3.20 |  2.75   31.40 |  4.25    4.20 |  5.75    2.10
                1.50    3.20 |  3.00   81.80 |  4.50    4.20 |  6.00    2.10

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

--------------------
| CALIB            |
| NASHYD    (1100) |   Area     (ha)=   2.18   Curve Number    (CN)= 67.7
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.20   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.36

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```



```
                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.10 | 1.583    5.20 | 3.083   11.50 |  4.58    3.20
               0.167    2.10 | 1.667    5.20 | 3.167   11.50 |  4.67    3.20
               0.250    2.10 | 1.750    5.20 | 3.250   11.50 |  4.75    3.20
               0.333    2.10 | 1.833    5.20 | 3.333   11.50 |  4.83    3.20
               0.417    2.10 | 1.917    5.20 | 3.417   11.50 |  4.92    3.20
               0.500    2.10 | 2.000    5.20 | 3.500   11.50 |  5.00    3.20
               0.583    3.20 | 2.083    6.30 | 3.583    5.20 |  5.08    2.10
               0.667    3.20 | 2.167    6.30 | 3.667    5.20 |  5.17    2.10
               0.750    3.20 | 2.250    6.30 | 3.750    5.20 |  5.25    2.10
               0.833    3.20 | 2.333    6.30 | 3.833    5.20 |  5.33    2.10
               0.917    3.20 | 2.417    6.30 | 3.917    5.20 |  5.42    2.10
               1.000    3.20 | 2.500    6.30 | 4.000    5.20 |  5.50    2.10
               1.083    3.20 | 2.583   31.40 | 4.083    4.20 |  5.58    2.10
               1.167    3.20 | 2.667   31.40 | 4.167    4.20 |  5.67    2.10
               1.250    3.20 | 2.750   31.40 | 4.250    4.20 |  5.75    2.10
               1.333    3.20 | 2.833   81.80 | 4.333    4.20 |  5.83    2.10
               1.417    3.20 | 2.917   81.80 | 4.417    4.20 |  5.92    2.10
               1.500    3.20 | 3.000   81.80 | 4.500    4.20 |  6.00    2.10

     Unit Hyd Qpeak  (cms)=   0.231

     PEAK FLOW       (cms)=   0.056 (i)
     TIME TO PEAK    (hrs)=   3.250
     RUNOFF VOLUME    (mm)=  11.833
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.226

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (1200) |   Area     (ha)=   1.76   Curve Number    (CN)= 64.3
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.12

     Unit Hyd Qpeak  (cms)=   0.560

     PEAK FLOW       (cms)=   0.081 (i)
     TIME TO PEAK    (hrs)=   3.000
     RUNOFF VOLUME    (mm)=  10.138
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.193

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (1300) |   Area     (ha)=   1.70   Curve Number    (CN)= 68.8
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.51

     Unit Hyd Qpeak  (cms)=   0.127
```

```
     PEAK FLOW       (cms)=   0.036 (i)
     TIME TO PEAK    (hrs)=   3.500
     RUNOFF VOLUME    (mm)=  12.376
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.236

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

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| NASHYD    (2201)  |   Area    (ha)=   0.74   Curve Number    (CN)= 64.2
|ID= 1 DT= 5.0 min  |   Ia      (mm)=   4.80   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.166

     PEAK FLOW       (cms)=   0.032 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  11.952
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.228

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

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| NASHYD    (2202)  |   Area    (ha)=   0.93   Curve Number    (CN)= 61.6
|ID= 1 DT= 5.0 min  |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.209

     PEAK FLOW       (cms)=   0.030 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   8.942
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.170

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

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD  (2200)  |   Area    (ha)=   2.14
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  43.00   Dir. Conn.(%)=  33.00
-------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.92         1.22
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      1.50         0.27
     Length            (m)=    119.44       215.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     81.80        10.03
                 over (min)        5.00        95.00
     Storage Coeff.  (min)=      2.73 (ii)   91.30 (ii)
     Unit Hyd. Tpeak (min)=      5.00        95.00
     Unit Hyd. peak  (cms)=      0.29         0.01
```



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                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.16         0.01          0.162 (iii)
     TIME TO PEAK    (hrs)=       3.00         4.50           3.00
     RUNOFF VOLUME    (mm)=      51.45        12.27          25.18
     TOTAL RAINFALL   (mm)=      52.45        52.45          52.45
     RUNOFF COEFFICIENT   =       0.98         0.23           0.48

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.5     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   (0009) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)     (cms)    (hrs)     (mm)
          ID1= 1 (2200):     2.14   0.162     3.00    25.18
        + ID2= 2 (2201):     0.74   0.032     3.08    11.95
          ================================================
          ID = 3 (0009):     2.88   0.193     3.00    21.78

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| ADD HYD   (0009) |
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)     (cms)    (hrs)     (mm)
          ID1= 3 (0009):     2.88   0.193     3.00    21.78
        + ID2= 2 (2202):     0.93   0.030     3.08     8.94
          ================================================
          ID = 1 (0009):     3.81   0.220     3.00    18.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| NASHYD    (2101)  |   Area    (ha)=   1.28   Curve Number    (CN)= 65.1
|ID= 1 DT= 5.0 min  |   Ia      (mm)=   4.70   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.44

     Unit Hyd Qpeak  (cms)=   0.111

     PEAK FLOW       (cms)=   0.030 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=  12.395
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.236

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

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```
| CALIB           |
| STANDHYD  (2100) |   Area    (ha)=   0.24
|ID= 1 DT= 5.0 min |   Total Imp(%)=  64.00   Dir. Conn.(%)=  61.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.09
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       3.06         3.04
     Length            (m)=      40.00        70.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      81.80        17.51
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       1.14 (ii)   18.63 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.34         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.03         0.00          0.035 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.25           3.00
     RUNOFF VOLUME    (mm)=      51.45        11.39          35.79
     TOTAL RAINFALL   (mm)=      52.45        52.45          52.45
     RUNOFF COEFFICIENT   =       0.98         0.22           0.68

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.5    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   (0006) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)     (cms)    (hrs)     (mm)
         ID1= 1 (2100):     0.24   0.035     3.00    35.79
       + ID2= 2 (2101):     1.28   0.030     3.33    12.40
         ================================================
         ID = 3 (0006):     1.52   0.050     3.00    16.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB           |
| NASHYD    (2300) |   Area    (ha)=   0.31   Curve Number   (CN)= 69.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.40   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.25

     Unit Hyd Qpeak  (cms)=   0.047

     PEAK FLOW       (cms)=   0.013 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  14.412
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.275

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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--------------------------------------------------------------------------------
--------------------
| CALIB           |
| NASHYD    (3101) |   Area    (ha)=   1.28   Curve Number   (CN)= 65.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.44

     Unit Hyd Qpeak  (cms)=   0.111

     PEAK FLOW       (cms)=   0.030 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=  12.395
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.236

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

--------------------------------------------------------------------------------
--------------------
| CALIB           |
| STANDHYD  (3100) |   Area    (ha)=   0.24
|ID= 1 DT= 5.0 min |   Total Imp(%)=  64.00   Dir. Conn.(%)=  61.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.09
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       3.06         3.04
     Length            (m)=      40.00        70.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      81.80        17.51
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       1.14 (ii)   18.63 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.34         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.03         0.00          0.035 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.25           3.00
     RUNOFF VOLUME    (mm)=      51.45        11.39          35.79
     TOTAL RAINFALL   (mm)=      52.45        52.45          52.45
     RUNOFF COEFFICIENT   =       0.98         0.22           0.68

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.5    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.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0042) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                         0.0000     0.0000    |   0.0116     0.0040
                         0.0023     0.0003    |   0.0127     0.0051
                         0.0055     0.0008    |   0.0140     0.0068
```

0.0075	0.0014	0.0169	0.0073
0.0091	0.0021	0.0320	0.0086
0.0104	0.0030	0.0447	0.0093

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (3100)	0.240	0.035	3.00	35.79
OUTFLOW: ID= 1 (0042)	0.240	0.011	3.08	35.67

PEAK FLOW REDUCTION [Qout/Qin](%)= 30.79
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0033

ADD HYD (0040)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (3101):	1.28	0.030	3.33	12.40
+ ID2= 2 (0042):	0.24	0.011	3.08	35.67
ID = 3 (0040):	1.52	0.041	3.33	16.07

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
NASHYD (3201) | Area (ha)= 0.74 | Curve Number (CN)= 64.2
ID= 1 DT= 5.0 min | Ia (mm)= 4.80 | # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.17

Unit Hyd Qpeak (cms)= 0.166

PEAK FLOW (cms)= 0.032 (i)
TIME TO PEAK (hrs)= 3.083
RUNOFF VOLUME (mm)= 11.952
TOTAL RAINFALL (mm)= 52.450
RUNOFF COEFFICIENT = 0.228

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

CALIB
NASHYD (3202) | Area (ha)= 0.93 | Curve Number (CN)= 61.6
ID= 1 DT= 5.0 min | Ia (mm)= 10.00 | # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.17

Unit Hyd Qpeak (cms)= 0.209

PEAK FLOW (cms)= 0.030 (i)
TIME TO PEAK (hrs)= 3.083
RUNOFF VOLUME (mm)= 8.942
TOTAL RAINFALL (mm)= 52.450
RUNOFF COEFFICIENT = 0.170

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

ADD HYD (0049)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (3201):	0.74	0.032	3.08	11.95
+ ID2= 2 (3202):	0.93	0.030	3.08	8.94
ID = 3 (0049):	1.67	0.062	3.08	10.28

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (3200) | Area (ha)= 2.14
ID= 1 DT= 5.0 min | Total Imp(%)= 43.00 | Dir. Conn.(%)= 33.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.92	1.22
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.50	0.27
Length	(m)=	119.44	215.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		81.80	10.03
over (min)		5.00	95.00
Storage Coeff. (min)=		2.73 (ii)	91.30 (ii)
Unit Hyd. Tpeak (min)=		5.00	95.00
Unit Hyd. peak (cms)=		0.29	0.01

				TOTALS
PEAK FLOW	(cms)=	0.16	0.01	0.162 (iii)
TIME TO PEAK	(hrs)=	3.00	4.50	3.00
RUNOFF VOLUME	(mm)=	51.45	12.27	25.18
TOTAL RAINFALL	(mm)=	52.45	52.45	52.45
RUNOFF COEFFICIENT	=	0.98	0.23	0.48

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 60.5 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.

RESERVOIR (0046)
IN= 2---> OUT= 1
DT= 5.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0187	0.0264
0.0022	0.0020	0.0351	0.0338
0.0051	0.0052	0.0569	0.0421
0.0069	0.0093	0.0834	0.0512
0.0083	0.0141	0.1144	0.0614
0.0095	0.0199	0.0000	0.0000

	AREA	QPEAK	TPEAK	R.V.

	(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (3200)	2.140	0.162	3.00	25.18
OUTFLOW: ID= 1 (0046)	2.140	0.019	5.00	25.07

PEAK FLOW REDUCTION [Qout/Qin](%)= 11.82
TIME SHIFT OF PEAK FLOW (min)=120.00
MAXIMUM STORAGE USED (ha.m.)= 0.0266

ADD HYD (0045)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0046):	2.14	0.019	5.00	25.07
	+ ID2= 2 (0049):	1.67	0.062	3.08	10.28
	ID = 3 (0045):	3.81	0.076	3.08	18.59

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION NUMBER: 3 **
****

READ STORM	Filename: C:\Users\cproctorbennett\AppData\Local\Temp\018c0a16-af77-41ae-a24b-cc941a5e1371\05ac1321
Ptotal= 61.60 mm	Comments: 10-Year, 6 hour SCS Type II - City of Pe

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	2.50	1.75	6.20	3.25	13.50	4.75	3.70
0.50	2.50	2.00	6.20	3.50	13.50	5.00	3.70
0.75	3.70	2.25	7.40	3.75	6.20	5.25	2.50
1.00	3.70	2.50	7.40	4.00	6.20	5.50	2.50
1.25	3.70	2.75	36.90	4.25	4.90	5.75	2.50
1.50	3.70	3.00	95.90	4.50	4.90	6.00	2.50

CALIB					
NASHYD (1100)	Area (ha)= 2.18	Curve Number (CN)= 67.7			
ID= 1 DT= 5.0 min	Ia (mm)= 8.20	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.36				

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.50	1.583	6.20	3.083	13.50	4.58	3.70
0.167	2.50	1.667	6.20	3.167	13.50	4.67	3.70
0.250	2.50	1.750	6.20	3.250	13.50	4.75	3.70
0.333	2.50	1.833	6.20	3.333	13.50	4.83	3.70

0.417	2.50	1.917	6.20	3.417	13.50	4.92	3.70
0.500	2.50	2.000	6.20	3.500	13.50	5.00	3.70
0.583	3.70	2.083	7.40	3.583	6.20	5.08	2.50
0.667	3.70	2.167	7.40	3.667	6.20	5.17	2.50
0.750	3.70	2.250	7.40	3.750	6.20	5.25	2.50
0.833	3.70	2.333	7.40	3.833	6.20	5.33	2.50
0.917	3.70	2.417	7.40	3.917	6.20	5.42	2.50
1.000	3.70	2.500	7.40	4.000	6.20	5.50	2.50
1.083	3.70	2.583	36.90	4.083	4.90	5.58	2.50
1.167	3.70	2.667	36.90	4.167	4.90	5.67	2.50
1.250	3.70	2.750	36.90	4.250	4.90	5.75	2.50
1.333	3.70	2.833	95.90	4.333	4.90	5.83	2.50
1.417	3.70	2.917	95.90	4.417	4.90	5.92	2.50
1.500	3.70	3.000	95.90	4.500	4.90	6.00	2.50

Unit Hyd Qpeak (cms)= 0.231

PEAK FLOW (cms)= 0.079 (i)
TIME TO PEAK (hrs)= 3.250
RUNOFF VOLUME (mm)= 16.330
TOTAL RAINFALL (mm)= 61.600
RUNOFF COEFFICIENT = 0.265

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

CALIB					
NASHYD (1200)	Area (ha)= 1.76	Curve Number (CN)= 64.3			
ID= 1 DT= 5.0 min	Ia (mm)= 8.90	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.12				

Unit Hyd Qpeak (cms)= 0.560

PEAK FLOW (cms)= 0.114 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 14.145
TOTAL RAINFALL (mm)= 61.600
RUNOFF COEFFICIENT = 0.230

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

CALIB					
NASHYD (1300)	Area (ha)= 1.70	Curve Number (CN)= 68.8			
ID= 1 DT= 5.0 min	Ia (mm)= 8.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.51				

Unit Hyd Qpeak (cms)= 0.127

PEAK FLOW (cms)= 0.050 (i)
TIME TO PEAK (hrs)= 3.500
RUNOFF VOLUME (mm)= 17.020
TOTAL RAINFALL (mm)= 61.600
RUNOFF COEFFICIENT = 0.276

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

```
--------------------
| CALIB            |
| NASHYD    (2201) |   Area    (ha)=   0.74   Curve Number    (CN)= 64.2
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.80   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.166

     PEAK FLOW       (cms)=   0.043 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  16.200
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.263

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (2202) |   Area    (ha)=   0.93   Curve Number    (CN)= 61.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.209

     PEAK FLOW       (cms)=   0.042 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  12.637
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.205

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (2200) |   Area    (ha)=   2.14
|ID= 1 DT= 5.0 min |   Total Imp(%)=  43.00   Dir. Conn.(%)=  33.00
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92         1.22
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.50         0.27
     Length            (m)=     119.44       215.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      95.90        13.59
               over (min)        5.00        85.00
     Storage Coeff.  (min)=       2.56 (ii)   80.99 (ii)
     Unit Hyd. Tpeak (min)=       5.00        85.00
     Unit Hyd. peak  (cms)=       0.29         0.01
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.19         0.02          0.191 (iii)
     TIME TO PEAK    (hrs)=       3.00         4.33           3.00
     RUNOFF VOLUME    (mm)=      60.60        16.57          31.08
     TOTAL RAINFALL   (mm)=      61.60        61.60          61.60
     RUNOFF COEFFICIENT   =       0.98         0.27           0.50

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



```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  60.5     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   (0009) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (2200):     2.14   0.191     3.00    31.08
        + ID2= 2 (2201):     0.74   0.043     3.08    16.20
          ================================================
          ID = 3 (0009):     2.88   0.233     3.00    27.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0009) |
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 3 (0009):     2.88   0.233     3.00    27.26
        + ID2= 2 (2202):     0.93   0.042     3.08    12.64
          ================================================
          ID = 1 (0009):     3.81   0.273     3.00    23.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (2101) |   Area    (ha)=   1.28   Curve Number    (CN)= 65.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.44

     Unit Hyd Qpeak  (cms)=   0.111

     PEAK FLOW       (cms)=   0.041 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=  16.767
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.272

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (2100) |   Area    (ha)=   0.24
|ID= 1 DT= 5.0 min |   Total Imp(%)=  64.00   Dir. Conn.(%)=  61.00
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.09
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       3.06         3.04
     Length            (m)=      40.00        70.00
```

```
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      95.90        29.60
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       1.07 (ii)   15.24 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.34         0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.04         0.00          0.042 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.17           3.00
     RUNOFF VOLUME    (mm)=      60.60        15.46          42.96
     TOTAL RAINFALL   (mm)=      61.60        61.60          61.60
     RUNOFF COEFFICIENT   =       0.98         0.25           0.70

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.5    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   (0006) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
          ID1= 1 (2100):     0.24   0.042     3.00    42.96
        + ID2= 2 (2101):     1.28   0.041     3.33    16.77
          ================================================
          ID = 3 (0006):     1.52   0.063     3.00    20.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (2300) |   Area     (ha)=   0.31   Curve Number    (CN)= 69.4
|ID= 1 DT= 5.0 min |   Ia       (mm)=   4.40   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.25

     Unit Hyd Qpeak  (cms)=   0.047

     PEAK FLOW       (cms)=   0.017 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  19.321
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.314

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (3101) |   Area     (ha)=   1.28   Curve Number    (CN)= 65.1
|ID= 1 DT= 5.0 min |   Ia       (mm)=   4.70   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.44

     Unit Hyd Qpeak  (cms)=   0.111
```



```
     PEAK FLOW       (cms)=   0.041 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=  16.767
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.272

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (3100) |   Area     (ha)=   0.24
|ID= 1 DT= 5.0 min |   Total Imp(%)=  64.00   Dir. Conn.(%)=  61.00
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         0.15          0.09
     Dep. Storage     (mm)=         1.00          5.00
     Average Slope     (%)=         3.06          3.04
     Length            (m)=        40.00         70.00
     Mannings n           =        0.013         0.250

     Max.Eff.Inten.(mm/hr)=        95.90         29.60
               over (min)          5.00         20.00
     Storage Coeff.  (min)=         1.07 (ii)    15.24 (ii)
     Unit Hyd. Tpeak (min)=         5.00         20.00
     Unit Hyd. peak  (cms)=         0.34          0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=         0.04          0.00          0.042 (iii)
     TIME TO PEAK    (hrs)=         3.00          3.17           3.00
     RUNOFF VOLUME    (mm)=        60.60         15.46          42.96
     TOTAL RAINFALL   (mm)=        61.60         61.60          61.60
     RUNOFF COEFFICIENT   =         0.98          0.25           0.70

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.5    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.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0042) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0116     0.0040
                          0.0023     0.0003   |   0.0127     0.0051
                          0.0055     0.0008   |   0.0140     0.0068
                          0.0075     0.0014   |   0.0169     0.0073
                          0.0091     0.0021   |   0.0320     0.0086
                          0.0104     0.0030   |   0.0447     0.0093

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (3100)      0.240     0.042      3.00      42.96
     OUTFLOW: ID= 1 (0042)      0.240     0.012      3.08      42.84
```

```
                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 27.96
                    TIME SHIFT OF PEAK FLOW          (min)=  5.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0040

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--------------------
| ADD HYD   (0040) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (3101):     1.28   0.041     3.33    16.77
        + ID2= 2 (0042):     0.24   0.012     3.08    42.84
          ================================================
          ID = 3 (0040):     1.52   0.053     3.33    20.88

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (3201) |   Area     (ha)=   0.74   Curve Number    (CN)= 64.2
|ID= 1 DT= 5.0 min |   Ia       (mm)=   4.80   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.166

     PEAK FLOW       (cms)=   0.043 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  16.200
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.263

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (3202) |   Area     (ha)=   0.93   Curve Number    (CN)= 61.6
|ID= 1 DT= 5.0 min |   Ia       (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.209

     PEAK FLOW       (cms)=   0.042 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  12.637
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.205

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

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--------------------
| ADD HYD   (0049) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (3201):     0.74   0.043     3.08    16.20
        + ID2= 2 (3202):     0.93   0.042     3.08    12.64
          ================================================
```



```
          ID = 3 (0049):     1.67   0.086     3.08    14.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (3200) |   Area     (ha)=   2.14
|ID= 1 DT= 5.0 min |   Total Imp(%)=  43.00   Dir. Conn.(%)=  33.00
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       0.92          1.22
     Dep. Storage      (mm)=       1.00          5.00
     Average Slope      (%)=       1.50          0.27
     Length             (m)=     119.44        215.00
     Mannings n            =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=      95.90         13.59
               over (min)         5.00         85.00
     Storage Coeff.  (min)=       2.56 (ii)    80.99 (ii)
     Unit Hyd. Tpeak (min)=       5.00         85.00
     Unit Hyd. peak  (cms)=       0.29          0.01
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.19          0.02      0.191 (iii)
     TIME TO PEAK    (hrs)=       3.00          4.33       3.00
     RUNOFF VOLUME    (mm)=      60.60         16.57      31.08
     TOTAL RAINFALL   (mm)=      61.60         61.60      61.60
     RUNOFF COEFFICIENT   =       0.98          0.27       0.50

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.5     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.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0046) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |   0.0187     0.0264
                         0.0022     0.0020    |   0.0351     0.0338
                         0.0051     0.0052    |   0.0569     0.0421
                         0.0069     0.0093    |   0.0834     0.0512
                         0.0083     0.0141    |   0.1144     0.0614
                         0.0095     0.0199    |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (3200)   2.140     0.191      3.00       31.08
     OUTFLOW: ID= 1 (0046)   2.140     0.028      4.67       30.98

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.54
                    TIME SHIFT OF PEAK FLOW          (min)=100.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0305

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--------------------
| ADD HYD   (0045) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)      (cms)     (hrs)      (mm)
          ID1= 1 (0046):      2.14    0.028      4.67     30.98
        + ID2= 2 (0049):      1.67    0.086      3.08     14.22
          ================================================
          ID = 3 (0045):      3.81    0.106      3.08     23.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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  ****************************
  ** SIMULATION NUMBER:   4 **
  ****************************


--------------------
|    READ STORM    |    Filename: C:\Users\cproctorbennett\AppD
|                  |              ata\Local\Temp\
|                  |              018c0a16-af77-41ae-a24b-cc941a5e1371\39c58a00
| Ptotal= 72.90 mm |    Comments: 25-Year, 6 hour SCS Type II - City of Pe
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.25    2.90 |  1.75    7.30 |  3.25   16.00 |  4.75    4.40
                0.50    2.90 |  2.00    7.30 |  3.50   16.00 |  5.00    4.40
                0.75    4.40 |  2.25    8.80 |  3.75    7.30 |  5.25    2.90
                1.00    4.40 |  2.50    8.80 |  4.00    7.30 |  5.50    2.90
                1.25    4.40 |  2.75   43.70 |  4.25    5.80 |  5.75    2.90
                1.50    4.40 |  3.00  113.70 |  4.50    5.80 |  6.00    2.90

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--------------------
| CALIB            |
| NASHYD    (1100) |   Area     (ha)=   2.18   Curve Number    (CN)= 67.7
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.20   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.36

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.90 | 1.583    7.30 | 3.083   16.00 |  4.58    4.40
               0.167    2.90 | 1.667    7.30 | 3.167   16.00 |  4.67    4.40
               0.250    2.90 | 1.750    7.30 | 3.250   16.00 |  4.75    4.40
               0.333    2.90 | 1.833    7.30 | 3.333   16.00 |  4.83    4.40
               0.417    2.90 | 1.917    7.30 | 3.417   16.00 |  4.92    4.40
               0.500    2.90 | 2.000    7.30 | 3.500   16.00 |  5.00    4.40
               0.583    4.40 | 2.083    8.80 | 3.583    7.30 |  5.08    2.90
               0.667    4.40 | 2.167    8.80 | 3.667    7.30 |  5.17    2.90
               0.750    4.40 | 2.250    8.80 | 3.750    7.30 |  5.25    2.90
               0.833    4.40 | 2.333    8.80 | 3.833    7.30 |  5.33    2.90
               0.917    4.40 | 2.417    8.80 | 3.917    7.30 |  5.42    2.90
               1.000    4.40 | 2.500    8.80 | 4.000    7.30 |  5.50    2.90
               1.083    4.40 | 2.583   43.70 | 4.083    5.80 |  5.58    2.90
```



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               1.167    4.40 | 2.667   43.70 | 4.167    5.80 |  5.67    2.90
               1.250    4.40 | 2.750   43.70 | 4.250    5.80 |  5.75    2.90
               1.333    4.40 | 2.833  113.70 | 4.333    5.80 |  5.83    2.90
               1.417    4.40 | 2.917  113.70 | 4.417    5.80 |  5.92    2.90
               1.500    4.40 | 3.000  113.70 | 4.500    5.80 |  6.00    2.90

     Unit Hyd Qpeak  (cms)=   0.231

     PEAK FLOW       (cms)=   0.110 (i)
     TIME TO PEAK    (hrs)=   3.250
     RUNOFF VOLUME    (mm)=  22.515
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.309

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

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--------------------
| CALIB            |
| NASHYD    (1200) |   Area     (ha)=   1.76   Curve Number    (CN)= 64.3
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.12

     Unit Hyd Qpeak  (cms)=   0.560

     PEAK FLOW       (cms)=   0.161 (i)
     TIME TO PEAK    (hrs)=   3.000
     RUNOFF VOLUME    (mm)=  19.711
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.270

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (1300) |   Area     (ha)=   1.70   Curve Number    (CN)= 68.8
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.51

     Unit Hyd Qpeak  (cms)=   0.127

     PEAK FLOW       (cms)=   0.070 (i)
     TIME TO PEAK    (hrs)=   3.417
     RUNOFF VOLUME    (mm)=  23.387
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.321

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (2201) |   Area     (ha)=   0.74   Curve Number    (CN)= 64.2
|ID= 1 DT= 5.0 min |   Ia       (mm)=   4.80   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.166

     PEAK FLOW       (cms)=   0.059 (i)
```

```
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  22.032
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.302

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (2202) |   Area    (ha)=   0.93   Curve Number    (CN)= 61.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.209

     PEAK FLOW       (cms)=   0.060 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  17.819
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.244

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

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--------------------
| CALIB            |
| STANDHYD  (2200) |   Area    (ha)=   2.14
|ID= 1 DT= 5.0 min |   Total Imp(%)=  43.00   Dir. Conn.(%)=  33.00
--------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92         1.22
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.50         0.27
     Length            (m)=     119.44       215.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     113.70        18.55
               over (min)          5.00        75.00
     Storage Coeff.  (min)=       2.39 (ii)   71.64 (ii)
     Unit Hyd. Tpeak (min)=       5.00        75.00
     Unit Hyd. peak  (cms)=       0.30         0.02
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.22         0.03          0.228 (iii)
     TIME TO PEAK    (hrs)=       3.00         4.17           3.00
     RUNOFF VOLUME    (mm)=      71.90        22.47          38.76
     TOTAL RAINFALL   (mm)=      72.90        72.90          72.90
     RUNOFF COEFFICIENT   =       0.99         0.31           0.53

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  60.5    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   (0009) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)     (cms)    (hrs)      (mm)
          ID1= 1 (2200):     2.14   0.228     3.00     38.76
        + ID2= 2 (2201):     0.74   0.059     3.08     22.03
          ================================================
          ID = 3 (0009):     2.88   0.286     3.00     34.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0009) |
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)     (cms)    (hrs)      (mm)
          ID1= 3 (0009):     2.88   0.286     3.00     34.46
        + ID2= 2 (2202):     0.93   0.060     3.08     17.82
          ================================================
          ID = 1 (0009):     3.81   0.344     3.00     30.40

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (2101) |   Area    (ha)=   1.28   Curve Number    (CN)= 65.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.44

     Unit Hyd Qpeak  (cms)=   0.111

     PEAK FLOW       (cms)=   0.057 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=  22.756
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.312

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (2100) |   Area    (ha)=   0.24
|ID= 1 DT= 5.0 min |   Total Imp(%)=  64.00   Dir. Conn.(%)=  61.00
--------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.09
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       3.06         3.04
     Length            (m)=      40.00        70.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     113.70        40.60
               over (min)          5.00        15.00
     Storage Coeff.  (min)=       1.00 (ii)   13.49 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.34         0.08
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.01          0.051 (iii)
```

```
     TIME TO PEAK    (hrs)=       3.00         3.08          3.00
     RUNOFF VOLUME    (mm)=      71.90        21.06         52.03
     TOTAL RAINFALL   (mm)=      72.90        72.90         72.90
     RUNOFF COEFFICIENT   =       0.99         0.29          0.71

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  60.5    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   (0006) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (2100):     0.24   0.051     3.00    52.03
       + ID2= 2 (2101):     1.28   0.057     3.33    22.76
         ================================================
         ID = 3 (0006):     1.52   0.081     3.00    27.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (2300) |   Area    (ha)=   0.31   Curve Number    (CN)= 69.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.40   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.25

     Unit Hyd Qpeak  (cms)=   0.047

     PEAK FLOW       (cms)=   0.023 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  25.974
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.356

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (3101) |   Area    (ha)=   1.28   Curve Number    (CN)= 65.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.44

     Unit Hyd Qpeak  (cms)=   0.111

     PEAK FLOW       (cms)=   0.057 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=  22.756
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.312

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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--------------------
| CALIB            |
| STANDHYD  (3100) |   Area    (ha)=   0.24
|ID= 1 DT= 5.0 min |   Total Imp(%)=  64.00   Dir. Conn.(%)=  61.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15          0.09
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       3.06          3.04
     Length            (m)=      40.00         70.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     113.70         40.60
               over (min)          5.00         15.00
     Storage Coeff.  (min)=       1.00 (ii)    13.49 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=       0.34          0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.05          0.01        0.051 (iii)
     TIME TO PEAK    (hrs)=       3.00          3.08         3.00
     RUNOFF VOLUME    (mm)=      71.90         21.06         52.03
     TOTAL RAINFALL   (mm)=      72.90         72.90         72.90
     RUNOFF COEFFICIENT   =       0.99          0.29          0.71

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  60.5    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.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0042) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |   0.0116     0.0040
                         0.0023     0.0003    |   0.0127     0.0051
                         0.0055     0.0008    |   0.0140     0.0068
                         0.0075     0.0014    |   0.0169     0.0073
                         0.0091     0.0021    |   0.0320     0.0086
                         0.0104     0.0030    |   0.0447     0.0093

                              AREA     QPEAK      TPEAK       R.V.
                              (ha)     (cms)      (hrs)       (mm)
     INFLOW : ID= 2 (3100)    0.240      0.051      3.00       52.03
     OUTFLOW: ID= 1 (0042)    0.240      0.013      3.17       51.91

               PEAK   FLOW   REDUCTION [Qout/Qin](%)= 24.69
               TIME SHIFT OF PEAK FLOW       (min)= 10.00
               MAXIMUM  STORAGE   USED      (ha.m.)=  0.0051

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--------------------
| ADD HYD   (0040) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```

```
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (3101):     1.28   0.057     3.33    22.76
        + ID2= 2 (0042):     0.24   0.013     3.17    51.91
          ================================================
          ID = 3 (0040):     1.52   0.069     3.33    27.36

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB            |
| NASHYD    (3201) |   Area    (ha)=   0.74   Curve Number    (CN)= 64.2
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.80   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.166

     PEAK FLOW       (cms)=   0.059 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  22.032
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.302

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (3202) |   Area    (ha)=   0.93   Curve Number    (CN)= 61.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.209

     PEAK FLOW       (cms)=   0.060 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  17.819
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.244

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

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--------------------
| ADD HYD   (0049) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)     (cms)    (hrs)      (mm)
          ID1= 1 (3201):     0.74   0.059     3.08    22.03
        + ID2= 2 (3202):     0.93   0.060     3.08    17.82
          ================================================
          ID = 3 (0049):     1.67   0.120     3.08    19.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (3200) |   Area    (ha)=   2.14
|ID= 1 DT= 5.0 min |   Total Imp(%)=  43.00   Dir. Conn.(%)=  33.00
```



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--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       0.92         1.22
     Dep. Storage      (mm)=       1.00         5.00
     Average Slope      (%)=       1.50         0.27
     Length             (m)=     119.44       215.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     113.70        18.55
           over (min)             5.00        75.00
     Storage Coeff.  (min)=       2.39 (ii)   71.64 (ii)
     Unit Hyd. Tpeak (min)=       5.00        75.00
     Unit Hyd. peak  (cms)=       0.30         0.02
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.22         0.03        0.228 (iii)
     TIME TO PEAK    (hrs)=       3.00         4.17         3.00
     RUNOFF VOLUME    (mm)=      71.90        22.47        38.76
     TOTAL RAINFALL   (mm)=      72.90        72.90        72.90
     RUNOFF COEFFICIENT   =       0.99         0.31         0.53

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.5    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.

------------------------------------------------------------------------------
--------------------
| RESERVOIR (0046) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0187     0.0264
                          0.0022     0.0020   |   0.0351     0.0338
                          0.0051     0.0052   |   0.0569     0.0421
                          0.0069     0.0093   |   0.0834     0.0512
                          0.0083     0.0141   |   0.1144     0.0614
                          0.0095     0.0199   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (3200)    2.140     0.228      3.00      38.76
     OUTFLOW: ID= 1 (0046)    2.140     0.040      4.50      38.66

               PEAK   FLOW   REDUCTION [Qout/Qin](%)= 17.55
               TIME SHIFT OF PEAK FLOW          (min)= 90.00
               MAXIMUM  STORAGE   USED        (ha.m.)=  0.0357

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--------------------
| ADD HYD   (0045) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)     (cms)    (hrs)      (mm)
          ID1= 1 (0046):     2.14   0.040     4.50    38.66
        + ID2= 2 (0049):     1.67   0.120     3.08    19.69
          ================================================
          ID = 3 (0045):     3.81   0.152     3.08    30.34
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION NUMBER: 5 **
****

READ STORM	Filename: C:\Users\cproctorbennett\AppData\Local\Temp\018c0a16-af77-41ae-a24b-cc941a5e1371\275d0def
Ptotal= 81.47 mm	Comments: 50-Year, 6 hour SCS Type II - City of Pe

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	3.30	1.75	8.10	3.25	17.90	4.75	4.90
0.50	3.30	2.00	8.10	3.50	17.90	5.00	4.90
0.75	4.90	2.25	9.80	3.75	8.10	5.25	3.30
1.00	4.90	2.50	9.80	4.00	8.10	5.50	3.30
1.25	4.90	2.75	48.90	4.25	6.50	5.75	3.30
1.50	4.90	3.00	127.00	4.50	6.50	6.00	3.30

CALIB			
NASHYD (1100)	Area (ha)= 2.18	Curve Number (CN)= 67.7	
ID= 1 DT= 5.0 min	Ia (mm)= 8.20	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.36		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.30	1.583	8.10	3.083	17.90	4.58	4.90
0.167	3.30	1.667	8.10	3.167	17.90	4.67	4.90
0.250	3.30	1.750	8.10	3.250	17.90	4.75	4.90
0.333	3.30	1.833	8.10	3.333	17.90	4.83	4.90
0.417	3.30	1.917	8.10	3.417	17.90	4.92	4.90
0.500	3.30	2.000	8.10	3.500	17.90	5.00	4.90
0.583	4.90	2.083	9.80	3.583	8.10	5.08	3.30
0.667	4.90	2.167	9.80	3.667	8.10	5.17	3.30
0.750	4.90	2.250	9.80	3.750	8.10	5.25	3.30
0.833	4.90	2.333	9.80	3.833	8.10	5.33	3.30
0.917	4.90	2.417	9.80	3.917	8.10	5.42	3.30
1.000	4.90	2.500	9.80	4.000	8.10	5.50	3.30
1.083	4.90	2.583	48.90	4.083	6.50	5.58	3.30
1.167	4.90	2.667	48.90	4.167	6.50	5.67	3.30
1.250	4.90	2.750	48.90	4.250	6.50	5.75	3.30
1.333	4.90	2.833	127.00	4.333	6.50	5.83	3.30
1.417	4.90	2.917	127.00	4.417	6.50	5.92	3.30
1.500	4.90	3.000	127.00	4.500	6.50	6.00	3.30

Unit Hyd Qpeak (cms)= 0.231

PEAK FLOW (cms)= 0.136 (i)

TIME TO PEAK (hrs)= 3.250
RUNOFF VOLUME (mm)= 27.606
TOTAL RAINFALL (mm)= 81.475
RUNOFF COEFFICIENT = 0.339

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

CALIB			
NASHYD (1200)	Area (ha)= 1.76	Curve Number (CN)= 64.3	
ID= 1 DT= 5.0 min	Ia (mm)= 8.90	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.12		

Unit Hyd Qpeak (cms)= 0.560

PEAK FLOW (cms)= 0.199 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 24.330
TOTAL RAINFALL (mm)= 81.475
RUNOFF COEFFICIENT = 0.299

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

CALIB			
NASHYD (1300)	Area (ha)= 1.70	Curve Number (CN)= 68.8	
ID= 1 DT= 5.0 min	Ia (mm)= 8.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.51		

Unit Hyd Qpeak (cms)= 0.127

PEAK FLOW (cms)= 0.086 (i)
TIME TO PEAK (hrs)= 3.417
RUNOFF VOLUME (mm)= 28.613
TOTAL RAINFALL (mm)= 81.475
RUNOFF COEFFICIENT = 0.351

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

CALIB			
NASHYD (2201)	Area (ha)= 0.74	Curve Number (CN)= 64.2	
ID= 1 DT= 5.0 min	Ia (mm)= 4.80	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.17		

Unit Hyd Qpeak (cms)= 0.166

PEAK FLOW (cms)= 0.072 (i)
TIME TO PEAK (hrs)= 3.083
RUNOFF VOLUME (mm)= 26.833
TOTAL RAINFALL (mm)= 81.475
RUNOFF COEFFICIENT = 0.329

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

```
| CALIB             |
| NASHYD    (2202) |   Area     (ha)=   0.93   Curve Number    (CN)= 61.6
|ID= 1 DT= 5.0 min |   Ia       (mm)=  10.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.209

     PEAK FLOW       (cms)=   0.075 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  22.150
     TOTAL RAINFALL   (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.272

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

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD  (2200) |   Area     (ha)=   2.14
|ID= 1 DT= 5.0 min |   Total Imp(%)=  43.00   Dir. Conn.(%)=  33.00
-------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92         1.22
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.50         0.27
     Length            (m)=     119.44       215.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     127.00        22.61
                 over (min)        5.00        70.00
     Storage Coeff.  (min)=       2.29 (ii)   66.28 (ii)
     Unit Hyd. Tpeak (min)=       5.00        70.00
     Unit Hyd. peak  (cms)=       0.30         0.02
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.25         0.04          0.256 (iii)
     TIME TO PEAK    (hrs)=       3.00         4.08           3.00
     RUNOFF VOLUME    (mm)=      80.47        27.32          44.84
     TOTAL RAINFALL   (mm)=      81.48        81.48          81.48
     RUNOFF COEFFICIENT   =       0.99         0.34           0.55

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  60.5    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   (0009) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)     (cms)    (hrs)      (mm)
         ID1= 1 (2200):     2.14   0.256     3.00     44.84
       + ID2= 2 (2201):     0.74   0.072     3.08     26.83
         ================================================
         ID = 3 (0009):     2.88   0.328     3.00     40.21

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



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

-------------------
| ADD HYD   (0009) |
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)     (cms)    (hrs)      (mm)
         ID1= 3 (0009):     2.88   0.328     3.00     40.21
       + ID2= 2 (2202):     0.93   0.075     3.08     22.15
         ================================================
         ID = 1 (0009):     3.81   0.401     3.00     35.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| NASHYD    (2101) |   Area     (ha)=   1.28   Curve Number    (CN)= 65.1
|ID= 1 DT= 5.0 min |   Ia       (mm)=   4.70   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.44

     Unit Hyd Qpeak  (cms)=   0.111

     PEAK FLOW       (cms)=   0.069 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=  27.677
     TOTAL RAINFALL   (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.340

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

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD  (2100) |   Area     (ha)=   0.24
|ID= 1 DT= 5.0 min |   Total Imp(%)=  64.00   Dir. Conn.(%)=  61.00
-------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.09
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       3.06         3.04
     Length            (m)=      40.00        70.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     127.00        49.58
                 over (min)        5.00        15.00
     Storage Coeff.  (min)=       0.96 (ii)   12.49 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.34         0.08
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.01          0.058 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.08           3.00
     RUNOFF VOLUME    (mm)=      80.47        25.69          59.08
     TOTAL RAINFALL   (mm)=      81.48        81.48          81.48
     RUNOFF COEFFICIENT   =       0.99         0.32           0.73

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  60.5    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 (0006)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (2100):	0.24	0.058	3.00	59.08
	+ ID2= 2 (2101):	1.28	0.069	3.33	27.68
	ID = 3 (0006):	1.52	0.095	3.00	32.64

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (2300)	Area (ha)=	0.31	Curve Number	(CN)=	69.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)=		3.00
	U.H. Tp(hrs)=	0.25			

Unit Hyd Qpeak (cms)= 0.047

PEAK FLOW (cms)= 0.028 (i)
TIME TO PEAK (hrs)= 3.083
RUNOFF VOLUME (mm)= 31.393
TOTAL RAINFALL (mm)= 81.475
RUNOFF COEFFICIENT = 0.385

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

CALIB					
NASHYD (3101)	Area (ha)=	1.28	Curve Number	(CN)=	65.1
ID= 1 DT= 5.0 min	Ia (mm)=	4.70	# of Linear Res.(N)=		3.00
	U.H. Tp(hrs)=	0.44			

Unit Hyd Qpeak (cms)= 0.111

PEAK FLOW (cms)= 0.069 (i)
TIME TO PEAK (hrs)= 3.333
RUNOFF VOLUME (mm)= 27.677
TOTAL RAINFALL (mm)= 81.475
RUNOFF COEFFICIENT = 0.340

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

CALIB					
STANDHYD (3100)	Area (ha)=	0.24			
ID= 1 DT= 5.0 min	Total Imp(%)=	64.00	Dir. Conn.(%)=		61.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.15	0.09
Dep. Storage (mm)=	1.00	5.00

		IMPERVIOUS	PERVIOUS (i)	
Average Slope	(%)=	3.06	3.04	
Length	(m)=	40.00	70.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		127.00	49.58	
over (min)		5.00	15.00	
Storage Coeff. (min)=		0.96 (ii)	12.49 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.34	0.08	
				TOTALS
PEAK FLOW (cms)=		0.05	0.01	0.058 (iii)
TIME TO PEAK (hrs)=		3.00	3.08	3.00
RUNOFF VOLUME (mm)=		80.47	25.69	59.08
TOTAL RAINFALL (mm)=		81.48	81.48	81.48
RUNOFF COEFFICIENT =		0.99	0.32	0.73

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 60.5 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.

RESERVOIR (0042)				
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0116	0.0040
	0.0023	0.0003	0.0127	0.0051
	0.0055	0.0008	0.0140	0.0068
	0.0075	0.0014	0.0169	0.0073
	0.0091	0.0021	0.0320	0.0086
	0.0104	0.0030	0.0447	0.0093

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (3100)	0.240	0.058	3.00	59.08
OUTFLOW: ID= 1 (0042)	0.240	0.013	3.25	58.97

PEAK FLOW REDUCTION [Qout/Qin](%)= 22.92
TIME SHIFT OF PEAK FLOW (min)= 15.00
MAXIMUM STORAGE USED (ha.m.)= 0.0059

ADD HYD (0040)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (3101):	1.28	0.069	3.33	27.68
	+ ID2= 2 (0042):	0.24	0.013	3.25	58.97
	ID = 3 (0040):	1.52	0.083	3.33	32.62

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------
| CALIB            |
| NASHYD    (3201) |   Area    (ha)=   0.74   Curve Number    (CN)= 64.2
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.80   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.166

     PEAK FLOW       (cms)=   0.072 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  26.833
     TOTAL RAINFALL   (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.329

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (3202) |   Area    (ha)=   0.93   Curve Number    (CN)= 61.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.209

     PEAK FLOW       (cms)=   0.075 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  22.150
     TOTAL RAINFALL   (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.272

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

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--------------------
| ADD HYD   (0049) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
          ID1= 1 (3201):     0.74   0.072     3.08    26.83
        + ID2= 2 (3202):     0.93   0.075     3.08    22.15
          ================================================
          ID = 3 (0049):     1.67   0.147     3.08    24.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (3200) |   Area    (ha)=   2.14
|ID= 1 DT= 5.0 min |   Total Imp(%)=  43.00   Dir. Conn.(%)=  33.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92         1.22
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.50         0.27
     Length            (m)=     119.44       215.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     127.00        22.61
```



```
            over (min)        5.00        70.00
     Storage Coeff.  (min)=       2.29 (ii)   66.28 (ii)
     Unit Hyd. Tpeak (min)=       5.00        70.00
     Unit Hyd. peak  (cms)=       0.30         0.02
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.25         0.04          0.256 (iii)
     TIME TO PEAK    (hrs)=       3.00         4.08           3.00
     RUNOFF VOLUME    (mm)=      80.47        27.32          44.84
     TOTAL RAINFALL   (mm)=      81.48        81.48          81.48
     RUNOFF COEFFICIENT   =       0.99         0.34           0.55

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.5    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.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0046) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0187      0.0264
                          0.0022     0.0020   |   0.0351      0.0338
                          0.0051     0.0052   |   0.0569      0.0421
                          0.0069     0.0093   |   0.0834      0.0512
                          0.0083     0.0141   |   0.1144      0.0614
                          0.0095     0.0199   |   0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (3200)     2.140     0.256      3.00      44.84
     OUTFLOW: ID= 1 (0046)     2.140     0.050      4.42      44.73

               PEAK   FLOW   REDUCTION [Qout/Qin](%)= 19.55
               TIME SHIFT OF PEAK FLOW          (min)= 85.00
               MAXIMUM  STORAGE   USED       (ha.m.)=  0.0395

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--------------------
| ADD HYD   (0045) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
          ID1= 1 (0046):     2.14   0.050     4.42    44.73
        + ID2= 2 (0049):     1.67   0.147     3.08    24.22
          ================================================
          ID = 3 (0045):     3.81   0.189     3.08    35.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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  ***************************
  ** SIMULATION NUMBER:   6 **
  ***************************
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--------------------
|    READ STORM    |    Filename: C:\Users\cproctorbennett\AppD
|                  |              ata\Local\Temp\
|                  |              018c0a16-af77-41ae-a24b-cc941a5e1371\7ed9c59c
| Ptotal= 89.93 mm |    Comments: 100-Year, 6 hour SCS Type II - City of P
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	3.60	1.75	9.00	3.25	19.80	4.75	5.40
0.50	3.60	2.00	9.00	3.50	19.80	5.00	5.40
0.75	5.40	2.25	10.80	3.75	9.00	5.25	3.60
1.00	5.40	2.50	10.80	4.00	9.00	5.50	3.60
1.25	5.40	2.75	53.90	4.25	7.20	5.75	3.60
1.50	5.40	3.00	140.20	4.50	7.20	6.00	3.60

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--------------------
| CALIB            |
| NASHYD    (1100) |   Area     (ha)=   2.18   Curve Number    (CN)= 67.7
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.20   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.36

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.60	1.583	9.00	3.083	19.80	4.58	5.40
0.167	3.60	1.667	9.00	3.167	19.80	4.67	5.40
0.250	3.60	1.750	9.00	3.250	19.80	4.75	5.40
0.333	3.60	1.833	9.00	3.333	19.80	4.83	5.40
0.417	3.60	1.917	9.00	3.417	19.80	4.92	5.40
0.500	3.60	2.000	9.00	3.500	19.80	5.00	5.40
0.583	5.40	2.083	10.80	3.583	9.00	5.08	3.60
0.667	5.40	2.167	10.80	3.667	9.00	5.17	3.60
0.750	5.40	2.250	10.80	3.750	9.00	5.25	3.60
0.833	5.40	2.333	10.80	3.833	9.00	5.33	3.60
0.917	5.40	2.417	10.80	3.917	9.00	5.42	3.60
1.000	5.40	2.500	10.80	4.000	9.00	5.50	3.60
1.083	5.40	2.583	53.90	4.083	7.20	5.58	3.60
1.167	5.40	2.667	53.90	4.167	7.20	5.67	3.60
1.250	5.40	2.750	53.90	4.250	7.20	5.75	3.60
1.333	5.40	2.833	140.20	4.333	7.20	5.83	3.60
1.417	5.40	2.917	140.20	4.417	7.20	5.92	3.60
1.500	5.40	3.000	140.20	4.500	7.20	6.00	3.60

```
    Unit Hyd Qpeak  (cms)=   0.231

    PEAK FLOW       (cms)=   0.164 (i)
    TIME TO PEAK    (hrs)=   3.250
    RUNOFF VOLUME    (mm)=  32.910
    TOTAL RAINFALL   (mm)=  89.925
    RUNOFF COEFFICIENT   =   0.366

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

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```
| CALIB            |
| NASHYD    (1200) |   Area     (ha)=   1.76   Curve Number    (CN)= 64.3
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.12

    Unit Hyd Qpeak  (cms)=   0.560

    PEAK FLOW       (cms)=   0.239 (i)
    TIME TO PEAK    (hrs)=   3.000
    RUNOFF VOLUME    (mm)=  29.171
    TOTAL RAINFALL   (mm)=  89.925
    RUNOFF COEFFICIENT   =   0.324

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (1300) |   Area     (ha)=   1.70   Curve Number    (CN)= 68.8
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.51

    Unit Hyd Qpeak  (cms)=   0.127

    PEAK FLOW       (cms)=   0.103 (i)
    TIME TO PEAK    (hrs)=   3.417
    RUNOFF VOLUME    (mm)=  34.048
    TOTAL RAINFALL   (mm)=  89.925
    RUNOFF COEFFICIENT   =   0.379

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (2201) |   Area     (ha)=   0.74   Curve Number    (CN)= 64.2
|ID= 1 DT= 5.0 min |   Ia       (mm)=   4.80   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

    Unit Hyd Qpeak  (cms)=   0.166

    PEAK FLOW       (cms)=   0.086 (i)
    TIME TO PEAK    (hrs)=   3.083
    RUNOFF VOLUME    (mm)=  31.840
    TOTAL RAINFALL   (mm)=  89.925
    RUNOFF COEFFICIENT   =   0.354

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (2202) |   Area     (ha)=   0.93   Curve Number    (CN)= 61.6
|ID= 1 DT= 5.0 min |   Ia       (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

    Unit Hyd Qpeak  (cms)=   0.209

    PEAK FLOW       (cms)=   0.091 (i)
    TIME TO PEAK    (hrs)=   3.083
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```
     RUNOFF VOLUME    (mm)=  26.715
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.297

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

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD  (2200)  |   Area     (ha)=   2.14
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  43.00   Dir. Conn.(%)=  33.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92         1.22
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.50         0.27
     Length            (m)=     119.44       215.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     140.20        26.86
                 over (min)        5.00        65.00
     Storage Coeff.  (min)=       2.20 (ii)   61.93 (ii)
     Unit Hyd. Tpeak (min)=       5.00        65.00
     Unit Hyd. peak  (cms)=       0.30         0.02
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.27         0.05          0.285 (iii)
     TIME TO PEAK    (hrs)=       3.00         4.00           3.00
     RUNOFF VOLUME    (mm)=      88.93        32.37          51.02
     TOTAL RAINFALL   (mm)=      89.93        89.93          89.93
     RUNOFF COEFFICIENT   =       0.99         0.36           0.57

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.5    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   (0009) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)     (cms)    (hrs)     (mm)
         ID1= 1 (2200):     2.14   0.285     3.00    51.02
       + ID2= 2 (2201):     0.74   0.086     3.08    31.84
         ================================================
         ID = 3 (0009):     2.88   0.370     3.00    46.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| ADD HYD   (0009) |
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)     (cms)    (hrs)     (mm)
         ID1= 3 (0009):     2.88   0.370     3.00    46.09
       + ID2= 2 (2202):     0.93   0.091     3.08    26.71
```



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         ================================================
         ID = 1 (0009):     3.81   0.459     3.00    41.36

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| CALIB             |
| NASHYD    (2101)  |   Area     (ha)=   1.28   Curve Number    (CN)= 65.1
|ID= 1 DT= 5.0 min  |   Ia       (mm)=   4.70   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.44

     Unit Hyd Qpeak  (cms)=   0.111

     PEAK FLOW       (cms)=   0.082 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=  32.804
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.365

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

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD  (2100)  |   Area     (ha)=   0.24
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  64.00   Dir. Conn.(%)=  61.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15         0.09
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       3.06         3.04
     Length            (m)=      40.00        70.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     140.20        59.03
                 over (min)        5.00        15.00
     Storage Coeff.  (min)=       0.92 (ii)   11.67 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.34         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.01          0.065 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.08           3.00
     RUNOFF VOLUME    (mm)=      88.93        30.53          66.12
     TOTAL RAINFALL   (mm)=      89.93        89.93          89.93
     RUNOFF COEFFICIENT   =       0.99         0.34           0.74

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.5    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   (0006) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```

```
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (2100):     0.24    0.065     3.00     66.12
        + ID2= 2 (2101):     1.28    0.082     3.33     32.80
          ================================================
          ID = 3 (0006):     1.52    0.109     3.00     38.06

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (2300) |   Area    (ha)=   0.31   Curve Number    (CN)= 69.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.40   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.25

     Unit Hyd Qpeak  (cms)=   0.047

     PEAK FLOW       (cms)=   0.034 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  37.001
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.411

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (3101) |   Area    (ha)=   1.28   Curve Number    (CN)= 65.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.44

     Unit Hyd Qpeak  (cms)=   0.111

     PEAK FLOW       (cms)=   0.082 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=  32.804
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.365

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (3100) |   Area    (ha)=   0.24
|ID= 1 DT= 5.0 min |   Total Imp(%)=  64.00   Dir. Conn.(%)=  61.00
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.15         0.09
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      3.06         3.04
     Length            (m)=     40.00        70.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=    140.20        59.03
                  over (min)       5.00        15.00
     Storage Coeff.  (min)=      0.92 (ii)   11.67 (ii)
     Unit Hyd. Tpeak (min)=      5.00        15.00
     Unit Hyd. peak  (cms)=      0.34         0.09
```



```
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.01          0.065 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.08           3.00
     RUNOFF VOLUME    (mm)=      88.93        30.53          66.12
     TOTAL RAINFALL   (mm)=      89.93        89.93          89.93
     RUNOFF COEFFICIENT   =       0.99         0.34           0.74

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.5     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.

------------------------------------------------------------------------------
--------------------
| RESERVOIR (0042) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.0116     0.0040
                           0.0023     0.0003   |   0.0127     0.0051
                           0.0055     0.0008   |   0.0140     0.0068
                           0.0075     0.0014   |   0.0169     0.0073
                           0.0091     0.0021   |   0.0320     0.0086
                           0.0104     0.0030   |   0.0447     0.0093

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (3100)       0.240     0.065      3.00      66.12
     OUTFLOW: ID= 1 (0042)       0.240     0.014      3.33      66.02

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 21.53
                   TIME SHIFT OF PEAK FLOW          (min)= 20.00
                   MAXIMUM  STORAGE   USED        (ha.m.)=  0.0068

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--------------------
| ADD HYD   (0040) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
          ID1= 1 (3101):     1.28    0.082     3.33     32.80
        + ID2= 2 (0042):     0.24    0.014     3.33     66.02
          ================================================
          ID = 3 (0040):     1.52    0.096     3.33     38.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (3201) |   Area    (ha)=   0.74   Curve Number    (CN)= 64.2
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.80   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.166

     PEAK FLOW       (cms)=   0.086 (i)
```

```
     TIME TO PEAK     (hrs)=   3.083
     RUNOFF VOLUME     (mm)=  31.840
     TOTAL RAINFALL    (mm)=  89.925
     RUNOFF COEFFICIENT    =   0.354

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

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-------------------
| CALIB             |
| NASHYD    (3202)  |   Area     (ha)=   0.93   Curve Number    (CN)= 61.6
|ID= 1 DT= 5.0 min  |   Ia       (mm)=  10.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.209

     PEAK FLOW       (cms)=   0.091 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  26.715
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT    =   0.297

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

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-------------------
| ADD HYD   (0049) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)     (cms)    (hrs)     (mm)
          ID1= 1 (3201):     0.74   0.086     3.08    31.84
        + ID2= 2 (3202):     0.93   0.091     3.08    26.71
          ================================================
          ID = 3 (0049):     1.67   0.177     3.08    28.99

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| CALIB             |
| STANDHYD  (3200)  |   Area     (ha)=   2.14
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  43.00   Dir. Conn.(%)=  33.00
-------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.92         1.22
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.50         0.27
     Length            (m)=     119.44       215.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     140.20        26.86
               over (min)          5.00        65.00
     Storage Coeff.  (min)=       2.20 (ii)   61.93 (ii)
     Unit Hyd. Tpeak (min)=       5.00        65.00
     Unit Hyd. peak  (cms)=       0.30         0.02
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.27         0.05          0.285 (iii)
     TIME TO PEAK    (hrs)=       3.00         4.00           3.00
     RUNOFF VOLUME    (mm)=      88.93        32.37          51.02
     TOTAL RAINFALL   (mm)=      89.93        89.93          89.93
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     RUNOFF COEFFICIENT    =       0.99         0.36          0.57

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  60.5    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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-------------------
| RESERVOIR (0046) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)      (ha.m.)   |   (cms)      (ha.m.)
                         0.0000     0.0000    |   0.0187      0.0264
                         0.0022     0.0020    |   0.0351      0.0338
                         0.0051     0.0052    |   0.0569      0.0421
                         0.0069     0.0093    |   0.0834      0.0512
                         0.0083     0.0141    |   0.1144      0.0614
                         0.0095     0.0199    |   0.0000      0.0000

                               AREA     QPEAK     TPEAK      R.V.
                               (ha)     (cms)     (hrs)      (mm)
     INFLOW : ID= 2 (3200)     2.140     0.285     3.00      51.02
     OUTFLOW: ID= 1 (0046)     2.140     0.061     4.25      50.91

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 21.54
                TIME SHIFT OF PEAK FLOW          (min)= 75.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0437

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| ADD HYD   (0045) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)     (cms)    (hrs)     (mm)
          ID1= 1 (0046):     2.14   0.061     4.25    50.91
        + ID2= 2 (0049):     1.67   0.177     3.08    28.99
          ================================================
          ID = 3 (0045):     3.81   0.229     3.08    41.30

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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Appendix C

Quantity Control

Stage-Storage-Discharge: Outlet 1

Project No: 21-10985
Project Name: Heritage Line
Designed/Checked By: SO / KS
Date: May 10, 2022

Storage Summary		
Top of Permanent Pool:	224.38	m
Permanent Pool Volume:	0.0	m^3
Active Storage Volume:	92.7	m^3

Outlet Capacity Summary				
Type	Diameter	Slope	Peak Flow	% Full

Discharge Summary				
Stage	Type	Invert Elev (m)	Diameter / Width (mm)	(m)
1	Orifice Plate: Vertical	224.38	100	
2	Rectangular Weir	224.88	0.5	

Stage-Storage-Discharge Summary Table

Elevation	Stage	Stage 1 Orifice Plate	Stage 2 Weir					Active Storage	Total Discharge	Notes
m	m	m^3/s						ha*m	m^3/s	
224.38	0.00	0.000	0.000					**0.0000**	**0.000**	
224.39	0.01	**0.000**	0.000					**0.0001**	**0.000**	
224.40	0.02	**0.000**	0.000					**0.0001**	**0.000**	
224.41	0.03	**0.001**	0.000					**0.0002**	**0.001**	
224.42	0.04	**0.001**	0.000					**0.0002**	**0.001**	
224.43	0.05	**0.002**	0.000					**0.0003**	**0.002**	
224.44	0.06	**0.002**	0.000					**0.0003**	**0.002**	
224.45	0.07	**0.003**	0.000					**0.0004**	**0.003**	
224.46	0.08	**0.004**	0.000					**0.0005**	**0.004**	
224.47	0.09	**0.004**	0.000					**0.0006**	**0.004**	
224.48	0.10	**0.005**	0.000					**0.0006**	**0.005**	
224.49	0.11	**0.005**	0.000					**0.0007**	**0.005**	
224.50	0.12	**0.006**	0.000					**0.0008**	**0.006**	
224.51	0.13	**0.006**	0.000					**0.0009**	**0.006**	
224.52	0.14	**0.006**	0.000					**0.0010**	**0.006**	
224.53	0.15	**0.007**	0.000					**0.0011**	**0.007**	
224.54	0.16	**0.007**	0.000					**0.0012**	**0.007**	
224.55	0.17	**0.007**	0.000					**0.0013**	**0.007**	
224.56	0.18	**0.008**	0.000					**0.0014**	**0.008**	
224.57	0.19	**0.008**	0.000					**0.0015**	**0.008**	
224.58	0.20	**0.008**	0.000					**0.0016**	**0.008**	
224.59	0.21	**0.008**	0.000					**0.0017**	**0.008**	
224.60	0.22	**0.009**	0.000					**0.0019**	**0.009**	
224.61	0.23	**0.009**	0.000					**0.0020**	**0.009**	
224.62	0.24	**0.009**	0.000					**0.0021**	**0.009**	
224.63	0.25	**0.009**	0.000					**0.0022**	**0.009**	
224.64	0.26	**0.010**	0.000					**0.0024**	**0.010**	<= 2 Yr: 23 m³ (224.64m)
224.65	0.27	**0.010**	0.000					**0.0025**	**0.010**	
224.66	0.28	**0.010**	0.000					**0.0027**	**0.010**	
224.67	0.29	**0.010**	0.000					**0.0028**	**0.010**	
224.68	0.30	**0.010**	0.000					**0.0030**	**0.010**	
224.69	0.31	**0.011**	0.000					**0.0031**	**0.011**	
224.70	0.32	**0.011**	0.000					**0.0033**	**0.011**	
224.71	0.33	**0.011**	0.000					**0.0034**	**0.011**	<= 5 Yr: 33 m³ (224.71m)
224.72	0.34	**0.011**	0.000					**0.0036**	**0.011**	
224.73	0.35	**0.011**	0.000					**0.0038**	**0.011**	
224.74	0.36	**0.012**	0.000					**0.0040**	**0.012**	
224.75	0.37	**0.012**	0.000					**0.0041**	**0.012**	<= 10 Yr: 40 m³ (224.75m)
224.76	0.38	**0.012**	0.000					**0.0043**	**0.012**	
224.77	0.39	**0.012**	0.000					**0.0045**	**0.012**	
224.78	0.40	**0.012**	0.000					**0.0047**	**0.012**	
224.79	0.41	**0.013**	0.000					**0.0049**	**0.013**	
224.80	0.42	**0.013**	0.000					**0.0051**	**0.013**	
224.81	0.43	**0.013**	0.000					**0.0053**	**0.013**	<= 25 Yr: 51 m³ (224.81m)
224.82	0.44	**0.013**	0.000					**0.0055**	**0.013**	
224.83	0.45	**0.013**	0.000					**0.0057**	**0.013**	
224.84	0.46	**0.013**	0.000					**0.0059**	**0.013**	<= 50 Yr: 59 m³ (224.84m)
224.85	0.47	**0.014**	0.000					**0.0062**	**0.014**	
224.86	0.48	**0.014**	0.000					**0.0064**	**0.014**	

Stage-Storage-Discharge Summary Table										
Elevation	**Stage**	**Stage 1 Orifice Plate**	**Stage 2 Weir**					**Active Storage**	**Total Discharge**	**Notes**
m	**m**	**m^3/s**						**ha*m**	**m^3/s**	
224.87	0.49	**0.014**	0.000					**0.0066**	**0.014**	
224.88	0.50	**0.014**	**0.000**					**0.0068**	**0.014**	<= 100 Yr: 68 m³ (224.88m)
224.89	0.51	**0.014**	**0.001**					**0.0071**	**0.015**	
224.90	0.52	**0.014**	**0.003**					**0.0073**	**0.017**	
224.91	0.53	**0.014**	**0.005**					**0.0076**	**0.019**	
224.92	0.54	**0.015**	**0.007**					**0.0078**	**0.022**	
224.93	0.55	**0.015**	**0.010**					**0.0081**	**0.025**	
224.94	0.56	**0.015**	**0.013**					**0.0083**	**0.028**	
224.95	0.57	**0.015**	**0.017**					**0.0086**	**0.032**	
224.96	0.58	**0.015**	**0.021**					**0.0088**	**0.036**	
224.97	0.59	**0.015**	**0.025**					**0.0091**	**0.040**	
224.98	0.60	**0.015**	**0.029**					**0.0093**	**0.045**	

Stage-Storage-Discharge: Outlet 2

Project No: 21-10985
Project Name: Hertiage Line Preliminary SWM
Designed/Checked By: SO/KS
Date: May 10, 2022

Storage Summary		
Top of Permanent Pool:	225.32	m
Permanent Pool Volume:	169.2	m^3
Active Storage Volume:	614.3	m^3

Outlet Capacity Summary				
Type	Diameter	Slope	Peak Flow	% Full

Discharge Summary				
Stage	Type	Invert Elev (m)	Diameter / Width (mm)	(m)
1	Orifice Plate: Vertical	225.32	95	
2	Rectangular Weir	225.62	0.3	

Stage-Storage-Discharge Summary Table

Elevation	Stage	Stage 1 Orifice Plate	Stage 2 Weir					Active Storage	Total Discharge	Notes
m	m	m^3/s						ha*m	m^3/s	
225.32	0.00	0.000	0.000					**0.0000**	**0.000**	
225.33	0.01	**0.000**	0.000					**0.0001**	**0.000**	
225.34	0.02	**0.000**	0.000					**0.0003**	**0.000**	
225.35	0.03	**0.001**	0.000					**0.0007**	**0.001**	
225.36	0.04	**0.001**	0.000					**0.0011**	**0.001**	
225.37	0.05	**0.002**	0.000					**0.0015**	**0.002**	
225.38	0.06	**0.002**	0.000					**0.0020**	**0.002**	
225.39	0.07	**0.003**	0.000					**0.0025**	**0.003**	
225.40	0.08	**0.003**	0.000					**0.0030**	**0.003**	
225.41	0.09	**0.004**	0.000					**0.0035**	**0.004**	
225.42	0.10	**0.004**	0.000					**0.0040**	**0.004**	
225.43	0.11	**0.005**	0.000					**0.0046**	**0.005**	
225.44	0.12	**0.005**	0.000					**0.0052**	**0.005**	
225.45	0.13	**0.005**	0.000					**0.0058**	**0.005**	
225.46	0.14	**0.006**	0.000					**0.0065**	**0.006**	
225.47	0.15	**0.006**	0.000					**0.0071**	**0.006**	
225.48	0.16	**0.006**	0.000					**0.0078**	**0.006**	
225.49	0.17	**0.007**	0.000					**0.0085**	**0.007**	
225.50	0.18	**0.007**	0.000					**0.0093**	**0.007**	
225.51	0.19	**0.007**	0.000					**0.0100**	**0.007**	
225.52	0.20	**0.007**	0.000					**0.0108**	**0.007**	
225.53	0.21	**0.008**	0.000					**0.0116**	**0.008**	
225.54	0.22	**0.008**	0.000					**0.0124**	**0.008**	
225.55	0.23	**0.008**	0.000					**0.0133**	**0.008**	
225.56	0.24	**0.008**	0.000					**0.0141**	**0.008**	
225.57	0.25	**0.008**	0.000					**0.0150**	**0.008**	
225.58	0.26	**0.009**	0.000					**0.0159**	**0.009**	
225.59	0.27	**0.009**	0.000					**0.0169**	**0.009**	
225.60	0.28	**0.009**	0.000					**0.0179**	**0.009**	
225.61	0.29	**0.009**	0.000					**0.0189**	**0.009**	
225.62	0.30	**0.009**	**0.000**					**0.0199**	**0.009**	<= 2 Yr: 195 m³ (225.62m)
225.63	0.31	**0.010**	**0.001**					**0.0209**	**0.010**	
225.64	0.32	**0.010**	**0.002**					**0.0220**	**0.011**	
225.65	0.33	**0.010**	**0.003**					**0.0230**	**0.013**	
225.66	0.34	**0.010**	**0.004**					**0.0242**	**0.015**	
225.67	0.35	**0.010**	**0.006**					**0.0253**	**0.017**	
225.68	0.36	**0.011**	**0.008**					**0.0264**	**0.019**	
225.69	0.37	**0.011**	**0.010**					**0.0276**	**0.021**	<= 5 Yr: 266 m³ (225.69m)
225.70	0.38	**0.011**	**0.013**					**0.0288**	**0.024**	
225.71	0.39	**0.011**	**0.015**					**0.0300**	**0.026**	
225.72	0.40	**0.011**	**0.018**					**0.0312**	**0.029**	<= 10 Yr: 305 m³ (225.72m)
225.73	0.41	**0.011**	**0.021**					**0.0325**	**0.032**	
225.74	0.42	**0.011**	**0.024**					**0.0338**	**0.035**	
225.75	0.43	**0.012**	**0.027**					**0.0351**	**0.038**	
225.76	0.44	**0.012**	**0.030**					**0.0365**	**0.042**	<= 25 Yr: 357 m³ (225.76m)
225.77	0.45	**0.012**	**0.033**					**0.0378**	**0.045**	
225.78	0.46	**0.012**	**0.037**					**0.0392**	**0.049**	
225.79	0.47	**0.012**	**0.041**					**0.0406**	**0.053**	<= 50 Yr: 395 m³ (225.79m)
225.80	0.48	**0.012**	**0.045**					**0.0421**	**0.057**	

Stage-Storage-Discharge Summary Table										
Elevation	**Stage**	**Stage 1 Orifice Plate**	**Stage 2 Weir**					**Active Storage**	**Total Discharge**	**Notes**
m	**m**	**m^3/s**						**ha*m**	**m^3/s**	
225.81	0.49	**0.013**	**0.048**					**0.0435**	**0.061**	
225.82	0.50	**0.013**	**0.053**					**0.0450**	**0.065**	<= 100 Yr: 437 m³ (225.82m)
225.83	0.51	**0.013**	**0.057**					**0.0465**	**0.070**	
225.84	0.52	**0.013**	**0.061**					**0.0480**	**0.074**	
225.85	0.53	**0.013**	**0.066**					**0.0496**	**0.079**	
225.86	0.54	**0.013**	**0.070**					**0.0512**	**0.083**	
225.87	0.55	**0.013**	**0.075**					**0.0528**	**0.088**	
225.88	0.56	**0.013**	**0.080**					**0.0544**	**0.093**	
225.89	0.57	**0.014**	**0.085**					**0.0561**	**0.098**	
225.90	0.58	**0.014**	**0.090**					**0.0580**	**0.104**	
225.91	0.59	**0.014**	**0.095**					**0.0598**	**0.109**	
225.92	0.60	**0.014**	**0.100**					**0.0614**	**0.114**	

Appendix D

Quality Control

Infiltration Facility Design - PR-100

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO/KS
Date: May 5, 2022

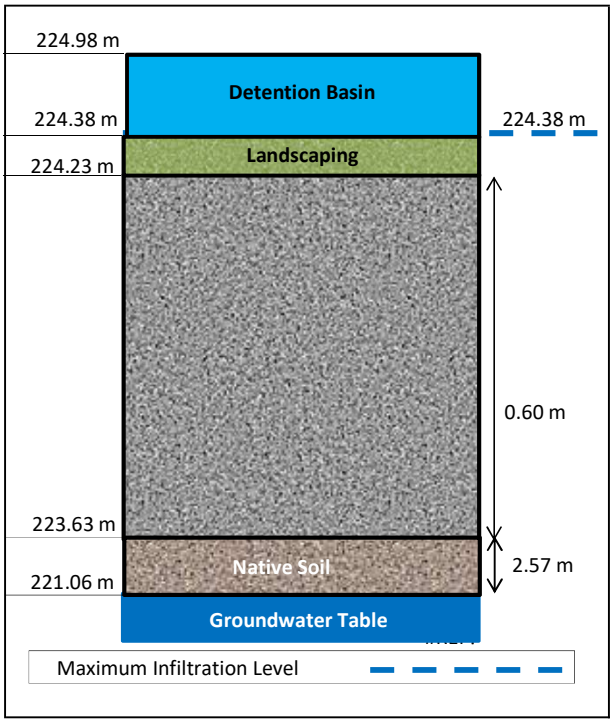
Site Characteristics		
Contributing Area	0.24	ha
Water Quality Storm	N/A	mm
Runoff Coefficient	0.61	
Groundwater Elevation	221.06	m
Bedrock Elevation	N/A	
Infiltration Characteristics		
Native Soil Infiltration Rate	30.0	mm/hr
Safety Correction Factor	2.5	
Adjusted Infiltration Rate	12.0	mm/hr

Design Constraints & Assumptions		
Water Quality Control Volume	8.4	m^3
Quantity Control Volume	79.0	m^3
Quantity Control Volume Includes Infiltration Storage?	No	
Max Allowable Drawdown Time	48	hours
Seperation to Groundwater	1.00	m
Stone Void Ratio	0.40	

Surface Storage		
Surface Storage Type	Detention Basin	
Pretreatment	None	
Starting Elevation	224.38	m
Maximum Elevation	224.98	m
Max Surface Ponding Depth	0.60	m
Surface Storage Volume	125.0	m^3
Underground Storage		
Underground Storage Type	Stone Trench	
Pretreatment	None	
Underground Storage Footprint	165	m^2
Bottom Elevation	223.63	m
Inlet Elevation	224.38	m
Outlet Elevation	224.38	m
Top Elevation	224.23	m
Underground Storage Volume	28.0	m^3
Infiltration Design		
Infiltration Footprint	165	m^2
Max Infiltration Storage Depth	0.75	m
Estimated Drawdown Time	25.0	hours
Infiltration Storage Volume	28.0	m^3

Provided Storage Summary		
Total Storage Depth	1.35	m
Groundwater Separation	2.57	m
Quality Control Volume	28.0	m^3
Quantity Control Volume	125.0	m^3
Total Storage Volume	153.0	m^3

Infiltration Facility Typical Section



Notes:

1. Runoff Coefficient determined based on the Hydrologic Parameters of the contributing drainage area
   Water Quality Control Volume based on MOE Table 3.2 for Infiltration Facilities
2. Native soil infiltration rate incorporates a safety correction factor in accordance with the method outlined in the LID Design Manual Appendix C, Table C2
3. Infiltration Storage Drawdown Time calculated using the following equation, rearranged from the BMP Sizing formula with in the LID Design Manual:

$$t_d = \frac{d_i V_r}{i}$$

t_d = Drawdown Time (hours)
d_i = Max infiltration storage depth (m)
i = Adjusted Infiltration Rate (mm/hr)
V_r = Void Space of Stone

Infiltration Facility Design - PR-200

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO/KS
Date: 05/10/2022

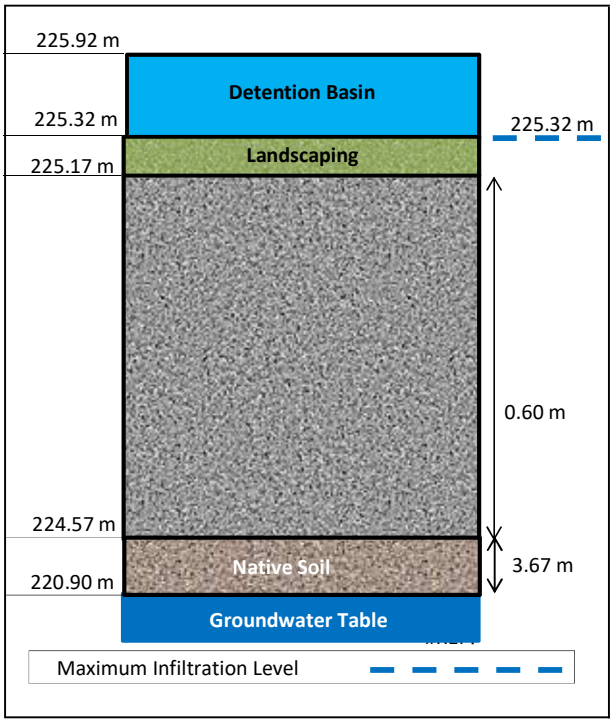
Site Characteristics		
Contributing Area	2.14	ha
Water Quality Storm	N/A	mm
Runoff Coefficient	0.42	
Groundwater Elevation	220.90	m
Bedrock Elevation	N/A	
Infiltration Characteristics		
Native Soil Infiltration Rate	20.0	mm/hr
Safety Correction Factor	2.5	
Adjusted Infiltration Rate	8.0	mm/hr

Design Constraints & Assumptions		
Water Quality Control Volume	64.2	m^3
Quantity Control Volume	453.0	m^3
Quantity Control Volume Includes Infiltration Storage?	No	
Max Allowable Drawdown Time	48	hours
Seperation to Groundwater	1.00	m
Stone Void Ratio	0.40	

Surface Storage		
Surface Storage Type	Detention Basin	
Pretreatment	None	
Starting Elevation	225.32	m
Maximum Elevation	225.92	m
Max Surface Ponding Depth	0.60	m
Surface Storage Volume	661.0	m^3
Underground Storage		
Underground Storage Type	Stone Trench	
Pretreatment	None	
Underground Storage Footprint	285.5	m^2
Bottom Elevation	224.57	m
Inlet Elevation	225.32	m
Outlet Elevation	225.32	m
Top Elevation	225.17	m
Underground Storage Volume	170.0	m^3
Infiltration Design		
Infiltration Footprint	285.5	m^2
Max Infiltration Storage Depth	0.75	m
Estimated Drawdown Time	37.5	hours
Infiltration Storage Volume	170.0	m^3

Provided Storage Summary		
Total Storage Depth	1.35	m
Groundwater Separation	3.67	m
Quality Control Volume	170.0	m^3
Quantity Control Volume	661.0	m^3
Total Storage Volume	831.0	m^3

Infiltration Facility Typical Section



Notes:

1. Runoff Coefficient determined based on the Hydrologic Parameters of the contributing drainage area
   Water Quality Control Volume based on MOE Table 3.2 for Infiltration Facilities
2. Native soil infiltration rate incorporates a safety correction factor in accordance with the method outlined in the LID Design Manual Appendix C, Table C2
3. Infiltration Storage Drawdown Time calculated using the following equation, rearranged from the BMP Sizing formula with in the LID Design Manual:

$$t_d = \frac{d_i V_r}{i}$$

t_d = Drawdown Time (hours)
d_i = Max infiltration storage depth (m)
i = Adjusted Infiltration Rate (mm/hr)
V_r = Void Space of Stone

Appendix E

Geotechnical Information

Soil Investigation Results OG

Project No: 21-10985
Project Name: Heritage Line
Designed/Checked By: RC/CPB
Date: August 19, 2021

Borehole / Test Pit Elevations

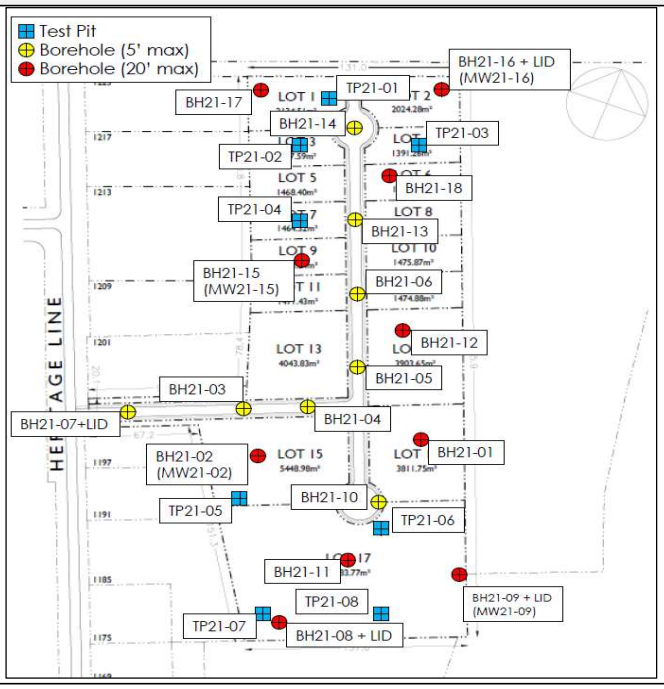
Borehole/ Test Pit ID	Assumed Benchmark (mbeg)			Geodetic Benchmark (m)			
	Existing Ground Elevation	Groundwater Depth	Termination Depth	Existing Ground Elevation	Groundwater Elevation	Termination Elevation	LID Base Elevation[1]
BH-01	225.24	Dry	6.55	225.24	-	218.69	219.69
MW-02	224.33	0.7	6.55	224.33	223.63	217.78	224.63
BH-03	225.11	1.3	2.00	225.11	223.81	223.11	224.81
BH-04	224.39	Dry	2.00	224.39	-	222.39	223.39
BH-05	224.78	1.2	2.00	224.78	223.58	222.78	224.58
BH-06	224.77	Dry	2.00	224.77	-	222.77	223.77
BH-07	227.56	Dry	2.00	227.56	-	225.56	226.56
BH-08	222.56	2.7	6.55	222.56	219.86	216.01	220.86
MW-09	213.23	4	6.55	213.23	209.23	206.68	210.23
BH-10	224.30	Dry	2.00	224.30	-	222.30	223.30
BH-11	223.70	4.6	5.05	223.70	219.10	218.65	220.10
BH-12	225.31	2.1	6.55	225.31	223.21	218.76	224.21
BH-13	224.05	1.2	2.00	224.05	222.85	222.05	223.85
BH-14	222.71	Dry	2.00	222.71	-	220.71	221.71
MW-15	225.34	0.9	6.55	225.34	224.44	218.79	225.44
MW-16	222.81	1.75	6.55	222.81	221.06	216.26	222.06
BH-17	220.53	Dry	6.55	220.53	-	213.98	214.98
BH-18	223.69	4.6	6.55	223.69	219.09	217.14	220.09

1. Low Impact Development design guidelines require a minimum 1.0 m separation from the base of an infiltration feature to the greater of the seasonally high groundwater elevation and the bedrock elevation. As such, the LID Base Elevation represents the lowest possible

In-Situ Infiltration Analysis

Borehole / Test Pit ID	Testing Depth (mbeg)	Testing Elevation (m)	Observed Infiltration Rate (mm/hr)	Recorded Infiltration Rate (mm/hr)	OBC Table 2 Percolation Rate (mm/hr)	Selected Infiltration Rate (mm/hr)	Recommended Safety Factor
MW-09	1.7	211.53	24.0			24.0	
MW-16	1.75	221.06	30.0			30.0	
BH-08	1.7	220.86					

Borehole / Test Pit Locations



Appendix F

Water Balance

Monthly Water Budget Calculations

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO / CPB
Date: 7-Oct-22

CANADIAN CLIMATE NORMALS FOR 'PETERBOROUGH A (5186)' (1981-2010)

Climate ID = 6166418
Latitude = 44.23
Longitude = 78.37

Thornthwaite (1948) Inputs				Monthly Water Budget Analysis				
Month	Mean Temperature (°C)[1]	Total Precipitation (mm)[1]	Heat Index	PET (mm)	Daylight Correction Factor	Adjusted PET (mm)	Surplus (mm)	Deficit (mm)
January	-8.5	57.4	0.00	0.0	0.77	0.0	57.4	0.0
February	-7.0	51.5	0.00	0.0	0.87	0.0	51.5	0.0
March	-1.8	56.1	0.00	0.0	0.99	0.0	56.1	0.0
April	5.9	68.6	1.28	28.8	1.12	32.3	39.8	0.0
May	12.1	81.5	3.81	62.3	1.23	76.8	19.2	0.0
June	17.0	79.9	6.38	85.6	1.29	110.2	0.0	30.3
July	19.6	70.6	7.91	102.4	1.26	129.0	0.0	58.4
August	18.3	77.0	7.13	95.4	1.17	111.2	0.0	34.2
September	13.9	85.3	4.70	69.6	1.04	72.6	15.7	0.0
October	7.5	76.9	1.85	38.1	0.92	34.9	38.8	0.0
November	1.9	86.4	0.23	9.0	0.80	7.2	77.4	0.0
December	-4.4	64.2	0.00	0.0	0.74	0.0	64.2	0.0
Totals		**855.4**	33.30			**574.2**	**420.1**	**122.9**
	Thornthwaite Coefficient (α)		**1.028**			Total Water Surplus (mm)		**281.2**

Notes:

1. Temperature and Precipitation are taken from Canadian Climate Normals 1981-2010
2. Water budget adjusted for latitude and length of daylight
3. Potential Evapotranspiration (PET) is calculated based on the Thornthwaite 1948 equation
4. Total Water Surplus (Thornthwaite, 1948) is calculated as total precipitation minus adjusted evapotranspiration

Water Balance Calculations for Existing Conditions

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO / CPB
Date: 7-Oct-22

Catchment Parameters	EX-100	EX-200	EX-300								Total
Drainage Area (m^2)	21800	17600	17000								**56400**
Pervious Area (m^2)	21800	17600	16800								**56200**
Impervious Area (m^2)	0	0	200								**200**
Evapotranspiration Factors											
Pervious PET Ratio	0.67	0.67	0.67								**0.67**
Impervious Evapotranspiration[3]	0.20	0.20	0.20								**0.20**
Infiltration Factors											
Topography Infiltration Factor	0.15	0.10	0.15								**0.13**
Soil Infiltration Factor	0.30	0.30	0.30								**0.30**
Land Cover Infiltration Factor	0.11	0.14	0.10								**0.12**
MOE Infiltration Factor	0.56	0.54	0.55								**0.55**
Actual Infiltration Factor	0.56	0.54	0.55								**0.55**
Run-Off Coefficient	0.44	0.46	0.45								**0.45**
Runoff from Impervious Surfaces	0.80	0.80	0.80								**0.80**
Inputs (mm/yr)											
Precipitation	855.4	855.4	855.4								**855.4**
Run-On	0.0	0.0	0.0								**0.0**
Other Inputs	0.0	0.0	0.0								**0.0**
Total Inputs	855.4	855.4	855.4								**855.4**
Outputs (mm/yr)											
Precipitation Surplus	281.2	281.2	285.9								**282.6**
Net Surplus	281.2	281.2	285.9								**282.6**
Evapotranspiration	574.2	574.2	569.5								**572.8**
Infiltration	157.1	152.9	153.7								**154.7**
Infiltration Features[4]	0.0	0.0	0.0								**0.0**
Total Infiltration	**157.1**	**152.9**	**153.7**								**154.7**
Runoff Pervious Areas	124.1	128.3	125.7								**125.9**
Runoff Impervious Areas	0.0	0.0	684.3								**684.3**
Total Unadjusted Runoff	124.1	128.3	132.3								**127.9**
Total Adjusted Runoff[5]	**124.1**	**128.3**	**132.3**								**127.9**
Total Outputs	**855.4**	**855.4**	**855.4**								**855.4**
Inputs (m^3/yr)											
Precipitation	18648	15055	14542								**48245**
Run-On	0	0	0								**0**
Other Inputs	0	0	0								**0**
Total Inputs	**18648**	**15055**	**14542**								**48245**
Outputs (m^3/yr)											
Precipitation Surplus	6130	4949	4861								**15939**
Net Surplus	6130	4949	4861								**15939**
Evapotranspiration	12518	10106	9681								**32306**
Infiltration	3425	2691	2612								**8728**
Infiltration Features[4]	0	0	0								**0**
Total Infiltration	3425	2691	2612								**8728**
Runoff Pervious Areas	2705	2258	2112								**7074**
Runoff Impervious Areas	0	0	137								**137**
Total Unadjusted Runoff	2705	2258	2248								**7211**
Total Adjusted Runoff[5]	2705	2258	2248								**7211**
Total Outputs	**18648**	**15055**	**14542**								**48245**

Notes:

1. Water Balance Calculations area in based on methodology described in the Conservation Authority Guidelines for Hydrogeological Assessments (June 2013)
2. Annual Precipitation and Evapotranspiration values were determined using the Thornthwaite (1948) method for monthly water budget calculations
3. Evaporation from impervious areas was assumed to be 20% of Precipitation
4. Infiltration Features are calculated using daily Precipitation data and averaged over the number of years of available data. The entire Catchment is assumed to contribute with no infiltration occuring during months with a negative average temperature.
5. Total Adjusted Runoff is calculated as (Pervious Runoff + Impervious Runoff) - (Infiltration Features)

Water Balance Calculations for Proposed Conditions

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO / CPB
Date: 7-Oct-22

Catchment Parameters	PR-100	PR-101	PR-200	PR-201	PR-202	PR-300					Total
Drainage Area (m^2)	2400	12800	21400	7400	9300	2300					**55600**
Pervious Area (m^2)	900	11500	12500	6800	9300	2000					**43000**
Impervious Area (m^2)	1500	1300.0	8900	600	0	300					**12600**
Evapotranspiration Factors											
Pervious PET Ratio	0.67	0.67	0.67	0.67	0.67	0.67					**0.67**
Impervious Evapotranspiration[3]	0.20	0.20	0.20	0.20	0.20	0.20					**0.20**
Infiltration Factors											
Topography Infiltration Factor	0.10	0.15	0.20	0.10	0.10	0.15					**0.14**
Soil Infiltration Factor	0.30	0.30	0.30	0.30	0.30	0.30					**0.30**
Land Cover Infiltration Factor	0.10	0.10	0.10	0.10	0.20	0.10					**0.12**
MOE Infiltration Factor	0.50	0.55	0.60	0.50	0.60	0.55					**0.57**
Actual Infiltration Factor	0.50	0.55	0.60	0.50	0.60	0.55					**0.57**
Run-Off Coefficient	0.50	0.45	0.40	0.50	0.40	0.45					**0.43**
Runoff from Impervious Surfaces	0.80	0.80	0.80	0.80	0.80	0.80					**0.80**
Inputs (mm/yr)											
Precipitation	855.4	855.4	855.4	855.4	855.4	855.4					**855.4**
Run-On	0.0	0.0	0.0	0.0	0.0	0.0					**0.0**
Other Inputs	0.0	0.0	0.0	0.0	0.0	0.0					**0.0**
Total Inputs	855.4	855.4	855.4	855.4	855.4	855.4					**855.4**
Outputs (mm/yr)											
Precipitation Surplus	533.1	322.1	448.8	313.9	281.2	333.8					**372.5**
Net Surplus	533.1	322.1	448.8	313.9	281.2	333.8					**372.5**
Evapotranspiration	322.3	533.3	406.6	541.5	574.2	521.6					**482.9**
Infiltration	52.7	138.9	98.5	129.2	168.7	134.5					**123.2**
Infiltration Features[4]	334.5	235.2	246.6	250.2	0.0	0.0					**196.8**
Total Infiltration	**387.2**	**374.2**	**345.2**	**379.4**	**168.7**	**134.5**					**320.0**
Runoff Pervious Areas	140.6	126.5	112.5	140.6	112.5	126.5					**121.9**
Runoff Impervious Areas	684.3	684.3	684.3	684.3	0.0	684.3					**684.3**
Total Unadjusted Runoff	480.4	183.2	350.3	184.7	112.5	199.3					**249.4**
Total Adjusted Runoff[5]	145.9	-52.1	103.7	-65.6	112.5	199.3					**52.6**
Total Outputs	**855.4**	**855.4**	**855.4**	**855.4**	**855.4**	**855.4**					**855.4**
Inputs (m^3/yr)											
Precipitation	2053	10949	18306	6330	7955	1967					**47560**
Run-On	0	0	0	0	0	0					**0**
Other Inputs	0	0	0	0	0	0					**0**
Total Inputs	**2053**	**10949**	**18306**	**6330**	**7955**	**1967**					**47560**
Outputs (m^3/yr)											
Precipitation Surplus	1280	4123	9605	2323	2615	768					**20713**
Net Surplus	1280	4123	9605	2323	2615	768					**20713**
Evapotranspiration	773	6826	8700	4007	5340	1200					**26847**
Infiltration	127	1778	2109	956	1569	309					**6848**
Infiltration Features[4]	803	3011	5277	1852	0	0					**10943**
Total Infiltration	929	4789	7386	2808	1569	309					**17791**
Runoff Pervious Areas	127	1455	1406	956	1046	253					**5242**
Runoff Impervious Areas	1026	890	6090	411	0	205					**8622**
Total Unadjusted Runoff	1153	2345	7496	1367	1046	458					**13865**
Total Adjusted Runoff[5]	350	-666	2219	-485	1046	458					**2922**
Total Outputs	**2053**	**10949**	**18306**	**6330**	**7955**	**1967**					**47560**

Notes:

1. Water Balance Calculations area in based on methodology described in the Conservation Authority Guidelines for Hydrogeological Assessments (June 2013)
2. Annual Precipitation and Evapotranspiration values were determined using the Thornthwaite (1948) method for monthly water budget calculations
3. Evaporation from impervious areas was assumed to be 20% of Precipitation
4. Infiltration Features are calculated using daily Precipitation data and averaged over the number of years of available data. The entire Catchment is assumed to contribute with no infiltration occuring during months with a negative average temperature.
5. Total Adjusted Runoff is calculated as (Pervious Runoff + Impervious Runoff) - (Infiltration Features)

Water Balance Assessment

WILLS

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO / CPB
Date: 7-Oct-22

Characteristic	Existing	Proposed No Mitigation	Change	Proposed With Mitigation	Change
Inputs (m^3/yr)					
Precipitation	48245	47560	-1.4%	47560	-1.4%
Run-On	0	0	0.0%	0	0.0%
Other Inputs	0	0	0.0%	0	0.0%
Total Inputs	48245	47560	-1.4%	47560	-1.4%
Outputs (m^3/yr)					
Precipitation Surplus	15939	20713	30.0%	20713	30.0%
Net Surplus	15939	20713	30.0%	20713	30.0%
Evapotranspiration	32306	26847	-16.9%	26847	-16.9%
Infiltration	8728	6848	-21.5%	6848	-21.5%
Infiltration Features	0	0	0.0%	10943	0.0%
Total Infiltration	**8728**	**6848**	**-21.5%**	**17791**	**103.8%**
Runoff Pervious Areas	7074	5242	-25.9%	5242	-25.9%
Runoff Impervious Areas	137	8622	6200.0%	8622	6200.0%
Total Runoff	**7211**	**13865**	**92.3%**	**2922**	**-59.5%**
Total Outputs	48245	47560	-1.4%	47560	-1.4%

Nitrate Dilution Calculations

Total Dilution Area	5.56	ha
No. of Lots	16	
Sewage Flow per Lot	1000	L/day
Total Daily Sewage Loading	16,000	L/day
Nitrate in Septic Effluent	40	mg/L
Background Nitrates	0.063	mg/L
Stormwater Effluent Nitrates	0	mg/L
Infiltration Rates		
Infiltration Rate (Clean Water)	138.9	mm/year
Infiltration Rate (Clean Water)	18,761	L/day
Infiltration Rate (Stormwater)	196.8	mm/year
Infiltration Rate (Stormwater)	29,981	L/day
Nitrate Concentrations		
Nitrate Loading - Development	640,000	mg/day
Nitrate Loading - Rainfall	1,182	mg/day
Nitrate Loading - Runoff	0	mg/day
Total Nitrate Loading	641,182	mg/day
Dilution - Development	16,000	L/day
Dilution - Groundwater Recharge	48,743	L/day
Total Dilution	64,743	L/day
Boundary Nitrate Concentration	**9.9**	**mg/L**

Infiltration Factor Calculations for EX-100

Sheet 1 of 1

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO / CPB
Date: 7-Oct-22

Topography	
Average Slope	2.59%
Slope Description	Rolling/Hilly Land
Topography Infiltration Factor	**0.15**

Soils		
Hydrologic Soil Group[2]	B	Total
Soil Type	Otonobee Loam	
Area (ha)	2.18	2.18
Soil Infiltration Factor	0.30	**0.30**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture		
Range	1.99	0.10
Grass		
Woods	0.19	0.20
Wetland		
Bare Earth (>70% Rock)		
Impervious		
Total[3]	2.18	**0.11**

MOE Infiltration Factor	**0.56**
Actual Infiltration Factor	**0.56**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Factor Calculations for EX-200

Sheet 1 of 1

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO / CPB
Date: 7-Oct-22

Topography	
Average Slope	14.31%
Slope Description	Hilly Land
Topography Infiltration Factor	**0.10**

Soils		
Hydrologic Soil Group[2]	B	Total
Soil Type	Otonobee Loam	
Area (ha)	1.76	1.76
Soil Infiltration Factor	0.30	**0.30**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture		
Range	0.99	0.10
Grass		
Woods	0.77	0.20
Wetland		
Bare Earth (>70% Rock)		
Impervious		
Total[3]	1.76	**0.14**

MOE Infiltration Factor	**0.54**
Actual Infiltration Factor	**0.54**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Factor Calculations for EX-300

Sheet 1 of 1

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO / CPB
Date: 7-Oct-22

Topography	
Average Slope	1.39%
Slope Description	Rolling/Hilly Land
Topography Infiltration Factor	**0.15**

Soils		
Hydrologic Soil Group[2]	B	Total
Soil Type	Otonobee Loam	
Area (ha)	1.70	1.70
Soil Infiltration Factor	0.30	**0.30**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture		
Range	1.63	0.10
Grass		
Woods	0.05	0.20
Wetland		
Bare Earth (>70% Rock)		
Impervious	0.02	
Total[3]	1.68	**0.10**

MOE Infiltration Factor	**0.55**
Actual Infiltration Factor	**0.55**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Factor Calculations for PR-100

WILLS

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO / CPB
Date: 7-Oct-22

Topography	
Average Slope	3.00%
Slope Description	Hilly Land
Topography Infiltration Factor	**0.10**

Soils		
Hydrologic Soil Group[2]	B	Total
Soil Type	Otonobee Loam	
Area (ha)	0.24	0.24
Soil Infiltration Factor	0.30	**0.30**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture Range Grass Woods Wetland Bare Earth (>70% Rock)	0.09	0.10
Impervious	0.15	
Total[3]	0.09	**0.10**

MOE Infiltration Factor	**0.50**
Actual Infiltration Factor	**0.50**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Features for PR-100

Sheet 2 of 2

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO / CPB
Date: 7-Oct-22

Infiltration Features Summary		
Total Storage Volume[1]	28.0	m^3
Contributing Area[2]	2400	m^2
Pervious Area	900	m^2
Impervious Area	1500	m^2
Maximum Drawdown	48	hrs
Average Infiltration Volume[3]	**803**	**m^3/yr**
	334.5	**mm/yr**

Notes:

1. Total Storage Volume from all Infiltration Features in the catchment
2. The entire catchment contributes flow to the Infiltration Features
3. Average Infiltration Volume is calculated using daily climate data and averaged over the number of years of available data. No benefit is assumed for Infiltration Features during months with a negative average temperature.
4. Daily climate data is taken from Environment Canada Station 'PETERBOROUGH A' from 1981-2010

Infiltration Factor Calculations for PR-101

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO / CPB
Date: 7-Oct-22

Topography	
Average Slope	2.09%
Slope Description	Rolling/Hilly Land
Topography Infiltration Factor	**0.15**

Soils		
Hydrologic Soil Group[2]	B	Total
Soil Type	Otonobee Loam	
Area (ha)	1.28	1.28
Soil Infiltration Factor	0.30	**0.30**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture Range Grass Woods Wetland Bare Earth (>70% Rock)	1.15	0.10
Impervious	0.13	
Total[3]	1.15	**0.10**

MOE Infiltration Factor	**0.55**
Actual Infiltration Factor	**0.55**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Features for PR-101

Sheet 2 of 2

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO / CPB
Date: 7-Oct-22

Infiltration Features Summary		
Total Storage Volume[1]	328.0	m^3
Contributing Area[2]	12800	m^2
Pervious Area	11500	m^2
Impervious Area	1300	m^2
Maximum Drawdown	48	hrs
Average Infiltration Volume[3]	**3011**	**m^3/yr**
	235.2	**mm/yr**

Notes:

1. Total Storage Volume from all Infiltration Features in the catchment
2. The entire catchment contributes flow to the Infiltration Features
3. Average Infiltration Volume is calculated using daily climate data and averaged over the number of years of available data. No benefit is assumed for Infiltration Features during months with a negative average temperature.
4. Daily climate data is taken from Environment Canada Station 'PETERBOROUGH A' from 1981-2010

Infiltration Factor Calculations for PR-200

WILLS

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO / CPB
Date: 7-Oct-22

Topography	
Average Slope	0.30%
Slope Description	Rolling Land
Topography Infiltration Factor	**0.20**

Soils		
Hydrologic Soil Group[2]	B	Total
Soil Type	Otonobee Loam	
Area (ha)	2.14	2.14
Soil Infiltration Factor	0.30	**0.30**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture Range Grass Woods Wetland Bare Earth (>70% Rock)	1.25	0.10
Impervious	0.89	
Total[3]	1.25	**0.10**

MOE Infiltration Factor	**0.60**
Actual Infiltration Factor	**0.60**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Features for PR-200

Sheet 2 of 2

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO / CPB
Date: 7-Oct-22

Infiltration Features Summary		
Total Storage Volume[1]	170.0	m^3
Contributing Area[2]	21400	m^2
Pervious Area	12500	m^2
Impervious Area	8900	m^2
Maximum Drawdown	48	hrs
Average Infiltration Volume[3]	**5277**	**m^3/yr**
	246.6	**mm/yr**

Notes:

1. Total Storage Volume from all Infiltration Features in the catchment
2. The entire catchment contributes flow to the Infiltration Features
3. Average Infiltration Volume is calculated using daily climate data and averaged over the number of years of available data. No benefit is assumed for Infiltration Features during months with a negative average temperature.
4. Daily climate data is taken from Environment Canada Station 'PETERBOROUGH A' from 1981-2010

Infiltration Factor Calculations for PR-201	Sheet 1 of 2

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO / CPB
Date: 7-Oct-22

Topography	
Average Slope	11.60%
Slope Description	Hilly Land
Topography Infiltration Factor	**0.10**

Soils		
Hydrologic Soil Group[2]	B	Total
Soil Type	Otonobee Loam	
Area (ha)	0.74	0.74
Soil Infiltration Factor	0.30	**0.30**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture Range Grass Woods Wetland Bare Earth (>70% Rock)	0.68	0.10
Impervious	0.06	
Total[3]	0.68	**0.10**

MOE Infiltration Factor	**0.50**
Actual Infiltration Factor	**0.50**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Features for PR-201

Sheet 2 of 2

WILLS

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO / CPB
Date: 7-Oct-22

Infiltration Features Summary		
Total Storage Volume[1]	203.0	m^3
Contributing Area[2]	7400	m^2
Pervious Area	6800	m^2
Impervious Area	600	m^2
Maximum Drawdown	48	hrs
Average Infiltration Volume[3]	**1852**	**m^3/yr**
	250.2	**mm/yr**

Notes:

1. Total Storage Volume from all Infiltration Features in the catchment
2. The entire catchment contributes flow to the Infiltration Features
3. Average Infiltration Volume is calculated using daily climate data and averaged over the number of years of available data. No benefit is assumed for Infiltration Features during months with a negative average temperature.
4. Daily climate data is taken from Environment Canada Station 'PETERBOROUGH A' from 1981-2010

Infiltration Factor Calculations for PR-202

Sheet 1 of 1

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO / CPB
Date: 7-Oct-22

Topography	
Average Slope	11.60%
Slope Description	Hilly Land
Topography Infiltration Factor	**0.10**

Soils		
Hydrologic Soil Group[2]	B	Total
Soil Type	Otonobee Loam	
Area (ha)	0.93	0.93
Soil Infiltration Factor	0.30	**0.30**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture Range Grass Woods Wetland Bare Earth (>70% Rock) Impervious	0.93	0.20
Total[3]	0.93	**0.20**

MOE Infiltration Factor	**0.60**
Actual Infiltration Factor	**0.60**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

Infiltration Factor Calculations for PR-300

Sheet 1 of 1

Project No: 21-10985
Project Name: Heritage Line Preliminary SWM
Designed/Checked By: SO / CPB
Date: 7-Oct-22

Topography	
Average Slope	0.80%
Slope Description	Rolling/Hilly Land
Topography Infiltration Factor	**0.15**

Soils		
Hydrologic Soil Group[2]	B	Total
Soil Type	Otonobee Loam	
Area (ha)	0.23	0.23
Soil Infiltration Factor	0.30	**0.30**

Cover		
Land Use	Area (ha)	**Cover Infiltration Factor**
Agriculture Range Grass Woods Wetland Bare Earth (>70% Rock)	0.20	0.10
Impervious	0.03	
Total[3]	0.20	**0.10**

MOE Infiltration Factor	**0.55**
Actual Infiltration Factor	**0.55**

Notes:

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

WILLS

PARTNERS IN ENGINEERING

Memo

From:	Chris Proctor-Bennett
Date:	October 7, 2022
Subject:	Average Annual Infiltration Volume based on Daily Water Balance Analysis.

In order to estimate the average annual infiltration volume provided by infiltration features, a daily water balance analysis has been completed using the same principles as the monthly water balance method described in the Conservation Authority Guidelines for Hydrogeological Assessments.

The following is an overview of the steps required to calculate the average annual infiltration volume.

1. Daily Climate Data is taken from the imported from the selected climate station and checked to ensure that sufficient temperature and precipitation data is available for the range of years. Where possible, the climate station and number of years analyzed will match the climate normal data.
2. The entire catchment is assumed to be directed to each infiltration feature analyzed. If this is not the case, the catchment will be divided into the portion that drains to the infiltration feature and the portion that does not.
3. For pervious areas, evapotranspiration is calculated based on the mean temperature of each day and adjusted for the actual length of daylight (using the sunrise equation). If there is a water surplus for a given day, the surplus is split between infiltration and runoff based on the Infiltration Factor for the catchment.
4. For impervious areas, evapotranspiration is assumed to be 20%. If there is a water surplus for a given day it is assumed to all be runoff.
5. If the average monthly temperature is above zero the total runoff volume is directed to the infiltration feature. If the average monthly temperature is below zero it assumes the ground is frozen and no infiltration will occur in the feature. This a conservative estimate as most infiltration features would be constructed with the base below frost depth.
6. The infiltration feature will be designed such that the maximum drawdown time is 24 or 48 hours. For 24 drawdown, the infiltration

feature is assumed to fully infiltrate at the end of each day. For 48 hour drawdown, the infiltration feature is assumed to infiltrate up to half of the total storage volume at the end of each day.

7. The storage volume available in the feature is checked at the start of each day. If the volume in the feature from the previous day is less than maximum infiltration volume, the full storage volume is available for the current day. If the volume in the feature from the previous day is more than maximum infiltration volume, the available storage will be the previous day's volume less the maximum infiltration volume.
8. If the runoff directed to the feature is less than the available storage. The volume will be counted as infiltration and subtracted from the runoff volume. If the runoff directed to the feature is more than the available storage. The available storage volume will be counted as infiltration and subtracted from the runoff volume, however the excess runoff will be assumed to overflow/bypass the feature and will be recorded as the adjusted runoff volume.
9. The average annual infiltration volume is then calculated as the Total Runoff Volume Captured by the feature, divided by the catchment area and divided by the number of years of data.

Note that the Infiltration Features Volume is the only output which uses daily climate data. The remainder of the Water Balance Analysis uses monthly data based on the methodology described in in the Conservation Authority Guidelines for Hydrogeological Assessments (June 2013). As such, summing up the daily totals for other outputs such as Evapotranspiration, Runoff etc. will result in slightly different values.

Sample calculations are attached using this method for a single infiltration feature in a single year. Since 30 Years of data takes up so many pages and a separate analysis is required for each feature the full output is not included in our report.

Daily Climate Data from Environment Canada						Daily PET Calculations					Unadjusted Runoff Volumes			Infiltration Feature Storage Calculations Catchment PR-100 (0.24 ha), Storage Volume = 28 m^3)				
Date/Time	Year	Month	Day	Mean Temp (°C)	Total Precip (mm)	Length of Daylight (days)	PET	Adj PET	Surplus (mm)	Deficit (mm)	Impervious Runoff Volume (m^3)	Pervious Runoff Volume (m^3)	Total Runoff Volume (m^3)	Average Monthly Temp > 0	Daily Volume Infiltrated (m^3)	Infiltration Storage Available (m^3)	Runoff Volume Captured by Feature (m^3)	Adjusted Runoff Volume (m^3)
Totals --->	30	360	10957		25587				20462.3	12823.9	30704.4	9208.1	39912.5		23206.5		23206.5	16705.9
2009-01-01	2009	1	1	-11.8	0	0.3721	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-01-02	2009	1	2	-2.2	0.5	0.3727	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-01-03	2009	1	3	-8.7	0	0.3733	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-01-04	2009	1	4	-10	1	0.3740	0.0	0.0	1.0	0.0	1.2	0.5	1.7	No	0.0	28.0	0.0	1.7
2009-01-05	2009	1	5	-6.4	0.5	0.3747	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-01-06	2009	1	6	-6.8	1.5	0.3755	0.0	0.0	1.5	0.0	1.8	0.7	2.5	No	0.0	28.0	0.0	2.5
2009-01-07	2009	1	7	-5.4	8.5	0.3764	0.0	0.0	8.5	0.0	10.2	3.8	14.0	No	0.0	28.0	0.0	14.0
2009-01-08	2009	1	8	-10.4	0	0.3773	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-01-09	2009	1	9	-15.5	0	0.3782	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-01-10	2009	1	10	-18.2	0.5	0.3792	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-01-11	2009	1	11	-12.1	0	0.3802	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-01-12	2009	1	12	-10.6	0.5	0.3813	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-01-13	2009	1	13	-10	2	0.3824	0.0	0.0	2.0	0.0	2.4	0.9	3.3	No	0.0	28.0	0.0	3.3
2009-01-14	2009	1	14	-24.6	0	0.3835	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-01-15	2009	1	15	-20.5	0	0.3847	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-01-16	2009	1	16	-21.9	0	0.3860	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-01-17	2009	1	17	-13.4	0.5	0.3873	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-01-18	2009	1	18	-6.3	5.5	0.3886	0.0	0.0	5.5	0.0	6.6	2.5	9.1	No	0.0	28.0	0.0	9.1
2009-01-19	2009	1	19	-14.1	0	0.3899	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-01-20	2009	1	20	-18.4	0.5	0.3913	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-01-21	2009	1	21	-16.5	0.5	0.3927	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-01-22	2009	1	22	-4.2	0	0.3942	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-01-23	2009	1	23	-2.9	0	0.3957	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-01-24	2009	1	24	-16.9	0	0.3972	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-01-25	2009	1	25	-16.3	0	0.3987	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-01-26	2009	1	26	-16.7	0	0.4003	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-01-27	2009	1	27	-9	0	0.4019	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-01-28	2009	1	28	-8.1	10	0.4035	0.0	0.0	10.0	0.0	12.0	4.5	16.5	No	0.0	28.0	0.0	16.5
2009-01-29	2009	1	29	-9.6	0	0.4052	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-01-30	2009	1	30	-8.8	0.5	0.4069	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-01-31	2009	1	31	-14.2	3.5	0.4086	0.0	0.0	3.5	0.0	4.2	1.6	5.8	No	0.0	28.0	0.0	5.8
2009-02-01	2009	2	1	0.2	1.5	0.4103	0.0	0.0	1.5	0.0	1.8	0.7	2.5	No	0.0	28.0	0.0	2.5
2009-02-02	2009	2	2	-8.8	0	0.4121	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-02-03	2009	2	3	-11.7	0	0.4138	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-02-04	2009	2	4	-15.7	0	0.4156	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-02-05	2009	2	5	-19.9	0	0.4175	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-02-06	2009	2	6	-10	0.5	0.4193	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-02-07	2009	2	7	-4.7	0	0.4212	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-02-08	2009	2	8	-1.3	1.5	0.4230	0.0	0.0	1.5	0.0	1.8	0.7	2.5	No	0.0	28.0	0.0	2.5
2009-02-09	2009	2	9	-4.3	0	0.4249	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-02-10	2009	2	10	1.7	1	0.4268	0.3	0.2	0.8	0.0	1.2	0.3	1.5	No	0.0	28.0	0.0	1.5
2009-02-11	2009	2	11	5.7	22	0.4287	0.9	0.8	21.2	0.0	26.4	9.5	35.9	No	0.0	28.0	0.0	35.9
2009-02-12	2009	2	12	1.6	6.5	0.4307	0.3	0.2	6.3	0.0	7.8	2.8	10.6	No	0.0	28.0	0.0	10.6

Daily Climate Data from Environment Canada						Daily PET Calculations					Unadjusted Runoff Volumes			Infiltration Feature Storage Calculations Catchment PR-100 (0.24 ha), Storage Volume = 28 m^3)				
Date/Time	Year	Month	Day	Mean Temp (°C)	Total Precip (mm)	Length of Daylight (days)	PET	Adj PET	Surplus (mm)	Deficit (mm)	Impervious Runoff Volume (m^3)	Pervious Runoff Volume (m^3)	Total Runoff Volume (m^3)	Average Monthly Temp > 0	Daily Volume Infiltrated (m^3)	Infiltration Storage Available (m^3)	Runoff Volume Captured by Feature (m^3)	Adjusted Runoff Volume (m^3)
2009-02-13	2009	2	13	-6.4	0	0.4326	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-02-14	2009	2	14	-5.3	0	0.4346	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-02-15	2009	2	15	-5.2	0	0.4366	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-02-16	2009	2	16	-5.8	0	0.4386	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-02-17	2009	2	17	-6.3	0	0.4406	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-02-18	2009	2	18	-3.5	3	0.4426	0.0	0.0	3.0	0.0	3.6	1.4	5.0	No	0.0	28.0	0.0	5.0
2009-02-19	2009	2	19	-5.4	1.5	0.4446	0.0	0.0	1.5	0.0	1.8	0.7	2.5	No	0.0	28.0	0.0	2.5
2009-02-20	2009	2	20	-9.1	1	0.4466	0.0	0.0	1.0	0.0	1.2	0.5	1.7	No	0.0	28.0	0.0	1.7
2009-02-21	2009	2	21	-9.3	0.5	0.4487	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-02-22	2009	2	22	-4.8	1.5	0.4507	0.0	0.0	1.5	0.0	1.8	0.7	2.5	No	0.0	28.0	0.0	2.5
2009-02-23	2009	2	23	-9.6	0	0.4528	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-02-24	2009	2	24	-10.8	0	0.4548	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-02-25	2009	2	25	-6.1	2	0.4569	0.0	0.0	2.0	0.0	2.4	0.9	3.3	No	0.0	28.0	0.0	3.3
2009-02-26	2009	2	26	1.8	1	0.4590	0.3	0.3	0.7	0.0	1.2	0.3	1.5	No	0.0	28.0	0.0	1.5
2009-02-27	2009	2	27	-2.5	10	0.4611	0.0	0.0	10.0	0.0	12.0	4.5	16.5	No	0.0	28.0	0.0	16.5
2009-02-28	2009	2	28	-12.3	0	0.4632	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-01	2009	3	1	-10.4	0	0.4653	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-02	2009	3	2	-12.3	0	0.4674	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-03	2009	3	3	-12.1	0	0.4695	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-04	2009	3	4	-7.9	0.5	0.4716	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-03-05	2009	3	5	-3.4	0	0.4737	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-06	2009	3	6	8.6	0.5	0.4758	1.4	1.3	0.0	0.8	0.6	0.0	0.6	No	0.0	28.0	0.0	0.6
2009-03-07	2009	3	7	1.7	22	0.4779	0.3	0.3	21.7	0.0	26.4	9.8	36.2	No	0.0	28.0	0.0	36.2
2009-03-08	2009	3	8	3.6	4	0.4800	0.6	0.6	3.4	0.0	4.8	1.6	6.4	No	0.0	28.0	0.0	6.4
2009-03-09	2009	3	9	0	8	0.4822	0.0	0.0	8.0	0.0	9.6	3.6	13.2	No	0.0	28.0	0.0	13.2
2009-03-10	2009	3	10	-0.2	4.5	0.4843	0.0	0.0	4.5	0.0	5.4	2.0	7.4	No	0.0	28.0	0.0	7.4
2009-03-11	2009	3	11	0.3	10.5	0.4864	0.0	0.0	10.5	0.0	12.6	4.7	17.3	No	0.0	28.0	0.0	17.3
2009-03-12	2009	3	12	-8	0	0.4886	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-13	2009	3	13	-7.8	0	0.4907	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-14	2009	3	14	-1.6	0.5	0.4928	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-03-15	2009	3	15	1.8	0	0.4950	0.3	0.3	0.0	0.3	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-16	2009	3	16	2.7	0	0.4971	0.4	0.4	0.0	0.4	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-17	2009	3	17	3.9	0	0.4992	0.6	0.6	0.0	0.6	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-18	2009	3	18	6	0	0.5014	1.0	1.0	0.0	1.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-19	2009	3	19	0.2	0	0.5035	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-20	2009	3	20	-2.6	0	0.5057	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-21	2009	3	21	-2.1	0	0.5078	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-22	2009	3	22	-0.6	0	0.5099	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-23	2009	3	23	-3.1	0	0.5121	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-24	2009	3	24	-2.4	0.5	0.5142	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-03-25	2009	3	25	4	0	0.5163	0.6	0.7	0.0	0.7	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-26	2009	3	26	5.7	0	0.5185	0.9	1.0	0.0	1.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-03-27	2009	3	27	3.8	0.5	0.5206	0.6	0.6	0.0	0.1	0.6	0.0	0.6	No	0.0	28.0	0.0	0.6
2009-03-28	2009	3	28	5.7	0	0.5227	0.9	1.0	0.0	1.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0

Daily Climate Data from Environment Canada						Daily PET Calculations					Unadjusted Runoff Volumes			Infiltration Feature Storage Calculations Catchment PR-100 (0.24 ha), Storage Volume = 28 m^3)				
Date/Time	Year	Month	Day	Mean Temp (°C)	Total Precip (mm)	Length of Daylight (days)	PET	Adj PET	Surplus (mm)	Deficit (mm)	Impervious Runoff Volume (m^3)	Pervious Runoff Volume (m^3)	Total Runoff Volume (m^3)	Average Monthly Temp > 0	Daily Volume Infiltrated (m^3)	Infiltration Storage Available (m^3)	Runoff Volume Captured by Feature (m^3)	Adjusted Runoff Volume (m^3)
2009-03-29	2009	3	29	4.4	12.5	0.5249	0.7	0.7	11.8	0.0	15.0	5.3	20.3	No	0.0	28.0	0.0	20.3
2009-03-30	2009	3	30	0.4	0.5	0.5270	0.1	0.1	0.4	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-03-31	2009	3	31	0.7	0	0.5291	0.1	0.1	0.0	0.1	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-04-01	2009	4	1	4.5	6	0.5312	0.7	0.8	5.2	0.0	7.2	2.4	9.6	Yes	0.0	28.0	9.6	0.0
2009-04-02	2009	4	2	5.9	0.5	0.5333	1.0	1.0	0.0	0.5	0.6	0.0	0.6	Yes	9.6	28.0	0.6	0.0
2009-04-03	2009	4	3	7.5	25.5	0.5354	1.2	1.3	24.2	0.0	30.6	10.9	41.5	Yes	0.6	28.0	28.0	13.5
2009-04-04	2009	4	4	2.6	0	0.5375	0.4	0.4	0.0	0.4	0.0	0.0	0.0	Yes	14.0	14.0	0.0	0.0
2009-04-05	2009	4	5	6.1	0.5	0.5396	1.0	1.1	0.0	0.6	0.6	0.0	0.6	Yes	14.0	42.0	0.6	0.0
2009-04-06	2009	4	6	0.4	0	0.5417	0.1	0.1	0.0	0.1	0.0	0.0	0.0	Yes	-13.4	14.0	0.0	0.0
2009-04-07	2009	4	7	-3.6	0	0.5438	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Yes	14.0	0.0	0.0	0.0
2009-04-08	2009	4	8	1.5		0.5459	0.2	0.3	0.0	0.3	0.0	0.0	0.0	Yes	14.0	-14.0	-14.0	14.0
2009-04-09	2009	4	9	3.2	0.5	0.5480	0.5	0.6	0.0	0.1	0.6	0.0	0.6	Yes	-14.0	28.0	0.6	0.0
2009-04-10	2009	4	10	3.2	0	0.5501	0.5	0.6	0.0	0.6	0.0	0.0	0.0	Yes	0.6	28.0	0.0	0.0
2009-04-11	2009	4	11	3.5	0.5	0.5521	0.6	0.6	0.0	0.1	0.6	0.0	0.6	Yes	0.0	28.0	0.6	0.0
2009-04-12	2009	4	12	1.8	0	0.5542	0.3	0.3	0.0	0.3	0.0	0.0	0.0	Yes	0.6	28.0	0.0	0.0
2009-04-13	2009	4	13	2.1	0	0.5562	0.3	0.4	0.0	0.4	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-04-14	2009	4	14	5.7	0	0.5583	0.9	1.0	0.0	1.0	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-04-15	2009	4	15	7.6	0	0.5603	1.2	1.4	0.0	1.4	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-04-16	2009	4	16	6.8	0	0.5623	1.1	1.3	0.0	1.3	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-04-17	2009	4	17	8.8	0.5	0.5644	1.4	1.6	0.0	1.1	0.6	0.0	0.6	Yes	0.0	28.0	0.6	0.0
2009-04-18	2009	4	18	9.8	4	0.5664	1.6	1.8	2.2	0.0	4.8	1.0	5.8	Yes	0.6	28.0	5.8	0.0
2009-04-19	2009	4	19	6.9	0.5	0.5684	1.1	1.3	0.0	0.8	0.6	0.0	0.6	Yes	5.8	28.0	0.6	0.0
2009-04-20	2009	4	20	6.4	15.5	0.5704	1.0	1.2	14.3	0.0	18.6	6.4	25.0	Yes	0.6	28.0	25.0	0.0
2009-04-21	2009	4	21	8.1	1.5	0.5723	1.3	1.5	0.0	0.0	1.8	0.0	1.8	Yes	14.0	39.0	1.8	0.0
2009-04-22	2009	4	22	5.7	1.5	0.5743	0.9	1.1	0.4	0.0	1.8	0.2	2.0	Yes	-9.2	50.1	2.0	0.0
2009-04-23	2009	4	23	4.6	0.5	0.5763	0.7	0.9	0.0	0.4	0.6	0.0	0.6	Yes	2.0	28.0	0.6	0.0
2009-04-24	2009	4	24	9.7	6	0.5782	1.6	1.9	4.1	0.0	7.2	1.9	9.1	Yes	0.6	28.0	9.1	0.0
2009-04-25	2009	4	25	16.1	9.5	0.5802	2.7	3.1	6.4	0.0	11.4	2.9	14.3	Yes	9.1	28.0	14.3	0.0
2009-04-26	2009	4	26	10.6	0	0.5821	1.8	2.0	0.0	2.0	0.0	0.0	0.0	Yes	14.0	27.7	0.0	0.0
2009-04-27	2009	4	27	15.9	1.5	0.5840	2.7	3.1	0.0	1.6	1.8	0.0	1.8	Yes	0.3	28.3	1.8	0.0
2009-04-28	2009	4	28	8.8	3	0.5859	1.4	1.7	1.3	0.0	3.6	0.6	4.2	Yes	1.5	28.5	4.2	0.0
2009-04-29	2009	4	29	7.4	0	0.5878	1.2	1.4	0.0	1.4	0.0	0.0	0.0	Yes	3.7	29.1	0.0	0.0
2009-04-30	2009	4	30	8.9	10	0.5896	1.5	1.7	8.3	0.0	12.0	3.7	15.7	Yes	0.0	28.0	15.7	0.0
2009-05-01	2009	5	1	11.8	1.5	0.5915	2.0	2.3	0.0	0.8	1.8	0.0	1.8	Yes	14.0	26.3	1.8	0.0
2009-05-02	2009	5	2	7.2	0	0.5933	1.2	1.4	0.0	1.4	0.0	0.0	0.0	Yes	3.5	29.7	0.0	0.0
2009-05-03	2009	5	3	9.1	0	0.5951	1.5	1.8	0.0	1.8	0.0	0.0	0.0	Yes	-1.7	26.3	0.0	0.0
2009-05-04	2009	5	4	10.5	0	0.5969	1.7	2.1	0.0	2.1	0.0	0.0	0.0	Yes	1.7	29.7	0.0	0.0
2009-05-05	2009	5	5	10.5	0	0.5987	1.7	2.1	0.0	2.1	0.0	0.0	0.0	Yes	-1.7	31.4	0.0	0.0
2009-05-06	2009	5	6	14.3	0	0.6004	2.4	2.9	0.0	2.9	0.0	0.0	0.0	Yes	-3.4	34.9	0.0	0.0
2009-05-07	2009	5	7	15.1	2.5	0.6022	2.5	3.0	0.0	0.5	3.0	0.0	3.0	Yes	0.0	28.0	3.0	0.0
2009-05-08	2009	5	8	14.7	35	0.6039	2.5	3.0	32.0	0.0	42.0	14.4	56.4	Yes	3.0	28.0	28.0	28.4
2009-05-09	2009	5	9	12	29.5	0.6056	2.0	2.4	27.1	0.0	35.4	12.2	47.6	Yes	14.0	14.0	14.0	33.6
2009-05-10	2009	5	10	6.3	0	0.6073	1.0	1.2	0.0	1.2	0.0	0.0	0.0	Yes	14.0	28.0	0.0	0.0
2009-05-11	2009	5	11	7.4	0	0.6089	1.2	1.5	0.0	1.5	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0

Daily Climate Data from Environment Canada						Daily PET Calculations					Unadjusted Runoff Volumes			Infiltration Feature Storage Calculations Catchment PR-100 (0.24 ha), Storage Volume = 28 m^3)				
Date/Time	Year	Month	Day	Mean Temp (°C)	Total Precip (mm)	Length of Daylight (days)	PET	Adj PET	Surplus (mm)	Deficit (mm)	Impervious Runoff Volume (m^3)	Pervious Runoff Volume (m^3)	Total Runoff Volume (m^3)	Average Monthly Temp > 0	Daily Volume Infiltrated (m^3)	Infiltration Storage Available (m^3)	Runoff Volume Captured by Feature (m^3)	Adjusted Runoff Volume (m^3)
2009-05-12	2009	5	12	10	0	0.6105	1.7	2.0	0.0	2.0	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-05-13	2009	5	13	10.5	0.5	0.6121	1.7	2.1	0.0	1.6	0.6	0.0	0.6	Yes	0.0	28.0	0.6	0.0
2009-05-14	2009	5	14	14.6	3.5	0.6137	2.4	3.0	0.5	0.0	4.2	0.2	4.4	Yes	0.6	28.0	4.4	0.0
2009-05-15	2009	5	15	10.1	0	0.6153	1.7	2.1	0.0	2.1	0.0	0.0	0.0	Yes	4.4	28.0	0.0	0.0
2009-05-16	2009	5	16	12	4	0.6168	2.0	2.5	1.5	0.0	4.8	0.7	5.5	Yes	0.0	28.0	5.5	0.0
2009-05-17	2009	5	17	5.8	0	0.6183	0.9	1.2	0.0	1.2	0.0	0.0	0.0	Yes	5.5	28.0	0.0	0.0
2009-05-18	2009	5	18	7.1	0	0.6197	1.2	1.4	0.0	1.4	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-05-19	2009	5	19	11.1	0	0.6212	1.8	2.3	0.0	2.3	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-05-20	2009	5	20	15.5	0	0.6226	2.6	3.2	0.0	3.2	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-05-21	2009	5	21	18.9	0	0.6239	3.2	4.0	0.0	4.0	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-05-22	2009	5	22	12.9	0	0.6253	2.1	2.7	0.0	2.7	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-05-23	2009	5	23	12.9	0	0.6266	2.1	2.7	0.0	2.7	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-05-24	2009	5	24	14.4	1	0.6278	2.4	3.0	0.0	2.0	1.2	0.0	1.2	Yes	0.0	28.0	1.2	0.0
2009-05-25	2009	5	25	11.8	0	0.6291	2.0	2.5	0.0	2.5	0.0	0.0	0.0	Yes	1.2	28.0	0.0	0.0
2009-05-26	2009	5	26	10.9	0	0.6303	1.8	2.3	0.0	2.3	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-05-27	2009	5	27	12.5	40.5	0.6314	2.1	2.6	37.9	0.0	48.6	17.0	65.6	Yes	0.0	28.0	28.0	37.6
2009-05-28	2009	5	28	14.7	34	0.6326	2.5	3.1	30.9	0.0	40.8	13.9	54.7	Yes	14.0	14.0	14.0	40.7
2009-05-29	2009	5	29	15.8	0.5	0.6337	2.6	3.4	0.0	2.9	0.6	0.0	0.6	Yes	14.0	28.0	0.6	0.0
2009-05-30	2009	5	30	13.7	5.5	0.6347	2.3	2.9	2.6	0.0	6.6	1.2	7.8	Yes	0.6	28.0	7.8	0.0
2009-05-31	2009	5	31	6.2	0.5	0.6357	1.0	1.3	0.0	0.8	0.6	0.0	0.6	Yes	7.8	28.0	0.6	0.0
2009-06-01	2009	6	1	7.9	0	0.6367	1.3	1.7	0.0	1.7	0.0	0.0	0.0	Yes	0.6	28.0	0.0	0.0
2009-06-02	2009	6	2	11.6	0	0.6376	1.9	2.5	0.0	2.5	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-06-03	2009	6	3	11.4	0.5	0.6385	1.9	2.4	0.0	1.9	0.6	0.0	0.6	Yes	0.0	28.0	0.6	0.0
2009-06-04	2009	6	4	10.8	0	0.6393	1.8	2.3	0.0	2.3	0.0	0.0	0.0	Yes	0.6	28.0	0.0	0.0
2009-06-05	2009	6	5	12.1	0	0.6401	2.0	2.6	0.0	2.6	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-06-06	2009	6	6	12.8	0	0.6409	2.1	2.7	0.0	2.7	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-06-07	2009	6	7	11.4	0	0.6416	1.9	2.4	0.0	2.4	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-06-08	2009	6	8	14.2	3.5	0.6422	2.4	3.0	0.5	0.0	4.2	0.2	4.4	Yes	0.0	28.0	4.4	0.0
2009-06-09	2009	6	9	14.9	7	0.6429	2.5	3.2	3.8	0.0	8.4	1.7	10.1	Yes	4.4	28.0	10.1	0.0
2009-06-10	2009	6	10	13.6	0	0.6434	2.3	2.9	0.0	2.9	0.0	0.0	0.0	Yes	10.1	28.0	0.0	0.0
2009-06-11	2009	6	11	15.7	1.5	0.6439	2.6	3.4	0.0	1.9	1.8	0.0	1.8	Yes	0.0	28.0	1.8	0.0
2009-06-12	2009	6	12	17.8	0.5	0.6444	3.0	3.9	0.0	3.4	0.6	0.0	0.6	Yes	1.8	28.0	0.6	0.0
2009-06-13	2009	6	13	15.9	0	0.6448	2.7	3.4	0.0	3.4	0.0	0.0	0.0	Yes	0.6	28.0	0.0	0.0
2009-06-14	2009	6	14	15.9	1	0.6452	2.7	3.4	0.0	2.4	1.2	0.0	1.2	Yes	0.0	28.0	1.2	0.0
2009-06-15	2009	6	15	16.9	3.5	0.6455	2.8	3.7	0.0	0.2	4.2	0.0	4.2	Yes	1.2	28.0	4.2	0.0
2009-06-16	2009	6	16	15.8	0	0.6458	2.6	3.4	0.0	3.4	0.0	0.0	0.0	Yes	4.2	28.0	0.0	0.0
2009-06-17	2009	6	17	17.1	1	0.6461	2.9	3.7	0.0	2.7	1.2	0.0	1.2	Yes	0.0	28.0	1.2	0.0
2009-06-18	2009	6	18	13.9	0	0.6462	2.3	3.0	0.0	3.0	0.0	0.0	0.0	Yes	1.2	28.0	0.0	0.0
2009-06-19	2009	6	19	16.9	0.5	0.6464	2.8	3.7	0.0	3.2	0.6	0.0	0.6	Yes	0.0	28.0	0.6	0.0
2009-06-20	2009	6	20	14.9	17	0.6464	2.5	3.2	13.8	0.0	20.4	6.2	26.6	Yes	0.6	28.0	26.6	0.0
2009-06-21	2009	6	21	21.4	4	0.6465	3.6	4.7	0.0	0.7	4.8	0.0	4.8	Yes	14.0	15.4	4.8	0.0
2009-06-22	2009	6	22	20.6	0.5	0.6465	3.5	4.5	0.0	4.0	0.6	0.0	0.6	Yes	14.0	37.2	0.6	0.0
2009-06-23	2009	6	23	20.4	0	0.6464	3.4	4.4	0.0	4.4	0.0	0.0	0.0	Yes	-8.6	46.4	0.0	0.0
2009-06-24	2009	6	24	21.9	0.5	0.6463	3.7	4.8	0.0	4.3	0.6	0.0	0.6	Yes	-18.4	64.8	0.6	0.0

Daily Climate Data from Environment Canada						Daily PET Calculations					Unadjusted Runoff Volumes			Infiltration Feature Storage Calculations Catchment PR-100 (0.24 ha), Storage Volume = 28 m^3)				
Date/Time	Year	Month	Day	Mean Temp (°C)	Total Precip (mm)	Length of Daylight (days)	PET	Adj PET	Surplus (mm)	Deficit (mm)	Impervious Runoff Volume (m^3)	Pervious Runoff Volume (m^3)	Total Runoff Volume (m^3)	Average Monthly Temp > 0	Daily Volume Infiltrated (m^3)	Infiltration Storage Available (m^3)	Runoff Volume Captured by Feature (m^3)	Adjusted Runoff Volume (m^3)
2009-06-25	2009	6	25	22.5	0	0.6461	3.8	4.9	0.0	4.9	0.0	0.0	0.0	Yes	0.6	28.0	0.0	0.0
2009-06-26	2009	6	26	20.2	1	0.6459	3.4	4.4	0.0	3.4	1.2	0.0	1.2	Yes	0.0	28.0	1.2	0.0
2009-06-27	2009	6	27	20	0.5	0.6456	3.4	4.4	0.0	3.9	0.6	0.0	0.6	Yes	1.2	28.0	0.6	0.0
2009-06-28	2009	6	28	16.9	13.5	0.6453	2.8	3.7	9.8	0.0	16.2	4.4	20.6	Yes	0.6	28.0	20.6	0.0
2009-06-29	2009	6	29	17.9	0.5	0.6449	3.0	3.9	0.0	3.4	0.6	0.0	0.6	Yes	14.0	21.4	0.6	0.0
2009-06-30	2009	6	30	18.3	1	0.6445	3.1	4.0	0.0	3.0	1.2	0.0	1.2	Yes	7.2	14.7	1.2	0.0
2009-07-01	2009	7	1	19.6	3	0.6441	3.3	4.3	0.0	1.3	3.6	0.0	3.6	Yes	14.0	1.9	1.9	1.7
2009-07-02	2009	7	2	18.3	7	0.6436	3.1	4.0	3.0	0.0	8.4	1.4	9.8	Yes	1.9	28.0	9.8	0.0
2009-07-03	2009	7	3	19.3	0.5	0.6430	3.3	4.2	0.0	3.7	0.6	0.0	0.6	Yes	9.8	28.0	0.6	0.0
2009-07-04	2009	7	4	14.4	0	0.6424	2.4	3.1	0.0	3.1	0.0	0.0	0.0	Yes	0.6	28.0	0.0	0.0
2009-07-05	2009	7	5	15.9	0.5	0.6418	2.7	3.4	0.0	2.9	0.6	0.0	0.6	Yes	0.0	28.0	0.6	0.0
2009-07-06	2009	7	6	15.9	0	0.6411	2.7	3.4	0.0	3.4	0.0	0.0	0.0	Yes	0.6	28.0	0.0	0.0
2009-07-07	2009	7	7	15.7	2	0.6403	2.6	3.4	0.0	1.4	2.4	0.0	2.4	Yes	0.0	28.0	2.4	0.0
2009-07-08	2009	7	8	16.3	0	0.6396	2.7	3.5	0.0	3.5	0.0	0.0	0.0	Yes	2.4	28.0	0.0	0.0
2009-07-09	2009	7	9	16.6	0	0.6387	2.8	3.6	0.0	3.6	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-07-10	2009	7	10	17.7	0	0.6379	3.0	3.8	0.0	3.8	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-07-11	2009	7	11	18.5	15	0.6370	3.1	4.0	11.0	0.0	18.0	5.0	23.0	Yes	0.0	28.0	23.0	0.0
2009-07-12	2009	7	12	14.3	0	0.6360	2.4	3.0	0.0	3.0	0.0	0.0	0.0	Yes	14.0	19.0	0.0	0.0
2009-07-13	2009	7	13	13.6	0.5	0.6350	2.3	2.9	0.0	2.4	0.6	0.0	0.6	Yes	9.0	37.0	0.6	0.0
2009-07-14	2009	7	14	14.7	0	0.6340	2.5	3.1	0.0	3.1	0.0	0.0	0.0	Yes	-8.4	45.9	0.0	0.0
2009-07-15	2009	7	15	14.5		0.6329	2.4	3.1	0.0	3.1	0.0	0.0	0.0	Yes	-17.9	63.9	0.0	0.0
2009-07-16	2009	7	16	18.8	0.5	0.6318	3.2	4.0	0.0	3.5	0.6	0.0	0.6	Yes	0.0	28.0	0.6	0.0
2009-07-17	2009	7	17	16	0	0.6307	2.7	3.4	0.0	3.4	0.0	0.0	0.0	Yes	0.6	28.0	0.0	0.0
2009-07-18	2009	7	18	16.3	0	0.6295	2.7	3.4	0.0	3.4	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-07-19	2009	7	19	15.1	0	0.6283	2.5	3.2	0.0	3.2	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-07-20	2009	7	20	16.4	0.5	0.6270	2.7	3.4	0.0	2.9	0.6	0.0	0.6	Yes	0.0	28.0	0.6	0.0
2009-07-21	2009	7	21	16.9	0	0.6257	2.8	3.5	0.0	3.5	0.0	0.0	0.0	Yes	0.6	28.0	0.0	0.0
2009-07-22	2009	7	22	18	0	0.6244	3.0	3.8	0.0	3.8	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-07-23	2009	7	23	19.6	39.5	0.6231	3.3	4.1	35.4	0.0	47.4	15.9	63.3	Yes	0.0	28.0	28.0	35.3
2009-07-24	2009	7	24	19.3	0.5	0.6217	3.3	4.0	0.0	3.5	0.6	0.0	0.6	Yes	14.0	14.0	0.6	0.0
2009-07-25	2009	7	25	18.8	21	0.6203	3.2	3.9	17.1	0.0	25.2	7.7	32.9	Yes	14.0	41.4	32.9	0.0
2009-07-26	2009	7	26	20.1	0.5	0.6188	3.4	4.2	0.0	3.7	0.6	0.0	0.6	Yes	14.0	9.1	0.6	0.0
2009-07-27	2009	7	27	19.5	0	0.6174	3.3	4.1	0.0	4.1	0.0	0.0	0.0	Yes	14.0	41.4	0.0	0.0
2009-07-28	2009	7	28	20.6	3.5	0.6159	3.5	4.3	0.0	0.8	4.2	0.0	4.2	Yes	-13.4	54.8	4.2	0.0
2009-07-29	2009	7	29	17.1	10	0.6144	2.9	3.5	6.5	0.0	12.0	2.9	14.9	Yes	-22.6	81.6	14.9	0.0
2009-07-30	2009	7	30	17.6	0.5	0.6128	3.0	3.6	0.0	3.1	0.6	0.0	0.6	Yes	14.0	27.1	0.6	0.0
2009-07-31	2009	7	31	19.4	3	0.6112	3.3	4.0	0.0	1.0	3.6	0.0	3.6	Yes	0.6	28.0	3.6	0.0
2009-08-01	2009	8	1	17.9	0.5	0.6096	3.0	3.7	0.0	3.2	0.6	0.0	0.6	Yes	3.6	28.0	0.6	0.0
2009-08-02	2009	8	2	16.8	1	0.6080	2.8	3.4	0.0	2.4	1.2	0.0	1.2	Yes	0.6	28.0	1.2	0.0
2009-08-03	2009	8	3	16.1	0	0.6064	2.7	3.3	0.0	3.3	0.0	0.0	0.0	Yes	1.2	28.0	0.0	0.0
2009-08-04	2009	8	4	20.7	1	0.6047	3.5	4.2	0.0	3.2	1.2	0.0	1.2	Yes	0.0	28.0	1.2	0.0
2009-08-05	2009	8	5	16.8	0	0.6030	2.8	3.4	0.0	3.4	0.0	0.0	0.0	Yes	1.2	28.0	0.0	0.0
2009-08-06	2009	8	6	16.3	0	0.6013	2.7	3.3	0.0	3.3	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-08-07	2009	8	7	15.6	0	0.5996	2.6	3.1	0.0	3.1	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0

Daily Climate Data from Environment Canada						Daily PET Calculations					Unadjusted Runoff Volumes			Infiltration Feature Storage Calculations Catchment PR-100 (0.24 ha), Storage Volume = 28 m^3)				
Date/Time	Year	Month	Day	Mean Temp (°C)	Total Precip (mm)	Length of Daylight (days)	PET	Adj PET	Surplus (mm)	Deficit (mm)	Impervious Runoff Volume (m^3)	Pervious Runoff Volume (m^3)	Total Runoff Volume (m^3)	Average Monthly Temp > 0	Daily Volume Infiltrated (m^3)	Infiltration Storage Available (m^3)	Runoff Volume Captured by Feature (m^3)	Adjusted Runoff Volume (m^3)
2009-08-08	2009	8	8	14.9	1	0.5978	2.5	3.0	0.0	2.0	1.2	0.0	1.2	Yes	0.0	28.0	1.2	0.0
2009-08-09	2009	8	9	22.1	14.5	0.5961	3.7	4.5	10.0	0.0	17.4	4.5	21.9	Yes	1.2	28.0	21.9	0.0
2009-08-10	2009	8	10	21.6	12.5	0.5943	3.6	4.3	8.2	0.0	15.0	3.7	18.7	Yes	14.0	20.1	18.7	0.0
2009-08-11	2009	8	11	21	0	0.5925	3.5	4.2	0.0	4.2	0.0	0.0	0.0	Yes	14.0	24.8	0.0	0.0
2009-08-12	2009	8	12	20.9	0	0.5907	3.5	4.2	0.0	4.2	0.0	0.0	0.0	Yes	3.2	21.5	0.0	0.0
2009-08-13	2009	8	13	21.4	0	0.5888	3.6	4.3	0.0	4.3	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-08-14	2009	8	14	21.3	0	0.5870	3.6	4.2	0.0	4.2	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-08-15	2009	8	15	22	0	0.5851	3.7	4.4	0.0	4.4	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-08-16	2009	8	16	22.3	0	0.5833	3.8	4.4	0.0	4.4	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-08-17	2009	8	17	24.5	0	0.5814	4.2	4.8	0.0	4.8	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-08-18	2009	8	18	22.4	15.5	0.5795	3.8	4.4	11.1	0.0	18.6	5.0	23.6	Yes	0.0	28.0	23.6	0.0
2009-08-19	2009	8	19	19.3	0	0.5775	3.3	3.8	0.0	3.8	0.0	0.0	0.0	Yes	14.0	37.6	0.0	0.0
2009-08-20	2009	8	20	20.4	24.5	0.5756	3.4	4.0	20.5	0.0	29.4	9.2	38.6	Yes	0.0	28.0	28.0	10.6
2009-08-21	2009	8	21	20.3	1	0.5737	3.4	3.9	0.0	2.9	1.2	0.0	1.2	Yes	14.0	14.0	1.2	0.0
2009-08-22	2009	8	22	19.9	0.5	0.5717	3.4	3.8	0.0	3.3	0.6	0.0	0.6	Yes	14.0	40.8	0.6	0.0
2009-08-23	2009	8	23	18.8	0.5	0.5698	3.2	3.6	0.0	3.1	0.6	0.0	0.6	Yes	-12.2	15.2	0.6	0.0
2009-08-24	2009	8	24	18	0	0.5678	3.0	3.4	0.0	3.4	0.0	0.0	0.0	Yes	13.4	40.8	0.0	0.0
2009-08-25	2009	8	25	17.1	0	0.5658	2.9	3.2	0.0	3.2	0.0	0.0	0.0	Yes	-12.8	53.6	0.0	0.0
2009-08-26	2009	8	26	15.4	1.5	0.5638	2.6	2.9	0.0	1.4	1.8	0.0	1.8	Yes	-25.6	79.2	1.8	0.0
2009-08-27	2009	8	27	12.9	0	0.5618	2.1	2.4	0.0	2.4	0.0	0.0	0.0	Yes	1.8	28.0	0.0	0.0
2009-08-28	2009	8	28	14.3	0.5	0.5598	2.4	2.7	0.0	2.2	0.6	0.0	0.6	Yes	0.0	28.0	0.6	0.0
2009-08-29	2009	8	29	16.7	19	0.5578	2.8	3.1	15.9	0.0	22.8	7.1	29.9	Yes	0.6	28.0	28.0	1.9
2009-08-30	2009	8	30	12.3	0	0.5558	2.0	2.3	0.0	2.3	0.0	0.0	0.0	Yes	14.0	14.0	0.0	0.0
2009-08-31	2009	8	31	12.1	0	0.5538	2.0	2.2	0.0	2.2	0.0	0.0	0.0	Yes	14.0	42.0	0.0	0.0
2009-09-01	2009	9	1	12.9	0.5	0.5518	2.1	2.4	0.0	1.9	0.6	0.0	0.6	Yes	-14.0	56.0	0.6	0.0
2009-09-02	2009	9	2	15.7	0	0.5497	2.6	2.9	0.0	2.9	0.0	0.0	0.0	Yes	-27.4	84.0	0.0	0.0
2009-09-03	2009	9	3	16	0	0.5477	2.7	2.9	0.0	2.9	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-09-04	2009	9	4	15.8	0.5	0.5456	2.6	2.9	0.0	2.4	0.6	0.0	0.6	Yes	0.0	28.0	0.6	0.0
2009-09-05	2009	9	5	17.9	0	0.5436	3.0	3.3	0.0	3.3	0.0	0.0	0.0	Yes	0.6	28.0	0.0	0.0
2009-09-06	2009	9	6	16.5	0	0.5415	2.8	3.0	0.0	3.0	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-09-07	2009	9	7	17.3	0	0.5394	2.9	3.1	0.0	3.1	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-09-08	2009	9	8	17.4	0	0.5374	2.9	3.1	0.0	3.1	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-09-09	2009	9	9	16.1	0	0.5353	2.7	2.9	0.0	2.9	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-09-10	2009	9	10	14.1	0.5	0.5332	2.4	2.5	0.0	2.0	0.6	0.0	0.6	Yes	0.0	28.0	0.6	0.0
2009-09-11	2009	9	11	14	1.5	0.5311	2.3	2.5	0.0	1.0	1.8	0.0	1.8	Yes	0.6	28.0	1.8	0.0
2009-09-12	2009	9	12	16.6	0	0.5290	2.8	2.9	0.0	2.9	0.0	0.0	0.0	Yes	1.8	28.0	0.0	0.0
2009-09-13	2009	9	13	17.2	0	0.5270	2.9	3.0	0.0	3.0	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-09-14	2009	9	14	15.5	0	0.5249	2.6	2.7	0.0	2.7	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-09-15	2009	9	15	14.3	0	0.5228	2.4	2.5	0.0	2.5	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-09-16	2009	9	16	10.8	0	0.5207	1.8	1.9	0.0	1.9	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-09-17	2009	9	17	11.1	0	0.5186	1.8	1.9	0.0	1.9	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-09-18	2009	9	18	11.7	1	0.5165	1.9	2.0	0.0	1.0	1.2	0.0	1.2	Yes	0.0	28.0	1.2	0.0
2009-09-19	2009	9	19	9.4	0.5	0.5144	1.6	1.6	0.0	1.1	0.6	0.0	0.6	Yes	1.2	28.0	0.6	0.0
2009-09-20	2009	9	20	10.6	0	0.5123	1.8	1.8	0.0	1.8	0.0	0.0	0.0	Yes	0.6	28.0	0.0	0.0

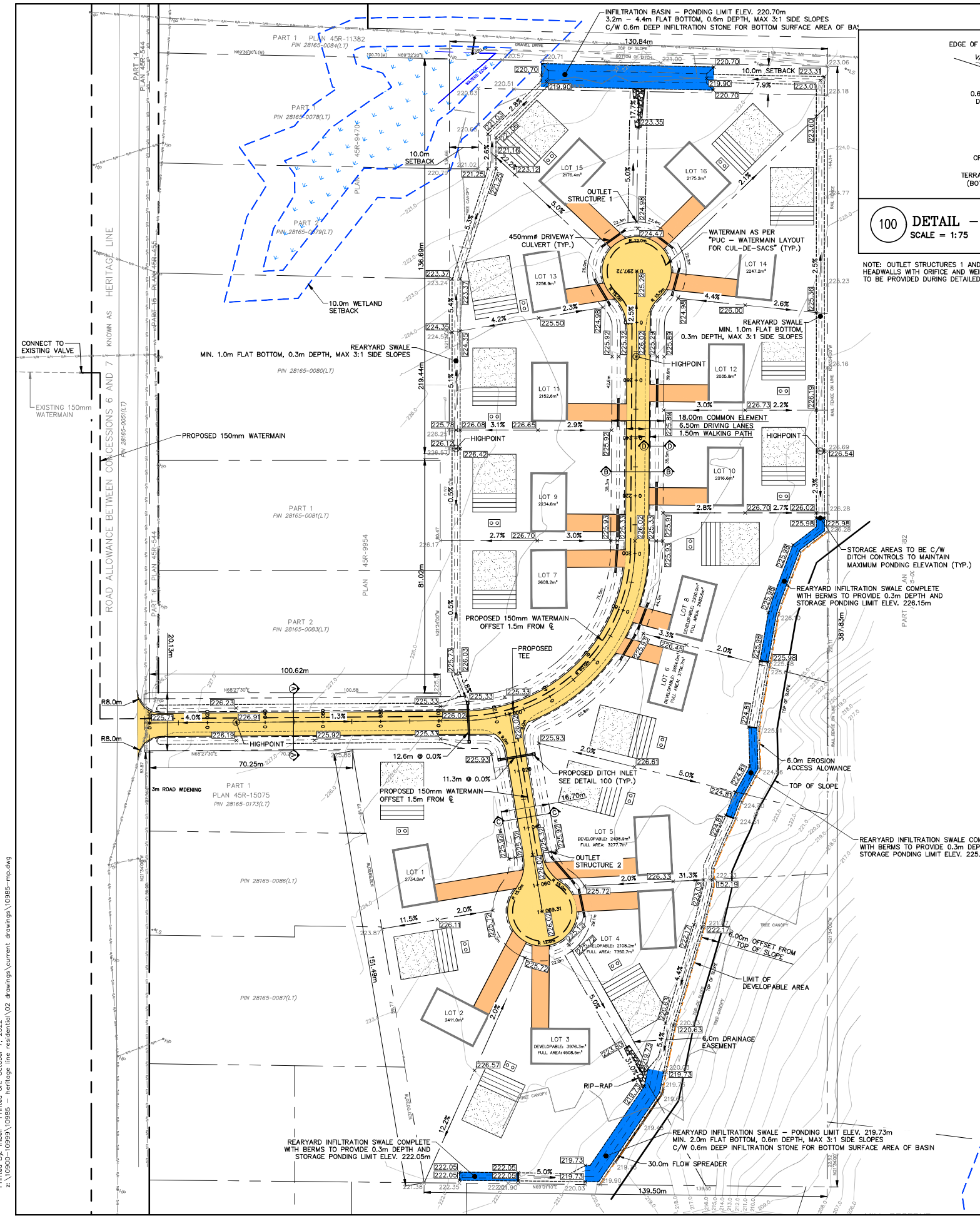
Daily Climate Data from Environment Canada						Daily PET Calculations					Unadjusted Runoff Volumes			Infiltration Feature Storage Calculations Catchment PR-100 (0.24 ha), Storage Volume = 28 m^3)				
Date/Time	Year	Month	Day	Mean Temp (°C)	Total Precip (mm)	Length of Daylight (days)	PET	Adj PET	Surplus (mm)	Deficit (mm)	Impervious Runoff Volume (m^3)	Pervious Runoff Volume (m^3)	Total Runoff Volume (m^3)	Average Monthly Temp > 0	Daily Volume Infiltrated (m^3)	Infiltration Storage Available (m^3)	Runoff Volume Captured by Feature (m^3)	Adjusted Runoff Volume (m^3)
2009-09-21	2009	9	21	13.6	0.5	0.5102	2.3	2.3	0.0	1.8	0.6	0.0	0.6	Yes	0.0	28.0	0.6	0.0
2009-09-22	2009	9	22	20.1	1	0.5081	3.4	3.4	0.0	2.4	1.2	0.0	1.2	Yes	0.6	28.0	1.2	0.0
2009-09-23	2009	9	23	19.9	3.5	0.5060	3.4	3.4	0.1	0.0	4.2	0.0	4.2	Yes	1.2	28.0	4.2	0.0
2009-09-24	2009	9	24	14.8	0	0.5039	2.5	2.5	0.0	2.5	0.0	0.0	0.0	Yes	4.2	28.0	0.0	0.0
2009-09-25	2009	9	25	8.8	0	0.5018	1.4	1.5	0.0	1.5	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-09-26	2009	9	26	9.6	5.5	0.4996	1.6	1.6	3.9	0.0	6.6	1.8	8.4	Yes	0.0	28.0	8.4	0.0
2009-09-27	2009	9	27	15.1	6.5	0.4975	2.5	2.5	4.0	0.0	7.8	1.8	9.6	Yes	8.4	28.0	9.6	0.0
2009-09-28	2009	9	28	12.8	19	0.4954	2.1	2.1	16.9	0.0	22.8	7.6	30.4	Yes	9.6	28.0	28.0	2.4
2009-09-29	2009	9	29	10.8		0.4933	1.8	1.8	0.0	1.8	0.0	0.0	0.0	Yes	14.0	42.0	0.0	0.0
2009-09-30	2009	9	30	6.5	0	0.4912	1.1	1.0	0.0	1.0	0.0	0.0	0.0	Yes	-14.0	56.0	0.0	0.0
2009-10-01	2009	10	1	5.7	0	0.4891	0.9	0.9	0.0	0.9	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-10-02	2009	10	2	6.7	7	0.4870	1.1	1.1	5.9	0.0	8.4	2.7	11.1	Yes	0.0	28.0	11.1	0.0
2009-10-03	2009	10	3	10	5.5	0.4849	1.7	1.6	3.9	0.0	6.6	1.8	8.4	Yes	11.1	28.0	8.4	0.0
2009-10-04	2009	10	4	8.4	2	0.4828	1.4	1.3	0.7	0.0	2.4	0.3	2.7	Yes	8.4	28.0	2.7	0.0
2009-10-05	2009	10	5	10	1.5	0.4807	1.7	1.6	0.0	0.1	1.8	0.0	1.8	Yes	2.7	28.0	1.8	0.0
2009-10-06	2009	10	6	8.4	5	0.4786	1.4	1.3	3.7	0.0	6.0	1.7	7.7	Yes	1.8	28.0	7.7	0.0
2009-10-07	2009	10	7	9.5	1	0.4765	1.6	1.5	0.0	0.5	1.2	0.0	1.2	Yes	7.7	28.0	1.2	0.0
2009-10-08	2009	10	8	8.5	0	0.4744	1.4	1.3	0.0	1.3	0.0	0.0	0.0	Yes	1.2	28.0	0.0	0.0
2009-10-09	2009	10	9	9.4	10.5	0.4724	1.6	1.5	9.0	0.0	12.6	4.1	16.7	Yes	0.0	28.0	16.7	0.0
2009-10-10	2009	10	10	9.4	0.5	0.4703	1.6	1.5	0.0	1.0	0.6	0.0	0.6	Yes	14.0	25.3	0.6	0.0
2009-10-11	2009	10	11	3.2	1	0.4682	0.5	0.5	0.5	0.0	1.2	0.2	1.4	Yes	3.3	30.7	1.4	0.0
2009-10-12	2009	10	12	1.8	0.5	0.4661	0.3	0.3	0.2	0.0	0.6	0.1	0.7	Yes	-1.2	25.3	0.7	0.0
2009-10-13	2009	10	13	3.7	1.5	0.4641	0.6	0.6	0.9	0.0	1.8	0.4	2.2	Yes	3.4	22.7	2.2	0.0
2009-10-14	2009	10	14	1.3	0	0.4620	0.2	0.2	0.0	0.2	0.0	0.0	0.0	Yes	7.6	17.3	0.0	0.0
2009-10-15	2009	10	15	1.7	0	0.4599	0.3	0.2	0.0	0.2	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-10-16	2009	10	16	0.8	0	0.4579	0.1	0.1	0.0	0.1	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-10-17	2009	10	17	1.8	0	0.4558	0.3	0.3	0.0	0.3	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-10-18	2009	10	18	1.9	0	0.4538	0.3	0.3	0.0	0.3	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-10-19	2009	10	19	3.6	0.5	0.4518	0.6	0.5	0.0	0.0	0.6	0.0	0.6	Yes	0.0	28.0	0.6	0.0
2009-10-20	2009	10	20	13.1	0	0.4497	2.2	2.0	0.0	2.0	0.0	0.0	0.0	Yes	0.6	28.0	0.0	0.0
2009-10-21	2009	10	21	9.2	7.5	0.4477	1.5	1.4	6.1	0.0	9.0	2.8	11.8	Yes	0.0	28.0	11.8	0.0
2009-10-22	2009	10	22	7.7	1.5	0.4457	1.3	1.1	0.4	0.0	1.8	0.2	2.0	Yes	11.8	28.0	2.0	0.0
2009-10-23	2009	10	23	5.4	8.5	0.4437	0.9	0.8	7.7	0.0	10.2	3.5	13.7	Yes	2.0	28.0	13.7	0.0
2009-10-24	2009	10	24	10.4	0.5	0.4417	1.7	1.5	0.0	1.0	0.6	0.0	0.6	Yes	13.7	28.0	0.6	0.0
2009-10-25	2009	10	25	5.6	0	0.4397	0.9	0.8	0.0	0.8	0.0	0.0	0.0	Yes	0.6	28.0	0.0	0.0
2009-10-26	2009	10	26	5.3	0	0.4378	0.9	0.8	0.0	0.8	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-10-27	2009	10	27	8	0	0.4358	1.3	1.1	0.0	1.1	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-10-28	2009	10	28	8.9	5	0.4339	1.5	1.3	3.7	0.0	6.0	1.7	7.7	Yes	0.0	28.0	7.7	0.0
2009-10-29	2009	10	29	9.2	0	0.4319	1.5	1.3	0.0	1.3	0.0	0.0	0.0	Yes	7.7	28.0	0.0	0.0
2009-10-30	2009	10	30	11.2	6	0.4300	1.9	1.6	4.4	0.0	7.2	2.0	9.2	Yes	0.0	28.0	9.2	0.0
2009-10-31	2009	10	31	10	10.5	0.4281	1.7	1.4	9.1	0.0	12.6	4.1	16.7	Yes	9.2	28.0	16.7	0.0
2009-11-01	2009	11	1	4.4	0	0.4262	0.7	0.6	0.0	0.6	0.0	0.0	0.0	Yes	14.0	25.3	0.0	0.0
2009-11-02	2009	11	2	3.8	0.5	0.4243	0.6	0.5	0.0	0.0	0.6	0.0	0.6	Yes	2.7	30.7	0.6	0.0
2009-11-03	2009	11	3	3.6	0.5	0.4225	0.6	0.5	0.0	0.0	0.6	0.0	0.6	Yes	-2.1	33.4	0.6	0.0

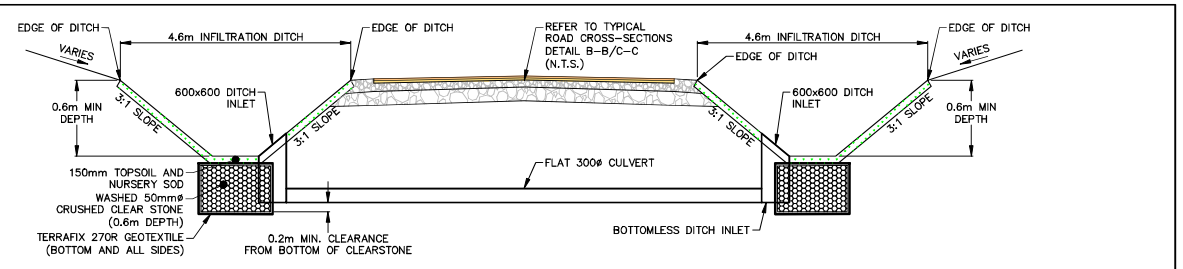
Daily Climate Data from Environment Canada						Daily PET Calculations					Unadjusted Runoff Volumes			Infiltration Feature Storage Calculations Catchment PR-100 (0.24 ha), Storage Volume = 28 m^3)				
Date/Time	Year	Month	Day	Mean Temp (°C)	Total Precip (mm)	Length of Daylight (days)	PET	Adj PET	Surplus (mm)	Deficit (mm)	Impervious Runoff Volume (m^3)	Pervious Runoff Volume (m^3)	Total Runoff Volume (m^3)	Average Monthly Temp > 0	Daily Volume Infiltrated (m^3)	Infiltration Storage Available (m^3)	Runoff Volume Captured by Feature (m^3)	Adjusted Runoff Volume (m^3)
2009-11-04	2009	11	4	1.2	0	0.4206	0.2	0.2	0.0	0.2	0.0	0.0	0.0	Yes	-4.8	38.8	0.0	0.0
2009-11-05	2009	11	5	3.1	5	0.4188	0.5	0.4	4.6	0.0	6.0	2.1	8.1	Yes	0.0	28.0	8.1	0.0
2009-11-06	2009	11	6	-0.2	0	0.4170	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Yes	8.1	28.0	0.0	0.0
2009-11-07	2009	11	7	5.9	0.5	0.4152	1.0	0.8	0.0	0.3	0.6	0.0	0.6	Yes	0.0	28.0	0.6	0.0
2009-11-08	2009	11	8	9	0	0.4134	1.5	1.2	0.0	1.2	0.0	0.0	0.0	Yes	0.6	28.0	0.0	0.0
2009-11-09	2009	11	9	8.4	0	0.4116	1.4	1.1	0.0	1.1	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-11-10	2009	11	10	7.4	0	0.4099	1.2	1.0	0.0	1.0	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-11-11	2009	11	11	2.1	0	0.4082	0.3	0.3	0.0	0.3	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-11-12	2009	11	12	1.4	0	0.4065	0.2	0.2	0.0	0.2	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-11-13	2009	11	13	2.5	0	0.4049	0.4	0.3	0.0	0.3	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-11-14	2009	11	14	5	0	0.4032	0.8	0.7	0.0	0.7	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-11-15	2009	11	15	7.1	0	0.4016	1.2	0.9	0.0	0.9	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-11-16	2009	11	16	1.7	0	0.4000	0.3	0.2	0.0	0.2	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-11-17	2009	11	17	-0.2	0	0.3985	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-11-18	2009	11	18	2.4	0	0.3969	0.4	0.3	0.0	0.3	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-11-19	2009	11	19	2.3	21.5	0.3954	0.4	0.3	21.2	0.0	25.8	9.5	35.3	Yes	0.0	28.0	28.0	7.3
2009-11-20	2009	11	20	5.9	11	0.3940	1.0	0.8	10.2	0.0	13.2	4.6	17.8	Yes	14.0	14.0	14.0	3.8
2009-11-21	2009	11	21	5.1	0	0.3925	0.8	0.6	0.0	0.6	0.0	0.0	0.0	Yes	14.0	28.0	0.0	0.0
2009-11-22	2009	11	22	4.5	0	0.3911	0.7	0.6	0.0	0.6	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-11-23	2009	11	23	4.6	0	0.3898	0.7	0.6	0.0	0.6	0.0	0.0	0.0	Yes	0.0	28.0	0.0	0.0
2009-11-24	2009	11	24	3.7	1	0.3884	0.6	0.5	0.5	0.0	1.2	0.2	1.4	Yes	0.0	28.0	1.4	0.0
2009-11-25	2009	11	25	8	6.5	0.3871	1.3	1.0	5.5	0.0	7.8	2.5	10.3	Yes	1.4	28.0	10.3	0.0
2009-11-26	2009	11	26	4.2	1	0.3859	0.7	0.5	0.5	0.0	1.2	0.2	1.4	Yes	10.3	28.0	1.4	0.0
2009-11-27	2009	11	27	2.5	4.5	0.3846	0.4	0.3	4.2	0.0	5.4	1.9	7.3	Yes	1.4	28.0	7.3	0.0
2009-11-28	2009	11	28	2	0	0.3835	0.3	0.2	0.0	0.2	0.0	0.0	0.0	Yes	7.3	28.0	0.0	0.0
2009-11-29	2009	11	29	1.1	9.5	0.3823	0.2	0.1	9.4	0.0	11.4	4.2	15.6	Yes	0.0	28.0	15.6	0.0
2009-11-30	2009	11	30	0.1	1	0.3812	0.0	0.0	1.0	0.0	1.2	0.4	1.6	Yes	14.0	26.4	1.6	0.0
2009-12-01	2009	12	1	1.7	1	0.3801	0.3	0.2	0.8	0.0	1.2	0.4	1.6	No	3.3	24.8	0.0	1.6
2009-12-02	2009	12	2	3.4	14.5	0.3791	0.5	0.4	14.1	0.0	17.4	6.3	23.7	No	3.2	21.5	0.0	23.7
2009-12-03	2009	12	3	4.5	8	0.3781	0.7	0.5	7.5	0.0	9.6	3.4	13.0	No	0.0	28.0	0.0	13.0
2009-12-04	2009	12	4	-0.8	0.5	0.3772	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-12-05	2009	12	5	-3	0	0.3763	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-12-06	2009	12	6	-2.6	0	0.3755	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-12-07	2009	12	7	-3.1	4.5	0.3747	0.0	0.0	4.5	0.0	5.4	2.0	7.4	No	0.0	28.0	0.0	7.4
2009-12-08	2009	12	8	-6.2	0.5	0.3740	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-12-09	2009	12	9	0.3	21	0.3733	0.0	0.0	21.0	0.0	25.2	9.4	34.6	No	0.0	28.0	0.0	34.6
2009-12-10	2009	12	10	-4.5	0.5	0.3726	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-12-11	2009	12	11	-8.7	0.5	0.3720	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-12-12	2009	12	12	-5.5	0	0.3715	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-12-13	2009	12	13	-3.3	2.5	0.3710	0.0	0.0	2.5	0.0	3.0	1.1	4.1	No	0.0	28.0	0.0	4.1
2009-12-14	2009	12	14	0.5	3.5	0.3706	0.1	0.1	3.4	0.0	4.2	1.5	5.7	No	0.0	28.0	0.0	5.7
2009-12-15	2009	12	15	-3.2	0.5	0.3702	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-12-16	2009	12	16	-8.5	0	0.3699	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-12-17	2009	12	17	-14.5	0	0.3696	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0

Daily Climate Data from Environment Canada						Daily PET Calculations					Unadjusted Runoff Volumes			Infiltration Feature Storage Calculations Catchment PR-100 (0.24 ha), Storage Volume = 28 m^3)				
Date/Time	Year	Month	Day	Mean Temp (°C)	Total Precip (mm)	Length of Daylight (days)	PET	Adj PET	Surplus (mm)	Deficit (mm)	Impervious Runoff Volume (m^3)	Pervious Runoff Volume (m^3)	Total Runoff Volume (m^3)	Average Monthly Temp > 0	Daily Volume Infiltrated (m^3)	Infiltration Storage Available (m^3)	Runoff Volume Captured by Feature (m^3)	Adjusted Runoff Volume (m^3)
2009-12-18	2009	12	18	-12.5	0	0.3694	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-12-19	2009	12	19	-10.2	0	0.3692	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-12-20	2009	12	20	-4.8	0	0.3691	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-12-21	2009	12	21	-9.1	0	0.3690	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-12-22	2009	12	22	-12.8	0	0.3690	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-12-23	2009	12	23	-10	0	0.3691	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-12-24	2009	12	24	-4.9	0	0.3692	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-12-25	2009	12	25	-0.1	12.5	0.3693	0.0	0.0	12.5	0.0	15.0	5.6	20.6	No	0.0	28.0	0.0	20.6
2009-12-26	2009	12	26	1.4	21.5	0.3695	0.2	0.2	21.3	0.0	25.8	9.6	35.4	No	0.0	28.0	0.0	35.4
2009-12-27	2009	12	27	-0.7	1	0.3698	0.0	0.0	1.0	0.0	1.2	0.5	1.7	No	0.0	28.0	0.0	1.7
2009-12-28	2009	12	28	-8.5	0.5	0.3701	0.0	0.0	0.5	0.0	0.6	0.2	0.8	No	0.0	28.0	0.0	0.8
2009-12-29	2009	12	29	-14.9	0	0.3705	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-12-30	2009	12	30	-7.5	0	0.3709	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	0.0	28.0	0.0	0.0
2009-12-31	2009	12	31	-2.1	2.5	0.3714	0.0	0.0	2.5	0.0	3.0	1.1	4.1	No	0.0	28.0	0.0	4.1

Appendix G

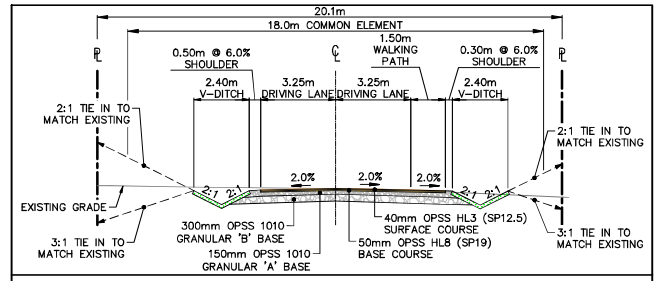
Drawings



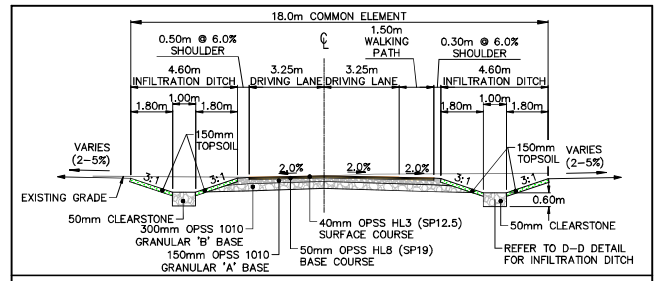


100 DETAIL – TYPICAL DITCH INLET – CROSS CULVERT
SCALE = 1:75

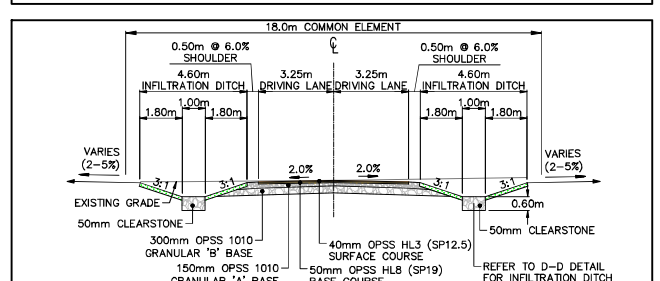
NOTE: OUTLET STRUCTURES 1 AND 2 TO CONSIST OF CONCRETE HEADWALLS WITH ORIFICE AND WEIR CONTROLS. DESIGN DETAILS TO BE PROVIDED DURING DETAILED DESIGN.



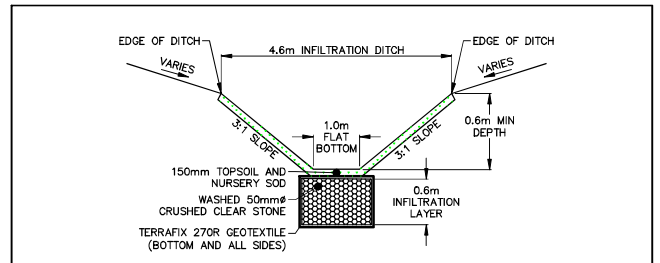
A-A DETAIL – TYPICAL CROSS SECTION
SCALE = 1:150 STA. 0+000 – 0+100



B-B DETAIL – TYPICAL CROSS SECTION
SCALE = 1:150 STA. 0+100 – 0+300



C-C DETAIL – TYPICAL CROSS SECTION
SCALE = 1:150 STA. 1+000 – 1+040

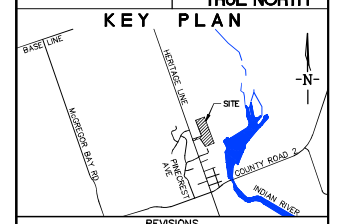


D-D DETAIL – TYPICAL CROSS SECTION
SCALE = N.T.S INFILTRATION DITCH

BM1 – 206.93m
N:4902490.35m
E:726461.29m
KEENE PUBLIC SCHOOL, TABLET IN NORTHEAST FACE OF CONCRETE FOUNDATION WALL.

TRUE NORTH

KEY PLAN



REVISIONS

No.	Description	Date
3	ZBA – 3RD SUBMISSION	22/10/07
2	ZBA – 2ND SUBMISSION	22/06/29
1	ZBA – 1ST SUBMISSION	21/09/02

METRIC Dimensions are in METRES and/or MILLIMETRES unless otherwise shown

LEGEND TO BE READ IN CONJUNCTION WITH OPSD 100 SERIES

- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED MEDIUM DUTY ASPHALT
- PROPOSED DRAINAGE STORAGE AREA
- WETLAND
- EX. BUILDING
- EX./PR. EDGE OF PAVEMENT
- EX./PR. ROAD CENTERLINE
- EX./PR. EDGE OF SHOULDER/GRAVEL
- EX./PR. WATER VALVE
- EXISTING HYDRO POLE
- EX. OVERHEAD HYDRO
- EX. UNDERGROUND HYDRO
- EX./PR. DITCH
- PR. SWALE
- PR. CULVERT
- PR. CATCH BASIN
- EX./PR. WATERMAIN
- R.O.W
- PROPERTY LINE
- EXISTING VEGETATION TEE
- PROPOSED HOUSE WITH 2 CAR GARAGE
- SEPTIC TANK
- TILE FIELD AND MANTLE
- x 214.00 EX./PR. ELEVATION

LICENSED PROFESSIONAL ENGINEER C.M.PROCTOR 100195369 Oct 7, 2022 PROVINCE OF ONTARIO

WILLS
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E. wills@dmwills.com

Project Name/Location

HERITAGE LINE RESIDENTIAL

KEENE, ONTARIO

Drawing Title

PRELIMINARY SERVICING AND GRADING PLAN

Drawn By: M.B.	SCALE: Horz. 1:750	Vert. –	
Designed By: M.B.	Issue Date: OCTOBER 7, 2022		
Checked By: J.D.F.	Project No.: 21-10985	Sht. No.:	
Engineer: C.P.B.	Dwg File No.: 10985-MP	500	

NOT FOR CONSTRUCTION

Printed By: mbell Printed On: October 7, 2022
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