Preliminary
Stormwater Management Report

Life at the Woodland
Township of Otonabee-South
Monaghan
County of Peterborough

Residential Subdivision Development

D.M. Wills Project No. 19-10874

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

February 2022

Prepared for:
Life at the Woodland Inc.

WILLS

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1.0 Purpose

D.M. Wills Associates Limited (Wills) has been retained by Mr. Rubal Kundra of Life at the Woodland Inc. to prepare a Preliminary Stormwater Management Plan and Report for the proposed residential subdivision located on Part of Lot 27, Concession 10, Township of Otonabee-South Monaghan in the County of Peterborough.

The purpose of this report is to evaluate the impact of the proposed development on the stormwater runoff and to develop a preliminary plan for stormwater management that will permit the development to proceed with no adverse impacts to the receiving drainage systems. This report has been prepared specifically for the County of Peterborough (County) and the Otonabee Region Conservation Authority (ORCA) to address stormwater management for the development and to satisfy the statutory requirements.

2.0 Site Description

The subject property is located in the township of Otonabee-South Monaghan with access provided from Burnham Line, situated approximately 6 kilometres east of Peterborough. The subject site is legally described as a Part of Lot 27, Concession 10 in the Township of Otonabee-South Monaghan in the County of Peterborough and is approximately 17.67 ha in area. The property is bounded by agricultural land use to the north, Burnham Line and wooded area to the west, wetland and wooded area to the east and residential lots accessed by Lancaster Road to the south. An unevaluated wetland feature is located in the western portion of the property, which drains to two separate outlets. The location of the site is shown on **Figure 1.**

The proposed residential subdivision consists of twenty-seven (27) lots adjacent to the wetland buffer. The portion of the site within the wetland buffer is to remain in an undisturbed natural state. The development of the site will require the removal of vegetated areas and grasslands. A cul-de-sac roadway off Burnham Line will provide access for the proposed lots.

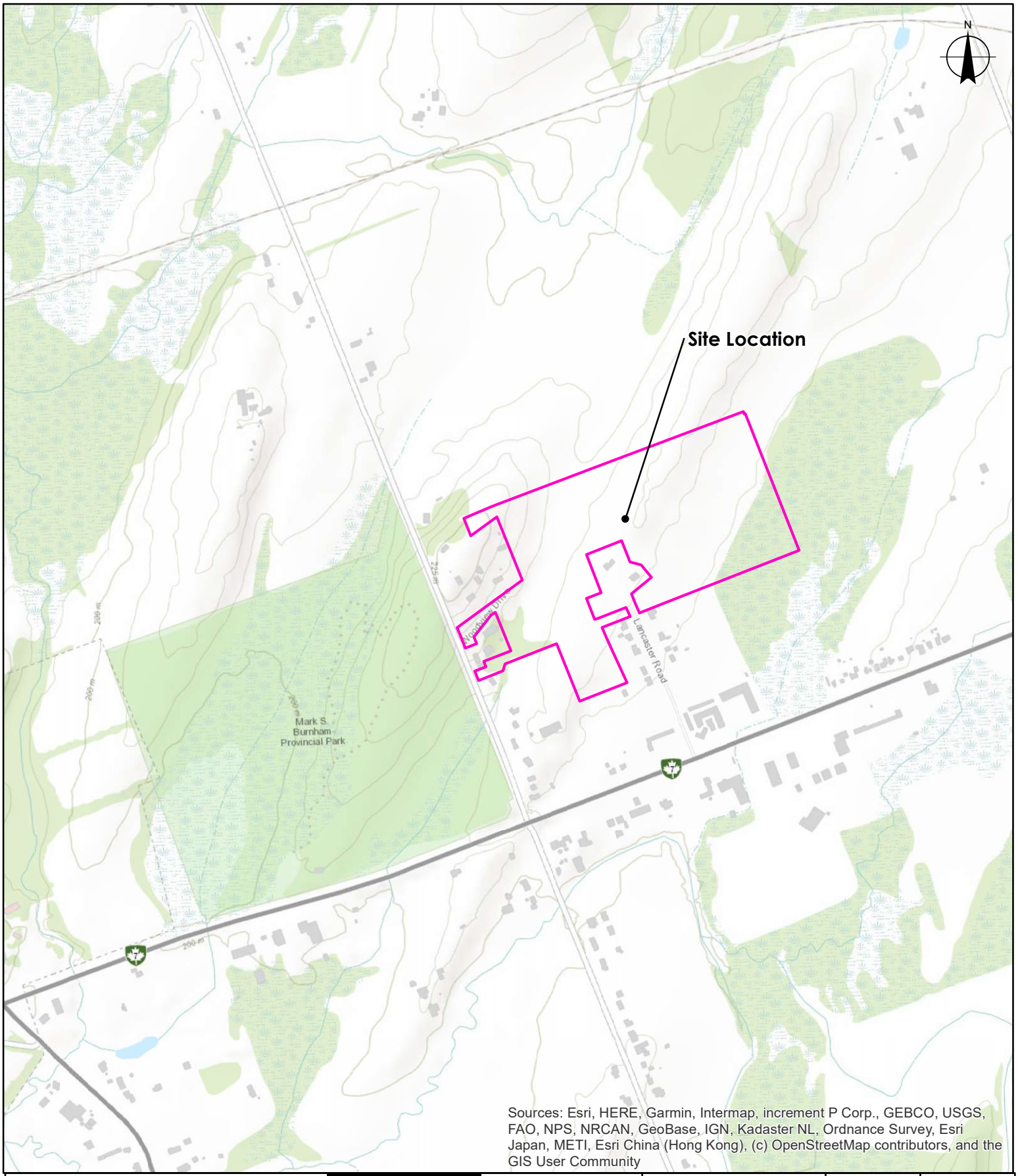


Figure 01
Location Plan

NAD83 UTM Zone 18

0 75 150 300 450 600

Meters

D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
K9J 0B9

P. 705.742.2297
F. 705.741.3568
E. wills@dmwills.com

Legend

— Property Limits

Drawn by: RC	Scale (Horz.) 1:10,000
Checked by: CPB	
Engineer: RC/CPB	Map Date Dec 2021
Project No. 10874	Map File No. 10874-DP01

According to the Soil Survey Complex of Ontario, the subject site is primarily composed of two types of surficial soils. The wetland portion of the site is composed of Foxboro Silt Loam with the remainder of the site composed of Otonabee Loam. According to the SCS method of classifying soils, these types of surficial soils correspond to Hydrologic Soils Groups C and B respectively.

A topographic survey of the subject property was completed by JBF Surveyors Ltd. (Project #7369) with the latest drawing version dated January 13, 2020, to determine existing elevations and the location of drainage features on the site. This information was used to determine drainage patterns and preliminary catchment area characteristics. A digital elevation model of the wetland was obtained from the South Central Ontario Orthophotography (SCOOP) under Land Information Ontario (LIO) database. The horizontal datum for the SCOOP is projected in UTM Zone 17 of the NAD83 Canadian Spatial Reference System and the vertical datum is sourced CGVD28. The SCOOP DEM raster has a resolution of 20 cm, however it was resampled into a raster cell of size 2 m. This data was produced to meet ASPRS Positional Accuracy Standards for Digital Geospatial Data (2014) with +/- 46.0cm actual VVA accuracy at the 95th percentile.

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 Stormwater Management Plans. There is no Master Plan directing the stormwater management strategy for this watershed. As such, the proposed development was prepared as an individual Preliminary Stormwater Management Plan.

3.1 Site Specific Stormwater Design Criteria

A pre-consultation meeting was held to discuss the requirements of the Draft Plan Approval process. The following design criteria have been established from the pre-consultation meeting and with follow-up correspondence from the County and ORCA.

- To provide stormwater quality controls, to achieve “Enhanced” Level 1 protection as defined in the Stormwater Management Planning and Design Manual (March 2003).
- To provide stormwater quantity controls, to reduce the post development peak flow rates to the existing condition peak flow rates at each outlet location, for the 2 to 100-year design storms.
- To respect the recommended statutory setback requirements provided by the regulatory agency for the unevaluated wetland located within the property.
- To incorporate Low Impact Development (LID) features as part of the proposed stormwater management strategy.

3.2 Catchment Area Characterization

For the purpose of the preliminary SWM plan, the site will be analyzed as six (6) catchment areas based on the site topography under existing conditions. The existing catchment areas are shown on **Figure 2.** The internal wetland area will remain undisturbed and has not been included in the analysis.

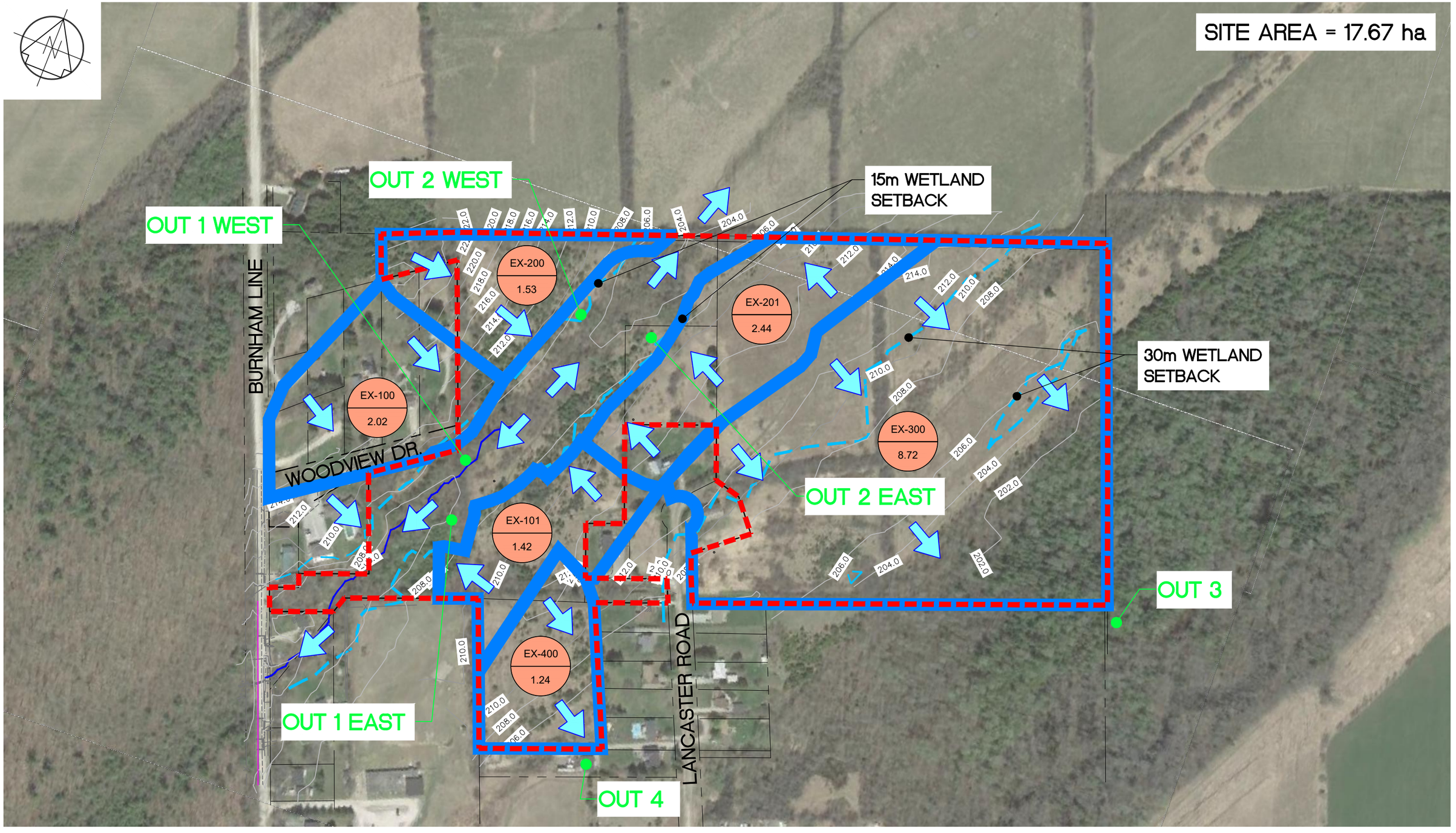
- Catchment area **EX-100** consists of 2.02 ha of land and includes the northwestern portion of the subject site and neighboring lots. This catchment consists of the current gravel access to the site from Burnham Line, wooded areas and rural residential lots. Runoff from this catchment currently flows overland to the wetland, discharging to **OUT-1 WEST**.
- Catchment area **EX-101** consists of 1.42 ha of land and includes the southwest portion of the site. This catchment is comprised of woodlots and grassed areas. Runoff from this catchment will flow overland northerly to the wetland, discharging to **OUT-1 EAST.**
- Catchment area **EX-200** consists of 1.53 ha of land and includes the northern portion of the site. This catchment is comprised of wooded areas and neighboring residential rear yards. Runoff from this catchment will flow overland towards the wetland, discharging to **OUT-2 WEST**.
- Catchment area **EX-201** consists of 2.44 ha of land and includes the north central portion of the site. This catchment consists of wood lots and grassed areas. Runoff from this catchment will drain northerly towards the wetland, discharging to **OUT-2 EAST**.
- Catchment **EX-300** consists of 8.72 ha of land located in the eastern portion of the site. This catchment is comprised of extensive grassed range type areas with a band of wooded areas and wetland area. The runoff generated within this catchment drains southeasterly to an unidentified wetland located southeast of the site (**OUT-3**).
- Catchment **EX-400** consists of 1.24 ha of land located in the south central portion of the subject property west of Lancaster Road. This catchment is comprised of grassed range with some wood pockets. The runoff generated within this catchment drains southerly overland towards the private properties on Lancaster Road (**OUT-4**).

Under the proposed condition, the catchment areas subject to land use change were delineated into eight (8) sub-catchment areas as shown on **Figure 3**.

- Catchment area **PR-100** consists of 2.66 ha of land and includes the northwest neighboring lots and proposed access road from Burnham Line. Runoff from this catchment will flow overland towards a proposed SWM facility for treatment and will then outlet to the wetland, discharging to **OUT-1 WEST**.
- Catchment area **PR-101** consists of 0.59 ha of land comprised of the rear lot yards located west of the proposed cul-de-sac. Runoff from this catchment will

drain uncontrolled towards the wetland as in the existing condition, discharging to **OUT-1 EAST.**

- Catchment area **PR-102** consists of 1.48 ha of land and includes the southern portion of the developed site comprised of the proposed roadway and cul-de-sac, and a portion of the proposed residential lots. Runoff from this catchment will flow overland to a proposed SWM facility for treatment and will then outlet to the wetland, discharging to **OUT-1 EAST**.
- Catchment area **PR-200** consists of 0.75 ha of land and includes the northern portion of the subject site. This catchment is comprised of proposed lots and a portion of the proposed roadway. Runoff from this catchment will drain towards a proposed SWM facility and will outlet to the wetland, discharging to **OUT-2 WEST**.
- Catchment area **PR-201** consists of 1.28 ha of land and includes a portion of the proposed roadway and residential lots. Runoff from this catchment will drain towards a proposed SWM facility and will outlet to the wetland, discharging to **OUT-2 EAST**.
- Catchment area **PR-202** consists of 1.40 ha of land and includes the northeastern portion of the site, consisting of the proposed roadway and lots. Runoff from this catchment will flow overland towards the wetland, discharging to **OUT-2 EAST**.
- Catchment **PR-300** consists of 8.50 ha of land includes the eastern portion of the site. This catchment is comprised of proposed lots and the existing wetland to the east. Runoff generated from this catchment will drain overland easterly to the existing wetland area (**OUT 3**) as in the existing condition.
- Catchment **PR-400** consists of 0.58 ha of land and includes the southern tip of the property, consisting of the rear yards of the proposed lots. Runoff from this catchment will drain overland, south easterly towards Lancaster Road as in the existing condition (**OUT 4**).



EX-100 / 0.22 — CATCHMENT ID / CATCHMENT AREA (ha)

CATCHMENT BOUNDARY

WETLAND SETBACK

SUBJECT PROPERTY LINE

OUT — OUTLET LOCATION

OVERLAND FLOW DIRECTION

Sketch No.

FIGURE 2
LIFE AT THE WOODLAND
EXISTING DRAINAGE AREA PLAN

WILLS

D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9

P. 705.742.2297
F. 705.741.3568
E. wills@dmwills.com

Drawn By: RC	Scale: 1: 3000
Designed By: RC	Plot Date: FEB 2022
Checked By: CPB	Project No.: 19-10874
Engineer: RC/CPB	Drawing File No.: SWM FIGURE 2

SITE AREA = 17.67 ha

ROADSIDE DITCH SWM FACILITY
(CATCHMENT PR-100):
DITCH LENGTH = 90m
BOTTOM WIDTH = 2m
INFILTRATION LAYER DEPTH = 1m
DITCH DEPTH = 0.6m
SIDE SLOPES = 3:1

ROADSIDE DITCH SWM FACILITY
(CATCHMENT PR-200):
DITCH LENGTH=50m
BOTTOM WIDTH=2m
SIDE SLOPES=3:1
INFILTRATION LAYER DEPTH = 0.5m

OUT 2 WEST

15m WETLAND SETBACK

OUT 2 EAST

PR-200 0.75

PR-202 1.40

PR-100 2.66

BURNHAM LINE

WOODVIEW DR.

PR-201 1.28

PR-102 1.48

PR-300 8.50

30m WETLAND SETBACK

OUT 1 WEST

OUT 1 EAST

PR-101 0.59

OUT 3

ROADSIDE DITCH SWM FACILITY
(CATCHMENT PR-201):
DITCH LENGTH = 107m
BOTTOM WIDTH = 2m
INFILTRATION LAYER DEPTH = 1m
DITCH DEPTH = 0.6m
SIDE SLOPES = 3:1

LANCASTER ROAD

ROADSIDE DITCH SWM FACILITY
(CATCHMENT PR-102):
DITCH LENGTH = 97m
BOTTOM WIDTH = 2m
INFILTRATION LAYER DEPTH = 1m
DITCH DEPTH = 0.8m
SIDE SLOPES = 3:1

PR-400 0.58

OUT 4

PR-100 0.22 — CATCHMENT ID / CATCHMENT AREA (ha)

CATCHMENT BOUNDARY

WETLAND SETBACK

SUBJECT PROPERTY LINE

OUT — OUTLET LOCATION

OVERLAND FLOW DIRECTION

Sketch No.
FIGURE 3
LIFE AT THE WOODLAND
PROPOSED DRAINAGE
AREA PLAN

WILLS
D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9
P. 705.742.2297
F. 705.741.3568
E. wills@dmwills.com

Drawn By: RC	Scale: 1:2500
Designed By: RC	Plot Date: FEB 2022
Checked By: CPB	Project No.: 19-10874
Engineer: CPB	Drawing File No.: SWM FIGURE 3

The hydrologic parameters used for each catchment area, in both existing and proposed conditions, are summarized **Table 1** and documented in **Appendix A**.

Table 1 – Existing and Proposed Hydrologic Parameters

Standhyd[1]						
Catchment ID	**Area (ha)**	**Impervious %**	**CN*[2]**	**Ia[3]**	**Pervious Slope (%)**	**Impervious Slope (%)**
PR-102	1.48	23	60.7	5.3	5.0	2.0
PR-201	1.28	24.6	62.5	5.8	6.6	1.0

Nashyd[1]					
Catchment ID	**Area (ha)**	**Impervious %**	**CN*[2]**	**Ia[3]**	**Tp[4] (hrs)**
EX-100	2.02	1.9	61.5	5.3	0.17
EX-101	1.42	2.4	63.1	9.1	0.22
EX-200	1.53	0.0	61.7	8.7	0.17
EX-201	2.44	0.7	68.8	8.0	0.17
EX-300	8.72	0	64.6	8.8	0.39
EX-400	1.24	0	67.5	8.2	0.26
PR-100	2.66	9.7	64.8	4.8	0.17
PR-101	0.59	10.0	65.0	4.7	0.17
PR-200	0.75	16.1	68.1	7.4	0.17
PR-202	1.40	14.8	67.1	4.6	0.17
PR-300	8.50	1.6	64.4	8.4	0.39
PR-400	0.58	12.1	66.1	4.6	0.26

Notes:
1. Command Line refers to the unit hydrograph used in the VO3 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.

Hydrologic parameters such as soil infiltration properties, land use and runoff response were determined based on aerial photography, site reconnaissance and literature review. Topographic mapping and AutoCAD Civil 3D 2019 software were used to establish sub-catchment areas, land use and slopes. Rainfall data for the site is taken from the City of Peterborough Engineering Design Standards (April 2019) and is included in **Appendix A**.

4.0 Stormwater Management

4.1 Low Impact Development Design

As the practice of stormwater management 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 Low Impact Development (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. ORCA 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 higher of the seasonally high groundwater or bedrock elevation. As such, a geotechnical study with in-situ infiltration testing will ultimately be required to confirm the availability of minimum separation and observed infiltration rates.

LID features must also include an underdrain for infiltration rates less than 15 mm/hr. Sandy loam soils typically have infiltration rates from 30 to 50 mm/hr. and therefore underdrains are not anticipated to be required. This assumption can be confirmed once the in-situ infiltration rates have been established during detailed design.

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 preferred design selected are stone filled infiltration trenches with detention storage provided above the infiltration portion where required. These features will be incorporated as part of the roadside ditch system. The SWM facilities have been designed to achieve the necessary quality control targets.

4.2 Stormwater Quality Control

The proposed 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. As such, the goal of SWM is to preserve the natural hydrologic cycle. In addition, 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.

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-Grit separators and filter systems.

4.2.1 Quality Control Summary

A SWM assessment was completed to evaluate the most appropriate measures to provide stormwater quality treatment for the proposed development. The following table summarizes the feasibility of each option for the proposed development.

Table 2 – Quality Control Feature Options Summary

Facility Description	Comments and Feasibility
Lot Level Controls • Soak-Away Pits	• Not a feasible option as a standalone **water quality** control for roadway runoff.
Conveyance Controls • Pervious pipes • Catchbasin treatment • Grass Swales	• Feasible option for **water quality** control. • Grassed swales can be considered as a viable option in combination with infiltration features to provide the necessary **water quantity control**.
End-of-Pipe Controls • Wetlands • Wet Ponds • Dry Ponds • Infiltration Basins • Infiltration Trenches • Filter Strips • Sand Filters • Oil-Grit separators (OGS)	• Not a feasible option due to site constraints and multiple outlets. • Wetlands are not feasible with available site area and configuration. • The increase in impervious area is not sufficient to consider a wet or dry pond facility as a viable option. • An OGS is not considered a viable option due to the outlet grade and configuration. • Infiltration basin/trench can be considered as viable options in combination with a conveyance feature to provide **water quality** control. • Filter systems are typically cumbersome, expensive and require extensive maintenance at regular intervals.

A review of the above-mentioned BMPs indicates that a hybrid feature incorporating conveyance and infiltration is an appropriate method for achieving the necessary quality control required.

Based on Table 3.2 of the Stormwater Management Planning and Design Manual, the proposed SWM facilities were designed to provide the necessary "Enhanced" level of protection for the proposed development. **Table 3** provides a summary of the proposed SWM features and demonstrates how water quality protection can be achieved for the selected sub-catchments.

Table 3 – Proposed Water Quality Treatment Summary

Description	Quality Control Feasibility
Catchment – PR-100 • Stone filled infiltration trench located within roadside ditch system.	• To achieve Level 1 (enhanced) protection, a storage volume of 66.5 m^3 is required based on Table 3.2 of the SWM Manual (2.66 ha x 25 m^3/ha) • Water quality target will be achieved by the provision of an outlet located above the dedicated stone filled infiltration layer.
Catchment – PR-102 • Stone filled infiltration trench located within roadside ditch system.	• To achieve Level 1 (enhanced) protection, a storage volume of 37 m^3 is required based on Table 3.2 of the SWM Manual (1.48 ha x 25 m^3/ha) • Water quality target will be achieved by the provision of an outlet located above the dedicated stone filled infiltration layer.
Catchment – PR-200 • Stone filled infiltration trench located within roadside ditch system.	• To achieve Level 1 (enhanced) protection, a storage volume of 19 m^3 is required based on Table 3.2 of the SWM Manual (0.75 ha x 25 m^3/ha) • Water quality target will be achieved by the provision of an outlet located above the dedicated stone filled infiltration layer.
Catchment – PR-201 • Stone filled infiltration trench located within roadside ditch system.	• To achieve Level 1 (enhanced) protection, a storage volume of 32 m^3 is required based on Table 3.2 of the SWM Manual (1.28 ha x 25 m^3/ha) • Water quality target will be achieved by the provision of an outlet located above the dedicated stone filled infiltration layer.

4.3 Stormwater Quantity Control

4.3.1 Peak Flow Calculations

Peak flows were estimated using Visual Otthymo version 3.0 (VO3) hydrologic modelling software

for each of the 2, 5, 10, 25, 50 and 100-year storm events. These calculations consider the 6-hour SCS storm duration as prescribed by the City of Peterborough Engineering Design Standards (April 2019). The schematic layout of the VO3 model and the simulation results are presented in **Appendix B.**

Table 4 – Existing and Uncontrolled Peak Flow Rates – OUT 1 and OUT 2

Return Period	Peak Flow Rates (m^3/s)							
	OUT 1 WEST		OUT 1 EAST		OUT 2 WEST		OUT 2 EAST	
	EX[1]	UNC[2]	EX[1]	UNC[2]	EX[1]	UNC[2]	EX[1]	UNC[2]
2-Year	0.042	**0.063**	0.020	**0.081**	0.025	0.017	0.056	**0.092**
5-Year	0.078	**0.117**	0.042	**0.133**	0.052	0.034	0.110	**0.149**
10-Year	0.107	**0.159**	0.060	**0.171**	0.073	0.046	0.151	**0.196**
25-Year	0.147	**0.216**	0.086	**0.238**	0.103	0.064	0.210	**0.257**
50-Year	0.180	**0.264**	0.107	**0.283**	0.128	0.078	0.257	**0.320**
100-Year	0.215	**0.313**	0.129	**0.330**	0.154	0.093	0.306	**0.374**

Notes: 1. EX refers to the existing development condition. (NHYD = 1, 2, 3, 4)

2. UNC refers to the proposed conditions without SWM controls. (NYHD = 6, 9, 13, 12)

As shown in **Table 4,** the proposed uncontrolled flows to **OUT 1 WEST, OUT 1 EAST** and **OUT 2 EAST** exceed the existing condition levels without the use of SWM controls, and therefore stormwater quantity controls will be required for these outlet locations. The proposed uncontrolled flows to **OUT 2 WEST** are reduced due to a reduction in drainage area discharging to that location in the proposed condition. As a result, stormwater quantity controls will not be required for **OUT 2 WEST**. The outlet locations are shown on **Figure 2** and **Figure 3.**

Table 5 – Existing and Uncontrolled Peak Flow Rates – OUT 3 and OUT 4

Return Period	Peak Flow Rates (m^3/s)			
	OUT 3		OUT 4	
	EX[1]	UNC[2]		
2-Year	0.089	0.089	0.020	0.011
5-Year	0.184	0.182	0.040	0.021
10-Year	0.261	0.256	0.056	0.028
25-Year	0.369	0.361	0.078	0.038
50-Year	0.458	0.448	0.096	0.047
100-Year	0.553	0.541	0.115	0.055

Notes: 1. EX refers to the existing development condition. (NHYD = 5, 55)

2. UNC refers to the proposed condition without SWM controls. (NYHD = 14, 56)

In the post development condition for Outlet 3 **(OUT 3)**, a portion of the overall developed site, including six (6) residential homes and backyards, will be directed to

the outlet. In the post development condition for Outlet 4 (**OUT 4**), a portion of the rear yards at the southern tip of the property will be directed to the outlet. A review of the hydrologic parameters and modelling indicates a reduction in drainage area to both **OUT 3** and **OUT 4**, offsetting the increase in impervious area. As a result and as outlined in **Table 5**, there is no increase in peak flow rates discharging to **OUT 3** and **OUT 4**, and therefore no stormwater quantity controls will be required for either outlet.

4.3.2 Quantity Control Summary

In accordance with the design criteria established in **Section 3.1**, quantity controls are required to ensure that post-development flow rates do not exceed existing conditions, for each outlet, up to the 100-year storm. The VO3 model is used to estimate the required storage volume to provide the necessary quantity control without overtopping. A preliminary design of the combination stone filled infiltration trenches / detention ditches have been completed to confirm that sufficient stage storage can be provided. The flow regulation can be achieved by means of an outlet control structure for each facility.

4.4 Stormwater Management Facilities

SWM facilities will be required for the development to achieve the necessary quality and quantity control targets. As discussed in **Table 3**, stone filled infiltration trenches will provide the necessary water quality control for each outlet location. As necessary, an open detention portion will be provided above the infiltration trench as part of the roadside ditch system, and will be controlled by a dedicated outlet structure within each facility.

4.4.1 Design Overview

The preliminary selection of the SWM facilities was designed based on the required volume targets, outlet configuration and site topography. A review of **Table 6** provides a summary of each SWM facility for each outlet location.

Table 6 – Proposed Stormwater Management Facility Summary

Catchment	Outlet ID	Design Summary
PR-100	**OUT-1 WEST**	• 1.0 m deep stone filled infiltration trench, 2.0 m in width and 90 m in length • Required storage volume of stone filled trench for quality control is 66.5 m^3, with 72 m^3 provided. • Total storage volume required for quantity control is 261 m^3, with 278 m^3 provided at 0.6 m depth. • One stage outlet control is assumed in the preliminary calculations, multi-stage will be considered during detailed design to maximize outlet efficiency and reduce facility size.
PR-102	**OUT-1 EAST**	• 1.0m deep stone filled infiltration trench, 2.0 m in width and 97 m in length • Required storage volume of stone filled trench for quality control is 37 m^3, with 74 m^3 provided. • Total storage volume required for quantity control is 433 m^3, with 435 m^3 provided at 0.8m depth. • One stage outlet control is assumed in the preliminary calculations, multi-stage will be considered during detailed design to maximize outlet efficiency and reduce facility size.
PR-200	**OUT-2 WEST**	• 0.5 m deep stone filled infiltration trench, 2.0 m in with and 50 m in length. • Required storage volume of stone filled trench for quality control is 19 m^3, with 21 m^3 provided. • Stormwater quantity control not required for PR-200.
PR-201	**OUT-2 EAST**	• 1.0 m deep stone filled infiltration trench, 2.0 m in width and 107 m in length • Required storage volume of stone filled trench for quality control is 32 m^3, with 52 m^3 provided. • Total storage volume required for quantity control is 200 m^3, with 301 m^3 provided at 0.6 m depth. • One stage outlet control is assumed in the preliminary calculations, multi-stage will be considered during detailed design to maximize outlet efficiency and reduce facility size.

A review of **Table 6** indicates that sufficient storage volumes can be provided within the SWM facilities to meet the LID, water quality and water quantity control requirements. A geotechnical study of the site is recommended during the detailed design phase to

determine actual infiltration rates and groundwater levels to confirm the final dimensions of the proposed facility and to include a shallow infiltration bottom to the proposed facilities.

4.4.2 Proposed Release Rates

The proposed peak flow rates for from the preliminary SWM facilities with respect to design storm events are shown in **Table** below.

Table 7 – Existing and Proposed Peak Flow Summary

Return Period	Peak Flow Rates (m^3/s)							
	OUT 1 WEST		OUT 1 EAST		OUT 2 WEST		OUT 2 EAST	
	EX[1]	PR[2]	EX[1]	PR[2]	EX[1]	PR[2]	EX[1]	PR[2]
2-Year	0.042	0.020	0.020	0.020	0.025	0.017	0.056	0.056
5-Year	0.078	0.068	0.042	0.038	0.052	0.034	0.110	0.110
10-Year	0.107	0.104	0.060	0.049	0.073	0.046	0.151	0.149
25-Year	0.147	0.140	0.086	0.065	0.103	0.064	0.210	0.194
50-Year	0.180	0.165	0.107	0.077	0.128	0.078	0.257	0.232
100-Year	0.215	0.186	0.129	0.089	0.154	0.093	0.306	0.268

Notes: 1. EX refers to the existing development condition. (NHYD = 1, 2, 3, 4)

2. PR refers to the proposed conditions with controlled flows from the proposed control facility. (NYHD = 16, 20, 13, 24)

A review of **Table 7** indicates the proposed SWM facilities will provide the required quantity controls such that the proposed development will not increase peak flow rates at each outlet location. Stage-Storage-Discharge calculations are provide for each facility in **Appendix D**. It is noted that these facilities have been conservatively designed using a single outlet control. During detailed design, the outlet configuration and infiltration storage depth for each facility will be optimized to reduce the storage volume requirements.

5.0 Conclusion

As the proposed residential subdivision will alter existing drainage patterns, a preliminary stormwater management report has been prepared to address the requirements of the County of Peterborough and ORCA.

Low Impact Development considerations and stormwater quality controls such as stone filled infiltration trenches within the roadway corridor can be provided to achieve "Enhanced" Level 1 protection as defined in the Stormwater Management Planning and Design Manual (March 2003).

Water quantity controls can be provided by the stone filled infiltration ditches within the roadway corridor with outlet control structures providing detention control to existing condition levels.

If you require any further information, or have any questions, please do not hesitate to contact the undersigned.

Respectfully submitted,

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

Mark Wilson, A.Sc.T.
Water Resources Designer

MW/CPB/jl

Statement of Limitations

This report has been prepared by D.M. Wills Associates Limited on behalf of Mr. Rubal Kundra of Life at the Woodland Inc. to address the requirements of the County of Peterborough and ORCA.

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 determine the feasibility of the proposed development with respect to Stormwater Management of the Site. The design information provided in this report is preliminary in nature and should not be used for site plan application or construction purposes.

Any use that a third party makes of this report other than a Preliminary Stormwater Management Report for the proposed 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 action taken based on using this report for purposes other than a Preliminary Stormwater Management Report for the proposed Life at the Woodland residential subdivision.

Appendix A

Rainfall Data and Hydrology

B.1 Storm Sewer System

City of Peterborough Standard Drawings and Specifications shall be adhered to at all times. Where the City has no standard or specification, the City of Peterborough recognizes the July 1984 release of the Ministry of Environment Guidelines for the Design of Storm Sewer Systems as the guidelines by-which all storm sewer work shall conform to. Otherwise, OPSS or OPSD shall apply.

B.1.1 Definition and Use

Storm systems may consist of one or any combination of pipes, ditches, culverts, open channels and storm water management facilities that convey storm water.

Storm sewers shall be designed to collect storm water discharge from pervious and impervious areas both on private and public lands. Storm drainage connected to buildings on private property requires a building permit before installation.

B.1.2 Location and Alignment

All works to be constructed within a City road allowance are to be located in accordance with the appropriate City of Peterborough Drawing from standards USD100.01 thru USD100.13. The City must approve locating works in non-standard locations.

Storm sewers connected to buildings on private property are regulated by Part 7 of the OBC. Where there are no specific regulations in the OBC, details from this document shall apply.

Connections to existing storm sewer systems shall be made at manholes. Where no manhole is present a new manhole is required on the City's main. Connections between storm sewer pipes on private property, where not at a manhole or catchbasin, shall be made with manufactured 'Tees" and only with approval from the City engineering department and only if sewer is not defined as a *building sewer* 200mm or greater. Control manholes for private sewers shall be placed on the front property line or just inside the property if placement on the property line is not possible.

B.1.3 Drainage / Sub Drainage Area Plans

Drainage/sub-drainage area limits for sewer designs are to be in accordance with approved grading plans to the proposed maintenance holes (or catchbasins if applicable) located on the R.O.W.

Note: All areas and runoff coefficients are to be shown for each drainage/sub-drainage areas.

B.1.4 External Watershed Limits and Drainage Areas

When design abuts undeveloped areas, identify the external watershed limit to be designed for, typically following contour lines. Developed external areas should encompass the entire sewershed.

Note: All areas, runoff coefficients and time of concentrations are to be shown for all drainage areas within external watershed limits.

B.1.5 Design Chart

Storm sewer design calculations are to be completed on an appropriate Storm Sewer Design chart.

B.1.6 Design Requirements and Location

The City of Peterborough rainfall data based upon 2002 AES Peterborough Airport IDF shall be used for the development of rainfall intensities for storm sewer design. Alternatively, IDF curve parameters A, B, and C provided in Table B.1.7.1 may be used.

Storm sewers shall be designed as a separate sewer system. Effluent from sanitary sewers or any potentially contaminated drainage from industrial, agricultural or commercial operations shall not be discharged into storm sewers. Contaminated drainage means, the introduction of any foreign, undesirable physical, chemical or biological substance into the environment, which results or is likely to result in deleterious effects.

Storm sewers shall be designed as deep storm sewers with approximately 3.0m of cover where private gravity service connections are required. An acceptable alternative to the deep sewer system is the provision of a separate foundation drainage system (generally with smaller pipes) with gravity service connections as well as a traditional storm sewer system with shallow pipes. Where physical constraints do not allow for either above noted system, a shallow system may be approved with pipe typically 1.25m deep.

The alignment of the storm varies depending on the type of road and whether or not deep storm sewers are to be implemented. Typically, deep storm sewers are offset 1.5m on one side of the centreline with the sanitary sewer offset 1.5m from the other side of the centreline. Shallow storm sewers, particularly those less than 450mm in diameter, are typically located 0.31 metres within the curb face. Storm sewers are generally to the north or west of the centerline.

MOE Guidelines require 0.5m vertical or 2.5m horizontal clearances between sewers and watermains. In some circumstances it may be prudent for the PUC/City jointly to decide by what means/best practice one main crosses the other in addition to MOE

design guidelines. Watermain bends may be required at sewer/watermain pipe crossings while sometimes it may be more appropriate to change the grade of a sewer, depending on the circumstances.

The capacity of the minor storm sewer systems shall typically be designed to carry the peak flow resulting from a one (1) in five (5) year rainfall event. Where gravity foundation service connections exist, the five year design flow must not exceed 80% of the just full pipe capacity.

Where gravity service connections exist or are proposed, a 100 year hydraulic grade line analysis must be undertaken, to determine peak 100 year water levels within a potentially surcharged storm sewer system. A minimum freeboard of 0.50m must be provided between the computed 100 year hydraulic grade line and the minimum basement floor level in conjunction with the use of backflow preventers. Where the change in grade has the potential for hydraulic jumps, additional freeboard shall be provided. The implementation of flow regulating ICDs may be permitted by the City Engineer to reduce 100 year storm sewer flows on a case by case basis only at low points in the road, however in all instances, the 5 year flow must pass through the ICD unencumbered with minimal backwater head and no surface ponding. Pipe sizes should be increased elsewhere to accommodate the 100 year flow with appropriate hydraulic grade line elevations.

The major system design shall be based on a one in 100 year rainfall event and should include assessment of road sags and boulevard overflows into stormwater management ponds and watercourses. The maximum ponding depth shall not exceed 300mm as measure to the centerline of the road.

B.1.7 Peak Flow Calculation and Storm Sewer Design

The design area shall include all areas, which reasonably or naturally drain to the system. To calculate the peak rate of runoff from an area, the Rational Method shall be used as follows:

$$Q = K \cdot A \cdot i \cdot C$$

Where:

‘Q’ - is peak flow (l/s)
‘K’ - is 2.78
‘A’ - is the area (hectares)
‘i’ - is the rainfall intensity (mm/hour) calculated as follows:

$$i = \frac{A}{(Tc + B)^C}$$

or as directly derived from 2002 Peterborough Airport IDF curves

Where: A, B and C are per Table B.1.7.1.

Table B.1.7.1

	A	B	C
2 Year	662	7.5	0.79
5 Year	1098	10.1	0.83
10 Year	1560	13	0.86
25 Year	2010	14	0.88
50 Year	2200	14.6	0.87
100 Year	2507	14.8	0.88

Please note that the above A, B, C values shall be used for storm sewer design only, or other calculations design storms of less than 3 hours duration. Stormwater Management Reports should use rainfall directly from the 2006 Peterborough Airport IDF curves.

The time of concentration (Tc) should be calculated rather than relying upon arbitrary minimum and maximum times. Where this is not practical, a ten (10) minute time of concentration (Tc) shall be used except when the zoning requires the use of a runoff coefficient of 0.75 or higher in which case five (5) minute time of concentration (Tc) shall be used.
'C' - is the co-efficient of run-off

The runoff co-efficient or "C" for storm drainage unless otherwise specified or adequately proven through calculation, shall be per Table B.1.7.2 for the 5 year design.

Table B.1.7.2

Parks – over 4.0 ha	0.20
Parks – 4.0 ha and under	0.25
Single family residential-15m lots	0.55
Single family residential-12m lots	0.65
Single family residential-9m lots	0.75
Semi-detached	0.80
Townhouses	0.85
Apartments	0.90
Schools and Churches / Industrial	Varies
Commercial	0.90
Heavily Developed Areas	0.90
Asphalt, Concrete, Roofed Areas	0.95

25 to 100 year runoff co-efficients shall be increased to account for soil saturation. Increase co-efficients for the 25, 50, and 100 year storms by 10%, 20%, and 25% respectively up to a maximum value of 0.95.

B.1.7.1 Flow Velocities and Minimum Slope

Storm sewer flow velocities shall not be less than 0.8 m/s when flowing full or 0.6m/s at design depth. Minimum longitudinal slope shall be 0.5%. The preferred maximum velocity is 3.0 m/s with an absolute maximum acceptable velocity of 6.0 m/s.

B.1.7.2 Pipe Cover

The minimum depth of cover to pipe crown shall be 1.2 m. Excessive cover should be avoided except under special circumstances.

Minimum pipe cover for deep sewers shall be based upon providing gravity connections including hydraulic grade line freeboard for storm services.

For concrete pipe, the maximum allowable cover permitted on concrete pipe to be constructed is to be based on OPSD 807.010, 807.030, 807.040 and 807.050. Where the pipe required exceeds the OPSD charts, a pipe design sealed by a Professional Engineer must be submitted to the City for approval.

For flexible pipe, the maximum allowable cover permitted shall be as per OPSD or manufacturers specifications.

B.1.7.3 Gravity Pipe Design

The minimum pipe diameter for storm sewers shall be 250 mm. Minimum pipe diameter for catchbasins leads shall be 250mm with the exception of double catchbasins which shall be 300mm.

The obvert of the inlet pipe at all maintenance holes shall be higher than or equal to the obvert of the outlet pipe. Appropriate invert elevation drops to account for the velocity head, transition and bend losses within manholes should be provided.

An outlet pipe from a manhole is not permitted to be smaller than the incoming pipe even if the outlet pipe has adequate capacity due to greater slope. Allowances may be granted by the City Engineer in special circumstances to allow a smaller outlet pipes on privately owned property in the event other regulatory agencies (e.g. MTO) require this for stormwater retention.

The Manning equation shall be used to calculate the required hydraulic capacity of a gravity sewer as follows:

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

Project No: 19-10874
Project Name: Life at the Woodland
Designed/Checked By: MW / CPB
Date: 22-Feb-22

Land Use

	Internal	External	
Agriculture	0.00	0.00	ha
Range	0.00	0.00	ha
Grass	0.35	1.47	ha
Woods	0.10	0.06	ha
Wetland	0.00	0.00	ha
Gravel	0.00	0.00	ha
Impervious	0.00	0.04	ha
SUM	**0.45**	**1.57**	
Hydrologic Soil Group[1]	B	B	
Soil Type	0	0	
C	0.21	0.21	
CN (Nashyd)	60.3	61.8	

Rainfall Data

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

Drainage Area	**2.02**	ha
Impervious Area	**0.04**	ha
Percent Impervious	**1.9%**	
Connected Impervious	1.9%	

	Pervious	Impervious	
Length	125	5	m
US Elev	226.5	207.5	m
DS Elev	207.5	207.4	m
Slope	15.2	2.0	%
	Steep	Flat	

Parameter	Soil Group	Land Use: Agriculture	Range	Grass	Woods	Wetland	Gravel	Imperv.	Weighted Value: Incl. Imperv. NASHYD	Weighted Value: Not Incl. Imperv. STANDHYD
Runoff Coefficient[2]**, C**	**B**	0.57	0.35	0.19	0.29	0.05	0.76	0.90	0.21	
	B	0.57	0.35	0.19	0.29	0.05	0.76	0.90	0.21	n.a.
SCS Curve No.[3]**, CN**	**B**	74	65	61	58	50	85	98	60.3	60.3
	B	74	65	61	58	50	85	98	61.8	60.9
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	5.3	5.4

Time of Concentration[6]

Pervious Length	125	m	
Slope	15.2	%	
Airport	13.2	min.	
Bransby - Williams	3.9	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Applicable Minimum[7]	**15.0**	min.	
Time to Peak	10.1	min.	
	0.17	**hr.**	

Composite Parameters

Drainage Area	2.02 ha	
Runoff Coefficient	0.21	
SCS Curve No.	61.5	60.8
Modified Curve No.[4]**, CN***	**61.5**	60.7
Initial Abstraction.	**5.3**	5.4

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 15 minutes
8. All impervious areas have been assumed to be directly connected.

Hydrologic Parameters for EX-101

Sheet 1 of 1

Project No: 19-10874
Project Name: Life at the Woodland
Designed/Checked By: MW / CPB
Date: 22-Feb-22

Land Use

Agriculture	0.00	0.00	ha
Range	0.21	0.07	ha
Grass	0.08	0.00	ha
Woods	0.96	0.07	ha
Wetland	0.00	0.00	ha
Gravel	0.00	0.00	ha
Impervious	0.03	0.00	ha
SUM	**1.27**	**0.14**	
Hydrologic Soil Group[1]	B	B	
Soil Type	0	0	
C	0.15	0.17	
CN (Nashyd)	60.4	61.5	

Rainfall Data

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

Drainage Area	**1.42**	ha
Impervious Area	**0.03**	ha
Percent Impervious	**2.4%**	
Connected Impervious	0.2%	

Pervious

Length	110	m
US Elev	212.2	m
DS Elev	207.5	m
Slope	4.3	%
	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	0.15	
	B	0.32	0.22	0.13	0.11	0.05	0.76	0.90	0.17	n.a.
SCS Curve No.[3]**, CN**	B	74	65	61	58	50	85	98	60.4	59.4
	B	74	65	61	58	50	85	98	61.5	61.5
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	9.1	9.3

Time of Concentration[6]

Total Length	110	m	
Average Slope	4.3	%	
Airport	**20.1**	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	4.5	min.	
Applicable Minimum[7]	15.0	min.	
Time to Peak	13.5	min.	
	0.22	**hr.**	

Composite Parameters

Drainage Area	1.42 ha	
Runoff Coefficient	0.15	
SCS Curve No.	60.5	59.6
Modified Curve No.[4]**, CN***	**63.1**	62.7
Initial Abstraction.	**9.1**	9.3

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 15 minutes
8. Connected Impervious is estimated using the Sutherland Equation with a Watershed Selection Criteria of Somewhat Connected

Hydrologic Parameters for EX-200

Sheet 1 of 1

Project No: 19-10874
Project Name: Life at the Woodland
Designed/Checked By: MW / CPB
Date: 22-Feb-22

Land Use

	Internal	External	
Agriculture	0.00	0.00	ha
Range	0.00	0.00	ha
Grass	0.27	0.13	ha
Woods	1.04	0.09	ha
Wetland	0.00	0.00	ha
Gravel	0.00	0.00	ha
Impervious	0.00	0.00	ha
SUM	**1.31**	**0.22**	
Hydrologic Soil Group[1]	B	B	
Soil Type	0	0	
C	0.27	0.23	
CN (Nashyd)	58.6	59.8	

Rainfall Data

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

Drainage Area	**1.53**	ha
Impervious Area	**0.00**	ha
Percent Impervious	**0.0%**	
Connected Impervious	0.0%	
	Pervious	
Length	130	m
US Elev	225.9	m
DS Elev	211.6	m
Slope	11.0	%
	Steep	

Parameter	Soil Group	Land Use: Agriculture	Range	Grass	Woods	Wetland	Gravel	Imperv.	Weighted Value: Incl. Imperv. NASHYD	Weighted Value: Not Incl. Imperv. STANDHYD
Runoff Coefficient[2]**, C**	**B**	0.57	0.35	0.19	0.29	0.05	0.76	0.90	0.27	
	B	0.57	0.35	0.19	0.29	0.05	0.76	0.90	0.23	n.a.
SCS Curve No.[3]**, CN**	**B**	74	65	61	58	50	85	98	58.6	58.6
	B	74	65	61	58	50	85	98	59.8	59.8
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	8.7	8.7

Time of Concentration[6]

Total Length	130	m	
Average Slope	11.0	%	
Airport	14.1	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	4.4	min.	
Applicable Minimum[7]	**15.0**	min.	
Time to Peak	10.1	min.	
	0.17	**hr.**	

Composite Parameters

Drainage Area	1.53 ha	
Runoff Coefficient	0.26	
SCS Curve No.	58.8	58.8
Modified Curve No.[4]**, CN***	**61.7**	61.7
Initial Abstraction.	**8.7**	8.7

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 15 minutes
8. All impervious areas have been assumed to be directly connected.

Hydrologic Parameters for EX-201

Sheet 1 of 1

Project No: 19-10874
Project Name: Life at the Woodland
Designed/Checked By: MW / CPB
Date: 22-Feb-22

Land Use

	Internal	External	
Agriculture	0.00	0.00	ha
Range	2.16	0.24	ha
Grass	0.00	0.00	ha
Woods	0.02	0.00	ha
Wetland	0.00	0.00	ha
Gravel	0.00	0.00	ha
Impervious	0.00	0.02	ha
SUM	**2.18**	**0.26**	
Hydrologic Soil Group[1]	B	B	
Soil Type	0	0	
C	0.30	0.34	
CN (Nashyd)	64.9	67.3	

Rainfall Data

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

Drainage Area	**2.44**	ha
Impervious Area	**0.02**	ha
Percent Impervious	**0.7%**	
Connected Impervious	0.7%	

Pervious

Length	100	m
US Elev	213.2	m
DS Elev	206.6	m
Slope	6.6	%
	Hilly	

Parameter	Soil Group	Land Use: Agriculture	Range	Grass	Woods	Wetland	Gravel	Imperv.	Weighted Value: Incl. Imperv. NASHYD	Weighted Value: Not Incl. Imperv. STANDHYD
Runoff Coefficient[2]**, C**	**B**	0.40	0.30	0.19	0.14	0.05	0.76	0.90	0.30	
	B	0.40	0.30	0.19	0.14	0.05	0.76	0.90	0.34	n.a.
SCS Curve No.[3]**, CN**	**B**	74	65	61	58	50	85	98	64.9	64.9
	B	74	65	61	58	50	85	98	67.3	65.0
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	8.0	8.0

Time of Concentration[6]

Total Length	100	m	
Average Slope	6.6	%	
Airport	13.9	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	3.6	min.	
Applicable Minimum[7]	**15.0**	min.	
Time to Peak	10.1	min.	
	0.17	**hr.**	

Composite Parameters

Drainage Area	2.44 ha	
Runoff Coefficient	0.30	
SCS Curve No.	65.2	64.9
Modified Curve No.[4]**, CN***	**68.8**	68.5
Initial Abstraction.	**8.0**	8.0

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 15 minutes
8. All impervious areas have been assumed to be directly connected.

Hydrologic Parameters for EX-300

Sheet 1 of 1

WILLS

Project No: 19-10874
Project Name: Life at the Woodland
Designed/Checked By: RC/CPB
Date: 22-Feb-22

Land Use

	Internal	
Agriculture	0.00	ha
Range	5.25	ha
Grass	0.00	ha
Woods	3.47	ha
Wetland	0.00	ha
Gravel	0.00	ha
Impervious	0.00	ha
SUM	**8.72**	

Hydrologic Soil Group[1]	B
Soil Type	0
C	0.18
CN (Nashyd)	62.2

Rainfall Data

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

Drainage Area	**8.72**	ha
Impervious Area	**0.00**	ha
Percent Impervious	**0.0%**	
Connected Impervious	0.0%	

Pervious

Length	330	m
US Elev	213.5	m
DS Elev	200.9	m
Slope	3.8	%
	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	0.18	n.a.
SCS Curve No.[3]**, CN**	B	74	65	61	58	50	85	98	62.2	62.2
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	8.8	8.8

Time of Concentration[6]

Total Length	330	m	
Average Slope	3.8	%	
Airport	**35.2**	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	11.6	min.	
Applicable Minimum[7]	15.0	min.	
Time to Peak	23.6	min.	
	0.39	**hr.**	

Composite Parameters

Drainage Area	8.72 ha	
Runoff Coefficient	0.18	
SCS Curve No.	62.2	62.2
Modified Curve No.[4]**, CN***	**64.6**	64.6
Initial Abstraction.	**8.8**	8.8

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 15 minutes
8. All impervious areas have been assumed to be directly connected.

Hydrologic Parameters for EX-400

Sheet 1 of 1

Project No: 19-10874
Project Name: Life at the Woodland
Designed/Checked By: RC/CPB
Date: 22-Feb-22

Land Use

	Internal	
Agriculture	0.00	ha
Range	1.09	ha
Grass	0.00	ha
Woods	0.15	ha
Wetland	0.00	ha
Gravel	0.00	ha
Impervious	0.00	ha
SUM	**1.24**	

Hydrologic Soil Group[1]	B
Soil Type	0
C	0.21
CN (Nashyd)	64.2

Rainfall Data

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

Drainage Area	**1.24**	ha
Impervious Area	**0.00**	ha
Percent Impervious	**0.0%**	
Connected Impervious	0.0%	

Pervious

Length	165	m
US Elev	211.6	m
DS Elev	204.8	m
Slope	4.1	%
	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	64.2	64.2
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	165	m	
Average Slope	4.1	%	
Airport	**23.5**	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	6.9	min.	
Applicable Minimum[7]	15.0	min.	
Time to Peak	15.7	min.	
	0.26	**hr.**	

Composite Parameters

Drainage Area	1.24 ha	
Runoff Coefficient	0.21	
SCS Curve No.	64.2	64.2
Modified Curve No.[4]**, CN***	**67.5**	67.5
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 15 minutes
8. All impervious areas have been assumed to be directly connected.

Hydrologic Parameters for PR-100

Sheet 1 of 1

Project No: 19-10874
Project Name: Life at the Woodland
Designed/Checked By: RC/CPB
Date: 22-Feb-22

Land Use

	Internal	External	
Agriculture	0.00	0.00	ha
Range	0.00	0.00	ha
Grass	0.87	1.47	ha
Woods	0.00	0.06	ha
Wetland	0.00	0.00	ha
Gravel	0.00	0.00	ha
Impervious	0.22	0.04	ha
SUM	**1.09**	**1.57**	
Hydrologic Soil Group[1]	B	B	
Soil Type	0	0	
C	0.33	0.21	
CN (Nashyd)	68.5	61.8	

Rainfall Data

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

Drainage Area	**2.66**	ha
Impervious Area	**0.26**	ha
Percent Impervious	**9.7%**	
Connected Impervious	9.7%	

	Pervious	Impervious	
Length	125	8	m
US Elev	226.5	207.5	m
DS Elev	207.5	207.3	m
Slope	15.2	2.0	%
	Steep	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**	0.57	0.35	0.19	0.29	0.05	0.76	0.90	0.33	
	B	0.57	0.35	0.19	0.29	0.05	0.76	0.90	0.21	n.a.
SCS Curve No.[3], CN	**B**	74	65	61	58	50	85	98	68.5	61.0
	B	74	65	61	58	50	85	98	61.8	60.9
Initial Abstraction[5], mm		6.0	8.0	5.0	10.0	10.0	2.5	2.0	4.8	5.1

Time of Concentration[6]

Pervious Length	125	m	
Slope	15.2	%	
Airport	12.5	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	3.7	min.	
Applicable Minimum[7]	**15.0**	min.	
Time to Peak	10.1	min.	
	0.17	**hr.**	

Composite Parameters

Drainage Area	2.66 ha	
Runoff Coefficient	0.26	
SCS Curve No.	64.5	60.9
Modified Curve No.[4], CN*	**64.8**	60.6
Initial Abstraction.	**4.8**	5.1

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 15 minutes
8. All impervious areas have been assumed to be directly connected.

Hydrologic Parameters for PR-101

Sheet 1 of 1

Project No: 19-10874
Project Name: Life at the Woodland
Designed/Checked By: RC/CPB
Date: 22-Feb-22

Land Use

	Controlled Lots	Uncontrolled Lots	Roadway	External
Agriculture	0.00	0.00	ha	
Range	0.00	0.00	ha	
Grass	0.00	0.53	ha	
Woods	0.00	0.00	ha	
Wetland	0.00	0.00	ha	
Gravel	0.00	0.00	ha	
Impervious	0.00	0.06	ha	
SUM	**0.00**	**0.59**		
Hydrologic Soil Group[1]	B	B		
Soil Type	0	0		
C		0.21		
CN (Nashyd)		64.7		

Rainfall Data

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

Drainage Area	**0.59**	ha
Impervious Area	**0.06**	ha
Percent Impervious	**10.0%**	
Connected Impervious	10.0%	

	Pervious	Impervious	
Length	40	5	m
US Elev	212.2	211.0	m
DS Elev	210.2	210.9	m
Slope	5.0	2.0	%
	Rolling	Flat	

Parameter	Soil Group	Land Use: Agriculture	Range	Grass	Woods	Wetland	Gravel	Imperv.	Weighted Value: Incl. Imperv. NASHYD	Weighted Value: Not Incl. Imperv. STANDHYD
Runoff Coefficient[2]**, C**	B	0.32	0.22	0.13	0.11	0.05	0.76	0.90		
	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		98		
	B	74	65	61	58	50	85	98	64.7	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	45	m	
Average Slope	4.7	%	
Airport	11.7	min.	
Bransby - Williams	2.0	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Applicable Minimum[7]	**15.0**	min.	
Time to Peak	10.1	min.	
	0.17	**hr.**	

Composite Parameters

Drainage Area	0.59 ha	
Runoff Coefficient	0.21	
SCS Curve No.	64.7	61.0
Modified Curve No.[4]**, CN***	**65.0**	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 15 minutes
8. Connected Impervious does not include areas that discharge to pervious surfaces.

Hydrologic Parameters for PR-102

Sheet 1 of 1

WILLS

Project No: 19-10874
Project Name: Life at the Woodland
Designed/Checked By: RC/CPB
Date: 22-Feb-22

Land Use

	Controlled Lots	Roadway	External	
Agriculture	0.00	0.00	0.00	ha
Range	0.00	0.00	0.00	ha
Grass	0.70	0.29	0.08	ha
Woods	0.00	0.00	0.07	ha
Wetland	0.00	0.00	0.00	ha
Gravel	0.00	0.00	0.00	ha
Impervious	0.08	0.23	0.03	ha
SUM	**0.78**	**0.52**	**0.18**	
Hydrologic Soil Group[1]	B	B	B	
Soil Type	0	0	0	
C	0.21	0.48	0.26	
CN (Nashyd)	64.7	77.7	66.6	

Rainfall Data

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

Drainage Area	**1.48**	ha
Impervious Area	**0.35**	ha
Percent Impervious	**23.3%**	
Connected Impervious	23.3%	

	Pervious	Impervious	
Length	40	5	m
US Elev	212.2	211.0	m
DS Elev	210.2	210.9	m
Slope	5.0	2.0	%
	Rolling	Flat	

Parameter	Soil Group	Land Use: Agriculture	Range	Grass	Woods	Wetland	Gravel	Imperv.	Weighted Value: Incl. Imperv. NASHYD	Weighted Value: 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.
	B	0.32	0.22	0.13	0.11	0.05	0.76	0.90	0.48	
	B	0.32	0.22	0.13	0.11	0.05	0.76	0.90	0.26	
SCS Curve No.[3]**, CN**	**B**	74	65	61	58	50	85	98	64.7	61.0
	B	74	65	61	58	50	85	98	77.7	61.0
	B	74	65	61	58	50	85	98	66.6	59.6
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	4.5	5.3

Time of Concentration[6]

Total Length	45	m	
Average Slope	4.7	%	
Airport	10.4	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	1.8	min.	
Applicable Minimum[7]	**15.0**	min.	
Time to Peak	10.1	min.	
	0.17	**hr.**	

Composite Parameters

Drainage Area	1.48 ha	
Runoff Coefficient	0.31	
SCS Curve No.	69.5	60.8
Modified Curve No.[4]**, CN***	70.8	**60.7**
Initial Abstraction.	4.5	**5.3**

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 15 minutes
8. All impervious areas have been assumed to be directly connected.

Hydrologic Parameters for PR-200

Sheet 1 of 1

Project No: 19-10874
Project Name: Life at the Woodland
Designed/Checked By: RC/CPB
Date: 22-Feb-22

Land Use

	Internal	External	
Agriculture	0.00		ha
Range	0.00		ha
Grass	0.20		ha
Woods	0.43		ha
Wetland	0.00		ha
Gravel	0.00		ha
Impervious	0.12		ha
SUM	**0.75**		

Hydrologic Soil Group[1]	B
Soil Type	0
C	0.36
CN (Nashyd)	65.2

Rainfall Data

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

Drainage Area	**0.75**	ha
Impervious Area	**0.12**	ha
Percent Impervious	**16.1%**	
Connected Impervious	16.1%	

	Pervious	Impervious	
Length	130	8	m
US Elev	225.9	210.0	m
DS Elev	211.6	209.8	m
Slope	11.0	2.0	%
	Steep	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**	0.57	0.35	0.19	0.29	0.05	0.76	0.90	0.36	n.a.
SCS Curve No.[3]**, CN**	**B**	74	65	61	58	50	85	98	65.2	59.0
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	7.4	8.4

Time of Concentration[6]

Total Length	138	m	
Average Slope	10.5	%	
Airport	13.0	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	5.1	min.	
Applicable Minimum[7]	**15.0**	min.	
Time to Peak	10.1	min.	
	0.17	**hr.**	

Composite Parameters

Drainage Area	0.75 ha	
Runoff Coefficient	0.36	
SCS Curve No.	65.2	59.0
Modified Curve No.[4]**, CN***	**68.1**	61.7
Initial Abstraction.	**7.4**	8.4

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 15 minutes
8. All impervious areas have been assumed to be directly connected.

Hydrologic Parameters for PR-201

Sheet 1 of 1

Project No: 19-10874
Project Name: Life at the Woodland
Designed/Checked By: RC/CPB
Date: 22-Feb-22

Land Use

	Controlled Lots	Controlled Roadway	External	
Agriculture	0.00	0.00	0.00	ha
Range	0.00	0.00	0.24	ha
Grass	0.41	0.30	0.00	ha
Woods	0.00	0.00	0.00	ha
Wetland	0.00	0.00	0.00	ha
Gravel	0.00	0.00	0.00	ha
Impervious	0.05	0.25	0.02	ha
SUM	**0.46**	**0.55**	**0.26**	
Hydrologic Soil Group[1]	B	B	B	
Soil Type	0	0	0	
C	0.26	0.51	0.34	
CN (Nashyd)	64.7	77.7	67.3	

Rainfall Data

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

Drainage Area	**1.28**	ha
Impervious Area	**0.31**	ha
Percent Impervious	**24.6%**	
Connected Impervious	24.6%	

Pervious

Length	100	m
US Elev	213.2	m
DS Elev	206.6	m
Slope	6.6	%
	Hilly	

Parameter	Soil Group	Land Use: Agriculture	Range	Grass	Woods	Wetland	Gravel	Imperv.	Weighted Value: Incl. Imperv. NASHYD	Weighted Value: Not Incl. Imperv. STANDHYD
Runoff Coefficient[2]**, C**	B	0.40	0.30	0.19	0.14	0.05	0.76	0.90	0.26	
	B	0.40	0.30	0.19	0.14	0.05	0.76	0.90	0.51	n.a.
	B	0.40	0.30	0.19	0.14	0.05	0.76	0.90	0.34	
SCS Curve No.[3]**, CN**	B	74	65	61	58	50	85	98	64.7	61.0
	B	74	65	61	58	50	85	98	77.7	61.0
	B	74	65	61	58	50	85	98	67.3	65.0
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	4.8	5.8

Time of Concentration[6]

Total Length	100	m	
Average Slope	6.6	%	
Airport	12.5	min.	
Bransby - Williams	3.8	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Applicable Minimum[7]	**15.0**	min.	
Time to Peak	10.1	min.	
	0.17	**hr.**	

Composite Parameters

Drainage Area	1.28 ha	
Runoff Coefficient	0.39	
SCS Curve No.	70.9	62.0
Modified Curve No.[4]**, CN***	72.2	**62.5**
Initial Abstraction.	4.8	**5.8**

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 15 minutes
8. All impervious areas have been assumed to be directly connected.

Hydrologic Parameters for PR-202

Sheet 1 of 1

Project No: 19-10874
Project Name: Life at the Woodland
Designed/Checked By: RC/CPB
Date: 22-Feb-22

Land Use

	Uncontrolled Lots	Uncontrolled Roadway	
Agriculture	0.00	0.00	ha
Range	0.00	0.00	ha
Grass	1.09	0.10	ha
Woods	0.00	0.00	ha
Wetland	0.00	0.00	ha
Gravel	0.00	0.00	ha
Impervious	0.12	0.09	ha
SUM	**1.21**	**0.19**	
Hydrologic Soil Group[1]	B	B	
Soil Type	0	0	
C	0.26	0.51	
CN (Nashyd)	64.7	77.7	

Rainfall Data

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

Drainage Area	**1.40**	ha
Impervious Area	**0.21**	ha
Percent Impervious	**14.8%**	
Connected Impervious	14.8%	

Pervious

Length	100	m
US Elev	213.2	m
DS Elev	206.6	m
Slope	6.6	%
	Hilly	

Parameter	Soil Group	Land Use: Agriculture	Range	Grass	Woods	Wetland	Gravel	Imperv.	Weighted Value: Incl. Imperv. NASHYD	Weighted Value: Not Incl. Imperv. STANDHYD
Runoff Coefficient[2]**, C**	B	0.40	0.30	0.19	0.14	0.05	0.76	0.90	0.26	
	B	0.40	0.30	0.19	0.14	0.05	0.76	0.90	0.51	n.a.
SCS Curve No.[3]**, CN**	B	74	65	61	58	50	85	98	64.7	61.0
	B	74	65	61	58	50	85	98	77.7	61.0
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	4.6	5.0

Time of Concentration[6]

Total Length	100	m	
Average Slope	6.6	%	
Airport	14.1	min.	
Bransby - Williams	3.8	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Applicable Minimum[7]	**15.0**	min.	
Time to Peak	10.1	min.	
	0.17	**hr.**	

Composite Parameters

Drainage Area	1.40 ha	
Runoff Coefficient	0.29	
SCS Curve No.	66.5	61.0
Modified Curve No.[4]**, CN***	**67.1**	60.5
Initial Abstraction.	**4.6**	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 15 minutes
8. All impervious areas have been assumed to be directly connected.

Hydrologic Parameters for PR-300

Sheet 1 of 1

Project No: 19-10874
Project Name: Life at the Woodland
Designed/Checked By: RC/CPB
Date: 22-Feb-22

Land Use

	Internal	
Agriculture	0.00	ha
Range	3.90	ha
Grass	0.99	ha
Woods	3.47	ha
Wetland	0.00	ha
Gravel	0.00	ha
Impervious	0.14	ha
SUM	**8.50**	

Hydrologic Soil Group[1]	B
Soil Type	0
C	0.18
CN (Nashyd)	62.2

Rainfall Data

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

Drainage Area	**8.50**	ha
Impervious Area	**0.14**	ha
Percent Impervious	**1.6%**	
Connected Impervious	1.6%	

Pervious

Length	330	m
US Elev	213.5	m
DS Elev	200.9	m
Slope	3.8	%
	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	0.18	n.a.
SCS Curve No.[3]**, CN**	B	74	65	61	58	50	85	98	62.2	61.6
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	8.4	8.5

Time of Concentration[6]

Total Length	330	m	
Average Slope	3.8	%	
Airport	**35.2**	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	11.6	min.	
Applicable Minimum[7]	15.0	min.	
Time to Peak	23.6	min.	
	0.39	**hr.**	

Composite Parameters

Drainage Area	8.50 ha	
Runoff Coefficient	0.18	
SCS Curve No.	62.2	61.6
Modified Curve No.[4]**, CN***	**64.4**	63.7
Initial Abstraction.	**8.4**	8.5

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 15 minutes
8. All impervious areas have been assumed to be directly connected.

Hydrologic Parameters for PR-400

Sheet 1 of 1

Project No: 19-10874
Project Name: Life at the Woodland
Designed/Checked By: RC/CPB
Date: 22-Feb-22

Land Use

	Internal	
Agriculture	0.00	ha
Range	0.00	ha
Grass	0.51	ha
Woods	0.00	ha
Wetland	0.00	ha
Gravel	0.00	ha
Impervious	0.07	ha
SUM	**0.58**	

Hydrologic Soil Group[1]	B
Soil Type	0
C	0.22
CN (Nashyd)	65.5

Rainfall Data

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

Drainage Area	**0.58**	ha
Impervious Area	**0.07**	ha
Percent Impervious	**12.1%**	
Connected Impervious	12.1%	

Pervious

Length	165	m
US Elev	211.6	m
DS Elev	204.8	m
Slope	4.1	%
	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	0.22	n.a.
SCS Curve No.[3]**, CN**	**B**	74	65	61	58	50	85	98	65.5	61.0
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	4.6	5.0

Time of Concentration[6]

Total Length	165	m	
Average Slope	4.1	%	
Airport	**23.0**	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	7.5	min.	
Applicable Minimum[7]	15.0	min.	
Time to Peak	15.4	min.	
	0.26	**hr.**	

Composite Parameters

Drainage Area	0.58 ha	
Runoff Coefficient	0.22	
SCS Curve No.	65.5	61.0
Modified Curve No.[4]**, CN***	**66.1**	60.5
Initial Abstraction.	**4.6**	5.0

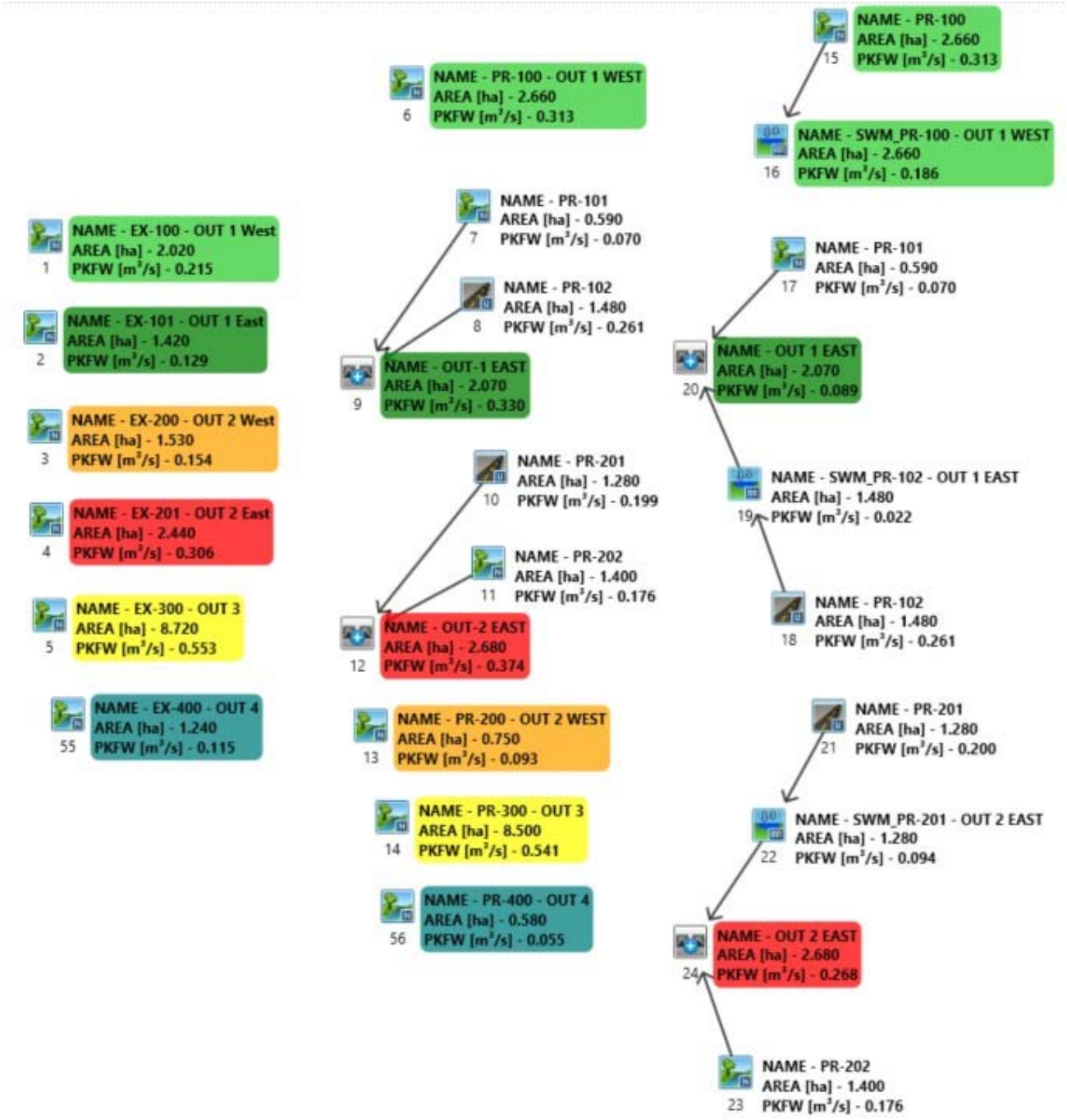
Notes:

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 15 minutes
8. All impervious areas have been assumed to be directly connected.

Appendix B

Hydrologic Modelling

VO3 Analysis



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

       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\mwilson\AppData\Local\Temp\ad98c7d6-b765-49b3-b3b5-
f4b8f2008ce1\Scenario.out
  Summary filename:
C:\Users\mwilson\AppData\Local\Temp\ad98c7d6-b765-49b3-b3b5-
f4b8f2008ce1\Scenario.sum


DATE: 02-24-2022                          TIME: 12:58:03

USER:



COMMENTS:
_____________________________________________________________


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

```
-------------------
|    READ STORM    |    Filename: C:\Users\mwilson\AppD
|                  |              ata\Local\Temp\
|                  |              ad98c7d6-b765-49b3-b3b5-
f4b8f2008ce1\227bdd08
| Ptotal= 38.75 mm |    Comments: 2-Year, 6 hour SCS Type II -
Peterboroug
-------------------
                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

------------------------------------------------------------
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-------------------
| CALIB           |
| NASHYD    (0002) |   Area    (ha)=   1.42   Curve Number
(CN)= 63.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.10   # of Linear
Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.22

        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)=   0.247

     PEAK FLOW       (cms)=   0.020 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   4.927
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.127

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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-------------------
| CALIB           |
| NASHYD    (0001) |   Area    (ha)=   2.02   Curve Number
(CN)= 61.5
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.30   # of Linear
Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.454

     PEAK FLOW       (cms)=   0.042 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   5.793
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.149

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

------------------------------------------------------------
--------------
-------------------
| CALIB           |
| NASHYD    (0015) |   Area    (ha)=   2.66   Curve Number
(CN)= 64.8
|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)=   0.598

     PEAK FLOW       (cms)=   0.063 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   6.680
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.172

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

------------------------------------------------------------
--------------
-------------------
| RESERVOIR (0016) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
```

```
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                           0.0001     0.0072   |   0.1306
0.0171
                           0.0065     0.0083   |   0.1492
0.0194
                           0.0242     0.0096   |   0.1656
0.0220
                           0.0501     0.0112   |   0.1806
0.0248
                           0.0806     0.0129   |   0.1944
0.0278
                           0.1098     0.0149   |   0.0000
0.0000

                                AREA     QPEAK     TPEAK
R.V.
                                (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0015)      2.660      0.063      3.08
6.68
     OUTFLOW: ID= 1 (0016)      2.660      0.020      3.58
3.97

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 31.42
                  TIME SHIFT OF PEAK FLOW         (min)= 30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=
0.0093

------------------------------------------------------------------
--------------
--------------------
| CALIB            |
| NASHYD    (0004) |   Area    (ha)=   2.44   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)=   0.17

     Unit Hyd Qpeak  (cms)=   0.548

     PEAK FLOW       (cms)=   0.056 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   6.456
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.167

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

------------------------------------------------------------------
--------------
--------------------
| CALIB            |
| NASHYD    (0003) |   Area    (ha)=   1.53   Curve Number
(CN)= 61.7
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.344

     PEAK FLOW       (cms)=   0.025 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   4.793
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.124

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

------------------------------------------------------------------
--------------
--------------------
| CALIB            |
| NASHYD    (0007) |   Area    (ha)=   0.59   Curve Number
(CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW       (cms)=   0.014 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   6.762
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.175

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

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--------------
--------------------
| CALIB            |
| STANDHYD  (0008) |   Area    (ha)=   1.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=
23.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.34         1.14
     Dep. Storage     (mm)=       1.00         5.30
     Average Slope     (%)=       2.00         5.00
     Length            (m)=      99.33        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      60.40         9.81
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       2.53 (ii)   16.10 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.29         0.06

*TOTALS*
     PEAK FLOW       (cms)=       0.06         0.02
0.067 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.25
3.00
     RUNOFF VOLUME    (mm)=      37.75         5.65
13.03
     TOTAL RAINFALL   (mm)=      38.75        38.75
38.75
     RUNOFF COEFFICIENT   =       0.97         0.15
0.34

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  60.7    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 (0007):     0.59   0.014     3.08     6.76
        + ID2= 2 (0008):     1.48   0.067     3.00    13.03
          ================================================

          ID = 3 (0009):     2.07   0.081     3.00    11.24

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------
--------------
--------------------
| CALIB            |
| NASHYD    (0011) |   Area    (ha)=   1.40   Curve Number
(CN)= 67.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.315

     PEAK FLOW       (cms)=   0.037 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   7.323
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.189

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

------------------------------------------------------------------
--------------
--------------------
| CALIB            |
| STANDHYD  (0010) |   Area    (ha)=   1.28
|ID= 1 DT= 5.0 min |   Total Imp(%)=  24.60   Dir. Conn.(%)=
24.60
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.31         0.97
     Dep. Storage     (mm)=       1.00         5.80
     Average Slope     (%)=       1.00         6.60
     Length            (m)=      92.38       100.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      60.40         6.94
               over (min)        5.00        30.00
     Storage Coeff.  (min)=       2.98 (ii)   27.82 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=       0.28         0.04

*TOTALS*
```

```
     PEAK FLOW      (cms)=       0.05         0.01
0.056 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.42
3.00
     RUNOFF VOLUME    (mm)=      37.75         5.86
13.69
     TOTAL RAINFALL   (mm)=      38.75        38.75
38.75
     RUNOFF COEFFICIENT   =       0.97         0.15
0.35

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.5    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   (0012) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0010):     1.28   0.056     3.00    13.69
        + ID2= 2 (0011):    1.40   0.037     3.08     7.32
          ================================================
          ID = 3 (0012):    2.68   0.092     3.00    10.36

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| CALIB            |
| NASHYD    (0005) |   Area    (ha)=   8.72   Curve Number
(CN)= 64.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.80   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.854

     PEAK FLOW       (cms)=   0.089 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=   5.303
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.137

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

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| CALIB            |
| NASHYD    (0014) |   Area    (ha)=   8.50   Curve Number
(CN)= 64.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.40   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.832

     PEAK FLOW       (cms)=   0.089 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=   5.393
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.139

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

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| CALIB            |
| NASHYD    (0006) |   Area    (ha)=   2.66   Curve Number
(CN)= 64.8
|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)=   0.598

     PEAK FLOW       (cms)=   0.063 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   6.680
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.172

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

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| CALIB            |
| NASHYD    (0013) |   Area    (ha)=   0.75   Curve Number
(CN)= 68.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.40   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.169

     PEAK FLOW       (cms)=   0.017 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   6.514
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.168

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

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| CALIB            |
| NASHYD    (0017) |   Area    (ha)=   0.59   Curve Number
(CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW       (cms)=   0.014 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   6.762
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.175

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

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| CALIB            |
| STANDHYD  (0018) |   Area    (ha)=   1.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=
23.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.34         1.14
     Dep. Storage     (mm)=       1.00         5.30
     Average Slope     (%)=       2.00         5.00
     Length            (m)=      99.33        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      60.40         9.81
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       2.53 (ii)   16.10 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.29         0.06

*TOTALS*
     PEAK FLOW       (cms)=       0.06         0.02
0.067 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.25
3.00
     RUNOFF VOLUME    (mm)=      37.75         5.65
13.03
     TOTAL RAINFALL   (mm)=      38.75        38.75
38.75
     RUNOFF COEFFICIENT   =       0.97         0.15
0.34

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  60.7    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 (0019) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                          0.0001     0.0074   |   0.0165
0.0238
```

```
                          0.0045     0.0089   |   0.0180
0.0280
                          0.0084     0.0111   |   0.0193
0.0326
                          0.0110     0.0137   |   0.0206
0.0376
                          0.0131     0.0166   |   0.0218
0.0435
                          0.0149     0.0200   |   0.0000
0.0000

                                AREA     QPEAK     TPEAK
R.V.
                                (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0018)      1.480      0.067      3.00
13.03
     OUTFLOW: ID= 1 (0019)      1.480      0.010      3.83
8.00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.63
                    TIME SHIFT OF PEAK FLOW         (min)= 50.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=
0.0125

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| ADD HYD   (0020) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0017):     0.59   0.014     3.08     6.76
        + ID2= 2 (0019):     1.48   0.010     3.83     8.00
          ================================================
          ID = 3 (0020):     2.07   0.020     3.08     7.65

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| CALIB            |
| NASHYD    (0023) |   Area    (ha)=   1.40   Curve Number
(CN)= 67.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
```

```
-------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.315

     PEAK FLOW       (cms)=   0.037 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   7.323
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.189

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

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| CALIB            |
| STANDHYD  (0021) |   Area    (ha)=   1.28
|ID= 1 DT= 5.0 min |   Total Imp(%)=  25.00   Dir. Conn.(%)=
25.00
--------------------
                                    IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.32         0.96
     Dep. Storage     (mm)=       1.00         5.80
     Average Slope     (%)=       1.00         6.60
     Length            (m)=      92.38       100.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      60.40         6.94
               over (min)        5.00        30.00
     Storage Coeff.  (min)=       2.98 (ii)   27.82 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=       0.28         0.04

*TOTALS*
     PEAK FLOW       (cms)=       0.05         0.01
0.057 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.42
3.00
     RUNOFF VOLUME    (mm)=      37.75         5.86
13.82
     TOTAL RAINFALL   (mm)=      38.75        38.75
38.75
     RUNOFF COEFFICIENT   =       0.97         0.15
0.36

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
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       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.5    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 (0022) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                          0.0001     0.0052   |   0.0843
0.0172
                          0.0056     0.0066   |   0.0945
0.0200
                          0.0202     0.0082   |   0.1036
0.0231
                          0.0402     0.0101   |   0.1121
0.0265
                          0.0595     0.0122   |   0.1199
0.0301
                          0.0728     0.0146   |   0.0000
0.0000

                                AREA     QPEAK     TPEAK
R.V.
                                (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0021)      1.280      0.057      3.00
13.82
     OUTFLOW: ID= 1 (0022)      1.280      0.019      3.08
9.73

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 33.86
                    TIME SHIFT OF PEAK FLOW         (min)=  5.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=
0.0081

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| ADD HYD   (0024) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0022):     1.28   0.019     3.08     9.73
        + ID2= 2 (0023):     1.40   0.037     3.08     7.32
          ================================================
          ID = 3 (0024):     2.68   0.056     3.08     8.47

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB            |
| NASHYD    (0055) |   Area    (ha)=   1.24   Curve Number
(CN)= 67.5
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.20   # of Linear
Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.26

     Unit Hyd Qpeak  (cms)=   0.182

     PEAK FLOW       (cms)=   0.020 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=   6.101
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.157

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

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| CALIB            |
| NASHYD    (0056) |   Area    (ha)=   0.58   Curve Number
(CN)= 66.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.26

     Unit Hyd Qpeak  (cms)=   0.085

     PEAK FLOW       (cms)=   0.011 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=   7.087
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.183
```

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

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

READ STORM	Filename: C:\Users\mwilson\AppData\Local\Temp\ad98c7d6-b765-49b3-b3b5-f4b8f2008ce1\fcd4f25c
Ptotal= 52.45 mm	Comments: 5-Year, 6 hour SCS Type II - Peterboroug

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN 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 (0002)	Area (ha)= 1.42 Curve Number (CN)= 63.1
ID= 1 DT= 5.0 min	Ia (mm)= 9.10 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.22

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	2.10	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)= 0.247

PEAK FLOW (cms)= 0.042 (i)
TIME TO PEAK (hrs)= 3.083
RUNOFF VOLUME (mm)= 9.780
TOTAL RAINFALL (mm)= 52.450
RUNOFF COEFFICIENT = 0.186

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

CALIB	
NASHYD (0001)	Area (ha)= 2.02 Curve Number (CN)= 61.5
ID= 1 DT= 5.0 min	Ia (mm)= 5.30 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.17

Unit Hyd Qpeak (cms)= 0.454

PEAK FLOW (cms)= 0.078 (i)
TIME TO PEAK (hrs)= 3.083
RUNOFF VOLUME (mm)= 10.745
TOTAL RAINFALL (mm)= 52.450
RUNOFF COEFFICIENT = 0.205

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

CALIB	
NASHYD (0015)	Area (ha)= 2.66 Curve Number (CN)= 64.8
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)= 0.598

PEAK FLOW (cms)= 0.117 (i)
TIME TO PEAK (hrs)= 3.083
RUNOFF VOLUME (mm)= 12.188
TOTAL RAINFALL (mm)= 52.450
RUNOFF COEFFICIENT = 0.232

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

RESERVOIR (0016)					
IN= 2---> OUT= 1					
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)	
	****** WARNING : FIRST OUTFLOW IS NOT ZERO.**				
	0.0001	0.0072	0.1306	0.0171	
	0.0065	0.0083	0.1492	0.0194	
	0.0242	0.0096	0.1656	0.0220	
	0.0501	0.0112	0.1806	0.0248	
	0.0806	0.0129	0.1944	0.0278	
	0.1098	0.0149	0.0000	0.0000	

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0015)	2.660	0.117	3.08	12.19
OUTFLOW: ID= 1 (0016)	2.660	0.068	3.25	9.47

PEAK FLOW REDUCTION [Qout/Qin](%)= 58.45
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.0123

CALIB	
NASHYD (0004)	Area (ha)= 2.44 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)=   0.17

     Unit Hyd Qpeak  (cms)=   0.548

     PEAK FLOW       (cms)=   0.110 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  12.333
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.235

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

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| CALIB            |
| NASHYD    (0003) |   Area    (ha)=   1.53   Curve Number
(CN)= 61.7
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.344

     PEAK FLOW       (cms)=   0.052 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   9.469
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.181

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

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| CALIB            |
| NASHYD    (0007) |   Area    (ha)=   0.59   Curve Number
(CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW       (cms)=   0.026 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  12.312
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.235

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

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| CALIB            |
| STANDHYD  (0008) |   Area    (ha)=   1.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=
23.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.34         1.14
     Dep. Storage     (mm)=       1.00         5.30
     Average Slope     (%)=       2.00         5.00
     Length            (m)=      99.33        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      81.80        18.50
                   over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.24 (ii)   12.77 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.30         0.08

*TOTALS*
     PEAK FLOW       (cms)=       0.08         0.04
0.107 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.08
3.00
     RUNOFF VOLUME    (mm)=      51.45        10.51
19.92
     TOTAL RAINFALL   (mm)=      52.45        52.45
52.45
     RUNOFF COEFFICIENT   =       0.98         0.20
0.38

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  60.7    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 (0007):     0.59   0.026     3.08    12.31
        + ID2= 2 (0008):    1.48   0.107     3.00    19.92
          ================================================
          ID = 3 (0009):    2.07   0.133     3.00    17.75

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| CALIB            |
| NASHYD    (0011) |   Area    (ha)=   1.40   Curve Number
(CN)= 67.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.315

     PEAK FLOW       (cms)=   0.067 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  13.234
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.252

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

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--------------------
| CALIB            |
| STANDHYD  (0010) |   Area    (ha)=   1.28
|ID= 1 DT= 5.0 min |   Total Imp(%)=  24.60   Dir. Conn.(%)=
24.60
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.31         0.97
     Dep. Storage     (mm)=       1.00         5.80
     Average Slope     (%)=       1.00         6.60
     Length            (m)=      92.38       100.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      81.80        15.49
                   over (min)        5.00        25.00
     Storage Coeff.  (min)=       2.64 (ii)   20.66 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=       0.29         0.05

*TOTALS*
     PEAK FLOW       (cms)=       0.07         0.02
0.083 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.33
3.00
     RUNOFF VOLUME    (mm)=      51.45        10.93
20.89
     TOTAL RAINFALL   (mm)=      52.45        52.45
52.45
     RUNOFF COEFFICIENT   =       0.98         0.21
0.40

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.5    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   (0012) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0010):     1.28   0.083     3.00    20.89
        + ID2= 2 (0011):    1.40   0.067     3.08    13.23
          ================================================
          ID = 3 (0012):    2.68   0.149     3.00    16.89

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| CALIB            |
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| NASHYD    (0005) |   Area    (ha)=   8.72   Curve Number
(CN)= 64.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.80   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.854

     PEAK FLOW       (cms)=   0.184 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=  10.419
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.199

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

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| CALIB             |
| NASHYD    (0014) |   Area    (ha)=   8.50   Curve Number
(CN)= 64.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.40   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.832

     PEAK FLOW       (cms)=   0.182 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=  10.518
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.201

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

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| CALIB             |
| NASHYD    (0006) |   Area    (ha)=   2.66   Curve Number
(CN)= 64.8
|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)=   0.598

     PEAK FLOW       (cms)=   0.117 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  12.188
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.232

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

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| CALIB             |
| NASHYD    (0013) |   Area    (ha)=   0.75   Curve Number
(CN)= 68.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.40   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.169

     PEAK FLOW       (cms)=   0.034 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  12.328
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.235

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

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| CALIB             |
| NASHYD    (0017) |   Area    (ha)=   0.59   Curve Number
(CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW       (cms)=   0.026 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  12.312
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.235

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

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| CALIB             |
| STANDHYD  (0018) |   Area    (ha)=   1.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=
23.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.34         1.14
     Dep. Storage     (mm)=      1.00         5.30
     Average Slope     (%)=      2.00         5.00
     Length            (m)=     99.33        40.00
     Mannings n           =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     81.80        18.50
               over (min)        5.00        15.00
     Storage Coeff.  (min)=      2.24 (ii)   12.77 (ii)
     Unit Hyd. Tpeak (min)=      5.00        15.00
     Unit Hyd. peak  (cms)=      0.30         0.08

*TOTALS*
     PEAK FLOW       (cms)=      0.08         0.04
0.107 (iii)
     TIME TO PEAK    (hrs)=      3.00         3.08
3.00
     RUNOFF VOLUME    (mm)=     51.45        10.51
19.92
     TOTAL RAINFALL   (mm)=     52.45        52.45
52.45
     RUNOFF COEFFICIENT   =      0.98         0.20
0.38

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  60.7    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 (0019) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                           0.0001     0.0074   |   0.0165
0.0238
                           0.0045     0.0089   |   0.0180
0.0280
                           0.0084     0.0111   |   0.0193
0.0326
                           0.0110     0.0137   |   0.0206
0.0376
                           0.0131     0.0166   |   0.0218
0.0435
                           0.0149     0.0200   |   0.0000
0.0000

                                AREA     QPEAK     TPEAK
R.V.
                                (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0018)      1.480      0.107      3.00
19.92
     OUTFLOW: ID= 1 (0019)      1.480      0.014      3.83
14.89

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.40
                    TIME SHIFT OF PEAK FLOW         (min)= 50.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=
0.0190

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| ADD HYD   (0020) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0017):     0.59   0.026     3.08    12.31
       + ID2= 2 (0019):     1.48   0.014     3.83    14.89
         ================================================
         ID = 3 (0020):     2.07   0.038     3.08    14.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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| CALIB             |
| NASHYD    (0023) |   Area    (ha)=   1.40   Curve Number
(CN)= 67.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.315

     PEAK FLOW       (cms)=   0.067 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  13.234
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.252

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

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| CALIB             |
| STANDHYD  (0021) |   Area    (ha)=   1.28
|ID= 1 DT= 5.0 min |   Total Imp(%)=  25.00   Dir. Conn.(%)=
25.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.32         0.96
     Dep. Storage     (mm)=      1.00         5.80
     Average Slope     (%)=      1.00         6.60
     Length            (m)=     92.38       100.00
     Mannings n           =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     81.80        15.49
               over (min)        5.00        25.00
     Storage Coeff.  (min)=      2.64 (ii)   20.66 (ii)
     Unit Hyd. Tpeak (min)=      5.00        25.00
     Unit Hyd. peak  (cms)=      0.29         0.05

*TOTALS*
     PEAK FLOW       (cms)=      0.07         0.02
0.084 (iii)
     TIME TO PEAK    (hrs)=      3.00         3.33
3.00
     RUNOFF VOLUME    (mm)=     51.45        10.93
21.05
     TOTAL RAINFALL   (mm)=     52.45        52.45
52.45
     RUNOFF COEFFICIENT   =      0.98         0.21
0.40

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.5    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 (0022) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                           0.0001     0.0052   |   0.0843
0.0172
                           0.0056     0.0066   |   0.0945
0.0200
                           0.0202     0.0082   |   0.1036
0.0231
                           0.0402     0.0101   |   0.1121
0.0265
                           0.0595     0.0122   |   0.1199
0.0301
                           0.0728     0.0146   |   0.0000
0.0000

                                 AREA     QPEAK     TPEAK
R.V.
                                 (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0021)      1.280      0.084      3.00
21.05
     OUTFLOW: ID= 1 (0022)      1.280      0.043      3.08
16.96

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 50.74
                  TIME SHIFT OF PEAK FLOW         (min)=  5.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=
0.0105

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| ADD HYD   (0024) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0022):     1.28   0.043     3.08    16.96
       + ID2= 2 (0023):     1.40   0.067     3.08    13.23
         ================================================
         ID = 3 (0024):     2.68   0.110     3.08    15.01

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| CALIB             |
| NASHYD    (0055) |   Area    (ha)=   1.24   Curve Number
(CN)= 67.5
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.20   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.26

     Unit Hyd Qpeak  (cms)=   0.182

     PEAK FLOW       (cms)=   0.040 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  11.748
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.224

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

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--------------------
| CALIB             |
| NASHYD    (0056) |   Area    (ha)=   0.58   Curve Number
(CN)= 66.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.26

     Unit Hyd Qpeak  (cms)=   0.085

     PEAK FLOW       (cms)=   0.021 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  12.845
     TOTAL RAINFALL   (mm)=  52.450
     RUNOFF COEFFICIENT   =   0.245

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

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


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|    READ STORM    |    Filename: C:\Users\mwilson\AppD
|                  |              ata\Local\Temp\
|                  |              ad98c7d6-b765-49b3-b3b5-
f4b8f2008ce1\b881660d
| Ptotal= 61.60 mm |    Comments: 10-Year, 6 hour SCS Type II -
Peterborou
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |
TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |
hrs   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

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| CALIB            |
| NASHYD    (0002) |   Area    (ha)=   1.42   Curve Number
(CN)= 63.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.10   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

        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    2.50 | 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)=   0.247

     PEAK FLOW       (cms)=   0.060 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  13.692
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.222

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

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--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=   2.02   Curve Number
(CN)= 61.5
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.30   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.454

     PEAK FLOW       (cms)=   0.107 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  14.669
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.238

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

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--------------------
| CALIB            |
| NASHYD    (0015) |   Area    (ha)=   2.66   Curve Number
(CN)= 64.8
|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)=   0.598

     PEAK FLOW       (cms)=   0.159 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  16.505
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.268

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

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--------------------
| RESERVOIR (0016) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                         0.0001     0.0072   |   0.1306
0.0171
                         0.0065     0.0083   |   0.1492
0.0194
                         0.0242     0.0096   |   0.1656
0.0220
                         0.0501     0.0112   |   0.1806
0.0248
                         0.0806     0.0129   |   0.1944
0.0278
                         0.1098     0.0149   |   0.0000
0.0000

                               AREA     QPEAK     TPEAK
R.V.
                               (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0015)      2.660      0.159      3.08
16.50
     OUTFLOW: ID= 1 (0016)      2.660      0.104      3.25
13.79

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 65.62
                  TIME SHIFT OF PEAK FLOW        (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=
0.0146

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--------------------
| CALIB            |
| NASHYD    (0004) |   Area    (ha)=   2.44   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)=   0.17

     Unit Hyd Qpeak  (cms)=   0.548

     PEAK FLOW       (cms)=   0.151 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  16.960
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.275

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

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--------------------
| CALIB            |
| NASHYD    (0003) |   Area    (ha)=   1.53   Curve Number
(CN)= 61.7
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.344

     PEAK FLOW       (cms)=   0.073 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  13.242
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.215

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

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| CALIB            |
| NASHYD    (0007) |   Area    (ha)=   0.59   Curve Number
(CN)= 65.0
```

```
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW       (cms)=   0.035 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  16.657
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.270

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

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--------------------
| CALIB            |
| STANDHYD  (0008) |   Area    (ha)=   1.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=
23.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.34         1.14
     Dep. Storage     (mm)=       1.00         5.30
     Average Slope     (%)=       2.00         5.00
     Length            (m)=      99.33        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      95.90        28.35
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.10 (ii)   10.98 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.31         0.09

*TOTALS*
     PEAK FLOW       (cms)=       0.09         0.05
0.136 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.08
3.00
     RUNOFF VOLUME    (mm)=      60.60        14.36
24.99
     TOTAL RAINFALL   (mm)=      61.60        61.60
61.60
     RUNOFF COEFFICIENT   =       0.98         0.23
0.41
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***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  60.7    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 (0007):     0.59   0.035     3.08    16.66
       + ID2= 2 (0008):     1.48   0.136     3.00    24.99
         ================================================
         ID = 3 (0009):     2.07   0.171     3.00    22.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB            |
| NASHYD    (0011) |   Area    (ha)=   1.40   Curve Number
(CN)= 67.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.315

     PEAK FLOW       (cms)=   0.090 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  17.833
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.289

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

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--------------------
| CALIB            |
| STANDHYD  (0010) |   Area    (ha)=   1.28
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```
|ID= 1 DT= 5.0 min |   Total Imp(%)=  24.60   Dir. Conn.(%)=
24.60
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.31         0.97
     Dep. Storage     (mm)=       1.00         5.80
     Average Slope     (%)=       1.00         6.60
     Length            (m)=      92.38       100.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      95.90        26.51
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       2.48 (ii)   17.02 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.29         0.06

*TOTALS*
     PEAK FLOW       (cms)=       0.08         0.04
0.108 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.17
3.00
     RUNOFF VOLUME    (mm)=      60.60        14.96
26.18
     TOTAL RAINFALL   (mm)=      61.60        61.60
61.60
     RUNOFF COEFFICIENT   =       0.98         0.24
0.42

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.5    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   (0012) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0010):     1.28   0.108     3.00    26.18
       + ID2= 2 (0011):     1.40   0.090     3.08    17.83
         ================================================
         ID = 3 (0012):     2.68   0.196     3.00    21.82
```

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     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB            |
| NASHYD    (0005) |   Area    (ha)=   8.72   Curve Number
(CN)= 64.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.80   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.854

     PEAK FLOW       (cms)=   0.261 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=  14.519
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.236

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

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--------------------
| CALIB            |
| NASHYD    (0014) |   Area    (ha)=   8.50   Curve Number
(CN)= 64.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.40   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.832

     PEAK FLOW       (cms)=   0.256 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=  14.616
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.237

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

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| CALIB            |
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```
| NASHYD    (0006) |   Area    (ha)=   2.66   Curve Number
(CN)= 64.8
|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)=   0.598

     PEAK FLOW       (cms)=   0.159 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  16.505
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.268

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

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--------------------
| CALIB             |
| NASHYD    (0013) |   Area    (ha)=   0.75   Curve Number
(CN)= 68.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.40   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.169

     PEAK FLOW       (cms)=   0.046 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  16.902
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.274

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

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--------------------
| CALIB             |
| NASHYD    (0017) |   Area    (ha)=   0.59   Curve Number
(CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW       (cms)=   0.035 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  16.657
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.270

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

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--------------
--------------------
| CALIB             |
| STANDHYD  (0018) |   Area    (ha)=   1.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=
23.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.34         1.14
     Dep. Storage     (mm)=       1.00         5.30
     Average Slope     (%)=       2.00         5.00
     Length            (m)=      99.33        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      95.90        28.35
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.10 (ii)   10.98 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.31         0.09

*TOTALS*
     PEAK FLOW       (cms)=       0.09         0.05
0.136 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.08
3.00
     RUNOFF VOLUME    (mm)=      60.60        14.36
24.99
     TOTAL RAINFALL   (mm)=      61.60        61.60
61.60
     RUNOFF COEFFICIENT   =       0.98         0.23
0.41

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.7    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 (0019) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                           0.0001     0.0074   |   0.0165
0.0238
                           0.0045     0.0089   |   0.0180
0.0280
                           0.0084     0.0111   |   0.0193
0.0326
                           0.0110     0.0137   |   0.0206
0.0376
                           0.0131     0.0166   |   0.0218
0.0435
                           0.0149     0.0200   |   0.0000
0.0000

                                AREA     QPEAK     TPEAK
R.V.
                                (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0018)      1.480      0.136      3.00
24.99
     OUTFLOW: ID= 1 (0019)      1.480      0.017      3.83
19.96

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.25
                   TIME SHIFT OF PEAK FLOW         (min)= 50.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=
0.0241

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--------------------
| ADD HYD   (0020) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)

          ID1= 1 (0017):     0.59   0.035     3.08    16.66
        + ID2= 2 (0019):     1.48   0.017     3.83    19.96
          ================================================
          ID = 3 (0020):     2.07   0.049     3.08    19.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB             |
| NASHYD    (0023) |   Area    (ha)=   1.40   Curve Number
(CN)= 67.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.315

     PEAK FLOW       (cms)=   0.090 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  17.833
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.289

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

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--------------------
| CALIB             |
| STANDHYD  (0021) |   Area    (ha)=   1.28
|ID= 1 DT= 5.0 min |   Total Imp(%)=  25.00   Dir. Conn.(%)=
25.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.32         0.96
     Dep. Storage     (mm)=       1.00         5.80
     Average Slope     (%)=       1.00         6.60
     Length            (m)=      92.38       100.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      95.90        26.51
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       2.48 (ii)   17.02 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.29         0.06
```

```
*TOTALS*
     PEAK FLOW       (cms)=       0.09         0.04
0.109 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.17
3.00
     RUNOFF VOLUME    (mm)=      60.60        14.96
26.36
     TOTAL RAINFALL   (mm)=      61.60        61.60
61.60
     RUNOFF COEFFICIENT   =       0.98         0.24
0.43

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  62.5    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 (0022) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                          0.0001     0.0052   |   0.0843
0.0172
                          0.0056     0.0066   |   0.0945
0.0200
                          0.0202     0.0082   |   0.1036
0.0231
                          0.0402     0.0101   |   0.1121
0.0265
                          0.0595     0.0122   |   0.1199
0.0301
                          0.0728     0.0146   |   0.0000
0.0000

                                AREA     QPEAK     TPEAK
R.V.
                                (ha)     (cms)     (hrs)
(mm)
    INFLOW : ID= 2 (0021)      1.280      0.109      3.00
26.36
     OUTFLOW: ID= 1 (0022)     1.280      0.059      3.08
22.27

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 54.24
                  TIME SHIFT OF PEAK FLOW         (min)=  5.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=
0.0122

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--------------------
| ADD HYD   (0024) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0022):     1.28   0.059     3.08    22.27
        + ID2= 2 (0023):     1.40   0.090     3.08    17.83
          ================================================
          ID = 3 (0024):     2.68   0.149     3.08    19.95

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB            |
| NASHYD    (0055) |   Area    (ha)=   1.24   Curve Number
(CN)= 67.5
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.20   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.26

     Unit Hyd Qpeak  (cms)=   0.182

     PEAK FLOW       (cms)=   0.056 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  16.219
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.263

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

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--------------------
| CALIB            |
| NASHYD    (0056) |   Area    (ha)=   0.58   Curve Number
(CN)= 66.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.26

     Unit Hyd Qpeak  (cms)=   0.085

     PEAK FLOW       (cms)=   0.028 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  17.337
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.281

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

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


--------------------
|    READ STORM    |    Filename: C:\Users\mwilson\AppD
|                  |              ata\Local\Temp\
|                  |              ad98c7d6-b765-49b3-b3b5-
f4b8f2008ce1\c775860c
| Ptotal= 72.90 mm |    Comments: 25-Year, 6 hour SCS Type II -
Peterborou
--------------------
                  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    (0002) |   Area    (ha)=   1.42   Curve Number
(CN)= 63.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.10   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

        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
                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)=   0.247

     PEAK FLOW       (cms)=   0.086 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  19.144
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.263

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

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--------------
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=   2.02   Curve Number
(CN)= 61.5
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.30   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.454

     PEAK FLOW       (cms)=   0.147 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  20.094
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.276

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

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| CALIB            |
| NASHYD    (0015) |   Area    (ha)=   2.66   Curve Number
(CN)= 64.8
|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)=   0.598

     PEAK FLOW       (cms)=   0.216 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  22.424
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.308

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

------------------------------------------------------------------
--------------
--------------------
| RESERVOIR (0016) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                          0.0001     0.0072   |   0.1306
0.0171
                          0.0065     0.0083   |   0.1492
0.0194
                          0.0242     0.0096   |   0.1656
0.0220
                          0.0501     0.0112   |   0.1806
0.0248
                          0.0806     0.0129   |   0.1944
0.0278
                          0.1098     0.0149   |   0.0000
0.0000

                                AREA     QPEAK     TPEAK
R.V.
                                (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0015)      2.660      0.216      3.08
22.42
```

```
     OUTFLOW: ID= 1 (0016)      2.660      0.140      3.25
19.71

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 64.86
                   TIME SHIFT OF PEAK FLOW         (min)= 10.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=
0.0185

------------------------------------------------------------------
--------------
--------------------
| CALIB            |
| NASHYD    (0004) |   Area    (ha)=   2.44   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)=   0.17

     Unit Hyd Qpeak  (cms)=   0.548

     PEAK FLOW       (cms)=   0.210 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  23.305
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.320

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

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--------------------
| CALIB            |
| NASHYD    (0003) |   Area    (ha)=   1.53   Curve Number
(CN)= 61.7
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.344

     PEAK FLOW       (cms)=   0.103 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  18.510
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.254

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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--------------------
| CALIB            |
| NASHYD    (0007) |   Area    (ha)=   0.59   Curve Number
(CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW       (cms)=   0.048 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  22.611
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.310

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

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--------------------
| CALIB            |
| STANDHYD  (0008) |   Area    (ha)=   1.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=
23.00
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.34         1.14
     Dep. Storage     (mm)=       1.00         5.30
     Average Slope     (%)=       2.00         5.00
     Length            (m)=      99.33        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     113.70        38.86
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       1.96 (ii)    9.79 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.31         0.11

*TOTALS*
     PEAK FLOW       (cms)=       0.11         0.08
0.190 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.08
3.00
```

```
     RUNOFF VOLUME    (mm)=      71.90        19.69
31.70
     TOTAL RAINFALL   (mm)=      72.90        72.90
72.90
     RUNOFF COEFFICIENT   =       0.99         0.27
0.43

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.7    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 (0007):     0.59   0.048     3.08    22.61
        + ID2= 2 (0008):     1.48   0.190     3.00    31.70
          ================================================
          ID = 3 (0009):     2.07   0.238     3.00    29.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB            |
| NASHYD    (0011) |   Area    (ha)=   1.40   Curve Number
(CN)= 67.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.315

     PEAK FLOW       (cms)=   0.123 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  24.104
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.331

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

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--------------------
| CALIB            |
| STANDHYD  (0010) |   Area    (ha)=   1.28
|ID= 1 DT= 5.0 min |   Total Imp(%)=  24.60   Dir. Conn.(%)=
24.60
--------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.31         0.97
     Dep. Storage     (mm)=       1.00         5.80
     Average Slope     (%)=       1.00         6.60
     Length            (m)=      92.38       100.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     113.70        36.62
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       2.31 (ii)   15.09 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.30         0.07

*TOTALS*
     PEAK FLOW       (cms)=       0.10         0.06
0.135 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.17
3.00
     RUNOFF VOLUME    (mm)=      71.90        20.51
33.15
     TOTAL RAINFALL   (mm)=      72.90        72.90
72.90
     RUNOFF COEFFICIENT   =       0.99         0.28
0.45

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  62.5    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   (0012) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0010):     1.28   0.135     3.00    33.15
        + ID2= 2 (0011):     1.40   0.123     3.08    24.10
          ================================================
          ID = 3 (0012):     2.68   0.257     3.00    28.42

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB            |
| NASHYD    (0005) |   Area    (ha)=   8.72   Curve Number
(CN)= 64.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.80   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.854

     PEAK FLOW       (cms)=   0.369 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=  20.209
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.277

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

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--------------------
| CALIB            |
| NASHYD    (0014) |   Area    (ha)=   8.50   Curve Number
(CN)= 64.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.40   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.832

     PEAK FLOW       (cms)=   0.361 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=  20.300
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.278

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

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--------------------
| CALIB            |
| NASHYD    (0006) |   Area    (ha)=   2.66   Curve Number
(CN)= 64.8
|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)=   0.598

     PEAK FLOW       (cms)=   0.216 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  22.424
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.308

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

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--------------------
| CALIB            |
| NASHYD    (0013) |   Area    (ha)=   0.75   Curve Number
(CN)= 68.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.40   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.169

     PEAK FLOW       (cms)=   0.064 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  23.172
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.318

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

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| CALIB            |
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| NASHYD    (0017) |   Area    (ha)=   0.59   Curve Number
(CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW       (cms)=   0.048 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  22.611
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.310

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

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--------------------
| CALIB           |
| STANDHYD  (0018) |   Area    (ha)=   1.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=
23.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.34         1.14
     Dep. Storage     (mm)=      1.00         5.30
     Average Slope     (%)=      2.00         5.00
     Length            (m)=     99.33        40.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=    113.70        38.86
                over (min)        5.00        10.00
     Storage Coeff.  (min)=      1.96 (ii)    9.79 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.31         0.11

*TOTALS*
     PEAK FLOW       (cms)=      0.11         0.08
0.190 (iii)
     TIME TO PEAK    (hrs)=      3.00         3.08
3.00
     RUNOFF VOLUME    (mm)=     71.90        19.69
31.70
     TOTAL RAINFALL   (mm)=     72.90        72.90
72.90
     RUNOFF COEFFICIENT   =      0.99         0.27
0.43

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  60.7    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 (0019) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                           0.0001     0.0074   |   0.0165
0.0238
                           0.0045     0.0089   |   0.0180
0.0280
                           0.0084     0.0111   |   0.0193
0.0326
                           0.0110     0.0137   |   0.0206
0.0376
                           0.0131     0.0166   |   0.0218
0.0435
                           0.0149     0.0200   |   0.0000
0.0000

                                  AREA     QPEAK     TPEAK
R.V.
                                  (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0018)      1.480      0.190      3.00
31.70
     OUTFLOW: ID= 1 (0019)      1.480      0.019      3.92
26.67

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.99
                   TIME SHIFT OF PEAK FLOW         (min)= 55.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=
0.0313

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--------------------
| ADD HYD   (0020) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0017):     0.59   0.048     3.08    22.61
        + ID2= 2 (0019):     1.48   0.019     3.92    26.67
          ================================================
          ID = 3 (0020):     2.07   0.065     3.08    25.51

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB           |
| NASHYD    (0023) |   Area    (ha)=   1.40   Curve Number
(CN)= 67.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.315

     PEAK FLOW       (cms)=   0.123 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  24.104
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.331

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

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--------------------
| CALIB           |
| STANDHYD  (0021) |   Area    (ha)=   1.28
|ID= 1 DT= 5.0 min |   Total Imp(%)=  25.00   Dir. Conn.(%)=
25.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.32         0.96
     Dep. Storage     (mm)=      1.00         5.80
     Average Slope     (%)=      1.00         6.60
     Length            (m)=     92.38       100.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=    113.70        36.62
                over (min)        5.00        20.00
     Storage Coeff.  (min)=      2.31 (ii)   15.09 (ii)
     Unit Hyd. Tpeak (min)=      5.00        20.00
     Unit Hyd. peak  (cms)=      0.30         0.07

*TOTALS*
     PEAK FLOW       (cms)=      0.10         0.06
0.137 (iii)
     TIME TO PEAK    (hrs)=      3.00         3.17
3.00
     RUNOFF VOLUME    (mm)=     71.90        20.51
33.35
     TOTAL RAINFALL   (mm)=     72.90        72.90
72.90
     RUNOFF COEFFICIENT   =      0.99         0.28
0.46

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.5    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 (0022) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                           0.0001     0.0052   |   0.0843
0.0172
                           0.0056     0.0066   |   0.0945
0.0200
                           0.0202     0.0082   |   0.1036
0.0231
                           0.0402     0.0101   |   0.1121
0.0265
```

```
                        0.0595     0.0122   |   0.1199
0.0301
                        0.0728     0.0146   |   0.0000
0.0000

                              AREA     QPEAK     TPEAK
R.V.
                              (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0021)      1.280      0.137      3.00
33.35
     OUTFLOW: ID= 1 (0022)      1.280      0.071      3.17
29.27

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 52.21
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=
0.0144

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--------------------
| ADD HYD   (0024) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0022):     1.28   0.071     3.17    29.27
       + ID2= 2 (0023):     1.40   0.123     3.08    24.10
         ================================================
         ID = 3 (0024):     2.68   0.194     3.08    26.57

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB            |
| NASHYD    (0055) |   Area    (ha)=   1.24   Curve Number
(CN)= 67.5
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.20   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.26

     Unit Hyd Qpeak  (cms)=   0.182

     PEAK FLOW       (cms)=   0.078 (i)
     TIME TO PEAK    (hrs)=   3.167

     RUNOFF VOLUME    (mm)=  22.370
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.307

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

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--------------------
| CALIB            |
| NASHYD    (0056) |   Area    (ha)=   0.58   Curve Number
(CN)= 66.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.26

     Unit Hyd Qpeak  (cms)=   0.085

     PEAK FLOW       (cms)=   0.038 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  23.476
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.322

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

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  ***************************
  ** SIMULATION NUMBER:   5 **
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|    READ STORM    |    Filename: C:\Users\mwilson\AppD
|                  |              ata\Local\Temp\
|                  |              ad98c7d6-b765-49b3-b3b5-
f4b8f2008ce1\4694a7c7
| Ptotal= 81.47 mm |    Comments: 50-Year, 6 hour SCS Type II -
Peterborou
--------------------
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |
TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |
hrs   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

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--------------------
| CALIB            |
| NASHYD    (0002) |   Area    (ha)=   1.42   Curve Number
(CN)= 63.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.10   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

        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    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)=   0.247

     PEAK FLOW       (cms)=   0.107 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  23.680
     TOTAL RAINFALL   (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.291

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

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--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=   2.02   Curve Number
(CN)= 61.5
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.30   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.454

     PEAK FLOW       (cms)=   0.180 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  24.585
     TOTAL RAINFALL   (mm)=  81.475
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     RUNOFF COEFFICIENT   =   0.302

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

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--------------------
| CALIB            |
| NASHYD    (0015) |   Area    (ha)=   2.66   Curve Number
(CN)= 64.8
|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)=   0.598

     PEAK FLOW       (cms)=   0.264 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  27.291
     TOTAL RAINFALL   (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.335

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

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--------------
--------------------
| RESERVOIR (0016) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                         0.0001     0.0072   |   0.1306
0.0171
                         0.0065     0.0083   |   0.1492
0.0194
                         0.0242     0.0096   |   0.1656
0.0220
                         0.0501     0.0112   |   0.1806
0.0248
                         0.0806     0.0129   |   0.1944
0.0278
                         0.1098     0.0149   |   0.0000
0.0000
```

```
                                AREA     QPEAK     TPEAK
R.V.
                                (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0015)      2.660      0.264      3.08
27.29
     OUTFLOW: ID= 1 (0016)      2.660      0.165      3.25
24.58

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 62.53
                    TIME SHIFT OF PEAK FLOW         (min)= 10.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=
0.0220

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--------------------
| CALIB            |
| NASHYD    (0004) |   Area    (ha)=   2.44   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)=   0.17

     Unit Hyd Qpeak  (cms)=   0.548

     PEAK FLOW       (cms)=   0.257 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  28.513
     TOTAL RAINFALL   (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.350

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

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--------------------
| CALIB            |
| NASHYD    (0003) |   Area    (ha)=   1.53   Curve Number
(CN)= 61.7
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.344

     PEAK FLOW       (cms)=   0.128 (i)
```

```
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  22.900
     TOTAL RAINFALL   (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.281

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

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--------------------
| CALIB            |
| NASHYD    (0007) |   Area    (ha)=   0.59   Curve Number
(CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW       (cms)=   0.059 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  27.504
     TOTAL RAINFALL   (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.338

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

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--------------------
| CALIB            |
| STANDHYD  (0008) |   Area    (ha)=   1.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=
23.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.34         1.14
     Dep. Storage     (mm)=      1.00         5.30
     Average Slope     (%)=      2.00         5.00
     Length            (m)=     99.33        40.00
     Mannings n           =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=    127.00        47.44
               over (min)        5.00        10.00
     Storage Coeff.  (min)=      1.88 (ii)    9.10 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.32         0.12
```

```
*TOTALS*
     PEAK FLOW       (cms)=       0.12         0.11
0.225 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.08
3.00
     RUNOFF VOLUME    (mm)=      80.48        24.11
37.07
     TOTAL RAINFALL   (mm)=      81.48        81.48
81.48
     RUNOFF COEFFICIENT   =       0.99         0.30
0.46

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  60.7    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 (0007):     0.59   0.059     3.08    27.50
        + ID2= 2 (0008):     1.48   0.225     3.00    37.07
          ==========================================
          ID = 3 (0009):     2.07   0.283     3.00    34.35

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB            |
| NASHYD    (0011) |   Area    (ha)=   1.40   Curve Number
(CN)= 67.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.315
```

```
     PEAK FLOW      (cms)=   0.149 (i)
     TIME TO PEAK   (hrs)=   3.083
     RUNOFF VOLUME   (mm)=  29.236
     TOTAL RAINFALL  (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.359

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

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--------------------
| CALIB           |
| STANDHYD  (0010) |   Area    (ha)=   1.28
|ID= 1 DT= 5.0 min |   Total Imp(%)=  24.60   Dir. Conn.(%)=
24.60
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.31         0.97
     Dep. Storage     (mm)=      1.00         5.80
     Average Slope     (%)=      1.00         6.60
     Length            (m)=     92.38       100.00
     Mannings n           =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=    127.00        44.89
               over (min)        5.00        15.00
     Storage Coeff.  (min)=      2.21 (ii)   13.99 (ii)
     Unit Hyd. Tpeak (min)=      5.00        15.00
     Unit Hyd. peak  (cms)=      0.30         0.08

*TOTALS*
     PEAK FLOW      (cms)=      0.11         0.07
0.172 (iii)
     TIME TO PEAK   (hrs)=      3.00         3.08
3.00
     RUNOFF VOLUME   (mm)=     80.48        25.11
38.72
     TOTAL RAINFALL  (mm)=     81.48        81.48
81.48
     RUNOFF COEFFICIENT   =      0.99         0.31
0.48

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.5    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
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     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| ADD HYD   (0012) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0010):     1.28   0.172     3.00    38.72
        + ID2= 2 (0011):     1.40   0.149     3.08    29.24
          ================================================
          ID = 3 (0012):     2.68   0.320     3.00    33.77

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB           |
| NASHYD    (0005) |   Area    (ha)=   8.72   Curve Number
(CN)= 64.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.80   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.854

     PEAK FLOW      (cms)=   0.458 (i)
     TIME TO PEAK   (hrs)=   3.250
     RUNOFF VOLUME   (mm)=  24.926
     TOTAL RAINFALL  (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.306

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

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--------------------
| CALIB           |
| NASHYD    (0014) |   Area    (ha)=   8.50   Curve Number
(CN)= 64.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.40   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.832
```

```
     PEAK FLOW      (cms)=   0.448 (i)
     TIME TO PEAK   (hrs)=   3.250
     RUNOFF VOLUME   (mm)=  25.010
     TOTAL RAINFALL  (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.307

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

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--------------------
| CALIB           |
| NASHYD    (0006) |   Area    (ha)=   2.66   Curve Number
(CN)= 64.8
|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)=   0.598

     PEAK FLOW      (cms)=   0.264 (i)
     TIME TO PEAK   (hrs)=   3.083
     RUNOFF VOLUME   (mm)=  27.291
     TOTAL RAINFALL  (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.335

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

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--------------------
| CALIB           |
| NASHYD    (0013) |   Area    (ha)=   0.75   Curve Number
(CN)= 68.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.40   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.169

     PEAK FLOW      (cms)=   0.078 (i)
     TIME TO PEAK   (hrs)=   3.083
     RUNOFF VOLUME   (mm)=  28.320
     TOTAL RAINFALL  (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.348
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     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB           |
| NASHYD    (0017) |   Area    (ha)=   0.59   Curve Number
(CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW      (cms)=   0.059 (i)
     TIME TO PEAK   (hrs)=   3.083
     RUNOFF VOLUME   (mm)=  27.504
     TOTAL RAINFALL  (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.338

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

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--------------------
| CALIB           |
| STANDHYD  (0018) |   Area    (ha)=   1.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=
23.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.34         1.14
     Dep. Storage     (mm)=      1.00         5.30
     Average Slope     (%)=      2.00         5.00
     Length            (m)=     99.33        40.00
     Mannings n           =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=    127.00        47.44
               over (min)        5.00        10.00
     Storage Coeff.  (min)=      1.88 (ii)    9.10 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.32         0.12

*TOTALS*
     PEAK FLOW      (cms)=      0.12         0.11
0.225 (iii)
```

```
     TIME TO PEAK    (hrs)=       3.00         3.08
3.00
     RUNOFF VOLUME    (mm)=      80.48        24.11
37.07
     TOTAL RAINFALL   (mm)=      81.48        81.48
81.48
     RUNOFF COEFFICIENT   =       0.99         0.30
0.46

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  60.7    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 (0019) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                          0.0001     0.0074   |   0.0165
0.0238
                          0.0045     0.0089   |   0.0180
0.0280
                          0.0084     0.0111   |   0.0193
0.0326
                          0.0110     0.0137   |   0.0206
0.0376
                          0.0131     0.0166   |   0.0218
0.0435
                          0.0149     0.0200   |   0.0000
0.0000

                               AREA     QPEAK     TPEAK
R.V.
                               (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0018)      1.480      0.225      3.00
37.07
     OUTFLOW: ID= 1 (0019)      1.480      0.020      4.00
32.04

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.12
                    TIME SHIFT OF PEAK FLOW         (min)= 60.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=
0.0372

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--------------------
| ADD HYD   (0020) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0017):     0.59   0.059     3.08    27.50
       + ID2= 2 (0019):     1.48   0.020     4.00    32.04
         ================================================
         ID = 3 (0020):     2.07   0.077     3.08    30.75

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| CALIB            |
| NASHYD    (0023) |   Area    (ha)=   1.40   Curve Number
(CN)= 67.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.315

     PEAK FLOW       (cms)=   0.149 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  29.236
     TOTAL RAINFALL   (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.359

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

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--------------------
| CALIB            |
| STANDHYD  (0021) |   Area    (ha)=   1.28
|ID= 1 DT= 5.0 min |   Total Imp(%)=  25.00   Dir. Conn.(%)=
25.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.32         0.96
     Dep. Storage     (mm)=       1.00         5.80
     Average Slope     (%)=       1.00         6.60
     Length            (m)=      92.38       100.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     127.00        44.89
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.21 (ii)   13.99 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.30         0.08

*TOTALS*
     PEAK FLOW       (cms)=       0.11         0.07
0.173 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.08
3.00
     RUNOFF VOLUME    (mm)=      80.47        25.11
38.94
     TOTAL RAINFALL   (mm)=      81.48        81.48
81.48
     RUNOFF COEFFICIENT   =       0.99         0.31
0.48

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.5    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 (0022) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                          0.0001     0.0052   |   0.0843
0.0172
                          0.0056     0.0066   |   0.0945
0.0200
                          0.0202     0.0082   |   0.1036
0.0231
                          0.0402     0.0101   |   0.1121
0.0265
                          0.0595     0.0122   |   0.1199
0.0301
                          0.0728     0.0146   |   0.0000
0.0000

                               AREA     QPEAK     TPEAK
R.V.
                               (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0021)      1.280      0.173      3.00
38.94
     OUTFLOW: ID= 1 (0022)      1.280      0.085      3.17
34.86

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 48.84
                    TIME SHIFT OF PEAK FLOW         (min)= 10.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=
0.0174

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--------------------
| ADD HYD   (0024) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0022):     1.28   0.085     3.17    34.86
       + ID2= 2 (0023):     1.40   0.149     3.08    29.24
         ================================================
         ID = 3 (0024):     2.68   0.232     3.08    31.92

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| CALIB            |
| NASHYD    (0055) |   Area    (ha)=   1.24   Curve Number
(CN)= 67.5
```

```
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.20   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.26

     Unit Hyd Qpeak  (cms)=   0.182

     PEAK FLOW       (cms)=   0.096 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  27.435
     TOTAL RAINFALL   (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.337

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

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| CALIB            |
| NASHYD    (0056) |   Area    (ha)=   0.58   Curve Number
(CN)= 66.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.26

     Unit Hyd Qpeak  (cms)=   0.085

     PEAK FLOW       (cms)=   0.047 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  28.510
     TOTAL RAINFALL   (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.350

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

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  ****************************
  ** SIMULATION NUMBER:   6 **
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|    READ STORM    |    Filename: C:\Users\mwilson\AppD
|                  |              ata\Local\Temp\
|                  |              ad98c7d6-b765-49b3-b3b5-
f4b8f2008ce1\3ec6332a

| Ptotal= 89.93 mm |    Comments: 100-Year, 6 hour SCS Type II -
Peterboro
--------------------
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |
TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |
hrs   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    (0002) |   Area    (ha)=   1.42   Curve Number
(CN)= 63.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.10   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

         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    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)=   0.247

     PEAK FLOW       (cms)=   0.129 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  28.444
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.316

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

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--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=   2.02   Curve Number
(CN)= 61.5

|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.30   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.454

     PEAK FLOW       (cms)=   0.215 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  29.289
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.326

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

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--------------------
| CALIB            |
| NASHYD    (0015) |   Area    (ha)=   2.66   Curve Number
(CN)= 64.8
|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)=   0.598

     PEAK FLOW       (cms)=   0.313 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  32.364
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.360

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

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| RESERVOIR (0016) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                          0.0001     0.0072   |   0.1306
0.0171
```

```
                        0.0065     0.0083   |   0.1492
0.0194
                        0.0242     0.0096   |   0.1656
0.0220
                        0.0501     0.0112   |   0.1806
0.0248
                        0.0806     0.0129   |   0.1944
0.0278
                        0.1098     0.0149   |   0.0000
0.0000

                              AREA     QPEAK     TPEAK
R.V.
                              (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0015)      2.660      0.313      3.08
32.36
     OUTFLOW: ID= 1 (0016)      2.660      0.186      3.25
29.65

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 59.59
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=
0.0261

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--------------------
| CALIB            |
| NASHYD    (0004) |   Area    (ha)=   2.44   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)=   0.17

     Unit Hyd Qpeak  (cms)=   0.548

     PEAK FLOW       (cms)=   0.306 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  33.929
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.377

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

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| CALIB            |
| NASHYD    (0003) |   Area    (ha)=   1.53   Curve Number
(CN)= 61.7
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.344

     PEAK FLOW       (cms)=   0.154 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  27.518
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.306

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

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| CALIB            |
| NASHYD    (0007) |   Area    (ha)=   0.59   Curve Number
(CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW       (cms)=   0.070 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  32.601
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.363

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

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--------------------
| CALIB            |
| STANDHYD  (0008) |   Area    (ha)=   1.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=
23.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)

     Surface Area     (ha)=       0.34         1.14
     Dep. Storage     (mm)=       1.00         5.30
     Average Slope     (%)=       2.00         5.00
     Length            (m)=      99.33        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     140.20        56.45
                 over (min)        5.00        10.00
     Storage Coeff.  (min)=       1.81 (ii)    8.54 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.32         0.12

*TOTALS*
     PEAK FLOW       (cms)=       0.13         0.13
0.261 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.00
3.00
     RUNOFF VOLUME    (mm)=      88.92        28.75
42.59
     TOTAL RAINFALL   (mm)=      89.93        89.93
89.93
     RUNOFF COEFFICIENT   =       0.99         0.32
0.47

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.7    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 (0007):     0.59   0.070     3.08    32.60
        + ID2= 2 (0008):     1.48   0.261     3.00    42.59
          ================================================
          ID = 3 (0009):     2.07   0.330     3.00    39.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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| CALIB            |
| NASHYD    (0011) |   Area    (ha)=   1.40   Curve Number
(CN)= 67.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.315

     PEAK FLOW       (cms)=   0.176 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  34.567
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.384

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

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--------------------
| CALIB            |
| STANDHYD  (0010) |   Area    (ha)=   1.28
|ID= 1 DT= 5.0 min |   Total Imp(%)=  24.60   Dir. Conn.(%)=
24.60
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.31         0.97
     Dep. Storage     (mm)=       1.00         5.80
     Average Slope     (%)=       1.00         6.60
     Length            (m)=      92.38       100.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     140.20        53.60
                 over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.13 (ii)   13.10 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.31         0.08

*TOTALS*
     PEAK FLOW       (cms)=       0.12         0.09
0.199 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.08
3.00
```

```
     RUNOFF VOLUME    (mm)=      88.92        29.92
44.43
     TOTAL RAINFALL   (mm)=      89.93        89.93
89.93
     RUNOFF COEFFICIENT   =       0.99         0.33
0.49

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  62.5    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   (0012) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0010):     1.28   0.199     3.00    44.43
        + ID2= 2 (0011):     1.40   0.176     3.08    34.57
          ================================================
          ID = 3 (0012):     2.68   0.374     3.00    39.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB            |
| NASHYD    (0005) |   Area    (ha)=   8.72   Curve Number
(CN)= 64.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.80   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.854

     PEAK FLOW       (cms)=   0.553 (i)
     TIME TO PEAK    (hrs)=   3.250
     RUNOFF VOLUME    (mm)=  29.868
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.332

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

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--------------------
| CALIB            |
| NASHYD    (0014) |   Area    (ha)=   8.50   Curve Number
(CN)= 64.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.40   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.832

     PEAK FLOW       (cms)=   0.541 (i)
     TIME TO PEAK    (hrs)=   3.250
     RUNOFF VOLUME    (mm)=  29.943
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.333

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

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--------------------
| CALIB            |
| NASHYD    (0006) |   Area    (ha)=   2.66   Curve Number
(CN)= 64.8
|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)=   0.598

     PEAK FLOW       (cms)=   0.313 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  32.364
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.360

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

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--------------------
| CALIB            |
| NASHYD    (0013) |   Area    (ha)=   0.75   Curve Number
(CN)= 68.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.40   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.169

     PEAK FLOW       (cms)=   0.093 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  33.676
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.374

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

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--------------------
| CALIB            |
| NASHYD    (0017) |   Area    (ha)=   0.59   Curve Number
(CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW       (cms)=   0.070 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  32.601
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.363

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

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--------------------
| CALIB            |
| STANDHYD  (0018) |   Area    (ha)=   1.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=
23.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.34         1.14
     Dep. Storage     (mm)=       1.00         5.30
     Average Slope     (%)=       2.00         5.00
     Length            (m)=      99.33        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     140.20        56.45
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       1.81 (ii)    8.54 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.32         0.12

*TOTALS*
     PEAK FLOW       (cms)=       0.13         0.13
0.261 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.00
3.00
     RUNOFF VOLUME    (mm)=      88.92        28.75
42.59
     TOTAL RAINFALL   (mm)=      89.93        89.93
89.93
     RUNOFF COEFFICIENT   =       0.99         0.32
0.47

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  60.7    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 (0019) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                           0.0001     0.0074   |   0.0165
0.0238
                           0.0045     0.0089   |   0.0180
0.0280
                           0.0084     0.0111   |   0.0193
0.0326
```

```
                          0.0110     0.0137   |   0.0206
0.0376
                          0.0131     0.0166   |   0.0218
0.0435
                          0.0149     0.0200   |   0.0000
0.0000

                                AREA     QPEAK     TPEAK
R.V.
                                (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0018)      1.480      0.261      3.00
42.59
     OUTFLOW: ID= 1 (0019)      1.480      0.022      4.08
37.56

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.34
                    TIME SHIFT OF PEAK FLOW         (min)= 65.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=
0.0433

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| ADD HYD   (0020) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0017):     0.59   0.070     3.08    32.60
       + ID2= 2 (0019):     1.48   0.022     4.08    37.56
         ================================================
         ID = 3 (0020):     2.07   0.089     3.08    36.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| CALIB            |
| NASHYD    (0023) |   Area    (ha)=   1.40   Curve Number
(CN)= 67.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.315

     PEAK FLOW       (cms)=   0.176 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  34.567
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.384

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

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--------------------
| CALIB            |
| STANDHYD  (0021) |   Area    (ha)=   1.28
|ID= 1 DT= 5.0 min |   Total Imp(%)=  25.00   Dir. Conn.(%)=
25.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.32         0.96
     Dep. Storage     (mm)=       1.00         5.80
     Average Slope     (%)=       1.00         6.60
     Length            (m)=      92.38       100.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     140.20        53.60
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.13 (ii)   13.10 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.31         0.08

*TOTALS*
     PEAK FLOW       (cms)=       0.12         0.09
0.200 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.08
3.00
     RUNOFF VOLUME    (mm)=      88.92        29.92
44.66
     TOTAL RAINFALL   (mm)=      89.93        89.93
89.93
     RUNOFF COEFFICIENT   =       0.99         0.33
0.50

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  62.5    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 (0022) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                          0.0001     0.0052   |   0.0843
0.0172
                          0.0056     0.0066   |   0.0945
0.0200
                          0.0202     0.0082   |   0.1036
0.0231
                          0.0402     0.0101   |   0.1121
0.0265
                          0.0595     0.0122   |   0.1199
0.0301
                          0.0728     0.0146   |   0.0000
0.0000

                                AREA     QPEAK     TPEAK
R.V.
                                (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0021)      1.280      0.200      3.00
44.66
     OUTFLOW: ID= 1 (0022)      1.280      0.094      3.25
40.58

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 46.97
                    TIME SHIFT OF PEAK FLOW         (min)= 15.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=
0.0200

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--------------------
| ADD HYD   (0024) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0022):     1.28   0.094     3.25    40.58
       + ID2= 2 (0023):     1.40   0.176     3.08    34.57
         ================================================
         ID = 3 (0024):     2.68   0.268     3.08    37.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB            |
| NASHYD    (0055) |   Area    (ha)=   1.24   Curve Number
(CN)= 67.5
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.20   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.26

     Unit Hyd Qpeak  (cms)=   0.182

     PEAK FLOW       (cms)=   0.115 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  32.714
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.364

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

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--------------------
| CALIB            |
| NASHYD    (0056) |   Area    (ha)=   0.58   Curve Number
(CN)= 66.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.26

     Unit Hyd Qpeak  (cms)=   0.085

     PEAK FLOW       (cms)=   0.055 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  33.746
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.375

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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  ****************************
  ** SIMULATION NUMBER:   7 **
  ****************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 405.000
| Ptotal= 24.91 mm |                          B=   3.000
--------------------                          C=   0.760
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |
TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |
hrs   mm/hr
                0.17    1.76 |  1.17   11.75 |  2.17    3.88 |
3.17    2.07
                0.33    2.00 |  1.33   57.66 |  2.33    3.35 |
3.33    1.93
                0.50    2.32 |  1.50   15.20 |  2.50    2.96 |
3.50    1.81
                0.67    2.81 |  1.67    8.31 |  2.67    2.66 |
3.67    1.71
                0.83    3.61 |  1.83    5.91 |  2.83    2.42 |
3.83    1.62
                1.00    5.28 |  2.00    4.66 |  3.00    2.23 |
4.00    1.54


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--------------------
| CALIB            |
| NASHYD    (0002) |   Area    (ha)=   1.42   Curve Number
(CN)= 63.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.10   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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

|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.30   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.454

     PEAK FLOW       (cms)=   0.012 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   2.144
     TOTAL RAINFALL   (mm)=  24.906
     RUNOFF COEFFICIENT   =   0.086

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

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--------------------
| CALIB            |
| NASHYD    (0015) |   Area    (ha)=   2.66   Curve Number
(CN)= 64.8
|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)=   0.598

     PEAK FLOW       (cms)=   0.019 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   2.548
     TOTAL RAINFALL   (mm)=  24.906
     RUNOFF COEFFICIENT   =   0.102

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

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--------------------
| RESERVOIR (0016) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                         0.0001     0.0072   |   0.1306
0.0171

                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |
TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |
hrs   mm/hr
                0.083    1.76 | 1.083   11.75 | 2.083    3.88 |
3.08    2.07
                0.167    1.76 | 1.167   11.75 | 2.167    3.88 |
3.17    2.07
                0.250    2.00 | 1.250   57.66 | 2.250    3.35 |
3.25    1.93
                0.333    2.00 | 1.333   57.66 | 2.333    3.35 |
3.33    1.93
                0.417    2.32 | 1.417   15.20 | 2.417    2.96 |
3.42    1.81
                0.500    2.32 | 1.500   15.20 | 2.500    2.96 |
3.50    1.81
                0.583    2.81 | 1.583    8.31 | 2.583    2.66 |
3.58    1.71
                0.667    2.81 | 1.667    8.31 | 2.667    2.66 |
3.67    1.71
                0.750    3.61 | 1.750    5.91 | 2.750    2.42 |
3.75    1.62
                0.833    3.61 | 1.833    5.91 | 2.833    2.42 |
3.83    1.62
                0.917    5.28 | 1.917    4.66 | 2.917    2.23 |
3.92    1.54
                1.000    5.28 | 2.000    4.66 | 3.000    2.23 |
4.00    1.54

     Unit Hyd Qpeak  (cms)=   0.247

     PEAK FLOW       (cms)=   0.004 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   1.518
     TOTAL RAINFALL   (mm)=  24.906
     RUNOFF COEFFICIENT   =   0.061

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

------------------------------------------------------------------
--------------
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=   2.02   Curve Number
(CN)= 61.5

                         0.0065     0.0083   |   0.1492
0.0194
                         0.0242     0.0096   |   0.1656
0.0220
                         0.0501     0.0112   |   0.1806
0.0248
                         0.0806     0.0129   |   0.1944
0.0278
                         0.1098     0.0149   |   0.0000
0.0000

                                  AREA     QPEAK     TPEAK
R.V.
                                  (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0015)      2.660      0.019      1.50
2.55
     OUTFLOW: ID= 1 (0016)      2.660      0.000      4.58
0.03

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.50
                   TIME SHIFT OF PEAK FLOW         (min)=185.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=
0.0067

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--------------------
| CALIB            |
| NASHYD    (0004) |   Area    (ha)=   2.44   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)=   0.17

     Unit Hyd Qpeak  (cms)=   0.548

     PEAK FLOW       (cms)=   0.012 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   2.156
     TOTAL RAINFALL   (mm)=  24.906
     RUNOFF COEFFICIENT   =   0.087

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

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--------------------
| CALIB            |
| NASHYD    (0003) |   Area    (ha)=   1.53   Curve Number
(CN)= 61.7
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.344

     PEAK FLOW       (cms)=   0.005 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   1.505
     TOTAL RAINFALL   (mm)=  24.906
     RUNOFF COEFFICIENT   =   0.060

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

------------------------------------------------------------------
--------------
--------------------
| CALIB            |
| NASHYD    (0007) |   Area    (ha)=   0.59   Curve Number
(CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW       (cms)=   0.004 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   2.591
     TOTAL RAINFALL   (mm)=  24.906
     RUNOFF COEFFICIENT   =   0.104

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

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--------------
--------------------
| CALIB            |
| STANDHYD  (0008) |   Area    (ha)=   1.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=
23.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.34         1.14
     Dep. Storage     (mm)=       1.00         5.30
     Average Slope     (%)=       2.00         5.00
     Length            (m)=      99.33        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      57.66         1.95
                 over (min)       5.00        30.00
     Storage Coeff.  (min)=       2.58 (ii)   28.49 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=       0.29         0.04

*TOTALS*
     PEAK FLOW       (cms)=       0.05         0.00
0.054 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.92
1.33
     RUNOFF VOLUME    (mm)=      23.91         2.09
7.09
     TOTAL RAINFALL   (mm)=      24.91        24.91
24.91
     RUNOFF COEFFICIENT   =       0.96         0.08
0.28

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  60.7    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 (0007):     0.59   0.004     1.50     2.59
        + ID2= 2 (0008):     1.48   0.054     1.33     7.09
          ==========================================
          ID = 3 (0009):     2.07   0.057     1.33     5.81

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

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------------------------------------------------------------------
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--------------------
| CALIB            |
| NASHYD    (0011) |   Area    (ha)=   1.40   Curve Number
(CN)= 67.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.315

     PEAK FLOW       (cms)=   0.011 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   2.836
     TOTAL RAINFALL   (mm)=  24.906
     RUNOFF COEFFICIENT   =   0.114

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

------------------------------------------------------------------
--------------
--------------------
| CALIB            |
| STANDHYD  (0010) |   Area    (ha)=   1.28
|ID= 1 DT= 5.0 min |   Total Imp(%)=  24.60   Dir. Conn.(%)=
24.60
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.31         0.97
     Dep. Storage     (mm)=       1.00         5.80
     Average Slope     (%)=       1.00         6.60
     Length            (m)=      92.38       100.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      57.66         1.57
                 over (min)       5.00        50.00
     Storage Coeff.  (min)=       3.04 (ii)   48.01 (ii)
     Unit Hyd. Tpeak (min)=       5.00        50.00
     Unit Hyd. peak  (cms)=       0.27         0.02

*TOTALS*
     PEAK FLOW       (cms)=       0.05         0.00
0.049 (iii)
     TIME TO PEAK    (hrs)=       1.33         2.33
1.33
     RUNOFF VOLUME    (mm)=      23.91         2.13
7.46
     TOTAL RAINFALL   (mm)=      24.91        24.91
24.91
     RUNOFF COEFFICIENT   =       0.96         0.09
0.30

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.5    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   (0012) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0010):     1.28   0.049     1.33     7.46
        + ID2= 2 (0011):     1.40   0.011     1.50     2.84
          ==========================================
          ID = 3 (0012):     2.68   0.056     1.33     5.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------
--------------
--------------------
| CALIB            |
| NASHYD    (0005) |   Area    (ha)=   8.72   Curve Number
(CN)= 64.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.80   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.854

     PEAK FLOW       (cms)=   0.021 (i)
     TIME TO PEAK    (hrs)=   1.917
     RUNOFF VOLUME    (mm)=   1.670
     TOTAL RAINFALL   (mm)=  24.906
     RUNOFF COEFFICIENT   =   0.067
```

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

---------------------------------------------------------------
--------------
--------------------
| CALIB            |
| NASHYD    (0014) |   Area    (ha)=   8.50   Curve Number
(CN)= 64.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.40   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.39

     Unit Hyd Qpeak  (cms)=   0.832

     PEAK FLOW       (cms)=   0.022 (i)
     TIME TO PEAK    (hrs)=   1.917
     RUNOFF VOLUME    (mm)=   1.736
     TOTAL RAINFALL   (mm)=  24.906
     RUNOFF COEFFICIENT   =   0.070

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

---------------------------------------------------------------
--------------
--------------------
| CALIB            |
| NASHYD    (0006) |   Area    (ha)=   2.66   Curve Number
(CN)= 64.8
|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)=   0.598

     PEAK FLOW       (cms)=   0.019 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   2.548
     TOTAL RAINFALL   (mm)=  24.906
     RUNOFF COEFFICIENT   =   0.102

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

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--------------------
| CALIB            |
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```
| NASHYD    (0013) |   Area    (ha)=   0.75   Curve Number
(CN)= 68.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.40   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.169

     PEAK FLOW       (cms)=   0.004 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   2.237
     TOTAL RAINFALL   (mm)=  24.906
     RUNOFF COEFFICIENT   =   0.090

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

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--------------
--------------------
| CALIB            |
| NASHYD    (0017) |   Area    (ha)=   0.59   Curve Number
(CN)= 65.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.70   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW       (cms)=   0.004 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   2.591
     TOTAL RAINFALL   (mm)=  24.906
     RUNOFF COEFFICIENT   =   0.104

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

---------------------------------------------------------------
--------------
--------------------
| CALIB            |
| STANDHYD  (0018) |   Area    (ha)=   1.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=
23.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.34         1.14
     Dep. Storage     (mm)=      1.00         5.30
```

```
     Average Slope     (%)=      2.00         5.00
     Length            (m)=     99.33        40.00
     Mannings n           =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     57.66         1.95
               over (min)        5.00        30.00
     Storage Coeff.  (min)=      2.58 (ii)   28.49 (ii)
     Unit Hyd. Tpeak (min)=      5.00        30.00
     Unit Hyd. peak  (cms)=      0.29         0.04

*TOTALS*
     PEAK FLOW       (cms)=      0.05         0.00
0.054 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.92
1.33
     RUNOFF VOLUME    (mm)=     23.91         2.09
7.09
     TOTAL RAINFALL   (mm)=     24.91        24.91
24.91
     RUNOFF COEFFICIENT   =      0.96         0.08
0.28

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  60.7    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 (0019) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                         0.0001     0.0074   |   0.0165
0.0238
                         0.0045     0.0089   |   0.0180
0.0280
                         0.0084     0.0111   |   0.0193
0.0326
```

```
                         0.0110     0.0137   |   0.0206
0.0376
                         0.0131     0.0166   |   0.0218
0.0435
                         0.0149     0.0200   |   0.0000
0.0000

                              AREA     QPEAK     TPEAK
R.V.
                              (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0018)      1.480      0.054      1.33
7.09
     OUTFLOW: ID= 1 (0019)      1.480      0.003      3.50
2.06

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.96
                   TIME SHIFT OF PEAK FLOW         (min)=130.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=
0.0085

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

--------------------
| ADD HYD   (0020) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0017):     0.59   0.004     1.50     2.59
        + ID2= 2 (0019):     1.48   0.003     3.50     2.06
          ================================================
          ID = 3 (0020):     2.07   0.004     1.50     2.21

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------
--------------
--------------------
| CALIB            |
| NASHYD    (0023) |   Area    (ha)=   1.40   Curve Number
(CN)= 67.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.315
```

```
     PEAK FLOW       (cms)=   0.011 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   2.836
     TOTAL RAINFALL   (mm)=  24.906
     RUNOFF COEFFICIENT   =   0.114

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

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--------------------
| CALIB           |
| STANDHYD  (0021) |   Area    (ha)=   1.28
|ID= 1 DT= 5.0 min |   Total Imp(%)=  25.00   Dir. Conn.(%)=
25.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.32         0.96
     Dep. Storage     (mm)=      1.00         5.80
     Average Slope     (%)=      1.00         6.60
     Length            (m)=     92.38       100.00
     Mannings n           =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     57.66         1.57
               over (min)        5.00        50.00
     Storage Coeff.  (min)=      3.04 (ii)   48.01 (ii)
     Unit Hyd. Tpeak (min)=      5.00        50.00
     Unit Hyd. peak  (cms)=      0.27         0.02

*TOTALS*
     PEAK FLOW       (cms)=      0.05         0.00
0.050 (iii)
     TIME TO PEAK    (hrs)=      1.33         2.33
1.33
     RUNOFF VOLUME    (mm)=     23.91         2.13
7.55
     TOTAL RAINFALL   (mm)=     24.91        24.91
24.91
     RUNOFF COEFFICIENT   =      0.96         0.09
0.30

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.5    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 (0022) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW
STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)
(ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                           0.0001     0.0052   |   0.0843
0.0172
                           0.0056     0.0066   |   0.0945
0.0200
                           0.0202     0.0082   |   0.1036
0.0231
                           0.0402     0.0101   |   0.1121
0.0265
                           0.0595     0.0122   |   0.1199
0.0301
                           0.0728     0.0146   |   0.0000
0.0000

                                AREA     QPEAK     TPEAK
R.V.
                                (ha)     (cms)     (hrs)
(mm)
     INFLOW : ID= 2 (0021)      1.280      0.050      1.33
7.55
     OUTFLOW: ID= 1 (0022)      1.280      0.004      2.75
3.46

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.63
                   TIME SHIFT OF PEAK FLOW         (min)= 85.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=
0.0063

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

--------------------
| ADD HYD   (0024) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0022):     1.28   0.004     2.75     3.46

        + ID2= 2 (0023):     1.40   0.011     1.50     2.84
          ================================================
          ID = 3 (0024):     2.68   0.011     1.50     3.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------
--------------
--------------------
| CALIB           |
| NASHYD    (0055) |   Area    (ha)=   1.24   Curve Number
(CN)= 67.5
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.20   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.26

     Unit Hyd Qpeak  (cms)=   0.182

     PEAK FLOW       (cms)=   0.005 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   2.006
     TOTAL RAINFALL   (mm)=  24.906
     RUNOFF COEFFICIENT   =   0.081

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

------------------------------------------------------------------
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--------------------
| CALIB           |
| NASHYD    (0056) |   Area    (ha)=   0.58   Curve Number
(CN)= 66.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.60   # of Linear
Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.26

     Unit Hyd Qpeak  (cms)=   0.085

     PEAK FLOW       (cms)=   0.003 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   2.735
     TOTAL RAINFALL   (mm)=  24.906
     RUNOFF COEFFICIENT   =   0.110

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

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Appendix C

Stormwater Facility Design

3.3.2 Water Quality Sizing Criteria

The volumetric water quality criteria are presented in Table 3.2. The values are based on a 24 hour drawdown time and a design which conforms to the guidance provided in this manual. Requirements differ with SWMP type to reflect differences in removal efficiencies. Of the specified storage volume for wet facilities, 40 m^3/ha is extended detention, while the remainder represents the permanent pool.

Table 3.2 Water Quality Storage Requirements based on Receiving Waters[1, 2]

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35%	55%	70%	85%
Enhanced 80% long-term S.S. removal	Infiltration	25	30	35	40
	Wetlands	80	105	120	140
	Hybrid Wet Pond/Wetland	110	150	175	195
	Wet Pond	140	190	225	250
Normal 70% long-term S.S. removal	Infiltration	20	20	25	30
	Wetlands	60	70	80	90
	Hybrid Wet Pond/Wetland	75	90	105	120
	Wet Pond	90	110	130	150
Basic 60% long-term S.S. removal	Infiltration	20	20	20	20
	Wetlands	60	60	60	60
	Hybrid Wet Pond/Wetland	60	70	75	80
	Wet Pond	60	75	85	95
	Dry Pond (Continuous Flow)	90	150	200	240

[1]Table 3.2 does not include every available SWMP type. Any SWMP type that can be demonstrated to the approval agencies to meet the required long-term suspended solids removal for the selected protection levels under the conditions of the site is acceptable for water quality objectives. The sizing for these SWMP types is to be determined based on performance results that have been peer-reviewed. The designer and those who review the design should be fully aware of the assumptions and sampling methodologies used in formulating performance predictions and their implications for the design.

[2]Hybrid Wet Pond/Wetland systems have 50-60% of their permanent pool volume in deeper portions of the facility (e.g., forebay, wet pond).

Stage-Storage-Discharge: PR-100 Roadside Ditch

Project No: 19-10874
Project Name: Life at the Woodland
Designed/Checked By: MW / CPB
Date: February 23, 2022

Storage Summary		
Top of Dead Storage:	1.00	m
Dead Storage Volume:	71.6	m^3
Active Storage Volume:	206.5	m^3

Outlet Capacity Summary				
Type	Diameter	Slope	Peak Flow	% Full

Discharge Summary				
Stage	Type	Invert Elev (m)	Diameter / Width (mm)	(m)
1	Orifice Tube: Vertical	1.00	325	

Stage-Storage-Discharge Summary Table

Elevation	Stage	Stage 1 Orifice Tube						Total Storage	Total Discharge	Notes
m	m	m^3/s						ha*m	m^3/s	
1.00	0.00	0.000						**0.0072**	**0.000**	
1.01	0.01	**0.000**						**0.0073**	**0.000**	
1.02	0.02	**0.001**						**0.0075**	**0.001**	
1.03	0.03	**0.002**						**0.0077**	**0.002**	
1.04	0.04	**0.003**						**0.0079**	**0.003**	
1.05	0.05	**0.005**						**0.0081**	**0.005**	
1.06	0.06	**0.006**						**0.0083**	**0.006**	
1.07	0.07	**0.009**						**0.0085**	**0.009**	
1.08	0.08	**0.011**						**0.0087**	**0.011**	
1.09	0.09	**0.014**						**0.0089**	**0.014**	
1.10	0.10	**0.017**						**0.0091**	**0.017**	
1.11	0.11	**0.021**						**0.0094**	**0.021**	<= 2 Yr: 93 m³ (1.11m)
1.12	0.12	**0.024**						**0.0096**	**0.024**	
1.13	0.13	**0.028**						**0.0099**	**0.028**	
1.14	0.14	**0.032**						**0.0101**	**0.032**	
1.15	0.15	**0.036**						**0.0104**	**0.036**	
1.16	0.16	**0.041**						**0.0106**	**0.041**	
1.17	0.17	**0.045**						**0.0109**	**0.045**	
1.18	0.18	**0.050**						**0.0112**	**0.050**	
1.19	0.19	**0.055**						**0.0115**	**0.055**	
1.20	0.20	**0.060**						**0.0117**	**0.060**	
1.21	0.21	**0.065**						**0.0120**	**0.065**	
1.22	0.22	**0.070**						**0.0123**	**0.070**	<= 5 Yr: 123 m³ (1.22m)
1.23	0.23	**0.075**						**0.0126**	**0.075**	
1.24	0.24	**0.081**						**0.0129**	**0.081**	
1.25	0.25	**0.086**						**0.0133**	**0.086**	
1.26	0.26	**0.091**						**0.0136**	**0.091**	
1.27	0.27	**0.096**						**0.0139**	**0.096**	
1.28	0.28	**0.101**						**0.0142**	**0.101**	
1.29	0.29	**0.105**						**0.0146**	**0.105**	
1.30	0.30	**0.110**						**0.0149**	**0.110**	<= 10 Yr: 146 m³ (1.3m)
1.31	0.31	**0.114**						**0.0153**	**0.114**	
1.32	0.32	**0.117**						**0.0156**	**0.117**	
1.33	0.33	**0.120**						**0.0160**	**0.120**	
1.34	0.34	**0.124**						**0.0163**	**0.124**	
1.35	0.35	**0.127**						**0.0167**	**0.127**	
1.36	0.36	**0.131**						**0.0171**	**0.131**	
1.37	0.37	**0.134**						**0.0175**	**0.134**	
1.38	0.38	**0.137**						**0.0178**	**0.137**	
1.39	0.39	**0.140**						**0.0182**	**0.140**	
1.40	0.40	**0.143**						**0.0186**	**0.143**	<= 25 Yr: 185 m³ (1.4m)
1.41	0.41	**0.146**						**0.0190**	**0.146**	
1.42	0.42	**0.149**						**0.0194**	**0.149**	
1.43	0.43	**0.152**						**0.0199**	**0.152**	
1.44	0.44	**0.155**						**0.0203**	**0.155**	
1.45	0.45	**0.158**						**0.0207**	**0.158**	
1.46	0.46	**0.160**						**0.0211**	**0.160**	
1.47	0.47	**0.163**						**0.0216**	**0.163**	
1.48	0.48	**0.166**						**0.0220**	**0.166**	<= 50 Yr: 220 m³ (1.48m)

Stage-Storage-Discharge Summary Table										
Elevation	Stage	Stage 1 Orifice Tube						Total Storage	Total Discharge	Notes
m	m	m^3/s						ha*m	m^3/s	
1.49	0.49	**0.168**						**0.0225**	**0.168**	
1.50	0.50	**0.171**						**0.0229**	**0.171**	
1.51	0.51	**0.173**						**0.0234**	**0.173**	
1.52	0.52	**0.176**						**0.0239**	**0.176**	
1.53	0.53	**0.178**						**0.0243**	**0.178**	
1.54	0.54	**0.181**						**0.0248**	**0.181**	
1.55	0.55	**0.183**						**0.0253**	**0.183**	
1.56	0.56	**0.185**						**0.0258**	**0.185**	
1.57	0.57	**0.188**						**0.0263**	**0.188**	<= 100 Yr: 261 m³ (1.57m)
1.58	0.58	**0.190**						**0.0268**	**0.190**	
1.59	0.59	**0.192**						**0.0273**	**0.192**	
1.60	0.60	**0.194**						**0.0278**	**0.194**	

Stage-Storage-Discharge: PR-102 Roadside Ditch

Project No: 19-10874
Project Name: Life at the Woodland
Designed/Checked By: MW / CPB
Date: February 23, 2022

Storage Summary		
Top of Dead Storage:	1.00	m
Dead Storage Volume:	78.3	m^3
Active Storage Volume:	356.7	m^3

Outlet Capacity Summary				
Type	Diameter	Slope	Peak Flow	% Full

Discharge Summary				
Stage	Type	Invert Elev (m)	Diameter / Width (mm)	(m)
1	Orifice Tube: Vertical	1.00	95	

Stage-Storage-Discharge Summary Table

Elevation	Stage	Stage 1 Orifice Tube						Total Storage	Total Discharge	Notes
m	m	m^3/s						ha*m	m^3/s	
1.00	0.00	0.000						**0.0074**	**0.000**	
1.01	0.01	**0.000**						**0.0073**	**0.000**	
1.02	0.02	**0.000**						**0.0075**	**0.000**	
1.03	0.03	**0.001**						**0.0077**	**0.001**	
1.04	0.04	**0.001**						**0.0080**	**0.001**	
1.05	0.05	**0.002**						**0.0082**	**0.002**	
1.06	0.06	**0.003**						**0.0084**	**0.003**	
1.07	0.07	**0.004**						**0.0086**	**0.004**	<= 25 mm: 85 m^3 (1.07m)
1.08	0.08	**0.005**						**0.0089**	**0.005**	
1.09	0.09	**0.005**						**0.0091**	**0.005**	
1.10	0.10	**0.006**						**0.0094**	**0.006**	
1.11	0.11	**0.006**						**0.0097**	**0.006**	
1.12	0.12	**0.007**						**0.0099**	**0.007**	
1.13	0.13	**0.007**						**0.0102**	**0.007**	
1.14	0.14	**0.008**						**0.0105**	**0.008**	
1.15	0.15	**0.008**						**0.0108**	**0.008**	
1.16	0.16	**0.008**						**0.0111**	**0.008**	
1.17	0.17	**0.009**						**0.0114**	**0.009**	
1.18	0.18	**0.009**						**0.0117**	**0.009**	
1.19	0.19	**0.009**						**0.0120**	**0.009**	
1.20	0.20	**0.010**						**0.0123**	**0.010**	
1.21	0.21	**0.010**						**0.0126**	**0.010**	<= 2 Yr: 125 m^3 (1.21m)
1.22	0.22	**0.010**						**0.0130**	**0.010**	
1.23	0.23	**0.011**						**0.0133**	**0.011**	
1.24	0.24	**0.011**						**0.0137**	**0.011**	
1.25	0.25	**0.011**						**0.0140**	**0.011**	
1.26	0.26	**0.012**						**0.0144**	**0.012**	
1.27	0.27	**0.012**						**0.0147**	**0.012**	
1.28	0.28	**0.012**						**0.0151**	**0.012**	
1.29	0.29	**0.012**						**0.0155**	**0.012**	
1.30	0.30	**0.013**						**0.0158**	**0.013**	
1.31	0.31	**0.013**						**0.0162**	**0.013**	
1.32	0.32	**0.013**						**0.0166**	**0.013**	
1.33	0.33	**0.013**						**0.0170**	**0.013**	
1.34	0.34	**0.014**						**0.0174**	**0.014**	
1.35	0.35	**0.014**						**0.0178**	**0.014**	
1.36	0.36	**0.014**						**0.0183**	**0.014**	
1.37	0.37	**0.014**						**0.0187**	**0.014**	
1.38	0.38	**0.014**						**0.0191**	**0.014**	<= 5 Yr: 190 m^3 (1.38m)
1.39	0.39	**0.015**						**0.0196**	**0.015**	
1.40	0.40	**0.015**						**0.0200**	**0.015**	
1.41	0.41	**0.015**						**0.0204**	**0.015**	
1.42	0.42	**0.015**						**0.0209**	**0.015**	
1.43	0.43	**0.016**						**0.0214**	**0.016**	
1.44	0.44	**0.016**						**0.0218**	**0.016**	
1.45	0.45	**0.016**						**0.0223**	**0.016**	
1.46	0.46	**0.016**						**0.0228**	**0.016**	
1.47	0.47	**0.016**						**0.0233**	**0.016**	
1.48	0.48	**0.017**						**0.0238**	**0.017**	

Stage-Storage-Discharge Summary Table										
Elevation	**Stage**	**Stage 1 Orifice Tube**						**Total Storage**	**Total Discharge**	**Notes**
m	**m**	**m^3/s**						**ha*m**	**m^3/s**	
1.49	0.49	**0.017**						**0.0243**	**0.017**	<= 10 Yr: 241 m³ (1.49m)
1.50	0.50	**0.017**						**0.0248**	**0.017**	
1.51	0.51	**0.017**						**0.0253**	**0.017**	
1.52	0.52	**0.017**						**0.0258**	**0.017**	
1.53	0.53	**0.017**						**0.0263**	**0.017**	
1.54	0.54	**0.018**						**0.0269**	**0.018**	
1.55	0.55	**0.018**						**0.0274**	**0.018**	
1.56	0.56	**0.018**						**0.0280**	**0.018**	
1.57	0.57	**0.018**						**0.0285**	**0.018**	
1.58	0.58	**0.018**						**0.0291**	**0.018**	
1.59	0.59	**0.019**						**0.0296**	**0.019**	
1.60	0.60	**0.019**						**0.0302**	**0.019**	
1.61	0.61	**0.019**						**0.0308**	**0.019**	
1.62	0.62	**0.019**						**0.0314**	**0.019**	<= 25 Yr: 313 m³ (1.62m)
1.63	0.63	**0.019**						**0.0320**	**0.019**	
1.64	0.64	**0.019**						**0.0326**	**0.019**	
1.65	0.65	**0.019**						**0.0332**	**0.019**	
1.66	0.66	**0.020**						**0.0338**	**0.020**	
1.67	0.67	**0.020**						**0.0344**	**0.020**	
1.68	0.68	**0.020**						**0.0350**	**0.020**	
1.69	0.69	**0.020**						**0.0356**	**0.020**	
1.70	0.70	**0.020**						**0.0363**	**0.020**	
1.71	0.71	**0.020**						**0.0369**	**0.020**	
1.72	0.72	**0.021**						**0.0376**	**0.021**	<= 50 Yr: 372 m³ (1.72m)
1.73	0.73	**0.021**						**0.0382**	**0.021**	
1.74	0.74	**0.021**						**0.0389**	**0.021**	
1.75	0.75	**0.021**						**0.0396**	**0.021**	
1.76	0.76	**0.021**						**0.0402**	**0.021**	
1.77	0.77	**0.021**						**0.0409**	**0.021**	
1.78	0.78	**0.021**						**0.0416**	**0.021**	
1.79	0.79	**0.022**						**0.0425**	**0.022**	
1.80	0.80	**0.022**						**0.0435**	**0.022**	<= 100 Yr: 433 m³ (1.8m)

Stage-Storage-Discharge: PR-201 Roadside Ditch

Project No: 19-10874
Project Name: Life at the Woodland
Designed/Checked By: MW / CPB
Date: February 23, 2022

Storage Summary		
Top of Dead Storage:	1.00	m
Dead Storage Volume:	51.9	m^3
Active Storage Volume:	248.7	m^3

Outlet Capacity Summary				
Type	Diameter	Slope	Peak Flow	% Full

Discharge Summary				
Stage	Type	Invert Elev (m)	Diameter / Width (mm)	(m)
1	Orifice Tube: Vertical	1.00	250	

Stage-Storage-Discharge Summary Table

Elevation	Stage	Stage 1 Orifice Tube						Total Storage	Total Discharge	Notes
m	m	m^3/s						ha*m	m^3/s	
1.00	0.00	0.000						**0.0052**	**0.000**	
1.01	0.01	**0.000**						**0.0054**	**0.000**	
1.02	0.02	**0.001**						**0.0056**	**0.001**	
1.03	0.03	**0.001**						**0.0058**	**0.001**	
1.04	0.04	**0.003**						**0.0061**	**0.003**	
1.05	0.05	**0.004**						**0.0063**	**0.004**	<= 25 mm: 63 m³ (1.05m)
1.06	0.06	**0.006**						**0.0066**	**0.006**	
1.07	0.07	**0.007**						**0.0068**	**0.007**	
1.08	0.08	**0.010**						**0.0071**	**0.010**	
1.09	0.09	**0.012**						**0.0074**	**0.012**	
1.10	0.10	**0.015**						**0.0076**	**0.015**	
1.11	0.11	**0.017**						**0.0079**	**0.017**	
1.12	0.12	**0.020**						**0.0082**	**0.020**	<= 2 Yr: 81 m³ (1.12m)
1.13	0.13	**0.023**						**0.0085**	**0.023**	
1.14	0.14	**0.027**						**0.0088**	**0.027**	
1.15	0.15	**0.030**						**0.0091**	**0.030**	
1.16	0.16	**0.033**						**0.0094**	**0.033**	
1.17	0.17	**0.037**						**0.0097**	**0.037**	
1.18	0.18	**0.040**						**0.0101**	**0.040**	
1.19	0.19	**0.044**						**0.0104**	**0.044**	
1.20	0.20	**0.047**						**0.0108**	**0.047**	<= 5 Yr: 105 m³ (1.2m)
1.21	0.21	**0.051**						**0.0111**	**0.051**	
1.22	0.22	**0.054**						**0.0115**	**0.054**	
1.23	0.23	**0.057**						**0.0118**	**0.057**	
1.24	0.24	**0.059**						**0.0122**	**0.059**	
1.25	0.25	**0.061**						**0.0126**	**0.061**	<= 10 Yr: 122 m³ (1.25m)
1.26	0.26	**0.064**						**0.0130**	**0.064**	
1.27	0.27	**0.066**						**0.0133**	**0.066**	
1.28	0.28	**0.068**						**0.0137**	**0.068**	
1.29	0.29	**0.071**						**0.0141**	**0.071**	
1.30	0.30	**0.073**						**0.0146**	**0.073**	<= 25 Yr: 144 m³ (1.3m)
1.31	0.31	**0.075**						**0.0150**	**0.075**	
1.32	0.32	**0.077**						**0.0154**	**0.077**	
1.33	0.33	**0.079**						**0.0158**	**0.079**	
1.34	0.34	**0.081**						**0.0163**	**0.081**	
1.35	0.35	**0.083**						**0.0167**	**0.083**	
1.36	0.36	**0.084**						**0.0172**	**0.084**	
1.37	0.37	**0.086**						**0.0176**	**0.086**	<= 50 Yr: 174 m³ (1.37m)
1.38	0.38	**0.088**						**0.0181**	**0.088**	
1.39	0.39	**0.090**						**0.0186**	**0.090**	
1.40	0.40	**0.091**						**0.0190**	**0.091**	
1.41	0.41	**0.093**						**0.0195**	**0.093**	
1.42	0.42	**0.094**						**0.0200**	**0.094**	<= 100 Yr: 200 m³ (1.42m)
1.43	0.43	**0.096**						**0.0205**	**0.096**	
1.44	0.44	**0.098**						**0.0210**	**0.098**	
1.45	0.45	**0.099**						**0.0215**	**0.099**	
1.46	0.46	**0.101**						**0.0221**	**0.101**	
1.47	0.47	**0.102**						**0.0226**	**0.102**	
1.48	0.48	**0.104**						**0.0231**	**0.104**	

Stage-Storage-Discharge Summary Table										
Elevation	Stage	Stage 1 Orifice Tube						Total Storage	Total Discharge	Notes
m	m	m^3/s						ha*m	m^3/s	
1.49	0.49	**0.105**						**0.0237**	**0.105**	
1.50	0.50	**0.107**						**0.0242**	**0.107**	
1.51	0.51	**0.108**						**0.0248**	**0.108**	
1.52	0.52	**0.109**						**0.0253**	**0.109**	
1.53	0.53	**0.111**						**0.0259**	**0.111**	
1.54	0.54	**0.112**						**0.0265**	**0.112**	
1.55	0.55	**0.113**						**0.0270**	**0.113**	
1.56	0.56	**0.115**						**0.0276**	**0.115**	
1.57	0.57	**0.116**						**0.0282**	**0.116**	
1.58	0.58	**0.117**						**0.0288**	**0.117**	
1.59	0.59	**0.119**						**0.0294**	**0.119**	
1.60	0.60	**0.120**						**0.0301**	**0.120**	

Appendix D

Drawings