

12.0 STORMWATER MANAGEMENT

12.1 Introduction

This section summarizes the stormwater management applicability for CMP's NECEC transmission line corridors and substation sites.

12.1.1 Transmission Lines

Pursuant to the Stormwater Management Law 38 M.R.S. §420-D, a utility corridor or a portion of a utility corridor is not required to meet the general standards of Chapter 500, provided the project meets the following criteria:

1. The project or portion of the project does not include impervious area;
2. Disturbed areas are restored to pre-construction contours and revegetated within one month in the growing season following construction;
3. Mowing of the revegetated ROW occurs no more than once during any twelve month period; and
4. A vegetation management plan for the project has been reviewed and approved by the Department.

The NECEC project does not require stormwater analysis for the transmission line components for the reasons provided below.

The proposed transmission lines have been designed to minimize potential impacts to the environment and, as such, the permanent conversion of vegetated areas to impervious surfaces along the corridor will be limited to the transmission line poles themselves. Necessary clearing of the transmission line corridor will be limited to the removal of mature trees and capable species (i.e., trees capable of attaining heights that would cause safety/reliability problems due to their proximity to the conductors), as necessary, to allow placement of pole structures and to ensure adequate clearance between any vegetation and the conductors. The removal of understory vegetation and ground cover will be required only as needed to install a structure, to create access to or within the corridor, and for puller/tensioner sites. Restoration activities following construction will restore site contours to pre-construction conditions and ensure that areas disturbed during construction will be revegetated as discussed in **Section 14**, Basic Standards Submissions.

After construction, the corridor will be allowed to revegetate and will be maintained in an early successional state in accordance with CMP's Post-Construction Vegetation Management Plan (**Exhibit**

10-2). The corridor will become dominated by shrubs and a variety of broad and narrow-leaved herbaceous vegetation as is typical of established transmission line corridors. Generally, the conversion of a forest cover to a scrub-shrub or early successional cover type within a transmission line corridor may improve the ability of the land to absorb runoff due to the increased density of the root mass associated with the resultant vegetative cover. Specifically, the runoff curve numbers found in Urban Hydrology for Small Watersheds, Technical Release 55 (TR-55), Table 2-2c, shows similar curve numbers when comparing “woods” to “brush” in C and D soils. Non-forested cover type runoff curve numbers will generally remain the same as pre-development cover types runoff curve numbers. Vegetation along the corridor will be trimmed or maintained every 4 years, which will promote a “brush” type cover.

Transmission line corridor management techniques are discussed in more detail in Section 10- Buffers, and have also been incorporated into the NECEC Construction Vegetation Clearing Plan (**Exhibit 10-1**) and CMP’s Post-Construction Vegetation Management Plan (**Exhibit 10-2**).

12.1.2 Substation Permitting Methodology

CMP is providing stormwater management analysis for each of the substations affected by the NECEC project. Two different categories of substation improvements include:

1. Existing Substations – (equipment to be added will be within the existing fence line; no substation yard expansion needed)
2. New Substations – (new yard with associated access road)

The following subsections summarize the Chapter 500 requirements that apply to each substation category.

12.1.3 Existing Substations

Substations in this category are those substations with proposed equipment additions and a minimal amount of additional impervious area (e.g., concrete foundations). Per Chapter 500 criteria, these sites would not trigger a stormwater permit requirement if they were stand-alone applications. However, because the entire NECEC Project is jurisdictional under the Site Location of Development Act, the following narratives describing the proposed improvements at each location, a statement that each substation meets the requirements of the Basic Standards (Erosion and Sedimentation Control), and a United States Geological Survey (USGS) topographic map excerpt that shows the location of the substation (**Exhibit 12-1**).

12.1.3.1 Coopers Mills Substation

The existing Coopers Mills 345/115kV Substation is located off Coopers Mills Road in the Town of Windsor, Kennebec County, Maine. The existing substation occupies approximately 17.86 acres and is accessed by a gravel access road off Maxcys Mills Road.

All modifications at the Coopers Mills 345/115kV Substation will be within the existing, fenced substation yard and include a new 345kV transmission line termination and an additional 345kV +/- 200MVAR Static Compensator, with associated equipment, bus work and foundations. The locations of the proposed modifications are shown on SK-COOP-GL. Concrete foundations for new equipment will add approximately 12,000 square feet (0.275 acres) of impervious surface to the substation yard in areas that are currently crushed stone, and will support the additional aboveground equipment required as part of the overall NECEC Project.

12.1.3.1.1 Development Impacts

Although the area of new impervious surfaces (approximately 12,000 square feet or 0.275 acres) represents only 1.5% of the overall station area, this resulted in a slight increase in the overall station runoff curve number, as discussed in Section 12.1.3.1.5. The additional concrete area will result in a slight increase (1% or less) of stormwater runoff from the site during the 2-year, 10-year and 25-year storms. However, the proposed runoff rates from the site will be lower than the runoff rates that existed prior to the construction of the existing substation. The existing substation was constructed in 2012.

12.1.3.1.2 Downstream Ponds and Lakes

The Coopers Mills 345/115kV Substation is not located in a watershed of a “Lake Most at Risk from Development” or an “Urban Impaired Stream” as defined in Chapter 502 of the Department Regulations. The project is located within the West Branch Sheepscot River watershed.

12.1.3.1.3 Basic Standards Compliance

In accordance with the Basic Standards, during and after construction at the Coopers Mills 345/115kV Substation, CMP’s Environmental Guidelines (**Exhibit 14-1**), which incorporates the applicable procedures of the Maine Erosion and Sediment Control Practices Field Guide for Contractors, will be utilized to prevent erosion from occurring, as well as to correct any problems that may develop. Accordingly, the Basic Standards will be met.

12.1.3.1.4 General Standards Compliance

All improvements at the Coopers Mills 345/115kV Substation will be located within the existing fence line. As such, the area will be considered to be treated in place via the standard CMP station yard construction, consisting of 18" of MDOT Type "A" Gravel topped with 6" of crushed stone.

12.1.3.1.5 Flooding Standard Compliance

In order to confirm that the proposed improvements will still meet the Flooding Standard, the runoff curve number (CN) from the most recent stormwater model (dated 5/4/2017) was compared to a revised CN, incorporating the proposed improvements. If the proposed improvements will not change the CN, then runoff characteristics will not change and the Flooding Standard will still be met. The results of this comparison are illustrated in **Table 12-1** and **Table 12-2** below.

Table 12-1: Current Conditions Curve Number Calculation, Watershed 3SA (5/4/2017)

Coopers Mills 345/115kV Substation Yard (Watershed 3SA)		
	Area (acres)	CN
>75% Grass cover, Good, HSG C	0.010	74
Existing Roofs and foundations	0.664	98
Substation Yard	17.196	60
Total Acreage	17.870	
Weighted Curve Number		61

Table 12-2: Revised Curve Number Calculation, Watershed 3SA (includes new impervious concrete foundations)

Coopers Mills 345/115kV Substation Yard (Watershed 3SA)		
	Area (acres)	CN
>75% Grass cover, Good, HSG C	0.010	74
Existing Roofs and foundations	0.664	98
Substation Yard	16.921	60
New Impervious Area	0.275	98
Total Acreage	17.870	
Weighted Curve Number		62

As shown in the tables above, the proposed improvements will slightly increase the CN for the substation watershed. A model was developed to determine what effect the increase in substation watershed CN would have on the site's compliance with the Flooding Standard.

Model output for the original Pre-Development (prior to substation construction) model, dated 4/17/2009, has been included in **Exhibit 12-2**, model output for the Current Conditions (as modified in May 2017), dated 5/4/2017, has been included in **Exhibit 12-3** and model out for the Proposed Conditions Model has been included in **Exhibit 12-4**. The results for runoff from the site during the pre-development condition, the current condition and the proposed condition are compared in **Table 12-3** below.

Table 12-3: Comparison of Peak Runoff Rate in Pre-Development, Current and Proposed Conditions for Coopers Mills 345/115kV Substation Site, Node BNDY (Sheepscot)

Coopers Mills 345/115kV Substation Site (Node BNDY Sheepscot) Peak Runoff Rates, cfs			
	2-Year Storm	10-Year Storm	25-Year Storm
Pre-Development Conditions	59.73	137.01	180.90
Current Conditions	35.77	98.30	128.69
Proposed Conditions	36.16	98.99	129.46
Proposed Conditions to Current Conditions	0.39 - 1.1%	0.69 - 0.7%	0.77 - 0.6%
Proposed Conditions to Pre-Development Conditions	(23.57) (40.1%)	(38.02) (27.7%)	(51.44) (28.4%)

The proposed improvements will increase the overall peak runoff rate from the site by 1.1%, 0.7% and 0.6%, during the 2-Year, 10-Year and 25-Year Storms, respectively. However, the peak runoff rate will still represent a significant reduction from pre-development conditions.

12.1.3.2 Crowley's Substation

No additional impervious surfaces are proposed as part of Crowley's Substation upgrades.

12.1.3.3 Larrabee Road Substation

The existing Larrabee Road 345/115kV Substation is located off Larrabee Road in the City of Lewiston, Androscoggin County, Maine. The existing substation occupies approximately 15.44 acres and is accessed by a gravel access road off the end of Larrabee Road.

All modifications at the Larrabee Road 345/115kV Substation will be within the existing, fenced substation yard and include a new 345kV transmission line termination and the replacement of a 345/115kV autotransformer, with associated equipment, bus work and foundations. The locations of the proposed modifications are shown on SK-LAR-GL. Concrete foundations for new equipment will add approximately 0.08 acres of impervious surface to the substation yard in areas that are currently crushed

stone, and will support the additional aboveground equipment required as part of the overall NECEC Project.

12.1.3.3.1 Development Impacts

Given the very small area of new impervious surfaces (approximately 0.08 acres) and no other permanent change to the existing substation or surrounding ground surface, the modifications to the Larrabee Road Substation will not significantly alter the stormwater runoff characteristics of the site or surrounding area. The existing CMP station yard construction, consisting of 18" of MDOT Type "A" Gravel topped with 6" of crushed stone, will have adequate stormwater treatment capacity to accommodate these minor modifications.

12.1.3.3.2 Downstream Ponds and Lakes

The Larrabee Road 345/115kV Substation is not located in a watershed of a "Lake Most at Risk from Development" or an "Urban Impaired Stream" as defined in Chapter 502 of the Department Regulations. The project is located within the Androscoggin River watershed.

12.1.3.3.3 Basic Standards Compliance

In accordance with the Basic Standards, during and after construction at the Larrabee Road 345/115kV Substation, CMP's Environmental Guidelines (**Exhibit 14-1**), which incorporates the applicable procedures of the State of Maine Erosion and Sediment Control Best Management Practices, will be utilized to prevent erosion from occurring, as well as to correct any problems that may develop. Accordingly, the Basic Standards will be met.

12.1.3.3.4 General Standards Compliance

All improvements at the Larrabee Road 345/115kV Substation will be located within the existing fence line. As such, the area will be considered to be treated in place via the standard CMP station yard construction, consisting of 18" of MDOT Type "A" Gravel topped with 6" of crushed stone.

12.1.3.3.5 Flooding Standard Compliance

In order to confirm the proposed improvements would still meet the Flooding Standard, the runoff curve number (CN) from the previous stormwater model was compared to a revised CN, incorporating the proposed improvements. If the proposed improvements will not change the CN, then runoff characteristics will not change and the Flooding Standard will still be met. The results of this comparison are illustrated in **Table 12-4** and **Table 12-5** below.

Table 12-4: Most Recent Curve Number Calculation, Watershed 1SA (3/2/2009)

Larrabee Road 345/115kV Substation Yard (Watershed 1SA)		
	Area (acres)	CN
Existing Roofs and foundations	0.35	98
Substation Yard	15.09	55
Total Acreage	15.44	
Weighted Curve Number		56

Table 12-5: Revised Curve Number Calculation, Watershed 1SA (includes new impervious concrete foundations)

Larrabee Road 345/115kV Substation Yard (Watershed 1SA)		
	Area (acres)	CN
Existing Roofs and foundations	0.35	98
Substation Yard	15.01	55
New Impervious Area	0.08	98
Total Acreage	15.44	
Weighted Curve Number		56

As shown in the tables above, the proposed improvements will not increase the CN for the substation watershed. Therefore, the proposed improvements will not alter the runoff characteristics of the site, and compliance with the Flooding Standard will be maintained.

12.1.3.4 Maine Yankee Substation

The existing Maine Yankee 345kV Substation is located off Old Ferry Road in Wiscasset, Lincoln County, Maine. The existing substation occupies approximately 4.91 acres and is accessed by a paved drive off Old Ferry Road.

All modifications at the Maine Yankee 345kV Substation will be within the existing, fenced substation yard and include a new 345kV transmission line termination, with associated equipment, bus work and foundations. The locations of the proposed modifications are shown on SK-MEY-GL. Concrete foundations for new equipment will add approximately 0.02 acres of impervious surface to the substation yard in areas that are currently crushed stone, and will support the additional aboveground equipment required as part of the overall NECEC Project.

12.1.3.4.1 Development Impacts

Given the very small area of new impervious surfaces (approximately 0.02 acres) and no other permanent change to the existing substation or surrounding ground surface, the modifications to the Maine Yankee 345kV Substation will not significantly alter stormwater runoff characteristics of the site or surrounding area. The existing CMP station yard construction, consisting of 18" of MDOT Type "A" Gravel topped with 6" of crushed stone, will have adequate stormwater treatment capacity to accommodate these minor modifications.

12.1.3.4.2 Downstream Ponds and Lakes

The Maine Yankee 345kV Substation is not located in a watershed of a "Lake Most at Risk from Development" or an "Urban Impaired Stream" as defined in Chapter 502 of the Department Regulations. The project is located within the Sheepscot Bay watershed.

12.1.3.4.3 Basic Standards Compliance

In accordance with the Basic Standards, during and after construction at the Maine Yankee 345kV Substation, CMP's Environmental Guidelines (**Exhibit 14-1**), which incorporates the applicable procedures of the State of Maine Erosion and Sediment Control Best Management Practices, will be utilized to prevent erosion from occurring, as well as to correct any problems that may develop. Accordingly, the Basic Standards will be met.

12.1.3.4.4 General Standards Compliance

All improvements at the Maine Yankee 345kV Substation will be located within the existing fence line. As such, the area will be considered to be treated in place via the standard CMP station yard construction, consisting of 18" of MDOT Type "A" Gravel topped with 6" of crushed stone.

12.1.3.4.5 Flooding Standard Compliance

In order to confirm the proposed improvements would still meet the Flooding Standard, the runoff curve number (CN) from the previous stormwater model was compared to a revised CN, incorporating the proposed improvements. If the proposed improvements will not change the CN, then runoff characteristics will not change and the Flooding Standard will still be met. The results of this comparison are illustrated in **Table 12-6** and **Table 12-7** below.

Table 12-6: Most Recent Curve Number Calculation, Watershed 1S (4/9/2009)

Maine Yankee 345kV Substation Yard (Watershed 1S)		
	Area (acres)	CN
Woods, Good, HSG C	0.16	70
Woods, Good, HSG D	0.18	77
>75% Grass Cover, Good, HSG C	2.61	74
>75% Grass Cover, Good, HSG D	0.02	80
Brush Fair, HSG C	1.59	70
Brush Fair, HSG D	0.15	77
Paved Area & Roofs	0.09	98
Stone Yard	2.28	60
Total Acreage	7.08	
Weighted Curve Number		69

Table 12-7: Revised Curve Number Calculation, Watershed 1S (includes new impervious concrete foundations)

Maine Yankee 345kV Substation Yard (Watershed 1S)		
	Area (acres)	CN
Woods, Good, HSG C	0.16	70
Woods, Good, HSG D	0.18	77
>75% Grass Cover, Good, HSG C	2.61	74
>75% Grass Cover, Good, HSG D	0.02	80
Brush Fair, HSG C	1.59	70
Brush Fair, HSG D	0.15	77
Paved Area & Roofs	0.09	98
Stone Yard	2.26	60
New Impervious	0.02	98
Total Acreage	7.08	
Weighted Curve Number		69

As shown in the tables above, the proposed improvements will not increase the CN for the substation watershed. Therefore, the proposed improvements will not alter the runoff characteristics of the site, and compliance with the Flooding Standard will be maintained.

12.1.3.5 Surowiec Substation

The existing Surowiec 345/115kV Substation is located off Allen Road in the Town of Pownal, Cumberland County, Maine. The existing substation occupies approximately 9.41 acres and is accessed by a gravel driveway off Allen Road.

All modifications at the Surowiec 345/115kV Substation will be within the existing, fenced substation yard and include a new 345kV transmission line termination and the replacement of 115kV switches, with associated equipment, bus work and foundations. The locations of the proposed modifications are shown on SK-SUR-GL SH.1 and SK-SUR-GL SH.2. Concrete foundations for new equipment will add approximately 0.01 acres of impervious surface to the substation yard in areas that are currently crushed stone, and will support the additional aboveground equipment required as part of the overall NECEC project.

12.1.3.5.1 Development Impacts

Given the very small area of new impervious surfaces (approximately 0.01 acres) and no other permanent change to the existing substation or surrounding ground surface, the modifications to the Surowiec Substation will not significantly alter stormwater runoff characteristics of the site or surrounding area. The existing CMP station yard construction, consisting of 18" of MDOT Type "A" Gravel topped with 6" of crushed stone, will have adequate stormwater treatment capacity to accommodate these minor modifications.

12.1.3.5.2 Downstream Ponds and Lakes

The Surowiec 345/115kV Substation is located in the watershed of Runaround Pond, which is a "Lake Most at Risk from Development" as defined in Chapter 502 of the Department Regulations.

12.1.3.5.3 Basic Standards Compliance

In accordance with the Basic Standards, during and after construction at the Surowiec 345/115kV Substation, CMP's Environmental Guidelines (**Exhibit 14-1**), which incorporates the applicable procedures of the State of Maine Erosion and Sediment Control Best Management Practices, dated March 2003, will be utilized to prevent erosion from occurring, as well as to correct any problems that may develop. Accordingly, the Basic Standards will be met.

12.1.3.5.4 Phosphorous Standards Compliance

Phosphorous export at the Surowiec Substation was first evaluated during permitting for the Maine Power Reliability Program project. The permit application for the substation calculated the phosphorous budget to be 2.19175 lbs P/year, and the post-treatment phosphorous export to be 0.4225 lbs P/year.

The additional 0.01 acres of impervious surface carries an export coefficient of 0.5 for phosphorous, resulting in a pre-treatment export of 0.005 lbs P/year. The area will be considered to be treated in place via the standard CMP station yard construction, consisting of 18” of MDOT Type “A” Gravel topped with 6” of crushed stone, providing a treatment factor of 0.1. The post-treatment export for the new impervious area will be 0.0005 lbs P/year, bringing the total for the substation to 0.4230 lbs P/year. Therefore, compliance with the Phosphorous Standard will be maintained.

12.1.3.5.5 Flooding Standard Compliance

In order to confirm the proposed improvements would still meet the Flooding Standard, the runoff curve number (CN) from the previous stormwater model was compared to a revised CN, incorporating the proposed improvements. If the proposed improvements will not change the CN, then runoff characteristics will not change and the Flooding Standard will still be met. The results of this comparison are illustrated in **Table 12-8** and **Table 12-9** below.

Table 12-8: Most Recent Curve Number Calculation, Watershed 1S (3/2/2009)

Surowiec 345/115kV Substation Yard (Watershed 1S)		
	Area (acres)	CN
Brush, Good, HSG D	4.13	73
Unconnected roofs, HSG D	0.51	98
>75% Grass cover, Good, HSG D	1.37	80
Gravel Roads, HSG D	0.14	91
Paved Road	0.32	98
Woods, Good, HSG D	0.13	77
Substation	8.90	60
Stream	0.22	98
Total Acreage	15.72	
Weighted Curve Number		68

Table 12-9: Revised Curve Number Calculation, Watershed 1S (includes new impervious concrete foundations)

Surowiec 345/115kV Substation Yard (Watershed 1S)		
	Area (acres)	CN
Brush, Good, HSG D	4.13	73
Unconnected roofs, HSG D	0.51	98
>75% Grass cover, Good, HSG D	1.37	80
Gravel Roads, HSG D	0.14	91
Paved Road	0.32	98
Woods, Good, HSG D	0.13	77
Substation	8.89	60
Stream	0.22	98
New Impervious	0.01	98
Total Acreage	15.72	
Weighted Curve Number		68

As shown in the tables above, the proposed improvements will not increase the CN for the substation watershed. Therefore, the proposed improvements will not alter the runoff characteristics of the site, and compliance with the Flooding Standard will be maintained.

12.1.3.6 Raven Farm Substation

The existing Raven Farm 345kV Substation is located off Greely Road in the Town of Cumberland, Cumberland County, Maine. The existing substation was originally permitted as a 345/115kV substation to occupy approximately 15.5 acres, but only a little over half of the substation, the 345kV section, has been fully constructed. The remainder of the substation has been brought to grade, but has not been built out. The substation is accessed by a gravel access road off Greely Road.

All modifications at the Raven Farm 345kV Substation will be consistent with the originally permitted yard. The modifications will include beginning to build out the 115kV section of the substation, a new 345/115kV autotransformer and three new 115kV transmission line terminations, with associated equipment, bus work and foundations. The locations of the proposed modifications are shown on SK-RAV-GL. The 115kV build out will include approximately 3.52 acres of stone substation yard, and the concrete foundations for new equipment will add approximately 0.05 acres of impervious surface. This work will support the additional aboveground equipment required as part of the overall NECEC Project. As stated above, this new impervious area is consistent with the originally permitted substation.

12.1.3.6.1 Development Impacts

The new stone substation yard area (3.52 acres) and small area of new impervious surfaces (approximately 0.05 acres) are consistent with the station that was previously permitted as part of the MPRP project. The existing stormwater management design for the station will be maintained.

12.1.3.6.2 Downstream Ponds and Lakes

The Raven Farm 345/115kV Substation is not located in a watershed of a “Lake Most at Risk from Development” or an “Urban Impaired Stream” as defined in Chapter 502 of the Department Regulations. The project is located within the Casco Bay Coastal watershed.

12.1.3.6.3 Basic Standards Compliance

In accordance with the Basic Standards, during and after construction at the Raven Farm 345/115kV Substation, CMP’s Environmental Guidelines (**Exhibit 14-1**), which incorporates the applicable procedures of the State of Maine Erosion and Sediment Control Best Management Practices, dated March 2003, will be utilized to prevent erosion from occurring, as well as to correct any problems that may develop. Accordingly, the Basic Standards will be met.

12.1.3.6.4 General Standards Compliance

All improvements at the Raven Farm 345/115kV Substation will be located within the existing fence line, or within newly created stone substation area. As such, the area will be considered to be treated in place via the standard CMP station yard construction, consisting of 18” of MDOT Type “A” Gravel topped with 6” of crushed stone.

12.1.3.6.5 Flooding Standard Compliance

As stated above, the proposed improvements do not diverge from the original design intent of the station and stormwater management features. Therefore, the runoff characteristics of the site will remain consistent with the original permitted design, and compliance with the Flooding Standard will be maintained.

12.1.4 New Substations

All new substations will be reviewed based on all applicable Chapter 500 standards. The Basic Standards will be applied to the two new substation locations. The General Standards for water quality treatment of stormwater runoff from the substation yard will be met in that all new yards will be constructed in accordance with the substation yard cross section specified in the CMP/MDEP agreement letter dated

June 5, 2008 (**Exhibit 12-5**). In addition, the requirements of the Flooding, Phosphorus and Urban Impaired Stream Standards will be met, as applicable.

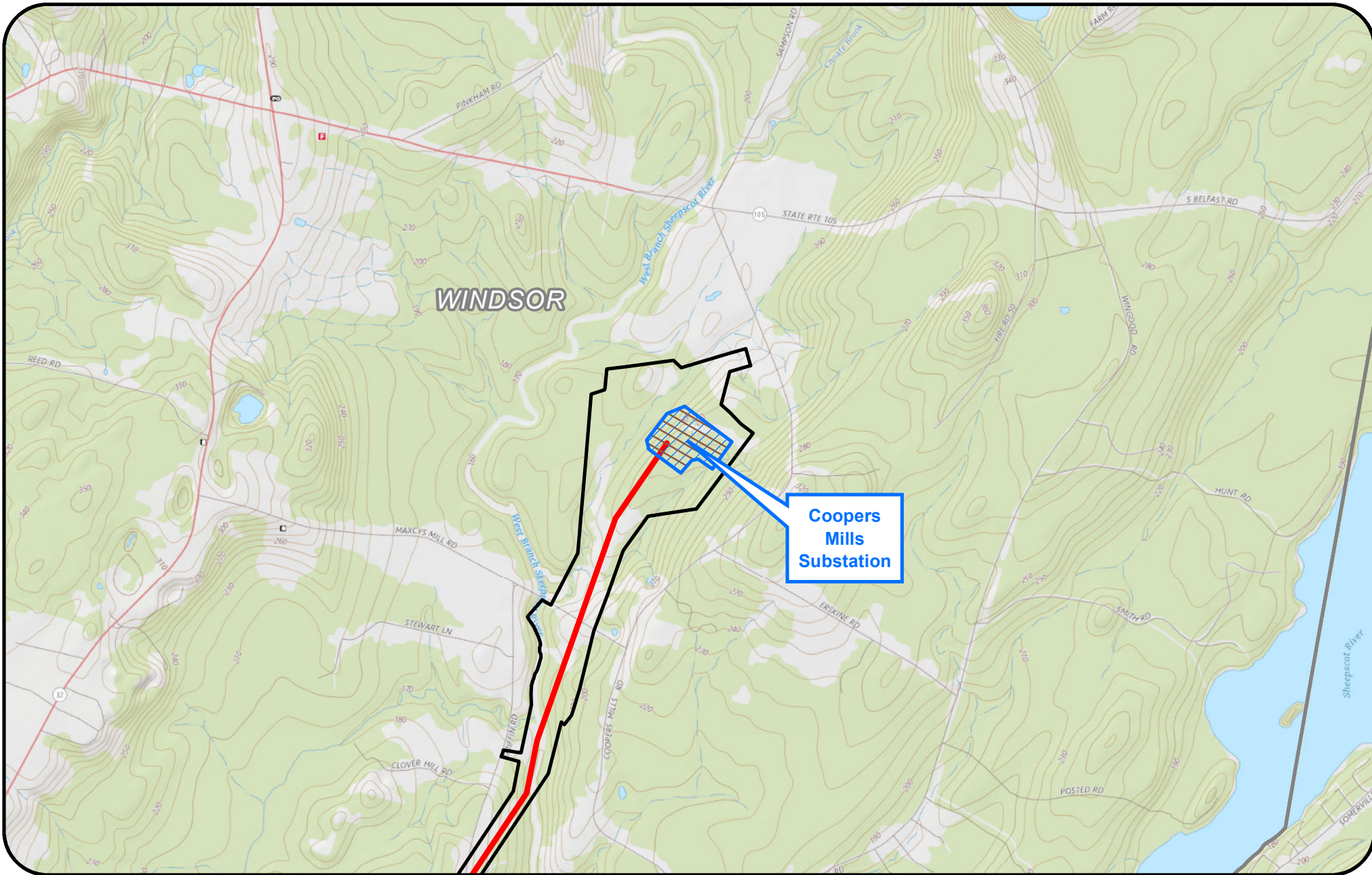
12.1.4.1 Merrill Road Converter Station

The stormwater narrative, calculations and plans for the Merrill Road Converter Station are provided in a separate binder.

12.1.4.2 Fickett Road Substation

The stormwater narrative, calculations and plans for the Fickett Road Substation are provided in a separate binder.

Exhibit 12-1: USGS Maps for Existing Substations

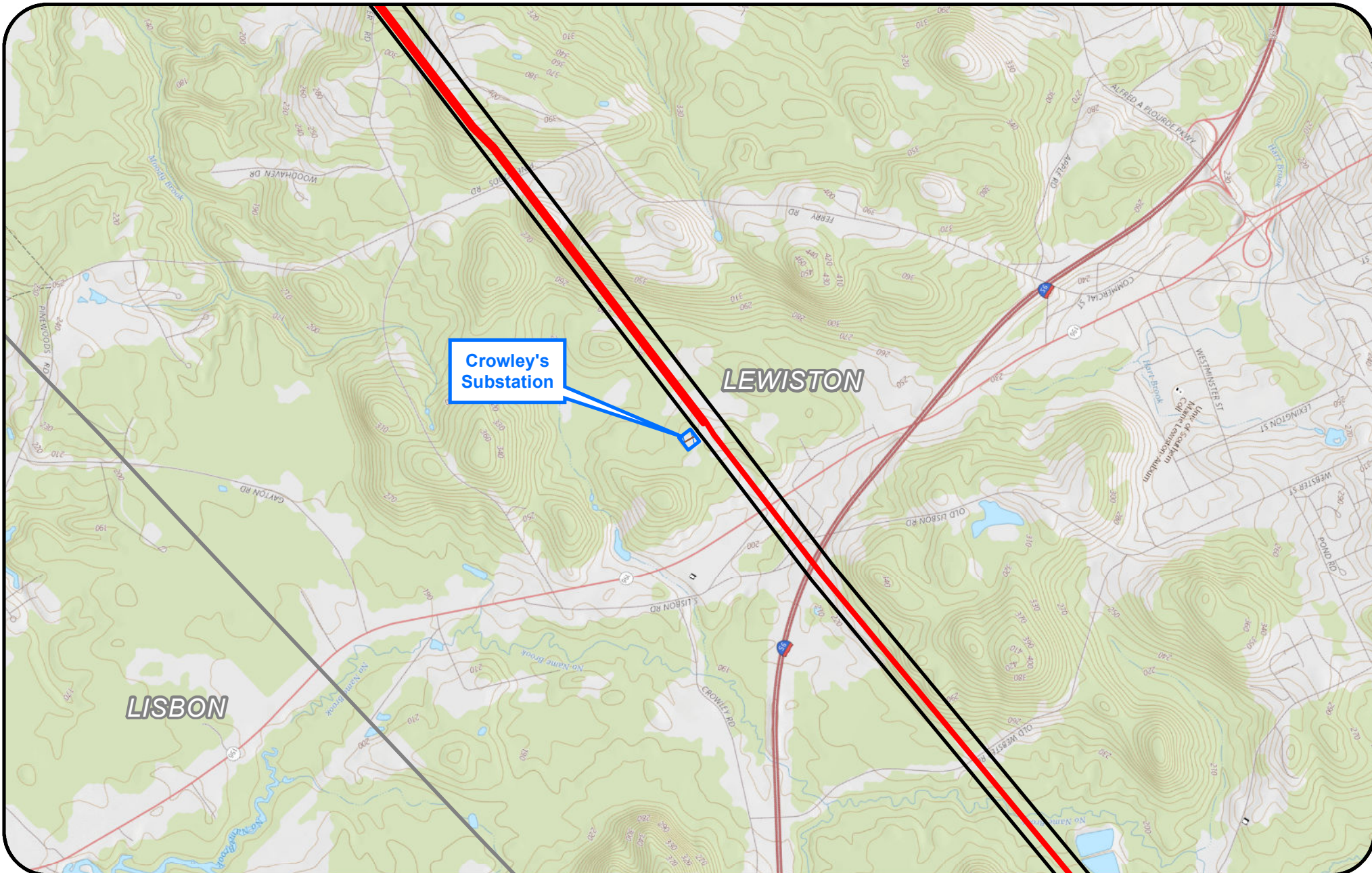


Legend




- CMP Ownership / Easement Extent
- Project Centerline
- Town Boundary

New England Clean Energy Connect
 USGS Series
 Coopers Mills Substation
 2,000
 Feet






Legend

-  CMP Ownership / Easement Extent
-  Project Centerline
-  Town Boundary

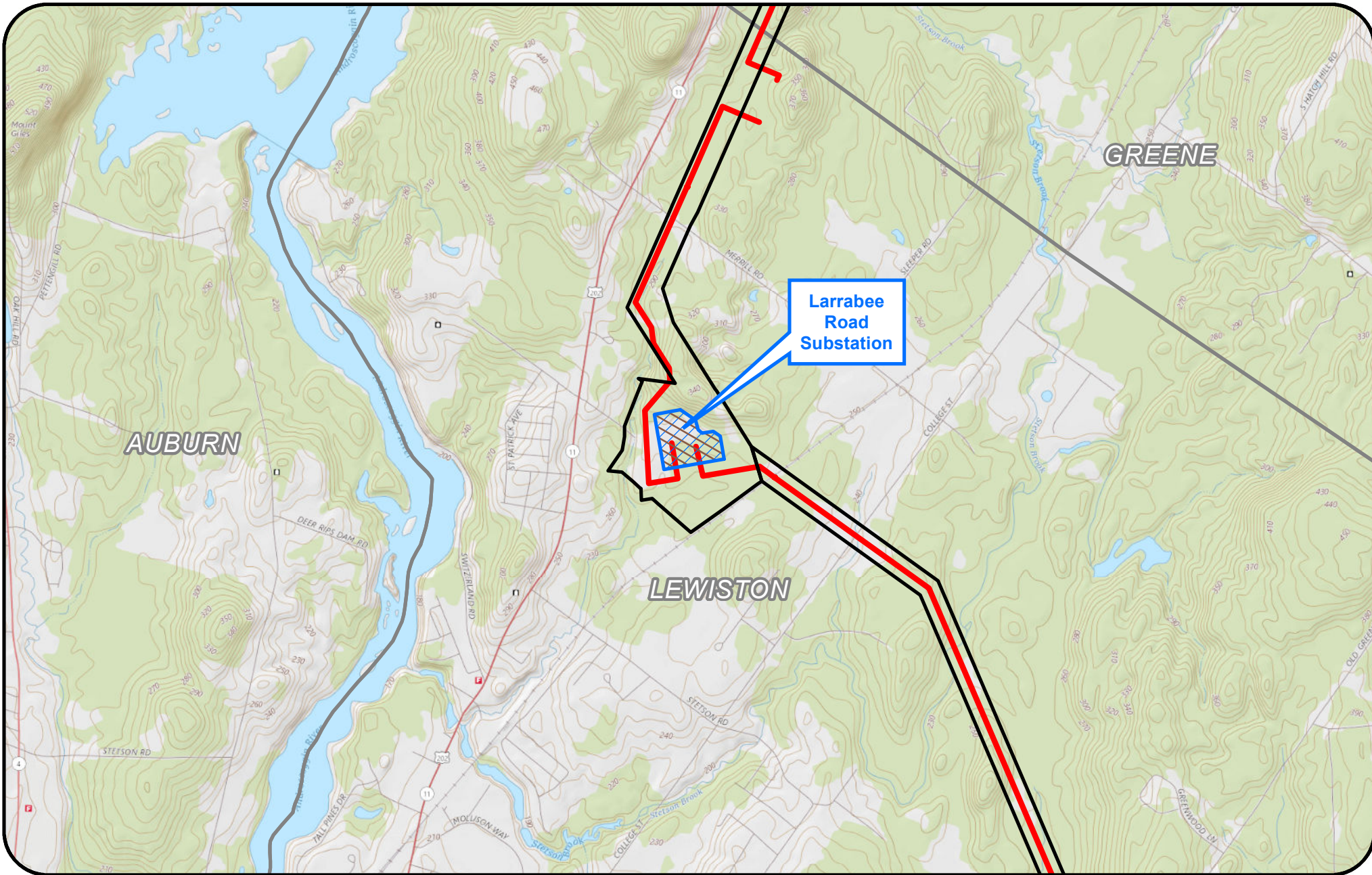
New England Clean Energy Connect

USGS Series
Crowley's Substation
2,000

 Feet

CENTRAL MAINE POWER






Larrabee Road Substation

AUBURN

LEWISTON

GREENE

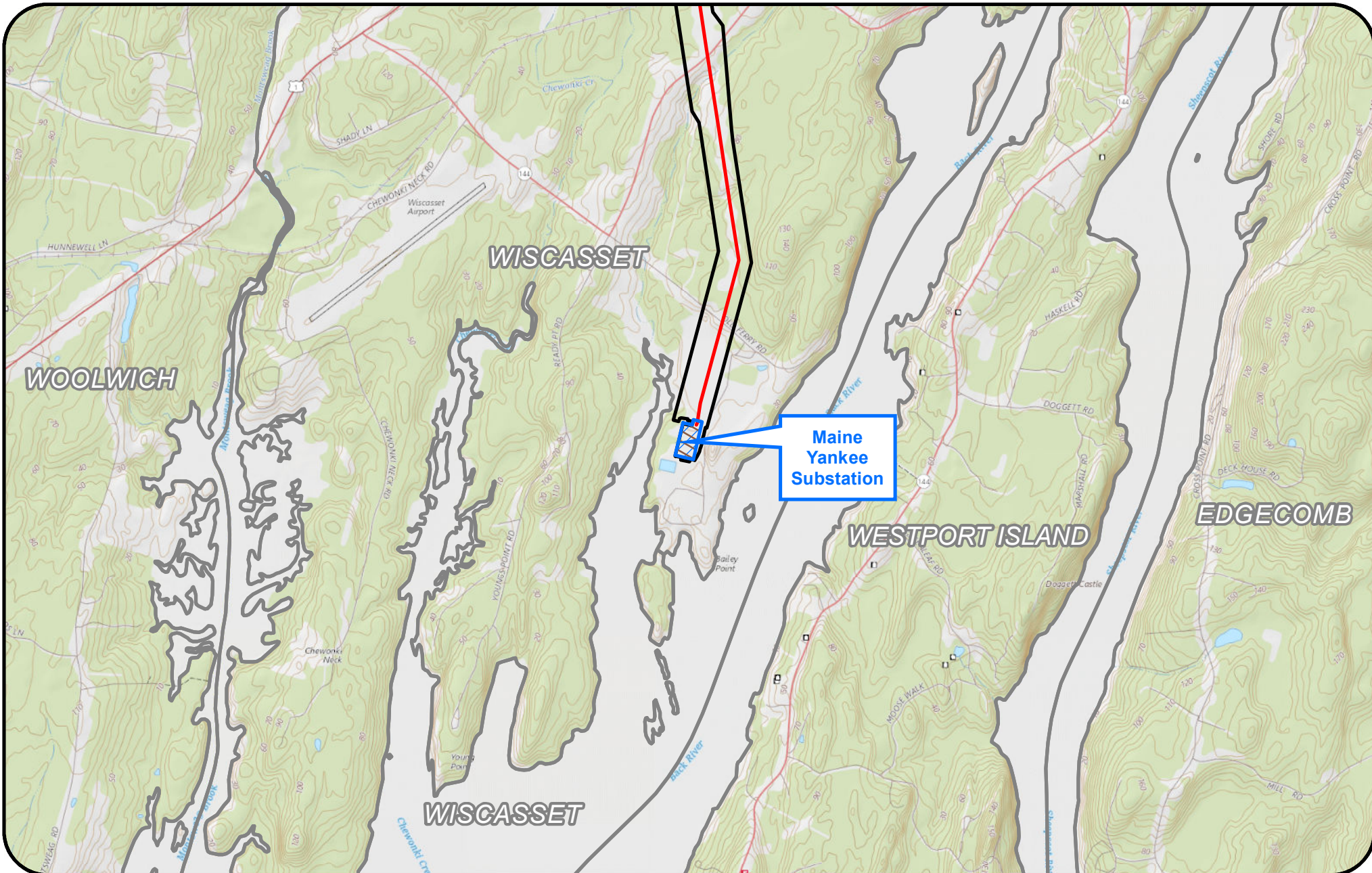


- Legend**
-  CMP Ownership / Easement Extent
 -  Project Centerline
 -  Town Boundary






New England Clean Energy Connect
 USGS Series
 Larrabee Road Substation
 2,000 Feet





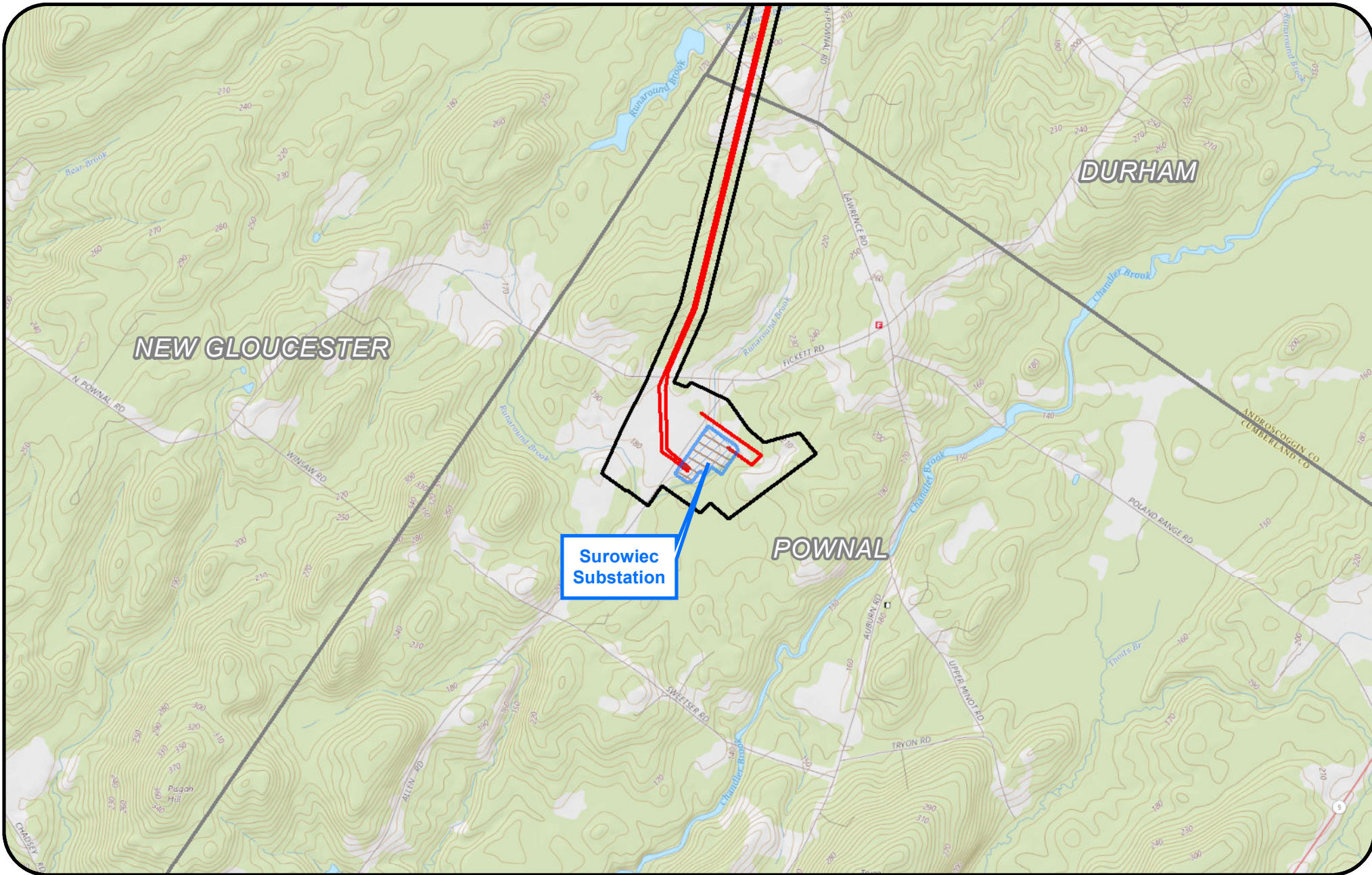
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-  CMP Ownership / Easement Extent
-  Project Centerline
-  Town Boundary



**New England
Clean Energy
Connect**
USGS Series
Maine Yankee Substation
2,000
 Feet





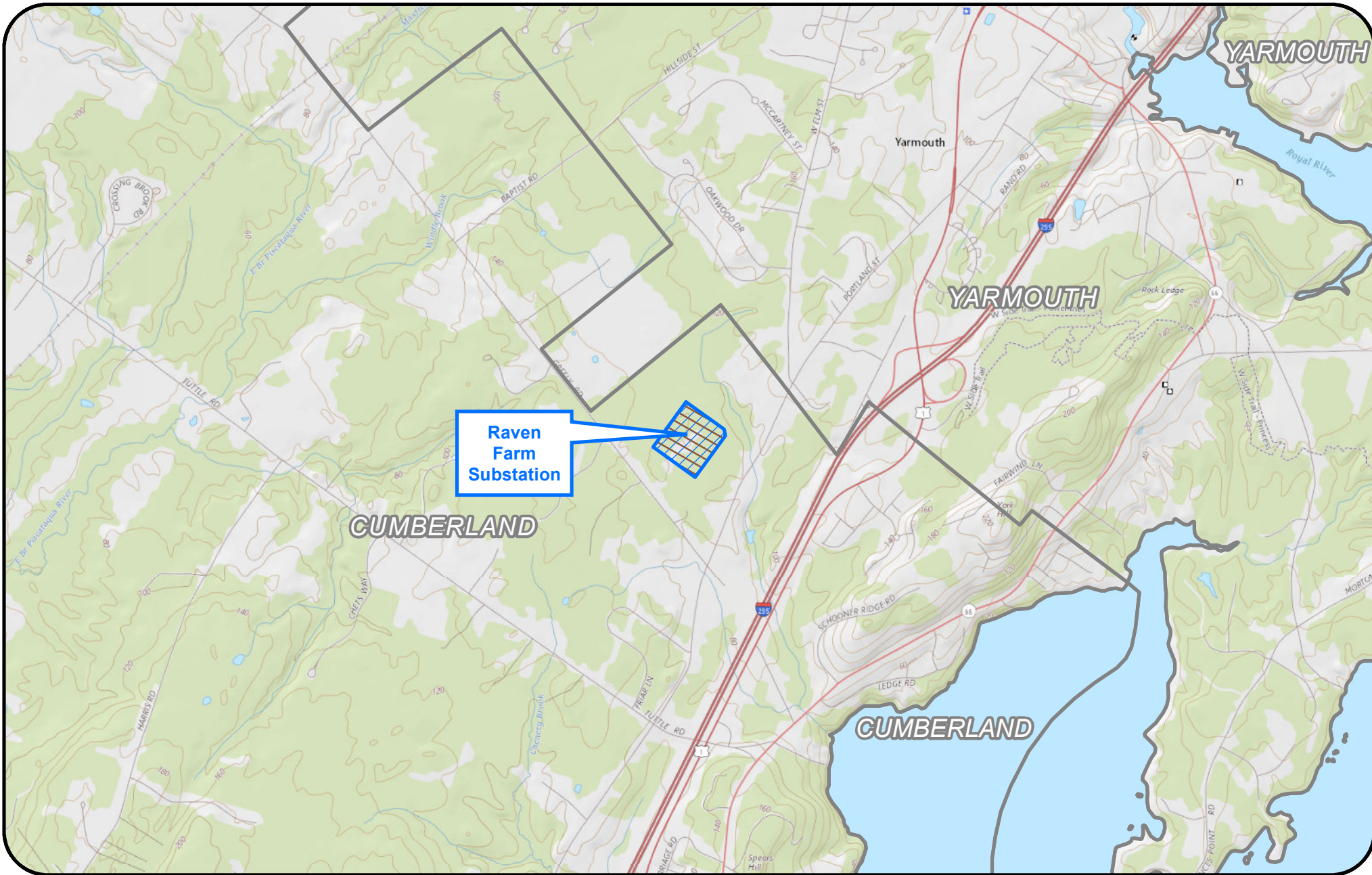
Legend

-  CMP Ownership / Easement Extent
-  Project Centerline
-  Town Boundary

New England Clean Energy Connect
USGS Series
Surowiec Substation
2,000


 Feet





**Raven
Farm
Substation**



**New England
Clean Energy
Connect**

USGS Series
Raven Farm Substation
2,000

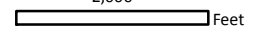
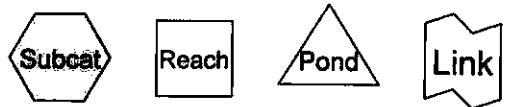
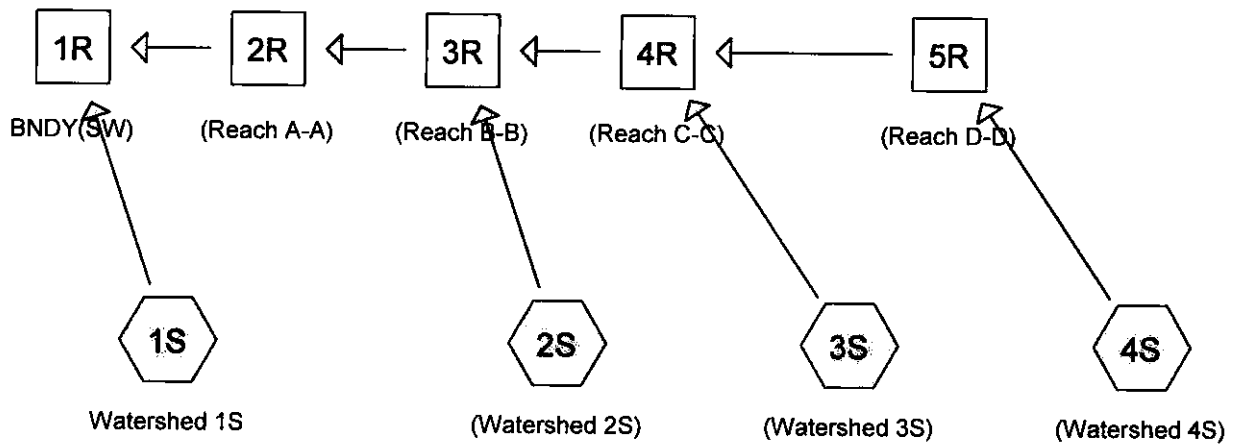


Exhibit 12-2: Coopers Mills Substation Pre-Development Model Output



Drainage Diagram for Coopers Mills Rd PRE-DEV-MODEL
 Prepared by TRC Environmental Corp, Printed 4/17/2009
 HydroCAD® 9.00 s/n 01824 © 2009 HydroCAD Software Solutions LLC

Coopers Mills Rd PRE-DEV-MODEL

Prepared by TRC Environmental Corp

HydroCAD® 9.00 s/n 01824 © 2009 HydroCAD Software Solutions LLC

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Page 3

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
0.000	HSG A	
0.130	HSG B	4S
141.170	HSG C	1S, 2S, 3S, 4S
60.820	HSG D	1S, 2S, 3S, 4S
1.750	Other	1S, 2S
203.870		TOTAL AREA

Coopers Mills Rd PRE-DEV-MODEL

Type III 24-hr 2-yr Rainfall=3.00"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Watershed 1S	Runoff Area=5.940 ac 1.68% Impervious Runoff Depth=0.67" Tc=57.1 min CN=69 Runoff=1.60 cfs 0.331 af
Subcatchment 2S: (Watershed 2S)	Runoff Area=134.030 ac 2.40% Impervious Runoff Depth=0.86" Tc=65.1 min CN=73 Runoff=45.98 cfs 9.576 af
Subcatchment 3S: (Watershed 3S)	Runoff Area=38.640 ac 0.00% Impervious Runoff Depth=0.86" Tc=69.9 min CN=73 Runoff=12.65 cfs 2.761 af
Subcatchment 4S: (Watershed 4S)	Runoff Area=25.260 ac 0.00% Impervious Runoff Depth=0.76" Tc=64.1 min CN=71 Runoff=7.50 cfs 1.601 af
Reach 1R: BNDY(SW)	Inflow=59.73 cfs 14.269 af Outflow=59.73 cfs 14.269 af
Reach 2R: (Reach A-A)	Avg. Depth=0.83' Max Vel=3.70 fps Inflow=58.30 cfs 13.937 af n=0.033 L=300.0' S=0.0133 '/ Capacity=2,448.09 cfs Outflow=58.27 cfs 13.937 af
Reach 3R: (Reach B-B)	Avg. Depth=1.74' Max Vel=2.58 fps Inflow=58.45 cfs 13.937 af n=0.033 L=350.0' S=0.0029 '/ Capacity=180.90 cfs Outflow=58.30 cfs 13.937 af
Reach 4R: (Reach C-C)	Avg. Depth=0.63' Max Vel=2.34 fps Inflow=12.66 cfs 4.361 af n=0.033 L=70.0' S=0.0071 '/ Capacity=286.02 cfs Outflow=12.66 cfs 4.361 af
Reach 5R: (Reach D-D)	Avg. Depth=0.18' Max Vel=0.86 fps Inflow=7.50 cfs 1.601 af n=0.033 L=3,130.0' S=0.0040 '/ Capacity=3,870.73 cfs Outflow=4.50 cfs 1.601 af

Total Runoff Area = 203.870 ac Runoff Volume = 14.269 af Average Runoff Depth = 0.84"
98.37% Pervious = 200.555 ac 1.63% Impervious = 3.315 ac

Coopers Mills Rd PRE-DEV-MODEL

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.060	48	Brush, Good, HSG B (4S)
0.070	55	Woods, Good, HSG B (4S)
14.810	65	Brush, Good, HSG C (1S, 2S, 3S, 4S)
98.990	70	Woods, Good, HSG C (2S, 3S, 4S)
10.690	71	Meadow, non-grazed, HSG C (2S, 4S)
22.590	73	Brush, Good, HSG D (1S, 2S, 3S, 4S)
1.240	74	>75% Grass cover, Good, HSG C (2S)
13.040	77	2 acre lots, 12% imp, HSG C (2S)
26.050	77	Woods, Good, HSG D (2S, 3S, 4S)
2.520	78	Meadow, non-grazed, HSG D (2S, 4S)
2.400	85	Row crops, straight row, Good, HSG C (2S, 3S)
9.660	89	Row crops, straight row, Good, HSG D (2S, 3S)
1.750	98	Paved roads (1S, 2S)
203.870		TOTAL AREA

Coopers Mills Rd PRE-DEV-MODEL

Type III 24-hr 2-yr Rainfall=3.00"

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Summary for Subcatchment 1S: Watershed 1S

Runoff = 1.60 cfs @ 12.88 hrs, Volume= 0.331 af, Depth= 0.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.00"

Area (ac)	CN	Description
3.490	65	Brush, Good, HSG C
2.350	73	Brush, Good, HSG D
* 0.100	98	Paved roads
5.940	69	Weighted Average
5.840		98.32% Pervious Area
0.100		1.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
57.1					Direct Entry, See Tc calculations

Summary for Subcatchment 2S: (Watershed 2S)

Runoff = 45.98 cfs @ 12.95 hrs, Volume= 9.576 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.00"

Area (ac)	CN	Description
3.870	65	Brush, Good, HSG C
0.850	73	Brush, Good, HSG D
1.650	98	Paved roads
1.240	74	>75% Grass cover, Good, HSG C
13.040	77	2 acre lots, 12% imp, HSG C
4.640	71	Meadow, non-grazed, HSG C
2.330	78	Meadow, non-grazed, HSG D
80.870	70	Woods, Good, HSG C
15.280	77	Woods, Good, HSG D
1.750	85	Row crops, straight row, Good, HSG C
8.510	89	Row crops, straight row, Good, HSG D
134.030	73	Weighted Average
130.815		97.60% Pervious Area
3.215		2.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
65.1					Direct Entry, See spreadsheet

Coopers Mills Rd PRE-DEV-MODEL

Type III 24-hr 2-yr Rainfall=3.00"

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Summary for Subcatchment 3S: (Watershed 3S)

Runoff = 12.65 cfs @ 13.04 hrs, Volume= 2.761 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.00"

Area (ac)	CN	Description
5.480	65	Brush, Good, HSG C
14.160	73	Brush, Good, HSG D
0.650	85	Row crops, straight row, Good, HSG C
1.150	89	Row crops, straight row, Good, HSG D
9.850	70	Woods, Good, HSG C
7.350	77	Woods, Good, HSG D
38.640	73	Weighted Average
38.640		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
69.9					Direct Entry, See spreadsheet

Summary for Subcatchment 4S: (Watershed 4S)

Runoff = 7.50 cfs @ 12.96 hrs, Volume= 1.601 af, Depth= 0.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.00"

Area (ac)	CN	Description
0.060	48	Brush, Good, HSG B
1.970	65	Brush, Good, HSG C
5.230	73	Brush, Good, HSG D
6.050	71	Meadow, non-grazed, HSG C
0.190	78	Meadow, non-grazed, HSG D
0.070	55	Woods, Good, HSG B
8.270	70	Woods, Good, HSG C
3.420	77	Woods, Good, HSG D
25.260	71	Weighted Average
25.260		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
64.1					Direct Entry, See spreadsheet

Coopers Mills Rd PRE-DEV-MODEL

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Type III 24-hr 2-yr Rainfall=3.00"

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Summary for Reach 1R: BNDY(SW)

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 203.870 ac, 1.63% Impervious, Inflow Depth = 0.84" for 2-yr event
Inflow = 59.73 cfs @ 13.07 hrs, Volume= 14.269 af
Outflow = 59.73 cfs @ 13.07 hrs, Volume= 14.269 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: (Reach A-A)

[61] Hint: Exceeded Reach 3R outlet invert by 0.83' @ 13.05 hrs

Inflow Area = 197.930 ac, 1.62% Impervious, Inflow Depth = 0.84" for 2-yr event
Inflow = 58.30 cfs @ 13.04 hrs, Volume= 13.937 af
Outflow = 58.27 cfs @ 13.08 hrs, Volume= 13.937 af, Atten= 0%, Lag= 2.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 3.70 fps, Min. Travel Time= 1.3 min

Avg. Velocity = 1.26 fps, Avg. Travel Time= 4.0 min

Peak Storage= 4,718 cf @ 13.05 hrs, Average Depth at Peak Storage= 0.83'

Bank-Full Depth= 5.00', Capacity at Bank-Full= 2,448.09 cfs

Custom cross-section, Length= 300.0' Slope= 0.0133 '/'

Constant n= 0.033 Earth, grassed & winding

Inlet Invert= 159.00', Outlet Invert= 155.00'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	162.00	0.00
13.00	161.00	1.00
19.00	160.00	2.00
26.00	159.00	3.00
31.00	158.00	4.00
36.00	157.00	5.00
48.00	157.00	5.00
60.00	158.00	4.00
66.00	159.00	3.00
73.00	160.00	2.00
74.00	161.00	1.00
75.00	162.00	0.00

Coopers Mills Rd PRE-DEV-MODEL

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Type III 24-hr 2-yr Rainfall=3.00"

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Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.0	0	0.00
1.00	20.5	29.1	6,150	84.31
2.00	55.0	40.3	16,500	351.73
3.00	102.0	54.5	30,600	805.81
4.00	159.5	62.0	47,850	1,557.74
5.00	227.5	76.4	68,250	2,448.09

Summary for Reach 3R: (Reach B-B)

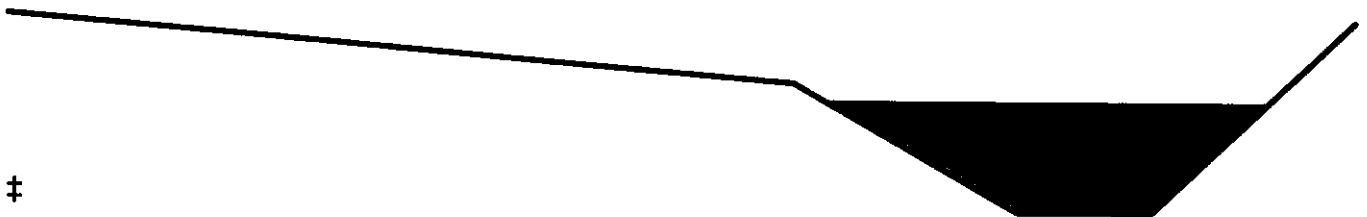
[63] Warning: Exceeded Reach 4R INLET depth by 0.61' @ 13.00 hrs

Inflow Area = 197.930 ac, 1.62% Impervious, Inflow Depth = 0.84" for 2-yr event
 Inflow = 58.45 cfs @ 12.95 hrs, Volume= 13.937 af
 Outflow = 58.30 cfs @ 13.04 hrs, Volume= 13.937 af, Atten= 0%, Lag= 4.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.58 fps, Min. Travel Time= 2.3 min
 Avg. Velocity= 0.75 fps, Avg. Travel Time= 7.7 min

Peak Storage= 7,915 cf @ 13.00 hrs, Average Depth at Peak Storage= 1.74'
 Bank-Full Depth= 3.00', Capacity at Bank-Full= 180.90 cfs

Custom cross-section, Length= 350.0' Slope= 0.0029 '/ (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 160.00', Outlet Invert= 159.00'



‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
35.00	159.00	1.00
40.00	158.00	2.00
45.00	157.00	3.00
51.00	157.00	3.00
54.00	158.00	2.00
57.00	159.00	1.00
60.00	160.00	0.00

Coopers Mills Rd PRE-DEV-MODEL

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Type III 24-hr 2-yr Rainfall=3.00"

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Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	6.0	0	0.00
1.00	10.0	14.3	3,500	19.00
2.00	28.0	22.5	9,800	77.92
3.00	69.0	60.7	24,150	180.90

Summary for Reach 4R: (Reach C-C)

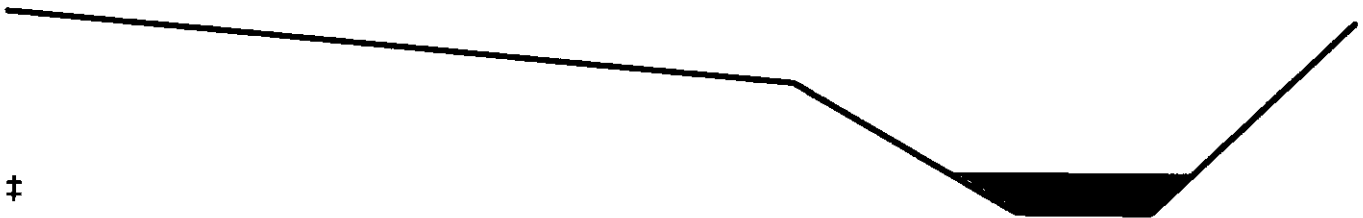
[62] Warning: Exceeded Reach 5R OUTLET depth by 0.51' @ 12.90 hrs

Inflow Area = 63.900 ac, 0.00% Impervious, Inflow Depth = 0.82" for 2-yr event
 Inflow = 12.66 cfs @ 13.04 hrs, Volume= 4.361 af
 Outflow = 12.66 cfs @ 13.05 hrs, Volume= 4.361 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.34 fps, Min. Travel Time= 0.5 min
 Avg. Velocity = 0.84 fps, Avg. Travel Time= 1.4 min

Peak Storage= 379 cf @ 13.04 hrs, Average Depth at Peak Storage= 0.63'
 Bank-Full Depth= 3.00', Capacity at Bank-Full= 286.02 cfs

Custom cross-section, Length= 70.0' Slope= 0.0071 ' / ' (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 160.50', Outlet Invert= 160.00'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
35.00	159.00	1.00
40.00	158.00	2.00
45.00	157.00	3.00
51.00	157.00	3.00
54.00	158.00	2.00
57.00	159.00	1.00
60.00	160.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	6.0	0	0.00
1.00	10.0	14.3	700	30.04
2.00	28.0	22.5	1,960	123.20
3.00	69.0	60.7	4,830	286.02

Coopers Mills Rd PRE-DEV-MODEL

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Type III 24-hr 2-yr Rainfall=3.00"

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Summary for Reach 5R: (Reach D-D)

Inflow Area = 25.260 ac, 0.00% Impervious, Inflow Depth = 0.76" for 2-yr event
 Inflow = 7.50 cfs @ 12.96 hrs, Volume= 1.601 af
 Outflow = 4.50 cfs @ 14.62 hrs, Volume= 1.601 af, Atten= 40%, Lag= 99.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.86 fps, Min. Travel Time= 60.6 min
 Avg. Velocity = 0.47 fps, Avg. Travel Time= 109.9 min

Peak Storage= 16,355 cf @ 13.61 hrs, Average Depth at Peak Storage= 0.18'
 Bank-Full Depth= 6.00', Capacity at Bank-Full= 3,870.73 cfs

Custom cross-section, Length= 3,130.0' Slope= 0.0040 ' / (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 173.00', Outlet Invert= 160.50'



‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	176.00	0.00
21.00	174.00	2.00
39.00	172.00	4.00
63.00	170.00	6.00
90.00	170.00	6.00
116.00	172.00	4.00
138.00	174.00	2.00
152.00	176.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	27.0	0	0.00
2.00	104.0	77.2	325,520	361.12
4.00	298.0	117.4	932,740	1,578.33
6.00	567.0	152.6	1,774,710	3,870.73

Coopers Mills Rd PRE-DEV-MODEL

Type III 24-hr 10-yr Rainfall=4.40"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
 Runoff by SCS TR-20 method, UH=SCS
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Watershed 1S	Runoff Area=5.940 ac 1.68% Impervious Runoff Depth=1.53" Tc=57.1 min CN=69 Runoff=4.12 cfs 0.759 af
Subcatchment 2S: (Watershed 2S)	Runoff Area=134.030 ac 2.40% Impervious Runoff Depth=1.82" Tc=65.1 min CN=73 Runoff=104.50 cfs 20.335 af
Subcatchment 3S: (Watershed 3S)	Runoff Area=38.640 ac 0.00% Impervious Runoff Depth=1.82" Tc=69.9 min CN=73 Runoff=28.97 cfs 5.862 af
Subcatchment 4S: (Watershed 4S)	Runoff Area=25.260 ac 0.00% Impervious Runoff Depth=1.67" Tc=64.1 min CN=71 Runoff=18.16 cfs 3.525 af
Reach 1R: BNDY(SW)	Inflow=137.01 cfs 30.481 af Outflow=137.01 cfs 30.481 af
Reach 2R: (Reach A-A)	Avg. Depth=1.25' Max Vel=4.76 fps Inflow=133.36 cfs 29.721 af n=0.033 L=300.0' S=0.0133 '/ Capacity=2,448.09 cfs Outflow=133.29 cfs 29.721 af
Reach 3R: (Reach B-B)	Avg. Depth=2.70' Max Vel=2.78 fps Inflow=133.84 cfs 29.721 af n=0.033 L=350.0' S=0.0029 '/ Capacity=180.90 cfs Outflow=133.36 cfs 29.721 af
Reach 4R: (Reach C-C)	Avg. Depth=0.99' Max Vel=2.99 fps Inflow=29.64 cfs 9.387 af n=0.033 L=70.0' S=0.0071 '/ Capacity=286.02 cfs Outflow=29.64 cfs 9.387 af
Reach 5R: (Reach D-D)	Avg. Depth=0.33' Max Vel=1.26 fps Inflow=18.16 cfs 3.525 af n=0.033 L=3,130.0' S=0.0040 '/ Capacity=3,870.73 cfs Outflow=13.10 cfs 3.525 af
Total Runoff Area = 203.870 ac Runoff Volume = 30.481 af Average Runoff Depth = 1.79"	
98.37% Pervious = 200.555 ac 1.63% Impervious = 3.315 ac	

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Type III 24-hr 10-yr Rainfall=4.40"

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Summary for Subcatchment 1S: Watershed 1S

Runoff = 4.12 cfs @ 12.82 hrs, Volume= 0.759 af, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.40"

Area (ac)	CN	Description
3.490	65	Brush, Good, HSG C
2.350	73	Brush, Good, HSG D
* 0.100	98	Paved roads
5.940	69	Weighted Average
5.840		98.32% Pervious Area
0.100		1.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
57.1					Direct Entry, See Tc calculations

Summary for Subcatchment 2S: (Watershed 2S)

Runoff = 104.50 cfs @ 12.94 hrs, Volume= 20.335 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.40"

Area (ac)	CN	Description
3.870	65	Brush, Good, HSG C
0.850	73	Brush, Good, HSG D
1.650	98	Paved roads
1.240	74	>75% Grass cover, Good, HSG C
13.040	77	2 acre lots, 12% imp, HSG C
4.640	71	Meadow, non-grazed, HSG C
2.330	78	Meadow, non-grazed, HSG D
80.870	70	Woods, Good, HSG C
15.280	77	Woods, Good, HSG D
1.750	85	Row crops, straight row, Good, HSG C
8.510	89	Row crops, straight row, Good, HSG D
134.030	73	Weighted Average
130.815		97.60% Pervious Area
3.215		2.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
65.1					Direct Entry, See spreadsheet

Coopers Mills Rd PRE-DEV-MODEL

Type III 24-hr 10-yr Rainfall=4.40"

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Summary for Subcatchment 3S: (Watershed 3S)

Runoff = 28.97 cfs @ 12.97 hrs, Volume= 5.862 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.40"

Area (ac)	CN	Description
5.480	65	Brush, Good, HSG C
14.160	73	Brush, Good, HSG D
0.650	85	Row crops, straight row, Good, HSG C
1.150	89	Row crops, straight row, Good, HSG D
9.850	70	Woods, Good, HSG C
7.350	77	Woods, Good, HSG D
38.640	73	Weighted Average
38.640		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
69.9					Direct Entry, See spreadsheet

Summary for Subcatchment 4S: (Watershed 4S)

Runoff = 18.16 cfs @ 12.89 hrs, Volume= 3.525 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.40"

Area (ac)	CN	Description
0.060	48	Brush, Good, HSG B
1.970	65	Brush, Good, HSG C
5.230	73	Brush, Good, HSG D
6.050	71	Meadow, non-grazed, HSG C
0.190	78	Meadow, non-grazed, HSG D
0.070	55	Woods, Good, HSG B
8.270	70	Woods, Good, HSG C
3.420	77	Woods, Good, HSG D
25.260	71	Weighted Average
25.260		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
64.1					Direct Entry, See spreadsheet

Summary for Reach 1R: BNDY(SW)

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 203.870 ac, 1.63% Impervious, Inflow Depth = 1.79" for 10-yr event
 Inflow = 137.01 cfs @ 13.03 hrs, Volume= 30.481 af
 Outflow = 137.01 cfs @ 13.03 hrs, Volume= 30.481 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: (Reach A-A)

[61] Hint: Exceeded Reach 3R outlet invert by 1.25' @ 13.02 hrs

Inflow Area = 197.930 ac, 1.62% Impervious, Inflow Depth = 1.80" for 10-yr event
 Inflow = 133.36 cfs @ 13.00 hrs, Volume= 29.721 af
 Outflow = 133.29 cfs @ 13.03 hrs, Volume= 29.721 af, Atten= 0%, Lag= 1.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 4.76 fps, Min. Travel Time= 1.0 min

Avg. Velocity = 1.45 fps, Avg. Travel Time= 3.4 min

Peak Storage= 8,393 cf @ 13.02 hrs, Average Depth at Peak Storage= 1.25'

Bank-Full Depth= 5.00', Capacity at Bank-Full= 2,448.09 cfs

Custom cross-section, Length= 300.0' Slope= 0.0133 'f'

Constant n= 0.033 Earth, grassed & winding

Inlet Invert= 159.00', Outlet Invert= 155.00'



‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	162.00	0.00
13.00	161.00	1.00
19.00	160.00	2.00
26.00	159.00	3.00
31.00	158.00	4.00
36.00	157.00	5.00
48.00	157.00	5.00
60.00	158.00	4.00
66.00	159.00	3.00
73.00	160.00	2.00
74.00	161.00	1.00
75.00	162.00	0.00

Coopers Mills Rd PRE-DEV-MODEL

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Type III 24-hr 10-yr Rainfall=4.40"

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Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.0	0	0.00
1.00	20.5	29.1	6,150	84.31
2.00	55.0	40.3	16,500	351.73
3.00	102.0	54.5	30,600	805.81
4.00	159.5	62.0	47,850	1,557.74
5.00	227.5	76.4	68,250	2,448.09

Summary for Reach 3R: (Reach B-B)

[63] Warning: Exceeded Reach 4R INLET depth by 1.21' @ 12.94 hrs

Inflow Area = 197.930 ac, 1.62% Impervious, Inflow Depth = 1.80" for 10-yr event
 Inflow = 133.84 cfs @ 12.95 hrs, Volume= 29.721 af
 Outflow = 133.36 cfs @ 13.00 hrs, Volume= 29.721 af, Atten= 0%, Lag= 3.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.78 fps, Min. Travel Time= 2.1 min
 Avg. Velocity = 0.87 fps, Avg. Travel Time= 6.7 min

Peak Storage= 18,525 cf @ 12.97 hrs, Average Depth at Peak Storage= 2.70'
 Bank-Full Depth= 3.00', Capacity at Bank-Full= 180.90 cfs

Custom cross-section, Length= 350.0' Slope= 0.0029 '/' (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 160.00', Outlet Invert= 159.00'



‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
35.00	159.00	1.00
40.00	158.00	2.00
45.00	157.00	3.00
51.00	157.00	3.00
54.00	158.00	2.00
57.00	159.00	1.00
60.00	160.00	0.00

Coopers Mills Rd PRE-DEV-MODEL

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Type III 24-hr 10-yr Rainfall=4.40"

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Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	6.0	0	0.00
1.00	10.0	14.3	3,500	19.00
2.00	28.0	22.5	9,800	77.92
3.00	69.0	60.7	24,150	180.90

Summary for Reach 4R: (Reach C-C)

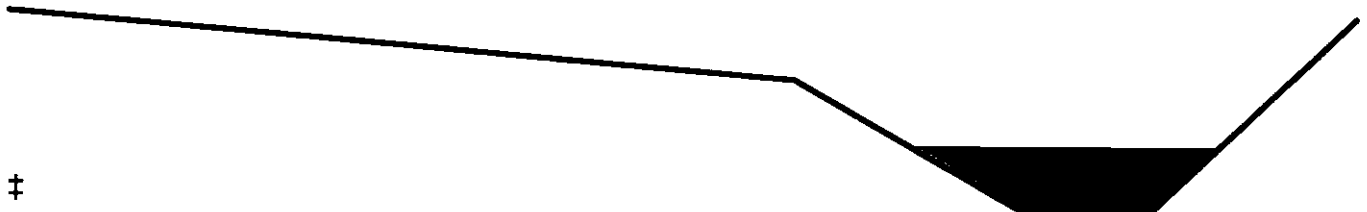
[62] Warning: Exceeded Reach 5R OUTLET depth by 0.72' @ 12.82 hrs

Inflow Area = 63.900 ac, 0.00% Impervious, Inflow Depth = 1.76" for 10-yr event
 Inflow = 29.64 cfs @ 13.04 hrs, Volume= 9.387 af
 Outflow = 29.64 cfs @ 13.05 hrs, Volume= 9.387 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.99 fps, Min. Travel Time= 0.4 min
 Avg. Velocity= 0.98 fps, Avg. Travel Time= 1.2 min

Peak Storage= 693 cf @ 13.05 hrs, Average Depth at Peak Storage= 0.99'
 Bank-Full Depth= 3.00', Capacity at Bank-Full= 286.02 cfs

Custom cross-section, Length= 70.0' Slope= 0.0071 '/' (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 160.50', Outlet Invert= 160.00'



‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
35.00	159.00	1.00
40.00	158.00	2.00
45.00	157.00	3.00
51.00	157.00	3.00
54.00	158.00	2.00
57.00	159.00	1.00
60.00	160.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	6.0	0	0.00
1.00	10.0	14.3	700	30.04
2.00	28.0	22.5	1,960	123.20
3.00	69.0	60.7	4,830	286.02

Coopers Mills Rd PRE-DEV-MODEL

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Type III 24-hr 10-yr Rainfall=4.40"

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Summary for Reach 5R: (Reach D-D)

Inflow Area = 25.260 ac, 0.00% Impervious, Inflow Depth = 1.67" for 10-yr event
 Inflow = 18.16 cfs @ 12.89 hrs, Volume= 3.525 af
 Outflow = 13.10 cfs @ 14.04 hrs, Volume= 3.525 af, Atten= 28%, Lag= 68.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.26 fps, Min. Travel Time= 41.3 min
 Avg. Velocity = 0.53 fps, Avg. Travel Time= 99.0 min

Peak Storage= 32,495 cf @ 13.35 hrs, Average Depth at Peak Storage= 0.33'
 Bank-Full Depth= 6.00', Capacity at Bank-Full= 3,870.73 cfs

Custom cross-section, Length= 3,130.0' Slope= 0.0040 '/' (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 173.00', Outlet Invert= 160.50'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	176.00	0.00
21.00	174.00	2.00
39.00	172.00	4.00
63.00	170.00	6.00
90.00	170.00	6.00
116.00	172.00	4.00
138.00	174.00	2.00
152.00	176.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	27.0	0	0.00
2.00	104.0	77.2	325,520	361.12
4.00	298.0	117.4	932,740	1,578.33
6.00	567.0	152.6	1,774,710	3,870.73

Coopers Mills Rd PRE-DEV-MODEL

Type III 24-hr 25-yr Rainfall=5.10"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Watershed 1S	Runoff Area=5.940 ac 1.68% Impervious Runoff Depth=2.03" Tc=57.1 min CN=69 Runoff=5.57 cfs 1.005 af
Subcatchment 2S: (Watershed 2S)	Runoff Area=134.030 ac 2.40% Impervious Runoff Depth=2.36" Tc=65.1 min CN=73 Runoff=136.84 cfs 26.349 af
Subcatchment 3S: (Watershed 3S)	Runoff Area=38.640 ac 0.00% Impervious Runoff Depth=2.36" Tc=69.9 min CN=73 Runoff=38.01 cfs 7.596 af
Subcatchment 4S: (Watershed 4S)	Runoff Area=25.260 ac 0.00% Impervious Runoff Depth=2.19" Tc=64.1 min CN=71 Runoff=24.18 cfs 4.615 af
Reach 1R: BNDY(SW)	Inflow=180.90 cfs 39.566 af Outflow=180.90 cfs 39.566 af
Reach 2R: (Reach A-A)	Avg. Depth=1.43' Max Vel=5.20 fps Inflow=175.97 cfs 38.561 af n=0.033 L=300.0' S=0.0133 '/' Capacity=2,448.09 cfs Outflow=175.89 cfs 38.561 af
Reach 3R: (Reach B-B)	Avg. Depth=2.97' Max Vel=2.78 fps Inflow=176.44 cfs 38.561 af n=0.033 L=350.0' S=0.0029 '/' Capacity=180.90 cfs Outflow=175.97 cfs 38.561 af
Reach 4R: (Reach C-C)	Avg. Depth=1.16' Max Vel=3.26 fps Inflow=40.44 cfs 12.211 af n=0.033 L=70.0' S=0.0071 '/' Capacity=286.02 cfs Outflow=40.43 cfs 12.211 af
Reach 5R: (Reach D-D)	Avg. Depth=0.40' Max Vel=1.41 fps Inflow=24.18 cfs 4.615 af n=0.033 L=3,130.0' S=0.0040 '/' Capacity=3,870.73 cfs Outflow=18.30 cfs 4.615 af

Total Runoff Area = 203.870 ac Runoff Volume = 39.566 af Average Runoff Depth = 2.33"
98.37% Pervious = 200.555 ac 1.63% Impervious = 3.315 ac

Coopers Mills Rd PRE-DEV-MODEL

Type III 24-hr 25-yr Rainfall=5.10"

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Summary for Subcatchment 1S: Watershed 1S

Runoff = 5.57 cfs @ 12.81 hrs, Volume= 1.005 af, Depth= 2.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.10"

Area (ac)	CN	Description
3.490	65	Brush, Good, HSG C
2.350	73	Brush, Good, HSG D
* 0.100	98	Paved roads
5.940	69	Weighted Average
5.840		98.32% Pervious Area
0.100		1.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
57.1					Direct Entry, See Tc calculations

Summary for Subcatchment 2S: (Watershed 2S)

Runoff = 136.84 cfs @ 12.88 hrs, Volume= 26.349 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.10"

Area (ac)	CN	Description
3.870	65	Brush, Good, HSG C
0.850	73	Brush, Good, HSG D
1.650	98	Paved roads
1.240	74	>75% Grass cover, Good, HSG C
13.040	77	2 acre lots, 12% imp, HSG C
4.640	71	Meadow, non-grazed, HSG C
2.330	78	Meadow, non-grazed, HSG D
80.870	70	Woods, Good, HSG C
15.280	77	Woods, Good, HSG D
1.750	85	Row crops, straight row, Good, HSG C
8.510	89	Row crops, straight row, Good, HSG D
134.030	73	Weighted Average
130.815		97.60% Pervious Area
3.215		2.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
65.1					Direct Entry, See spreadsheet

Coopers Mills Rd PRE-DEV-MODEL

Type III 24-hr 25-yr Rainfall=5.10"

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Summary for Subcatchment 3S: (Watershed 3S)

Runoff = 38.01 cfs @ 12.97 hrs, Volume= 7.596 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.10"

Area (ac)	CN	Description
5.480	65	Brush, Good, HSG C
14.160	73	Brush, Good, HSG D
0.650	85	Row crops, straight row, Good, HSG C
1.150	89	Row crops, straight row, Good, HSG D
9.850	70	Woods, Good, HSG C
7.350	77	Woods, Good, HSG D
38.640	73	Weighted Average
38.640		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
69.9					Direct Entry, See spreadsheet

Summary for Subcatchment 4S: (Watershed 4S)

Runoff = 24.18 cfs @ 12.89 hrs, Volume= 4.615 af, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.10"

Area (ac)	CN	Description
0.060	48	Brush, Good, HSG B
1.970	65	Brush, Good, HSG C
5.230	73	Brush, Good, HSG D
6.050	71	Meadow, non-grazed, HSG C
0.190	78	Meadow, non-grazed, HSG D
0.070	55	Woods, Good, HSG B
8.270	70	Woods, Good, HSG C
3.420	77	Woods, Good, HSG D
25.260	71	Weighted Average
25.260		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
64.1					Direct Entry, See spreadsheet

Coopers Mills Rd PRE-DEV-MODEL

Type III 24-hr 25-yr Rainfall=5.10"

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Summary for Reach 1R: BNDY(SW)

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 203.870 ac, 1.63% Impervious, Inflow Depth = 2.33" for 25-yr event
Inflow = 180.90 cfs @ 13.02 hrs, Volume= 39.566 af
Outflow = 180.90 cfs @ 13.02 hrs, Volume= 39.566 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: (Reach A-A)

[61] Hint: Exceeded Reach 3R outlet invert by 1.43' @ 13.01 hrs

Inflow Area = 197.930 ac, 1.62% Impervious, Inflow Depth = 2.34" for 25-yr event
Inflow = 175.97 cfs @ 13.00 hrs, Volume= 38.561 af
Outflow = 175.89 cfs @ 13.02 hrs, Volume= 38.561 af, Atten= 0%, Lag= 1.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.20 fps, Min. Travel Time= 1.0 min
Avg. Velocity= 1.53 fps, Avg. Travel Time= 3.3 min

Peak Storage= 10,157 cf @ 13.01 hrs, Average Depth at Peak Storage= 1.43'
Bank-Full Depth= 5.00', Capacity at Bank-Full= 2,448.09 cfs

Custom cross-section, Length= 300.0' Slope= 0.0133 '/'
Constant n= 0.033 Earth, grassed & winding
Inlet Invert= 159.00', Outlet Invert= 155.00'



‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	162.00	0.00
13.00	161.00	1.00
19.00	160.00	2.00
26.00	159.00	3.00
31.00	158.00	4.00
36.00	157.00	5.00
48.00	157.00	5.00
60.00	158.00	4.00
66.00	159.00	3.00
73.00	160.00	2.00
74.00	161.00	1.00
75.00	162.00	0.00

Coopers Mills Rd PRE-DEV-MODEL

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Type III 24-hr 25-yr Rainfall=5.10"

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Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.0	0	0.00
1.00	20.5	29.1	6,150	84.31
2.00	55.0	40.3	16,500	351.73
3.00	102.0	54.5	30,600	805.81
4.00	159.5	62.0	47,850	1,557.74
5.00	227.5	76.4	68,250	2,448.09

Summary for Reach 3R: (Reach B-B)

[63] Warning: Exceeded Reach 4R INLET depth by 1.32' @ 12.88 hrs

Inflow Area = 197.930 ac, 1.62% Impervious, Inflow Depth = 2.34" for 25-yr event
 Inflow = 176.44 cfs @ 12.95 hrs, Volume= 38.561 af
 Outflow = 175.97 cfs @ 13.00 hrs, Volume= 38.561 af, Atten= 0%, Lag= 3.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.78 fps, Min. Travel Time= 2.1 min
 Avg. Velocity = 0.91 fps, Avg. Travel Time= 6.4 min

Peak Storage= 23,594 cf @ 12.96 hrs, Average Depth at Peak Storage= 2.97'
 Bank-Full Depth= 3.00', Capacity at Bank-Full= 180.90 cfs

Custom cross-section, Length= 350.0' Slope= 0.0029 '/ (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 160.00', Outlet Invert= 159.00'



‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
35.00	159.00	1.00
40.00	158.00	2.00
45.00	157.00	3.00
51.00	157.00	3.00
54.00	158.00	2.00
57.00	159.00	1.00
60.00	160.00	0.00

Coopers Mills Rd PRE-DEV-MODEL

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Type III 24-hr 25-yr Rainfall=5.10"

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Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	6.0	0	0.00
1.00	10.0	14.3	3,500	19.00
2.00	28.0	22.5	9,800	77.92
3.00	69.0	60.7	24,150	180.90

Summary for Reach 4R: (Reach C-C)

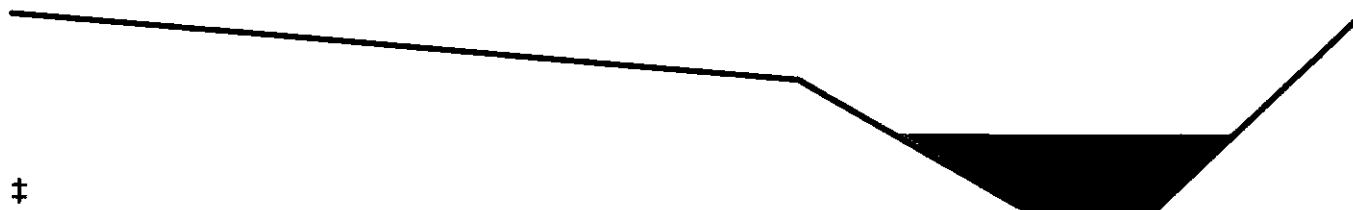
[62] Warning: Exceeded Reach 5R OUTLET depth by 0.81' @ 12.82 hrs

Inflow Area = 63.900 ac, 0.00% Impervious, Inflow Depth = 2.29" for 25-yr event
 Inflow = 40.44 cfs @ 13.12 hrs, Volume= 12.211 af
 Outflow = 40.43 cfs @ 13.13 hrs, Volume= 12.211 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.26 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 1.03 fps, Avg. Travel Time= 1.1 min

Peak Storage= 867 cf @ 13.12 hrs, Average Depth at Peak Storage= 1.16'
 Bank-Full Depth= 3.00', Capacity at Bank-Full= 286.02 cfs

Custom cross-section, Length= 70.0' Slope= 0.0071 ' / ' (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 160.50', Outlet Invert= 160.00'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
35.00	159.00	1.00
40.00	158.00	2.00
45.00	157.00	3.00
51.00	157.00	3.00
54.00	158.00	2.00
57.00	159.00	1.00
60.00	160.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	6.0	0	0.00
1.00	10.0	14.3	700	30.04
2.00	28.0	22.5	1,960	123.20
3.00	69.0	60.7	4,830	286.02

Coopers Mills Rd PRE-DEV-MODEL

Type III 24-hr 25-yr Rainfall=5.10"

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Summary for Reach 5R: (Reach D-D)

Inflow Area = 25.260 ac, 0.00% Impervious, Inflow Depth = 2.19" for 25-yr event
 Inflow = 24.18 cfs @ 12.89 hrs, Volume= 4.615 af
 Outflow = 18.30 cfs @ 13.91 hrs, Volume= 4.615 af, Atten= 24%, Lag= 60.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.41 fps, Min. Travel Time= 36.9 min
 Avg. Velocity = 0.55 fps, Avg. Travel Time= 95.0 min

Peak Storage= 40,541 cf @ 13.29 hrs, Average Depth at Peak Storage= 0.40'
 Bank-Full Depth= 6.00', Capacity at Bank-Full= 3,870.73 cfs

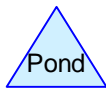
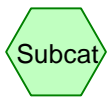
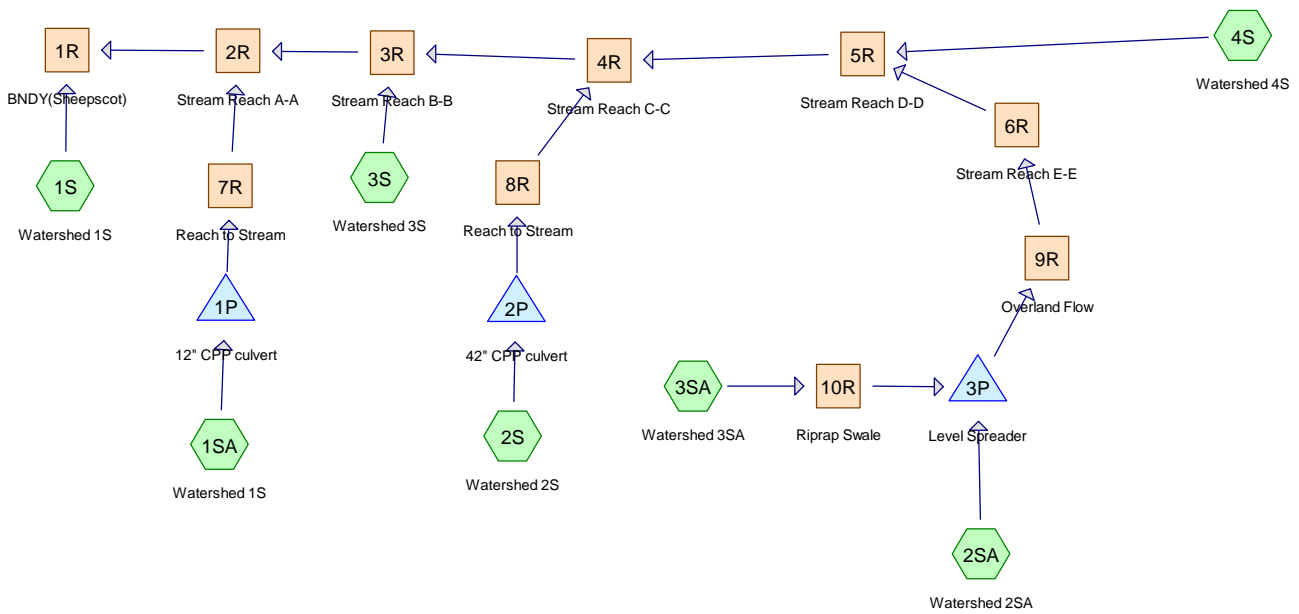
Custom cross-section, Length= 3,130.0' Slope= 0.0040 '/ (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 173.00', Outlet Invert= 160.50'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	176.00	0.00
21.00	174.00	2.00
39.00	172.00	4.00
63.00	170.00	6.00
90.00	170.00	6.00
116.00	172.00	4.00
138.00	174.00	2.00
152.00	176.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	27.0	0	0.00
2.00	104.0	77.2	325,520	361.12
4.00	298.0	117.4	932,740	1,578.33
6.00	567.0	152.6	1,774,710	3,870.73

Exhibit 12-3: Coopers Mills Substation Current Conditions Model Output



Routing Diagram for Coopers Mills Substation Post-Dev Model Modified
 Prepared by Montgomery Associates, Printed 5/4/2017
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Summary for Subcatchment 1S: Watershed 1S

Runoff = 1.27 cfs @ 12.11 hrs, Volume= 0.102 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (ac)	CN	Description
0.830	65	Brush, Good, HSG C
0.100	73	Brush, Good, HSG D
0.320	74	>75% Grass cover, Good, HSG C
* 0.010	98	Paved roads
* 0.220	89	Gravel roads, HSG C
* 0.030	91	Gravel roads, HSG D
1.510	72	Weighted Average
1.500	71	99.34% Pervious Area
0.010	98	0.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6					Direct Entry,

Summary for Subcatchment 1SA: Watershed 1S

Runoff = 1.30 cfs @ 12.86 hrs, Volume= 0.264 af, Depth= 0.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (ac)	CN	Description
1.840	65	Brush, Good, HSG C
2.130	73	Brush, Good, HSG D
0.250	74	>75% Grass cover, Good, HSG C
0.090	80	>75% Grass cover, Good, HSG D
* 0.090	98	Pavement
* 0.030	89	Gravel roads, HSG C
4.430	70	Weighted Average
4.340	70	97.97% Pervious Area
0.090	98	2.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
57.0					Direct Entry,

Summary for Subcatchment 2S: Watershed 2S

Runoff = 33.21 cfs @ 12.96 hrs, Volume= 6.921 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Coopers Mills Substation Post-Dev Model Modified

Type III 24-hr 2-Year Rainfall=3.00"

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Area (ac)	CN	Description
7.980	65	Brush, Good, HSG C
14.810	73	Brush, Good, HSG D
1.530	74	>75% Grass cover, Good, HSG C
0.709	80	>75% Grass cover, Good, HSG D
53.310	70	Woods, Good, HSG C
3.870	77	Woods, Good, HSG D
4.640	71	Meadow, non-grazed, HSG C
2.330	78	Meadow, non-grazed, HSG D
11.200	77	2 acre lots, 12% imp, HSG C
* 1.480	98	Pavement
* 0.220	89	Gravel roads, HSG C
* 0.300	91	Gravel roads, HSG D
* 0.264	60	Building Pad, HSG D
* 0.138	98	Storage Building
102.781	72	Weighted Average
99.819	71	97.12% Pervious Area
2.962	98	2.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
63.4					Direct Entry,

Summary for Subcatchment 2SA: Watershed 2SA

Runoff = 9.39 cfs @ 12.73 hrs, Volume= 1.632 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (ac)	CN	Description
1.290	65	Brush, Good, HSG C
1.440	73	Brush, Good, HSG D
2.900	74	>75% Grass cover, Good, HSG C
0.590	80	>75% Grass cover, Good, HSG D
15.170	70	Woods, Good, HSG C
0.850	77	Woods, Good, HSG D
1.840	77	2 acre lots, 12% imp, HSG C
* 0.160	98	Pavement
24.240	72	Weighted Average
23.859	71	98.43% Pervious Area
0.381	98	1.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.8					Direct Entry,

Summary for Subcatchment 3S: Watershed 3S

Runoff = 10.81 cfs @ 12.70 hrs, Volume= 1.886 af, Depth= 0.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (ac)	CN	Description
10.160	65	Brush, Good, HSG C
13.880	73	Brush, Good, HSG D
1.010	74	>75% Grass cover, Good, HSG C
1.430	80	>75% Grass cover, Good, HSG D
0.020	70	Woods, Good, HSG C
2.440	77	Woods, Good, HSG D
* 0.510	89	Gravel roads, HSG C
* 0.320	91	Gravel roads, HSG D
29.770	71	Weighted Average
29.770	71	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.7					Direct Entry,

Summary for Subcatchment 3SA: Watershed 3SA

Runoff = 2.82 cfs @ 12.53 hrs, Volume= 0.544 af, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (ac)	CN	Description
0.010	74	>75% Grass cover, Good, HSG C
* 0.320	98	Existing Roofs and foundations
* 17.196	60	Substation Yard
* 0.344	98	Net New Impervious
17.870	61	Weighted Average
17.206	60	96.28% Pervious Area
0.664	98	3.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.3					Direct Entry,

Summary for Subcatchment 4S: Watershed 4S

Runoff = 6.91 cfs @ 12.96 hrs, Volume= 1.475 af, Depth= 0.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.00"

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Type III 24-hr 2-Year Rainfall=3.00"

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Area (ac)	CN	Description
0.060	48	Brush, Good, HSG B
5.590	65	Brush, Good, HSG C
6.260	73	Brush, Good, HSG D
0.070	74	>75% Grass cover, Good, HSG C
0.180	80	>75% Grass cover, Good, HSG D
0.080	55	Woods, Good, HSG B
2.810	70	Woods, Good, HSG C
1.970	77	Woods, Good, HSG D
6.050	71	Meadow, non-grazed, HSG C
0.200	78	Meadow, non-grazed, HSG D
23.270	71	Weighted Average
23.270	71	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
64.1					Direct Entry,

Summary for Reach 1R: BNDY(Sheepscot)

Inflow Area = 203.871 ac, 2.01% Impervious, Inflow Depth = 0.75" for 2-Year event
 Inflow = 35.77 cfs @ 13.99 hrs, Volume= 12.798 af
 Outflow = 35.77 cfs @ 13.99 hrs, Volume= 12.798 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Stream Reach A-A

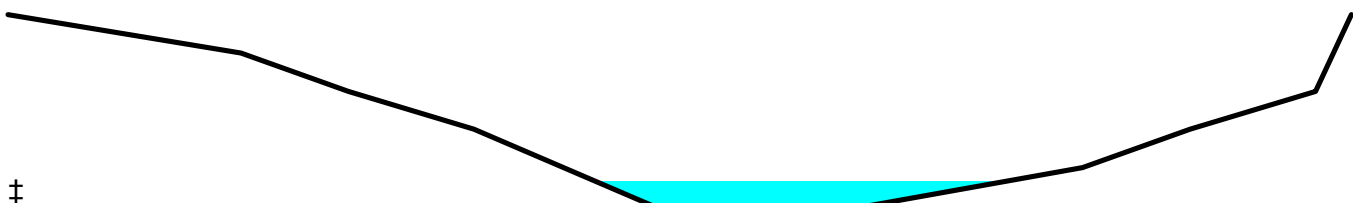
Inflow Area = 202.361 ac, 2.02% Impervious, Inflow Depth = 0.75" for 2-Year event
 Inflow = 35.65 cfs @ 13.97 hrs, Volume= 12.696 af
 Outflow = 35.65 cfs @ 13.99 hrs, Volume= 12.696 af, Atten= 0%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 3.14 fps, Min. Travel Time= 0.6 min
 Avg. Velocity = 1.20 fps, Avg. Travel Time= 1.7 min

Peak Storage= 1,364 cf @ 13.98 hrs
 Average Depth at Peak Storage= 0.65'
 Bank-Full Depth= 5.00' Flow Area= 227.5 sf, Capacity= 2,370.35 cfs

Custom cross-section, Length= 120.0' Slope= 0.0125 '/'
 Constant n= 0.033
 Inlet Invert= 156.50', Outlet Invert= 155.00'



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Type III 24-hr 2-Year Rainfall=3.00"

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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	162.00	0.00
13.00	161.00	1.00
19.00	160.00	2.00
26.00	159.00	3.00
31.00	158.00	4.00
36.00	157.00	5.00
48.00	157.00	5.00
60.00	158.00	4.00
66.00	159.00	3.00
73.00	160.00	2.00
74.00	161.00	1.00
75.00	162.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.0	0	0.00
1.00	20.5	29.1	2,460	81.64
2.00	55.0	40.3	6,600	340.57
3.00	102.0	54.5	12,240	780.22
4.00	159.5	62.0	19,140	1,508.27
5.00	227.5	76.4	27,300	2,370.35

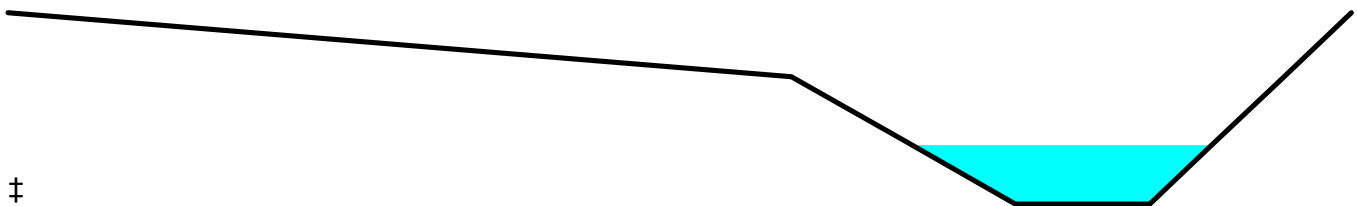
Summary for Reach 3R: Stream Reach B-B

Inflow Area = 197.931 ac, 2.02% Impervious, Inflow Depth = 0.75" for 2-Year event
 Inflow = 35.14 cfs @ 13.96 hrs, Volume= 12.432 af
 Outflow = 35.14 cfs @ 13.98 hrs, Volume= 12.432 af, Atten= 0%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.91 fps, Min. Travel Time= 0.8 min
 Avg. Velocity = 1.33 fps, Avg. Travel Time= 2.4 min

Peak Storage= 1,708 cf @ 13.97 hrs
 Average Depth at Peak Storage= 0.93'
 Bank-Full Depth= 3.00' Flow Area= 69.0 sf, Capacity= 388.20 cfs

Custom cross-section, Length= 190.0' Slope= 0.0132 '/' (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 159.00', Outlet Invert= 156.50'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
35.00	159.00	1.00
40.00	158.00	2.00
45.00	157.00	3.00
51.00	157.00	3.00
54.00	158.00	2.00
57.00	159.00	1.00
60.00	160.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	6.0	0	0.00
1.00	10.0	14.3	1,900	40.77
2.00	28.0	22.5	5,320	167.22
3.00	69.0	60.7	13,110	388.20

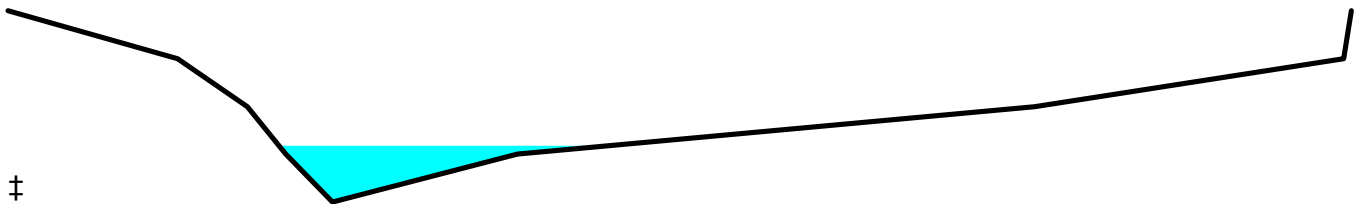
Summary for Reach 4R: Stream Reach C-C

Inflow Area = 168.161 ac, 2.38% Impervious, Inflow Depth = 0.75" for 2-Year event
 Inflow = 32.19 cfs @ 13.85 hrs, Volume= 10.546 af
 Outflow = 32.08 cfs @ 13.99 hrs, Volume= 10.546 af, Atten= 0%, Lag= 8.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.50 fps, Min. Travel Time= 4.0 min
 Avg. Velocity = 0.59 fps, Avg. Travel Time= 10.2 min

Peak Storage= 7,720 cf @ 13.92 hrs
 Average Depth at Peak Storage= 1.18'
 Bank-Full Depth= 4.00' Flow Area= 370.0 sf, Capacity= 1,448.12 cfs

Custom cross-section, Length= 360.0' Slope= 0.0028 '/'
 Constant n= 0.033
 Inlet Invert= 160.00', Outlet Invert= 159.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	162.00	0.00
22.00	161.00	1.00
31.00	160.00	2.00
36.00	159.00	3.00
42.00	158.00	4.00
66.00	159.00	3.00
133.00	160.00	2.00
173.00	161.00	1.00
174.00	162.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
1.00	15.0	30.1	5,400	22.37
2.00	81.0	102.2	29,160	164.63
3.00	207.5	151.3	74,700	607.95
4.00	370.0	174.7	133,200	1,448.12

Summary for Reach 5R: Stream Reach D-D

Inflow Area = 65.380 ac, 1.60% Impervious, Inflow Depth = 0.67" for 2-Year event
 Inflow = 18.81 cfs @ 12.96 hrs, Volume= 3.624 af
 Outflow = 12.04 cfs @ 14.15 hrs, Volume= 3.624 af, Atten= 36%, Lag= 71.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.24 fps, Min. Travel Time= 42.0 min
 Avg. Velocity= 0.54 fps, Avg. Travel Time= 96.0 min

Peak Storage= 30,361 cf @ 13.45 hrs
 Average Depth at Peak Storage= 0.31'
 Bank-Full Depth= 6.00' Flow Area= 567.0 sf, Capacity= 3,947.38 cfs

Custom cross-section, Length= 3,130.0' Slope= 0.0042 '/ (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 173.00', Outlet Invert= 160.00'



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Type III 24-hr 2-Year Rainfall=3.00"

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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	176.00	0.00
21.00	174.00	2.00
39.00	172.00	4.00
63.00	170.00	6.00
90.00	170.00	6.00
116.00	172.00	4.00
138.00	174.00	2.00
152.00	176.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	27.0	0	0.00
2.00	104.0	77.2	325,520	368.27
4.00	298.0	117.4	932,740	1,609.59
6.00	567.0	152.6	1,774,710	3,947.38

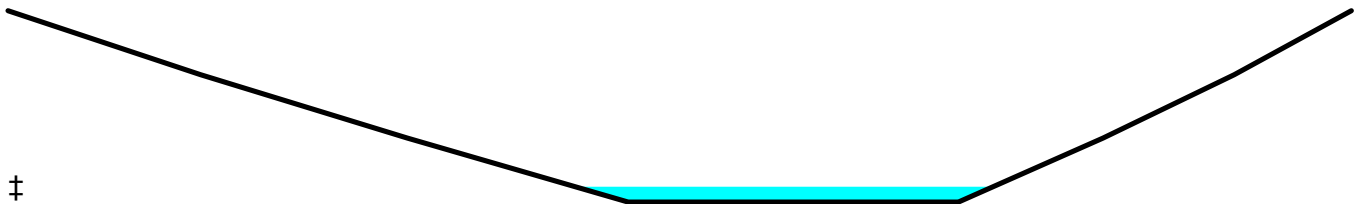
Summary for Reach 6R: Stream Reach E-E

Inflow Area = 42.110 ac, 2.48% Impervious, Inflow Depth = 0.61" for 2-Year event
 Inflow = 11.99 cfs @ 12.85 hrs, Volume= 2.150 af
 Outflow = 11.91 cfs @ 12.95 hrs, Volume= 2.150 af, Atten= 1%, Lag= 5.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.91 fps, Min. Travel Time= 3.5 min
 Avg. Velocity = 0.34 fps, Avg. Travel Time= 9.3 min

Peak Storage= 2,486 cf @ 12.89 hrs
 Average Depth at Peak Storage= 0.24'
 Bank-Full Depth= 3.00' Flow Area= 372.5 sf, Capacity= 1,450.55 cfs

Custom cross-section, Length= 190.0' Slope= 0.0032 '/ (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 173.60', Outlet Invert= 173.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	176.00	0.00
28.00	175.00	1.00
58.00	174.00	2.00
90.00	173.00	3.00
138.00	173.00	3.00
159.00	174.00	2.00
178.00	175.00	1.00
195.00	176.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	48.0	0	0.00
1.00	74.5	101.0	14,155	153.86
2.00	200.0	150.1	38,000	612.87
3.00	372.5	195.1	70,775	1,450.55

Summary for Reach 7R: Reach to Stream

Inflow Area = 4.430 ac, 2.03% Impervious, Inflow Depth = 0.71" for 2-Year event
 Inflow = 1.29 cfs @ 12.93 hrs, Volume= 0.264 af
 Outflow = 1.29 cfs @ 12.95 hrs, Volume= 0.264 af, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.71 fps, Min. Travel Time= 0.7 min
 Avg. Velocity= 0.97 fps, Avg. Travel Time= 1.3 min

Peak Storage= 57 cf @ 12.94 hrs
 Average Depth at Peak Storage= 0.05'
 Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 870.31 cfs

Custom cross-section, Length= 75.0' Slope= 0.0733 '/'
 Constant n= 0.033
 Inlet Invert= 162.00', Outlet Invert= 156.50'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
8.00	159.00	1.00
16.00	158.00	2.00
30.00	158.00	2.00
38.00	159.00	1.00
46.00	160.00	0.00

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Type III 24-hr 2-Year Rainfall=3.00"

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Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	14.0	0	0.00
1.00	22.0	30.1	1,650	217.56
2.00	60.0	46.2	4,500	870.31

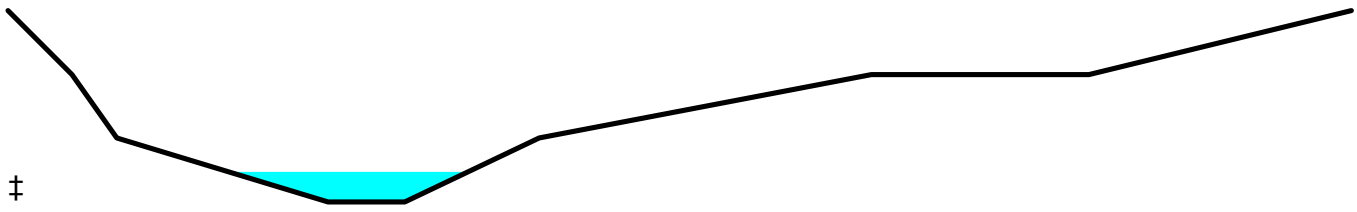
Summary for Reach 8R: Reach to Stream

Inflow Area = 102.781 ac, 2.88% Impervious, Inflow Depth = 0.81" for 2-Year event
 Inflow = 26.50 cfs @ 13.30 hrs, Volume= 6.921 af
 Outflow = 26.50 cfs @ 13.34 hrs, Volume= 6.921 af, Atten= 0%, Lag= 2.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.25 fps, Min. Travel Time= 1.3 min
 Avg. Velocity = 1.17 fps, Avg. Travel Time= 2.4 min

Peak Storage= 2,001 cf @ 13.32 hrs
 Average Depth at Peak Storage= 0.47'
 Bank-Full Depth= 3.00' Flow Area= 319.0 sf, Capacity= 2,057.71 cfs

Custom cross-section, Length= 170.0' Slope= 0.0118 '/' (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 162.00', Outlet Invert= 160.00'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	163.00	0.00
10.00	162.00	1.00
17.00	161.00	2.00
50.00	160.00	3.00
62.00	160.00	3.00
83.00	161.00	2.00
135.00	162.00	1.00
169.00	162.00	1.00
210.00	163.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.0	0	0.00
1.00	39.0	66.0	6,630	134.08
2.00	134.5	159.1	22,865	587.29
3.00	319.0	210.2	54,230	2,057.71

Summary for Reach 9R: Overland Flow

Inflow Area = 42.110 ac, 2.48% Impervious, Inflow Depth = 0.61" for 2-Year event
Inflow = 12.14 cfs @ 12.70 hrs, Volume= 2.150 af
Outflow = 11.99 cfs @ 12.85 hrs, Volume= 2.150 af, Atten= 1%, Lag= 9.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.47 fps, Min. Travel Time= 5.3 min
Avg. Velocity = 0.11 fps, Avg. Travel Time= 22.5 min

Peak Storage= 3,816 cf @ 12.76 hrs
Average Depth at Peak Storage= 0.39'
Bank-Full Depth= 0.50' Flow Area= 32.5 sf, Capacity= 17.99 cfs

65.00' x 0.50' deep channel, n= 0.410
Length= 150.0' Slope= 0.0600 '/' (102 Elevation Intervals)
Inlet Invert= 186.00', Outlet Invert= 177.00'



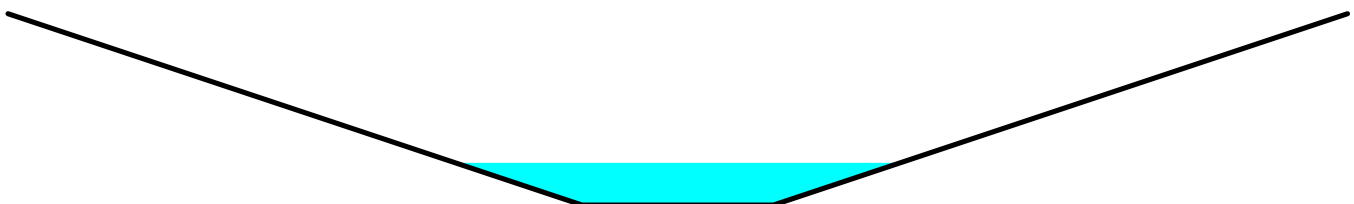
Summary for Reach 10R: Riprap Swale

Inflow Area = 17.870 ac, 3.72% Impervious, Inflow Depth = 0.37" for 2-Year event
Inflow = 2.82 cfs @ 12.53 hrs, Volume= 0.544 af
Outflow = 2.77 cfs @ 12.67 hrs, Volume= 0.544 af, Atten= 2%, Lag= 8.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.88 fps, Min. Travel Time= 4.1 min
Avg. Velocity = 0.91 fps, Avg. Travel Time= 8.5 min

Peak Storage= 679 cf @ 12.60 hrs
Average Depth at Peak Storage= 0.44'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 69.93 cfs

2.00' x 2.00' deep channel, n= 0.040
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 460.0' Slope= 0.0123 '/' (102 Elevation Intervals)
Inlet Invert= 189.66', Outlet Invert= 184.00'



Summary for Pond 1P: 12" CPP culvert

Inflow Area = 4.430 ac, 2.03% Impervious, Inflow Depth = 0.71" for 2-Year event
 Inflow = 1.30 cfs @ 12.86 hrs, Volume= 0.264 af
 Outflow = 1.29 cfs @ 12.93 hrs, Volume= 0.264 af, Atten= 1%, Lag= 4.2 min
 Primary = 1.29 cfs @ 12.93 hrs, Volume= 0.264 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 165.19' @ 12.93 hrs Surf.Area= 643 sf Storage= 182 cf

Plug-Flow detention time= 1.9 min calculated for 0.264 af (100% of inflow)
 Center-of-Mass det. time= 1.9 min (930.0 - 928.0)

Volume	Invert	Avail.Storage	Storage Description
#1	164.50'	23,203 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
164.50	0	0	0
165.00	353	88	88
166.00	1,887	1,120	1,208
167.00	4,541	3,214	4,422
168.00	8,926	6,734	11,156
169.00	15,168	12,047	23,203

Device	Routing	Invert	Outlet Devices
#1	Primary	164.50'	12.0" Round Culvert L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.50' / 162.00' S= 0.0250 ' /' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=1.29 cfs @ 12.93 hrs HW=165.19' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 1.29 cfs @ 2.23 fps)

Summary for Pond 2P: 42" CPP culvert

Inflow Area = 102.781 ac, 2.88% Impervious, Inflow Depth = 0.81" for 2-Year event
 Inflow = 33.21 cfs @ 12.96 hrs, Volume= 6.921 af
 Outflow = 26.50 cfs @ 13.30 hrs, Volume= 6.921 af, Atten= 20%, Lag= 20.8 min
 Primary = 26.50 cfs @ 13.30 hrs, Volume= 6.921 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 164.84' @ 13.30 hrs Surf.Area= 33,173 sf Storage= 34,199 cf

Plug-Flow detention time= 16.6 min calculated for 6.921 af (100% of inflow)
 Center-of-Mass det. time= 16.6 min (943.1 - 926.6)

Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	381,247 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Coopers Mills Substation Post-Dev Model Modified

Type III 24-hr 2-Year Rainfall=3.00"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.50	0	0	0
163.00	4,393	1,098	1,098
164.00	18,380	11,387	12,485
165.00	35,940	27,160	39,645
166.00	47,745	41,843	81,487
167.00	59,780	53,763	135,250
168.00	74,210	66,995	202,245
169.00	91,232	82,721	284,966
170.00	101,330	96,281	381,247

Device	Routing	Invert	Outlet Devices
#1	Primary	162.50'	42.0" Round Culvert L= 85.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 162.50' / 162.00' S= 0.0059 ' / Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 9.62 sf

Primary OutFlow Max=26.50 cfs @ 13.30 hrs HW=164.84' (Free Discharge)

↑**1=Culvert** (Barrel Controls 26.50 cfs @ 5.48 fps)

Summary for Pond 3P: Level Spreader

Inflow Area = 42.110 ac, 2.48% Impervious, Inflow Depth = 0.62" for 2-Year event
 Inflow = 12.14 cfs @ 12.69 hrs, Volume= 2.176 af
 Outflow = 12.14 cfs @ 12.70 hrs, Volume= 2.150 af, Atten= 0%, Lag= 0.4 min
 Primary = 12.14 cfs @ 12.70 hrs, Volume= 2.150 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 186.18' @ 12.70 hrs Surf.Area= 1,592 sf Storage= 1,424 cf

Plug-Flow detention time= 9.8 min calculated for 2.150 af (99% of inflow)
 Center-of-Mass det. time= 3.0 min (924.8 - 921.8)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	2,890 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	0	0	0
185.00	390	195	195
186.00	1,500	945	1,140
187.00	2,000	1,750	2,890

Device	Routing	Invert	Outlet Devices
#1	Primary	186.00'	65.0' long x 6.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=12.12 cfs @ 12.70 hrs HW=186.18' (Free Discharge)

↳ **1=Broad-Crested Rectangular Weir** (Weir Controls 12.12 cfs @ 1.02 fps)

Summary for Subcatchment 1S: Watershed 1S

Runoff = 2.96 cfs @ 12.10 hrs, Volume= 0.220 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.40"

Area (ac)	CN	Description
0.830	65	Brush, Good, HSG C
0.100	73	Brush, Good, HSG D
0.320	74	>75% Grass cover, Good, HSG C
* 0.010	98	Paved roads
* 0.220	89	Gravel roads, HSG C
* 0.030	91	Gravel roads, HSG D
1.510	72	Weighted Average
1.500	71	99.34% Pervious Area
0.010	98	0.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6					Direct Entry,

Summary for Subcatchment 1SA: Watershed 1S

Runoff = 3.24 cfs @ 12.85 hrs, Volume= 0.592 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.40"

Area (ac)	CN	Description
1.840	65	Brush, Good, HSG C
2.130	73	Brush, Good, HSG D
0.250	74	>75% Grass cover, Good, HSG C
0.090	80	>75% Grass cover, Good, HSG D
* 0.090	98	Pavement
* 0.030	89	Gravel roads, HSG C
4.430	70	Weighted Average
4.340	70	97.97% Pervious Area
0.090	98	2.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
57.0					Direct Entry,

Summary for Subcatchment 2S: Watershed 2S

Runoff = 78.11 cfs @ 12.89 hrs, Volume= 14.962 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.40"

Coopers Mills Substation Post-Dev Model Modified

Type III 24-hr 10-Year Rainfall=4.40"

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Area (ac)	CN	Description
7.980	65	Brush, Good, HSG C
14.810	73	Brush, Good, HSG D
1.530	74	>75% Grass cover, Good, HSG C
0.709	80	>75% Grass cover, Good, HSG D
53.310	70	Woods, Good, HSG C
3.870	77	Woods, Good, HSG D
4.640	71	Meadow, non-grazed, HSG C
2.330	78	Meadow, non-grazed, HSG D
11.200	77	2 acre lots, 12% imp, HSG C
* 1.480	98	Pavement
* 0.220	89	Gravel roads, HSG C
* 0.300	91	Gravel roads, HSG D
* 0.264	60	Building Pad, HSG D
* 0.138	98	Storage Building
102.781	72	Weighted Average
99.819	71	97.12% Pervious Area
2.962	98	2.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
63.4					Direct Entry,

Summary for Subcatchment 2SA: Watershed 2SA

Runoff = 21.92 cfs @ 12.68 hrs, Volume= 3.529 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.40"

Area (ac)	CN	Description
1.290	65	Brush, Good, HSG C
1.440	73	Brush, Good, HSG D
2.900	74	>75% Grass cover, Good, HSG C
0.590	80	>75% Grass cover, Good, HSG D
15.170	70	Woods, Good, HSG C
0.850	77	Woods, Good, HSG D
1.840	77	2 acre lots, 12% imp, HSG C
* 0.160	98	Pavement
24.240	72	Weighted Average
23.859	71	98.43% Pervious Area
0.381	98	1.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.8					Direct Entry,

Summary for Subcatchment 3S: Watershed 3S

Runoff = 26.06 cfs @ 12.65 hrs, Volume= 4.154 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.40"

Area (ac)	CN	Description
10.160	65	Brush, Good, HSG C
13.880	73	Brush, Good, HSG D
1.010	74	>75% Grass cover, Good, HSG C
1.430	80	>75% Grass cover, Good, HSG D
0.020	70	Woods, Good, HSG C
2.440	77	Woods, Good, HSG D
* 0.510	89	Gravel roads, HSG C
* 0.320	91	Gravel roads, HSG D
29.770	71	Weighted Average
29.770	71	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.7					Direct Entry,

Summary for Subcatchment 3SA: Watershed 3SA

Runoff = 10.92 cfs @ 12.44 hrs, Volume= 1.525 af, Depth= 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.40"

Area (ac)	CN	Description
0.010	74	>75% Grass cover, Good, HSG C
* 0.320	98	Existing Roofs and foundations
* 17.196	60	Substation Yard
* 0.344	98	Net New Impervious
17.870	61	Weighted Average
17.206	60	96.28% Pervious Area
0.664	98	3.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.3					Direct Entry,

Summary for Subcatchment 4S: Watershed 4S

Runoff = 16.73 cfs @ 12.89 hrs, Volume= 3.247 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.40"

Area (ac)	CN	Description
0.060	48	Brush, Good, HSG B
5.590	65	Brush, Good, HSG C
6.260	73	Brush, Good, HSG D
0.070	74	>75% Grass cover, Good, HSG C
0.180	80	>75% Grass cover, Good, HSG D
0.080	55	Woods, Good, HSG B
2.810	70	Woods, Good, HSG C
1.970	77	Woods, Good, HSG D
6.050	71	Meadow, non-grazed, HSG C
0.200	78	Meadow, non-grazed, HSG D
23.270	71	Weighted Average
23.270	71	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
64.1					Direct Entry,

Summary for Reach 1R: BNDY(Sheepscot)

Inflow Area = 203.871 ac, 2.01% Impervious, Inflow Depth = 1.66" for 10-Year event
 Inflow = 98.30 cfs @ 13.69 hrs, Volume= 28.201 af
 Outflow = 98.30 cfs @ 13.69 hrs, Volume= 28.201 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

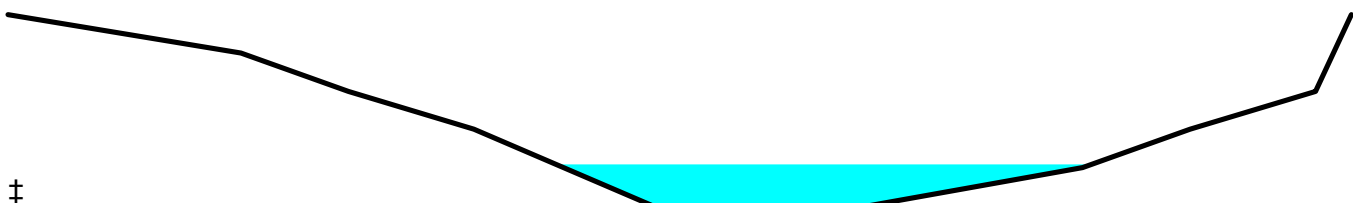
Summary for Reach 2R: Stream Reach A-A

Inflow Area = 202.361 ac, 2.02% Impervious, Inflow Depth = 1.66" for 10-Year event
 Inflow = 98.05 cfs @ 13.67 hrs, Volume= 27.982 af
 Outflow = 98.04 cfs @ 13.69 hrs, Volume= 27.982 af, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.23 fps, Min. Travel Time= 0.5 min
 Avg. Velocity = 1.39 fps, Avg. Travel Time= 1.4 min

Peak Storage= 2,784 cf @ 13.68 hrs
 Average Depth at Peak Storage= 1.09'
 Bank-Full Depth= 5.00' Flow Area= 227.5 sf, Capacity= 2,370.35 cfs

Custom cross-section, Length= 120.0' Slope= 0.0125 '/'
 Constant n= 0.033
 Inlet Invert= 156.50', Outlet Invert= 155.00'



Coopers Mills Substation Post-Dev Model Modified

Type III 24-hr 10-Year Rainfall=4.40"

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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	162.00	0.00
13.00	161.00	1.00
19.00	160.00	2.00
26.00	159.00	3.00
31.00	158.00	4.00
36.00	157.00	5.00
48.00	157.00	5.00
60.00	158.00	4.00
66.00	159.00	3.00
73.00	160.00	2.00
74.00	161.00	1.00
75.00	162.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.0	0	0.00
1.00	20.5	29.1	2,460	81.64
2.00	55.0	40.3	6,600	340.57
3.00	102.0	54.5	12,240	780.22
4.00	159.5	62.0	19,140	1,508.27
5.00	227.5	76.4	27,300	2,370.35

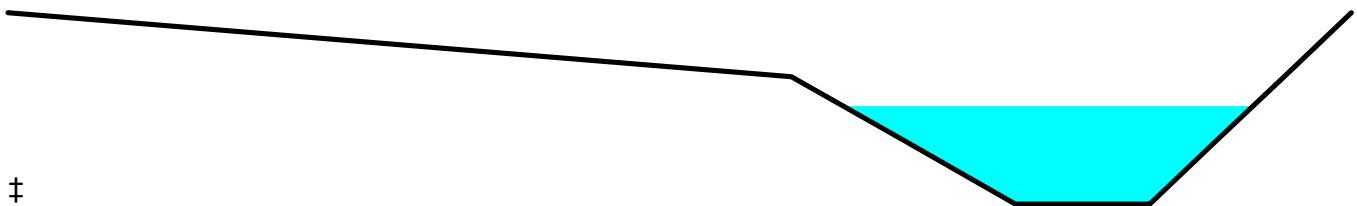
Summary for Reach 3R: Stream Reach B-B

Inflow Area = 197.931 ac, 2.02% Impervious, Inflow Depth = 1.66" for 10-Year event
 Inflow = 96.47 cfs @ 13.67 hrs, Volume= 27.390 af
 Outflow = 96.46 cfs @ 13.69 hrs, Volume= 27.390 af, Atten= 0%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 5.16 fps, Min. Travel Time= 0.6 min
 Avg. Velocity = 1.57 fps, Avg. Travel Time= 2.0 min

Peak Storage= 3,550 cf @ 13.68 hrs
 Average Depth at Peak Storage= 1.54'
 Bank-Full Depth= 3.00' Flow Area= 69.0 sf, Capacity= 388.20 cfs

Custom cross-section, Length= 190.0' Slope= 0.0132 '/' (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 159.00', Outlet Invert= 156.50'



Coopers Mills Substation Post-Dev Model Modified

Type III 24-hr 10-Year Rainfall=4.40"

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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
35.00	159.00	1.00
40.00	158.00	2.00
45.00	157.00	3.00
51.00	157.00	3.00
54.00	158.00	2.00
57.00	159.00	1.00
60.00	160.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	6.0	0	0.00
1.00	10.0	14.3	1,900	40.77
2.00	28.0	22.5	5,320	167.22
3.00	69.0	60.7	13,110	388.20

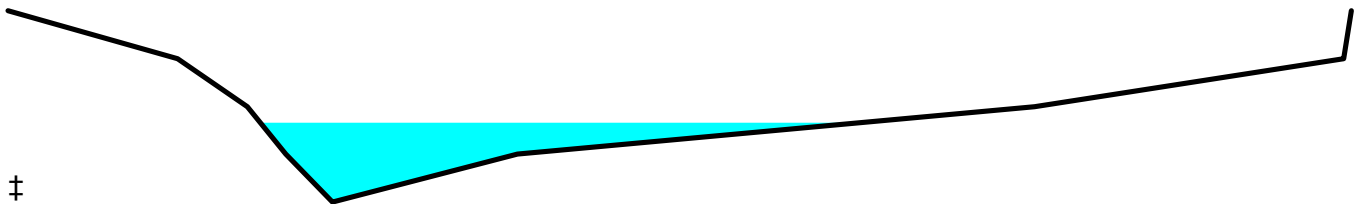
Summary for Reach 4R: Stream Reach C-C

Inflow Area = 168.161 ac, 2.38% Impervious, Inflow Depth = 1.66" for 10-Year event
 Inflow = 89.09 cfs @ 13.60 hrs, Volume= 23.236 af
 Outflow = 88.88 cfs @ 13.70 hrs, Volume= 23.236 af, Atten= 0%, Lag= 6.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.78 fps, Min. Travel Time= 3.4 min
 Avg. Velocity = 0.66 fps, Avg. Travel Time= 9.1 min

Peak Storage= 18,011 cf @ 13.65 hrs
 Average Depth at Peak Storage= 1.65'
 Bank-Full Depth= 4.00' Flow Area= 370.0 sf, Capacity= 1,448.12 cfs

Custom cross-section, Length= 360.0' Slope= 0.0028 '/'
 Constant n= 0.033
 Inlet Invert= 160.00', Outlet Invert= 159.00'



Coopers Mills Substation Post-Dev Model Modified

Type III 24-hr 10-Year Rainfall=4.40"

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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	162.00	0.00
22.00	161.00	1.00
31.00	160.00	2.00
36.00	159.00	3.00
42.00	158.00	4.00
66.00	159.00	3.00
133.00	160.00	2.00
173.00	161.00	1.00
174.00	162.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
1.00	15.0	30.1	5,400	22.37
2.00	81.0	102.2	29,160	164.63
3.00	207.5	151.3	74,700	607.95
4.00	370.0	174.7	133,200	1,448.12

Summary for Reach 5R: Stream Reach D-D

Inflow Area = 65.380 ac, 1.60% Impervious, Inflow Depth = 1.52" for 10-Year event
 Inflow = 47.94 cfs @ 12.82 hrs, Volume= 8.274 af
 Outflow = 36.33 cfs @ 13.66 hrs, Volume= 8.274 af, Atten= 24%, Lag= 50.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.79 fps, Min. Travel Time= 29.1 min
 Avg. Velocity= 0.62 fps, Avg. Travel Time= 84.3 min

Peak Storage= 63,462 cf @ 13.18 hrs
 Average Depth at Peak Storage= 0.59'
 Bank-Full Depth= 6.00' Flow Area= 567.0 sf, Capacity= 3,947.38 cfs

Custom cross-section, Length= 3,130.0' Slope= 0.0042 '/' (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 173.00', Outlet Invert= 160.00'



Coopers Mills Substation Post-Dev Model Modified

Type III 24-hr 10-Year Rainfall=4.40"

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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	176.00	0.00
21.00	174.00	2.00
39.00	172.00	4.00
63.00	170.00	6.00
90.00	170.00	6.00
116.00	172.00	4.00
138.00	174.00	2.00
152.00	176.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	27.0	0	0.00
2.00	104.0	77.2	325,520	368.27
4.00	298.0	117.4	932,740	1,609.59
6.00	567.0	152.6	1,774,710	3,947.38

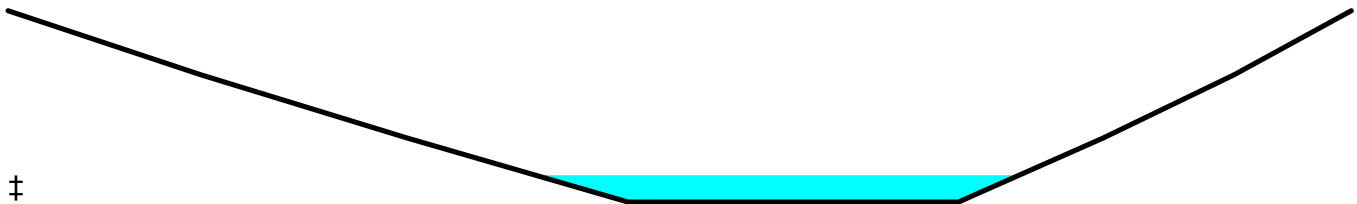
Summary for Reach 6R: Stream Reach E-E

Inflow Area = 42.110 ac, 2.48% Impervious, Inflow Depth = 1.43" for 10-Year event
 Inflow = 31.73 cfs @ 12.73 hrs, Volume= 5.027 af
 Outflow = 31.62 cfs @ 12.80 hrs, Volume= 5.027 af, Atten= 0%, Lag= 4.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.27 fps, Min. Travel Time= 2.5 min
 Avg. Velocity = 0.41 fps, Avg. Travel Time= 7.8 min

Peak Storage= 4,738 cf @ 12.76 hrs
 Average Depth at Peak Storage= 0.42'
 Bank-Full Depth= 3.00' Flow Area= 372.5 sf, Capacity= 1,450.55 cfs

Custom cross-section, Length= 190.0' Slope= 0.0032 '/ (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 173.60', Outlet Invert= 173.00'



Coopers Mills Substation Post-Dev Model Modified

Type III 24-hr 10-Year Rainfall=4.40"

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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	176.00	0.00
28.00	175.00	1.00
58.00	174.00	2.00
90.00	173.00	3.00
138.00	173.00	3.00
159.00	174.00	2.00
178.00	175.00	1.00
195.00	176.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	48.0	0	0.00
1.00	74.5	101.0	14,155	153.86
2.00	200.0	150.1	38,000	612.87
3.00	372.5	195.1	70,775	1,450.55

Summary for Reach 7R: Reach to Stream

Inflow Area = 4.430 ac, 2.03% Impervious, Inflow Depth = 1.60" for 10-Year event
 Inflow = 2.94 cfs @ 13.02 hrs, Volume= 0.592 af
 Outflow = 2.94 cfs @ 13.03 hrs, Volume= 0.592 af, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.32 fps, Min. Travel Time= 0.5 min
 Avg. Velocity = 1.09 fps, Avg. Travel Time= 1.2 min

Peak Storage= 95 cf @ 13.02 hrs
 Average Depth at Peak Storage= 0.09'
 Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 870.31 cfs

Custom cross-section, Length= 75.0' Slope= 0.0733 '/'
 Constant n= 0.033
 Inlet Invert= 162.00', Outlet Invert= 156.50'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
8.00	159.00	1.00
16.00	158.00	2.00
30.00	158.00	2.00
38.00	159.00	1.00
46.00	160.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	14.0	0	0.00
1.00	22.0	30.1	1,650	217.56
2.00	60.0	46.2	4,500	870.31

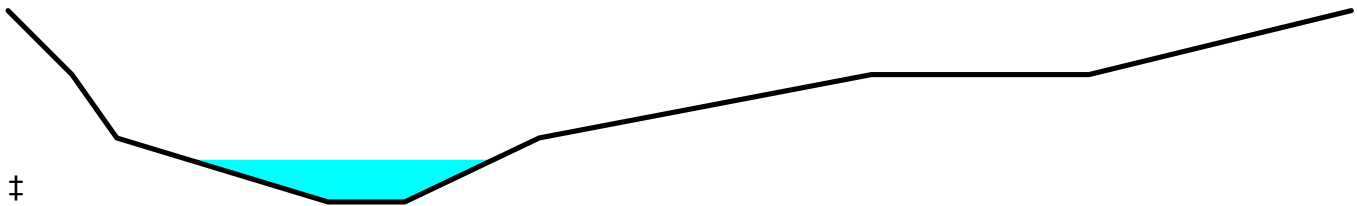
Summary for Reach 8R: Reach to Stream

Inflow Area = 102.781 ac, 2.88% Impervious, Inflow Depth = 1.75" for 10-Year event
 Inflow = 54.00 cfs @ 13.37 hrs, Volume= 14.962 af
 Outflow = 54.00 cfs @ 13.40 hrs, Volume= 14.962 af, Atten= 0%, Lag= 1.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.72 fps, Min. Travel Time= 1.0 min
 Avg. Velocity = 1.37 fps, Avg. Travel Time= 2.1 min

Peak Storage= 3,377 cf @ 13.38 hrs
 Average Depth at Peak Storage= 0.66'
 Bank-Full Depth= 3.00' Flow Area= 319.0 sf, Capacity= 2,057.71 cfs

Custom cross-section, Length= 170.0' Slope= 0.0118 '/' (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 162.00', Outlet Invert= 160.00'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	163.00	0.00
10.00	162.00	1.00
17.00	161.00	2.00
50.00	160.00	3.00
62.00	160.00	3.00
83.00	161.00	2.00
135.00	162.00	1.00
169.00	162.00	1.00
210.00	163.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.0	0	0.00
1.00	39.0	66.0	6,630	134.08
2.00	134.5	159.1	22,865	587.29
3.00	319.0	210.2	54,230	2,057.71

Summary for Reach 9R: Overland Flow

Inflow Area = 42.110 ac, 2.48% Impervious, Inflow Depth = 1.43" for 10-Year event
Inflow = 32.01 cfs @ 12.63 hrs, Volume= 5.027 af
Outflow = 31.73 cfs @ 12.73 hrs, Volume= 5.027 af, Atten= 1%, Lag= 5.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.67 fps, Min. Travel Time= 3.7 min
Avg. Velocity = 0.15 fps, Avg. Travel Time= 17.2 min

Peak Storage= 7,130 cf @ 12.66 hrs
Average Depth at Peak Storage= 0.73'
Bank-Full Depth= 0.50' Flow Area= 32.5 sf, Capacity= 17.99 cfs

65.00' x 0.50' deep channel, n= 0.410
Length= 150.0' Slope= 0.0600 '/' (102 Elevation Intervals)
Inlet Invert= 186.00', Outlet Invert= 177.00'



Summary for Reach 10R: Riprap Swale

Inflow Area = 17.870 ac, 3.72% Impervious, Inflow Depth = 1.02" for 10-Year event
Inflow = 10.92 cfs @ 12.44 hrs, Volume= 1.525 af
Outflow = 10.82 cfs @ 12.53 hrs, Volume= 1.525 af, Atten= 1%, Lag= 5.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.71 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 1.16 fps, Avg. Travel Time= 6.6 min

Peak Storage= 1,837 cf @ 12.48 hrs
Average Depth at Peak Storage= 0.87'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 69.93 cfs

2.00' x 2.00' deep channel, n= 0.040
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 460.0' Slope= 0.0123 '/' (102 Elevation Intervals)
Inlet Invert= 189.66', Outlet Invert= 184.00'



Summary for Pond 1P: 12" CPP culvert

Inflow Area = 4.430 ac, 2.03% Impervious, Inflow Depth = 1.60" for 10-Year event
 Inflow = 3.24 cfs @ 12.85 hrs, Volume= 0.592 af
 Outflow = 2.94 cfs @ 13.02 hrs, Volume= 0.592 af, Atten= 9%, Lag= 10.1 min
 Primary = 2.94 cfs @ 13.02 hrs, Volume= 0.592 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 165.97' @ 13.02 hrs Surf.Area= 1,837 sf Storage= 1,148 cf

Plug-Flow detention time= 3.3 min calculated for 0.592 af (100% of inflow)
 Center-of-Mass det. time= 3.3 min (905.4 - 902.1)

Volume	Invert	Avail.Storage	Storage Description
#1	164.50'	23,203 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
164.50	0	0	0
165.00	353	88	88
166.00	1,887	1,120	1,208
167.00	4,541	3,214	4,422
168.00	8,926	6,734	11,156
169.00	15,168	12,047	23,203

Device	Routing	Invert	Outlet Devices
#1	Primary	164.50'	12.0" Round Culvert L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.50' / 162.00' S= 0.0250 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=2.94 cfs @ 13.02 hrs HW=165.97' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 2.94 cfs @ 3.74 fps)

Summary for Pond 2P: 42" CPP culvert

Inflow Area = 102.781 ac, 2.88% Impervious, Inflow Depth = 1.75" for 10-Year event
 Inflow = 78.11 cfs @ 12.89 hrs, Volume= 14.962 af
 Outflow = 54.00 cfs @ 13.37 hrs, Volume= 14.962 af, Atten= 31%, Lag= 28.5 min
 Primary = 54.00 cfs @ 13.37 hrs, Volume= 14.962 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 166.43' @ 13.37 hrs Surf.Area= 52,925 sf Storage= 103,150 cf

Plug-Flow detention time= 22.2 min calculated for 14.958 af (100% of inflow)
 Center-of-Mass det. time= 22.2 min (924.8 - 902.6)

Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	381,247 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

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Type III 24-hr 10-Year Rainfall=4.40"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.50	0	0	0
163.00	4,393	1,098	1,098
164.00	18,380	11,387	12,485
165.00	35,940	27,160	39,645
166.00	47,745	41,843	81,487
167.00	59,780	53,763	135,250
168.00	74,210	66,995	202,245
169.00	91,232	82,721	284,966
170.00	101,330	96,281	381,247

Device	Routing	Invert	Outlet Devices
#1	Primary	162.50'	42.0" Round Culvert L= 85.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 162.50' / 162.00' S= 0.0059 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 9.62 sf

Primary OutFlow Max=54.00 cfs @ 13.37 hrs HW=166.43' (Free Discharge)

↑**1=Culvert** (Inlet Controls 54.00 cfs @ 5.61 fps)

Summary for Pond 3P: Level Spreader

Inflow Area =	42.110 ac,	2.48% Impervious,	Inflow Depth = 1.44"	for 10-Year event
Inflow =	32.01 cfs @	12.63 hrs,	Volume=	5.053 af
Outflow =	32.01 cfs @	12.63 hrs,	Volume=	5.027 af, Atten= 0%, Lag= 0.1 min
Primary =	32.01 cfs @	12.63 hrs,	Volume=	5.027 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 186.34' @ 12.63 hrs Surf.Area= 1,671 sf Storage= 1,681 cf

Plug-Flow detention time= 4.8 min calculated for 5.027 af (99% of inflow)
Center-of-Mass det. time= 1.7 min (895.5 - 893.8)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	2,890 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	0	0	0
185.00	390	195	195
186.00	1,500	945	1,140
187.00	2,000	1,750	2,890

Device	Routing	Invert	Outlet Devices
#1	Primary	186.00'	65.0' long x 6.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=32.00 cfs @ 12.63 hrs HW=186.34' (Free Discharge)

↳ **1=Broad-Crested Rectangular Weir** (Weir Controls 32.00 cfs @ 1.44 fps)

Summary for Subcatchment 1S: Watershed 1S

Runoff = 3.91 cfs @ 12.10 hrs, Volume= 0.286 af, Depth= 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.10"

Area (ac)	CN	Description
0.830	65	Brush, Good, HSG C
0.100	73	Brush, Good, HSG D
0.320	74	>75% Grass cover, Good, HSG C
* 0.010	98	Paved roads
* 0.220	89	Gravel roads, HSG C
* 0.030	91	Gravel roads, HSG D
1.510	72	Weighted Average
1.500	71	99.34% Pervious Area
0.010	98	0.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6					Direct Entry,

Summary for Subcatchment 1SA: Watershed 1S

Runoff = 4.34 cfs @ 12.80 hrs, Volume= 0.779 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.10"

Area (ac)	CN	Description
1.840	65	Brush, Good, HSG C
2.130	73	Brush, Good, HSG D
0.250	74	>75% Grass cover, Good, HSG C
0.090	80	>75% Grass cover, Good, HSG D
* 0.090	98	Pavement
* 0.030	89	Gravel roads, HSG C
4.430	70	Weighted Average
4.340	70	97.97% Pervious Area
0.090	98	2.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
57.0					Direct Entry,

Summary for Subcatchment 2S: Watershed 2S

Runoff = 103.17 cfs @ 12.89 hrs, Volume= 19.487 af, Depth= 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.10"

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Type III 24-hr 25-Year Rainfall=5.10"

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Area (ac)	CN	Description
7.980	65	Brush, Good, HSG C
14.810	73	Brush, Good, HSG D
1.530	74	>75% Grass cover, Good, HSG C
0.709	80	>75% Grass cover, Good, HSG D
53.310	70	Woods, Good, HSG C
3.870	77	Woods, Good, HSG D
4.640	71	Meadow, non-grazed, HSG C
2.330	78	Meadow, non-grazed, HSG D
11.200	77	2 acre lots, 12% imp, HSG C
* 1.480	98	Pavement
* 0.220	89	Gravel roads, HSG C
* 0.300	91	Gravel roads, HSG D
* 0.264	60	Building Pad, HSG D
* 0.138	98	Storage Building
102.781	72	Weighted Average
99.819	71	97.12% Pervious Area
2.962	98	2.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
63.4					Direct Entry,

Summary for Subcatchment 2SA: Watershed 2SA

Runoff = 28.98 cfs @ 12.64 hrs, Volume= 4.596 af, Depth= 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.10"

Area (ac)	CN	Description
1.290	65	Brush, Good, HSG C
1.440	73	Brush, Good, HSG D
2.900	74	>75% Grass cover, Good, HSG C
0.590	80	>75% Grass cover, Good, HSG D
15.170	70	Woods, Good, HSG C
0.850	77	Woods, Good, HSG D
1.840	77	2 acre lots, 12% imp, HSG C
* 0.160	98	Pavement
24.240	72	Weighted Average
23.859	71	98.43% Pervious Area
0.381	98	1.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.8					Direct Entry,

Summary for Subcatchment 3S: Watershed 3S

Runoff = 34.67 cfs @ 12.65 hrs, Volume= 5.439 af, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.10"

Area (ac)	CN	Description
10.160	65	Brush, Good, HSG C
13.880	73	Brush, Good, HSG D
1.010	74	>75% Grass cover, Good, HSG C
1.430	80	>75% Grass cover, Good, HSG D
0.020	70	Woods, Good, HSG C
2.440	77	Woods, Good, HSG D
* 0.510	89	Gravel roads, HSG C
* 0.320	91	Gravel roads, HSG D
29.770	71	Weighted Average
29.770	71	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.7					Direct Entry,

Summary for Subcatchment 3SA: Watershed 3SA

Runoff = 16.12 cfs @ 12.41 hrs, Volume= 2.129 af, Depth= 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.10"

Area (ac)	CN	Description
0.010	74	>75% Grass cover, Good, HSG C
* 0.320	98	Existing Roofs and foundations
* 17.196	60	Substation Yard
* 0.344	98	Net New Impervious
17.870	61	Weighted Average
17.206	60	96.28% Pervious Area
0.664	98	3.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.3					Direct Entry,

Summary for Subcatchment 4S: Watershed 4S

Runoff = 22.28 cfs @ 12.89 hrs, Volume= 4.251 af, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.10"

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Type III 24-hr 25-Year Rainfall=5.10"

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Area (ac)	CN	Description
0.060	48	Brush, Good, HSG B
5.590	65	Brush, Good, HSG C
6.260	73	Brush, Good, HSG D
0.070	74	>75% Grass cover, Good, HSG C
0.180	80	>75% Grass cover, Good, HSG D
0.080	55	Woods, Good, HSG B
2.810	70	Woods, Good, HSG C
1.970	77	Woods, Good, HSG D
6.050	71	Meadow, non-grazed, HSG C
0.200	78	Meadow, non-grazed, HSG D
23.270	71	Weighted Average
23.270	71	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
64.1					Direct Entry,

Summary for Reach 1R: BNDY(Sheepscot)

Inflow Area = 203.871 ac, 2.01% Impervious, Inflow Depth = 2.17" for 25-Year event
 Inflow = 128.69 cfs @ 13.61 hrs, Volume= 36.941 af
 Outflow = 128.69 cfs @ 13.61 hrs, Volume= 36.941 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

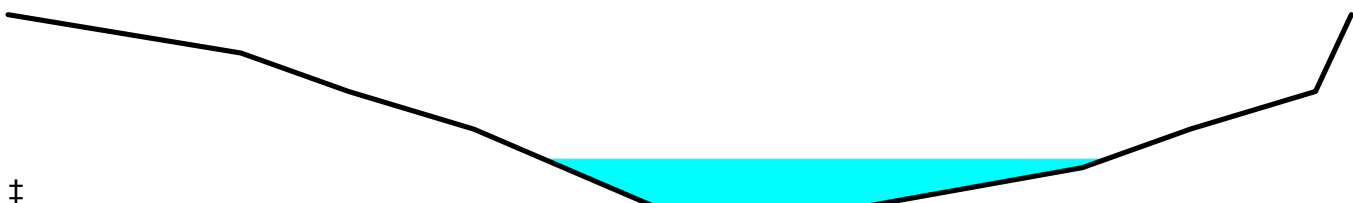
Summary for Reach 2R: Stream Reach A-A

Inflow Area = 202.361 ac, 2.02% Impervious, Inflow Depth = 2.17" for 25-Year event
 Inflow = 128.37 cfs @ 13.59 hrs, Volume= 36.655 af
 Outflow = 128.36 cfs @ 13.61 hrs, Volume= 36.655 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.61 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 1.48 fps, Avg. Travel Time= 1.4 min

Peak Storage= 3,344 cf @ 13.60 hrs
 Average Depth at Peak Storage= 1.24'
 Bank-Full Depth= 5.00' Flow Area= 227.5 sf, Capacity= 2,370.35 cfs

Custom cross-section, Length= 120.0' Slope= 0.0125 '/'
 Constant n= 0.033
 Inlet Invert= 156.50', Outlet Invert= 155.00'



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Type III 24-hr 25-Year Rainfall=5.10"

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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	162.00	0.00
13.00	161.00	1.00
19.00	160.00	2.00
26.00	159.00	3.00
31.00	158.00	4.00
36.00	157.00	5.00
48.00	157.00	5.00
60.00	158.00	4.00
66.00	159.00	3.00
73.00	160.00	2.00
74.00	161.00	1.00
75.00	162.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.0	0	0.00
1.00	20.5	29.1	2,460	81.64
2.00	55.0	40.3	6,600	340.57
3.00	102.0	54.5	12,240	780.22
4.00	159.5	62.0	19,140	1,508.27
5.00	227.5	76.4	27,300	2,370.35

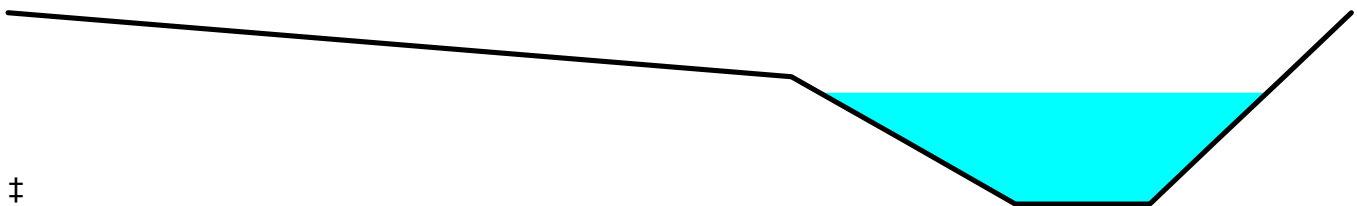
Summary for Reach 3R: Stream Reach B-B

Inflow Area = 197.931 ac, 2.02% Impervious, Inflow Depth = 2.18" for 25-Year event
 Inflow = 125.47 cfs @ 13.59 hrs, Volume= 35.876 af
 Outflow = 125.47 cfs @ 13.60 hrs, Volume= 35.876 af, Atten= 0%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 5.54 fps, Min. Travel Time= 0.6 min
 Avg. Velocity = 1.66 fps, Avg. Travel Time= 1.9 min

Peak Storage= 4,306 cf @ 13.60 hrs
 Average Depth at Peak Storage= 1.75'
 Bank-Full Depth= 3.00' Flow Area= 69.0 sf, Capacity= 388.20 cfs

Custom cross-section, Length= 190.0' Slope= 0.0132 '/' (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 159.00', Outlet Invert= 156.50'



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Type III 24-hr 25-Year Rainfall=5.10"

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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
35.00	159.00	1.00
40.00	158.00	2.00
45.00	157.00	3.00
51.00	157.00	3.00
54.00	158.00	2.00
57.00	159.00	1.00
60.00	160.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	6.0	0	0.00
1.00	10.0	14.3	1,900	40.77
2.00	28.0	22.5	5,320	167.22
3.00	69.0	60.7	13,110	388.20

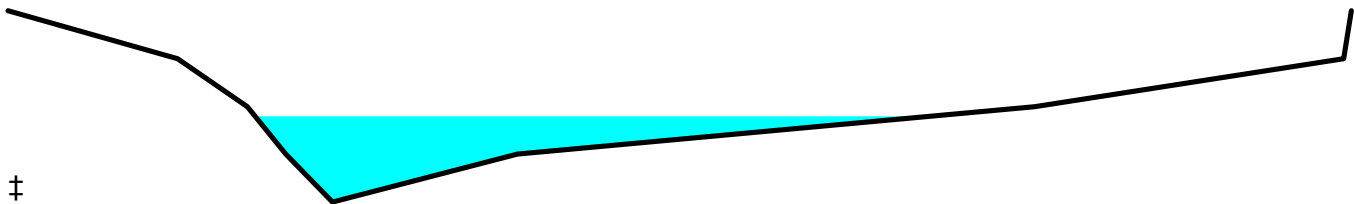
Summary for Reach 4R: Stream Reach C-C

Inflow Area = 168.161 ac, 2.38% Impervious, Inflow Depth = 2.17" for 25-Year event
 Inflow = 115.31 cfs @ 13.53 hrs, Volume= 30.437 af
 Outflow = 115.06 cfs @ 13.63 hrs, Volume= 30.437 af, Atten= 0%, Lag= 5.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.88 fps, Min. Travel Time= 3.2 min
 Avg. Velocity = 0.69 fps, Avg. Travel Time= 8.7 min

Peak Storage= 22,069 cf @ 13.58 hrs
 Average Depth at Peak Storage= 1.79'
 Bank-Full Depth= 4.00' Flow Area= 370.0 sf, Capacity= 1,448.12 cfs

Custom cross-section, Length= 360.0' Slope= 0.0028 '/'
 Constant n= 0.033
 Inlet Invert= 160.00', Outlet Invert= 159.00'



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Type III 24-hr 25-Year Rainfall=5.10"

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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	162.00	0.00
22.00	161.00	1.00
31.00	160.00	2.00
36.00	159.00	3.00
42.00	158.00	4.00
66.00	159.00	3.00
133.00	160.00	2.00
173.00	161.00	1.00
174.00	162.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
1.00	15.0	30.1	5,400	22.37
2.00	81.0	102.2	29,160	164.63
3.00	207.5	151.3	74,700	607.95
4.00	370.0	174.7	133,200	1,448.12

Summary for Reach 5R: Stream Reach D-D

Inflow Area = 65.380 ac, 1.60% Impervious, Inflow Depth = 2.01" for 25-Year event
 Inflow = 64.60 cfs @ 12.80 hrs, Volume= 10.950 af
 Outflow = 51.19 cfs @ 13.55 hrs, Volume= 10.950 af, Atten= 21%, Lag= 44.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.00 fps, Min. Travel Time= 26.1 min
 Avg. Velocity = 0.65 fps, Avg. Travel Time= 80.3 min

Peak Storage= 80,213 cf @ 13.11 hrs
 Average Depth at Peak Storage= 0.71'
 Bank-Full Depth= 6.00' Flow Area= 567.0 sf, Capacity= 3,947.38 cfs

Custom cross-section, Length= 3,130.0' Slope= 0.0042 '/' (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 173.00', Outlet Invert= 160.00'



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Type III 24-hr 25-Year Rainfall=5.10"

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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	176.00	0.00
21.00	174.00	2.00
39.00	172.00	4.00
63.00	170.00	6.00
90.00	170.00	6.00
116.00	172.00	4.00
138.00	174.00	2.00
152.00	176.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	27.0	0	0.00
2.00	104.0	77.2	325,520	368.27
4.00	298.0	117.4	932,740	1,609.59
6.00	567.0	152.6	1,774,710	3,947.38

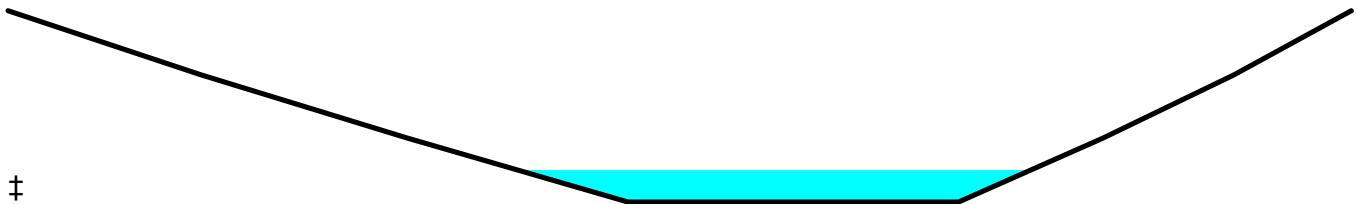
Summary for Reach 6R: Stream Reach E-E

Inflow Area = 42.110 ac, 2.48% Impervious, Inflow Depth = 1.91" for 25-Year event
 Inflow = 43.22 cfs @ 12.70 hrs, Volume= 6.698 af
 Outflow = 43.10 cfs @ 12.77 hrs, Volume= 6.698 af, Atten= 0%, Lag= 3.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.40 fps, Min. Travel Time= 2.3 min
 Avg. Velocity = 0.43 fps, Avg. Travel Time= 7.3 min

Peak Storage= 5,843 cf @ 12.73 hrs
 Average Depth at Peak Storage= 0.50'
 Bank-Full Depth= 3.00' Flow Area= 372.5 sf, Capacity= 1,450.55 cfs

Custom cross-section, Length= 190.0' Slope= 0.0032 '/ (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 173.60', Outlet Invert= 173.00'



Coopers Mills Substation Post-Dev Model Modified

Type III 24-hr 25-Year Rainfall=5.10"

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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	176.00	0.00
28.00	175.00	1.00
58.00	174.00	2.00
90.00	173.00	3.00
138.00	173.00	3.00
159.00	174.00	2.00
178.00	175.00	1.00
195.00	176.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	48.0	0	0.00
1.00	74.5	101.0	14,155	153.86
2.00	200.0	150.1	38,000	612.87
3.00	372.5	195.1	70,775	1,450.55

Summary for Reach 7R: Reach to Stream

Inflow Area = 4.430 ac, 2.03% Impervious, Inflow Depth = 2.11" for 25-Year event
 Inflow = 3.60 cfs @ 13.09 hrs, Volume= 0.779 af
 Outflow = 3.60 cfs @ 13.10 hrs, Volume= 0.779 af, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.50 fps, Min. Travel Time= 0.5 min
 Avg. Velocity = 1.14 fps, Avg. Travel Time= 1.1 min

Peak Storage= 108 cf @ 13.10 hrs
 Average Depth at Peak Storage= 0.10'
 Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 870.31 cfs

Custom cross-section, Length= 75.0' Slope= 0.0733 '/'
 Constant n= 0.033
 Inlet Invert= 162.00', Outlet Invert= 156.50'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
8.00	159.00	1.00
16.00	158.00	2.00
30.00	158.00	2.00
38.00	159.00	1.00
46.00	160.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	14.0	0	0.00
1.00	22.0	30.1	1,650	217.56
2.00	60.0	46.2	4,500	870.31

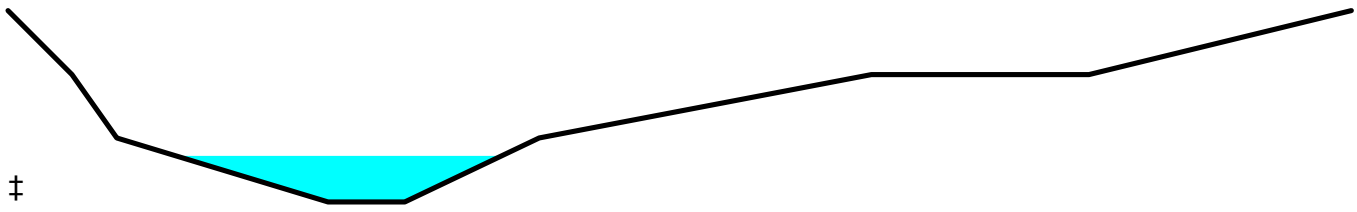
Summary for Reach 8R: Reach to Stream

Inflow Area = 102.781 ac, 2.88% Impervious, Inflow Depth = 2.28" for 25-Year event
 Inflow = 64.23 cfs @ 13.44 hrs, Volume= 19.487 af
 Outflow = 64.23 cfs @ 13.47 hrs, Volume= 19.487 af, Atten= 0%, Lag= 1.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.84 fps, Min. Travel Time= 1.0 min
 Avg. Velocity = 1.46 fps, Avg. Travel Time= 1.9 min

Peak Storage= 3,839 cf @ 13.45 hrs
 Average Depth at Peak Storage= 0.72'
 Bank-Full Depth= 3.00' Flow Area= 319.0 sf, Capacity= 2,057.71 cfs

Custom cross-section, Length= 170.0' Slope= 0.0118 '/' (102 Elevation Intervals)
 Constant n= 0.033
 Inlet Invert= 162.00', Outlet Invert= 160.00'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	163.00	0.00
10.00	162.00	1.00
17.00	161.00	2.00
50.00	160.00	3.00
62.00	160.00	3.00
83.00	161.00	2.00
135.00	162.00	1.00
169.00	162.00	1.00
210.00	163.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.0	0	0.00
1.00	39.0	66.0	6,630	134.08
2.00	134.5	159.1	22,865	587.29
3.00	319.0	210.2	54,230	2,057.71

Summary for Reach 9R: Overland Flow

Inflow Area = 42.110 ac, 2.48% Impervious, Inflow Depth = 1.91" for 25-Year event
Inflow = 43.58 cfs @ 12.59 hrs, Volume= 6.698 af
Outflow = 43.22 cfs @ 12.70 hrs, Volume= 6.698 af, Atten= 1%, Lag= 6.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.72 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 15.7 min

Peak Storage= 9,015 cf @ 12.65 hrs
Average Depth at Peak Storage= 0.92'
Bank-Full Depth= 0.50' Flow Area= 32.5 sf, Capacity= 17.99 cfs

65.00' x 0.50' deep channel, n= 0.410
Length= 150.0' Slope= 0.0600 '/' (102 Elevation Intervals)
Inlet Invert= 186.00', Outlet Invert= 177.00'



Summary for Reach 10R: Riprap Swale

Inflow Area = 17.870 ac, 3.72% Impervious, Inflow Depth = 1.43" for 25-Year event
Inflow = 16.12 cfs @ 12.41 hrs, Volume= 2.129 af
Outflow = 15.99 cfs @ 12.50 hrs, Volume= 2.129 af, Atten= 1%, Lag= 5.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.00 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 1.25 fps, Avg. Travel Time= 6.1 min

Peak Storage= 2,453 cf @ 12.46 hrs
Average Depth at Peak Storage= 1.04'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 69.93 cfs

2.00' x 2.00' deep channel, n= 0.040
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 460.0' Slope= 0.0123 '/' (102 Elevation Intervals)
Inlet Invert= 189.66', Outlet Invert= 184.00'



Summary for Pond 1P: 12" CPP culvert

Inflow Area = 4.430 ac, 2.03% Impervious, Inflow Depth = 2.11" for 25-Year event
 Inflow = 4.34 cfs @ 12.80 hrs, Volume= 0.779 af
 Outflow = 3.60 cfs @ 13.09 hrs, Volume= 0.779 af, Atten= 17%, Lag= 17.6 min
 Primary = 3.60 cfs @ 13.09 hrs, Volume= 0.779 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 166.45' @ 13.09 hrs Surf.Area= 3,092 sf Storage= 2,338 cf

Plug-Flow detention time= 4.8 min calculated for 0.779 af (100% of inflow)
 Center-of-Mass det. time= 4.8 min (898.7 - 893.9)

Volume	Invert	Avail.Storage	Storage Description
#1	164.50'	23,203 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
164.50	0	0	0
165.00	353	88	88
166.00	1,887	1,120	1,208
167.00	4,541	3,214	4,422
168.00	8,926	6,734	11,156
169.00	15,168	12,047	23,203

Device	Routing	Invert	Outlet Devices
#1	Primary	164.50'	12.0" Round Culvert L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.50' / 162.00' S= 0.0250 ' / ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=3.60 cfs @ 13.09 hrs HW=166.45' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 3.60 cfs @ 4.58 fps)

Summary for Pond 2P: 42" CPP culvert

Inflow Area = 102.781 ac, 2.88% Impervious, Inflow Depth = 2.28" for 25-Year event
 Inflow = 103.17 cfs @ 12.89 hrs, Volume= 19.487 af
 Outflow = 64.23 cfs @ 13.44 hrs, Volume= 19.487 af, Atten= 38%, Lag= 32.9 min
 Primary = 64.23 cfs @ 13.44 hrs, Volume= 19.487 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 167.33' @ 13.44 hrs Surf.Area= 64,609 sf Storage= 156,062 cf

Plug-Flow detention time= 26.4 min calculated for 19.483 af (100% of inflow)
 Center-of-Mass det. time= 26.4 min (921.1 - 894.8)

Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	381,247 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.50	0	0	0
163.00	4,393	1,098	1,098
164.00	18,380	11,387	12,485
165.00	35,940	27,160	39,645
166.00	47,745	41,843	81,487
167.00	59,780	53,763	135,250
168.00	74,210	66,995	202,245
169.00	91,232	82,721	284,966
170.00	101,330	96,281	381,247

Device	Routing	Invert	Outlet Devices
#1	Primary	162.50'	42.0" Round Culvert L= 85.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 162.50' / 162.00' S= 0.0059 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 9.62 sf

Primary OutFlow Max=64.23 cfs @ 13.44 hrs HW=167.33' (Free Discharge)

↑**1=Culvert** (Inlet Controls 64.23 cfs @ 6.68 fps)

Summary for Pond 3P: Level Spreader

Inflow Area = 42.110 ac, 2.48% Impervious, Inflow Depth = 1.92" for 25-Year event
 Inflow = 43.58 cfs @ 12.59 hrs, Volume= 6.725 af
 Outflow = 43.58 cfs @ 12.59 hrs, Volume= 6.698 af, Atten= 0%, Lag= 0.2 min
 Primary = 43.58 cfs @ 12.59 hrs, Volume= 6.698 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 186.41' @ 12.59 hrs Surf.Area= 1,707 sf Storage= 1,802 cf

Plug-Flow detention time= 3.8 min calculated for 6.697 af (100% of inflow)
 Center-of-Mass det. time= 1.4 min (886.5 - 885.0)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	2,890 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

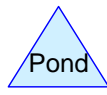
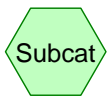
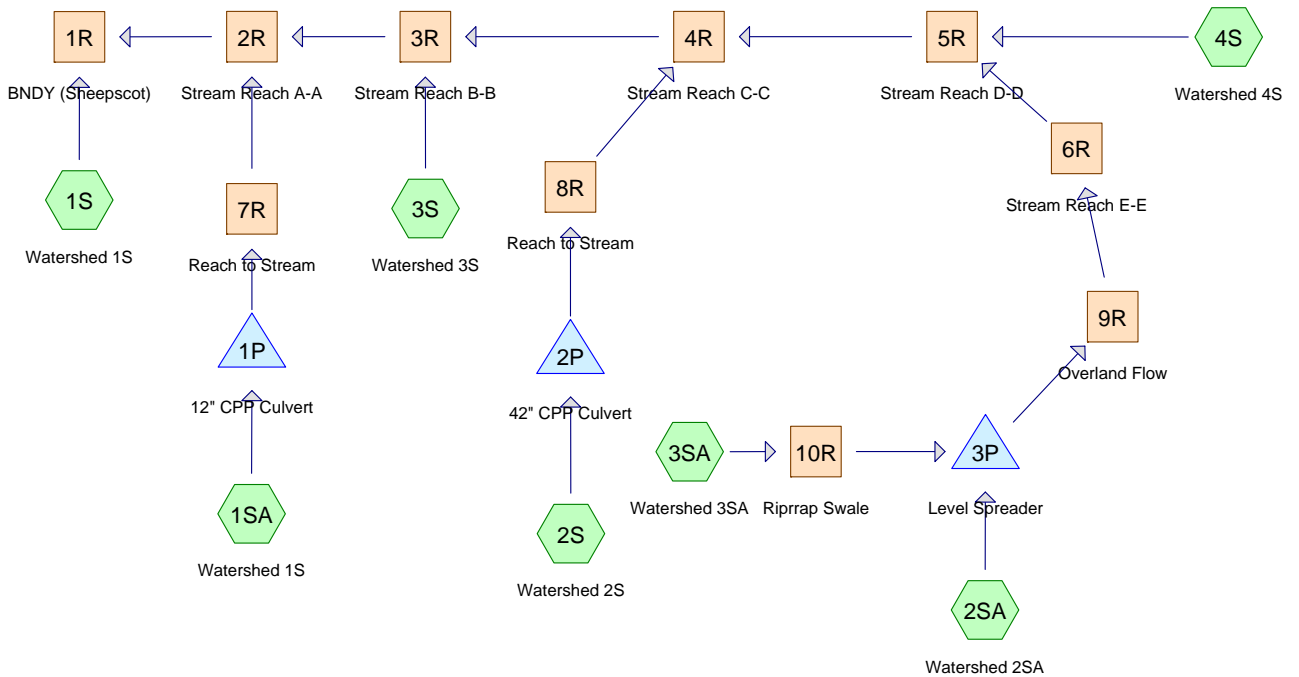
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	0	0	0
185.00	390	195	195
186.00	1,500	945	1,140
187.00	2,000	1,750	2,890

Device	Routing	Invert	Outlet Devices
#1	Primary	186.00'	65.0' long x 6.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=43.54 cfs @ 12.59 hrs HW=186.41' (Free Discharge)

↳ **1=Broad-Crested Rectangular Weir** (Weir Controls 43.54 cfs @ 1.62 fps)

Exhibit 12-4: Coopers Mills Substation Proposed Model Output



Drainage Diagram for Coopers Mills
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
16.921	60	Substation Yard (3SA)
4.430	70	Weighted Average (1SA)
53.040	71	Weighted Average (3S, 4S)
128.531	72	Weighted Average (1S, 2S, 2SA)
0.010	74	>75% Grass cover, Good, HSG C (3SA)
0.344	98	Net Add. Impervious StatCom1 (3SA)
0.275	98	New Impervious StatCom2 (3SA)
0.320	98	Roofs and foundations (3SA)
203.871		TOTAL AREA

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)
1	1P	164.50	162.00	100.0	0.0250	0.012	12.0	0.0
2	2P	162.50	162.00	85.0	0.0059	0.012	42.0	0.0

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Type III 24-hr 2-Year Rainfall=3.00"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Watershed 1SRunoff Area=1.510 ac Runoff Depth=0.81"
Tc=6.6 min CN=72 Runoff=1.27 cfs 0.102 af**Subcatchment 1SA: Watershed 1S**Runoff Area=4.430 ac Runoff Depth=0.71"
Tc=57.0 min CN=70 Runoff=1.30 cfs 0.264 af**Subcatchment 2S: Watershed 2S**Runoff Area=102.781 ac Runoff Depth=0.81"
Tc=63.4 min CN=72 Runoff=33.21 cfs 6.921 af**Subcatchment 2SA: Watershed 2SA**Runoff Area=24.240 ac Runoff Depth=0.81"
Tc=46.8 min CN=72 Runoff=9.39 cfs 1.632 af**Subcatchment 3S: Watershed 3S**Runoff Area=29.770 ac Runoff Depth=0.76"
Tc=45.7 min CN=71 Runoff=10.81 cfs 1.886 af**Subcatchment 3SA: Watershed 3SA**Runoff Area=17.870 ac Runoff Depth=0.40"
Tc=27.3 min CN=62 Runoff=3.25 cfs 0.593 af**Subcatchment 4S: Watershed 4S**Runoff Area=23.270 ac Runoff Depth=0.76"
Tc=64.1 min CN=71 Runoff=6.91 cfs 1.475 af**Reach 1R: BNDY (Sheepscot)**Inflow=36.16 cfs 12.847 af
Outflow=36.16 cfs 12.847 af**Reach 2R: Stream Reach A-A**Avg. Depth=0.65' Max Vel=3.15 fps Inflow=36.04 cfs 12.745 af
n=0.033 L=120.0' S=0.0125 '/' Capacity=2,370.35 cfs Outflow=36.04 cfs 12.745 af**Reach 3R: Stream Reach B-B**Avg. Depth=0.93' Max Vel=3.92 fps Inflow=35.52 cfs 12.482 af
n=0.033 L=190.0' S=0.0132 '/' Capacity=388.20 cfs Outflow=35.52 cfs 12.482 af**Reach 4R: Stream Reach C-C**Avg. Depth=1.18' Max Vel=1.50 fps Inflow=32.57 cfs 10.595 af
n=0.033 L=360.0' S=0.0028 '/' Capacity=1,448.12 cfs Outflow=32.45 cfs 10.595 af**Reach 5R: Stream Reach D-D**Avg. Depth=0.32' Max Vel=1.25 fps Inflow=19.19 cfs 3.674 af
n=0.033 L=3,130.0' S=0.0042 '/' Capacity=3,947.38 cfs Outflow=12.28 cfs 3.674 af**Reach 6R: Stream Reach E-E**Avg. Depth=0.25' Max Vel=0.92 fps Inflow=12.38 cfs 2.199 af
n=0.033 L=190.0' S=0.0032 '/' Capacity=1,450.55 cfs Outflow=12.30 cfs 2.199 af**Reach 7R: Reach to Stream**Avg. Depth=0.05' Max Vel=1.71 fps Inflow=1.29 cfs 0.264 af
n=0.033 L=75.0' S=0.0733 '/' Capacity=870.31 cfs Outflow=1.29 cfs 0.264 af**Reach 8R: Reach to Stream**Avg. Depth=0.47' Max Vel=2.25 fps Inflow=26.50 cfs 6.921 af
n=0.033 L=170.0' S=0.0118 '/' Capacity=2,057.71 cfs Outflow=26.50 cfs 6.921 af**Reach 9R: Overland Flow**Avg. Depth=0.40' Max Vel=0.48 fps Inflow=12.54 cfs 2.199 af
n=0.410 L=150.0' S=0.0600 '/' Capacity=17.99 cfs Outflow=12.38 cfs 2.199 af

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Type III 24-hr 2-Year Rainfall=3.00"

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Reach 10R: Riprap Swale

Avg. Depth=0.48' Max Vel=1.95 fps Inflow=3.25 cfs 0.593 af
n=0.040 L=460.0' S=0.0123 '/' Capacity=69.93 cfs Outflow=3.19 cfs 0.593 af

Pond 1P: 12" CPP Culvert

Peak Elev=165.19' Storage=182 cf Inflow=1.30 cfs 0.264 af
12.0" Round Culvert n=0.012 L=100.0' S=0.0250 '/' Outflow=1.29 cfs 0.264 af

Pond 2P: 42" CPP Culvert

Peak Elev=164.84' Storage=34,199 cf Inflow=33.21 cfs 6.921 af
42.0" Round Culvert n=0.012 L=85.0' S=0.0059 '/' Outflow=26.50 cfs 6.921 af

Pond 3P: Level Spreader

Peak Elev=186.19' Storage=1,430 cf Inflow=12.54 cfs 2.225 af
Outflow=12.54 cfs 2.199 af

Total Runoff Area = 203.871 ac Runoff Volume = 12.873 af Average Runoff Depth = 0.76"

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Type III 24-hr 2-Year Rainfall=3.00"
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Summary for Subcatchment 1S: Watershed 1S

Runoff = 1.27 cfs @ 12.11 hrs, Volume= 0.102 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (ac)	CN	Description
* 1.510	72	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6					Direct Entry, Direct Entry

Summary for Subcatchment 1SA: Watershed 1S

Runoff = 1.30 cfs @ 12.86 hrs, Volume= 0.264 af, Depth= 0.71"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (ac)	CN	Description
* 4.430	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
57.0					Direct Entry, Direct Entry

Summary for Subcatchment 2S: Watershed 2S

Runoff = 33.21 cfs @ 12.96 hrs, Volume= 6.921 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (ac)	CN	Description
* 102.781	72	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
63.4					Direct Entry, Direct Entry

Summary for Subcatchment 2SA: Watershed 2SA

Runoff = 9.39 cfs @ 12.73 hrs, Volume= 1.632 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.00"

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Type III 24-hr 2-Year Rainfall=3.00"
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Area (ac)	CN	Description
* 24.240	72	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.8					Direct Entry, Direct Entry

Summary for Subcatchment 3S: Watershed 3S

Runoff = 10.81 cfs @ 12.70 hrs, Volume= 1.886 af, Depth= 0.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (ac)	CN	Description
* 29.770	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.7					Direct Entry, Direct Entry

Summary for Subcatchment 3SA: Watershed 3SA

Runoff = 3.25 cfs @ 12.53 hrs, Volume= 0.593 af, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (ac)	CN	Description
0.010	74	>75% Grass cover, Good, HSG C
* 0.320	98	Roofs and foundations
* 16.921	60	Substation Yard
* 0.344	98	Net Add. Impervious StatCom1
* 0.275	98	New Impervious StatCom2
17.870	62	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.3					Direct Entry, Direct Entry

Summary for Subcatchment 4S: Watershed 4S

Runoff = 6.91 cfs @ 12.96 hrs, Volume= 1.475 af, Depth= 0.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.00"

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Area (ac)	CN	Description
* 23.270	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
64.1					Direct Entry, Direct Entry

Summary for Reach 1R: BNDY (Sheepscot)

Inflow Area = 203.871 ac, Inflow Depth = 0.76" for 2-Year event
 Inflow = 36.16 cfs @ 13.99 hrs, Volume= 12.847 af
 Outflow = 36.16 cfs @ 13.99 hrs, Volume= 12.847 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

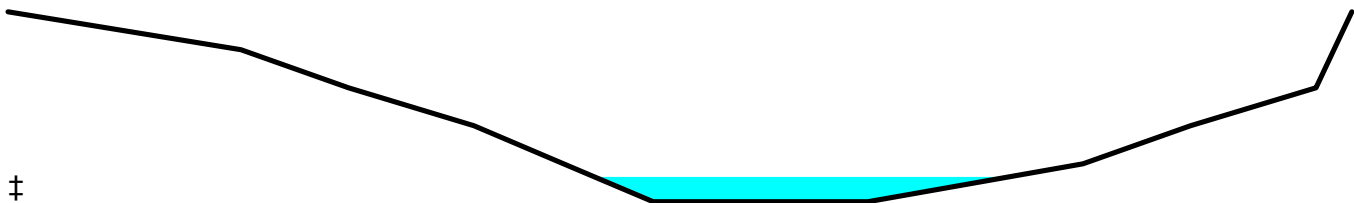
Summary for Reach 2R: Stream Reach A-A

Inflow Area = 202.361 ac, Inflow Depth = 0.76" for 2-Year event
 Inflow = 36.04 cfs @ 13.97 hrs, Volume= 12.745 af
 Outflow = 36.04 cfs @ 13.99 hrs, Volume= 12.745 af, Atten= 0%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.15 fps, Min. Travel Time= 0.6 min
 Avg. Velocity = 1.21 fps, Avg. Travel Time= 1.7 min

Peak Storage= 1,374 cf @ 13.98 hrs, Average Depth at Peak Storage= 0.65'
 Bank-Full Depth= 5.00', Capacity at Bank-Full= 2,370.35 cfs

Custom cross-section, Length= 120.0' Slope= 0.0125 '/'
 Constant n= 0.033 Earth, grassed & winding
 Inlet Invert= 156.50', Outlet Invert= 155.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	162.00	0.00
13.00	161.00	1.00
19.00	160.00	2.00
26.00	159.00	3.00
31.00	158.00	4.00
36.00	157.00	5.00
48.00	157.00	5.00
60.00	158.00	4.00
66.00	159.00	3.00
73.00	160.00	2.00
74.00	161.00	1.00
75.00	162.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.0	0	0.00
1.00	20.5	29.1	2,460	81.64
2.00	55.0	40.3	6,600	340.57
3.00	102.0	54.5	12,240	780.22
4.00	159.5	62.0	19,140	1,508.27
5.00	227.5	76.4	27,300	2,370.35

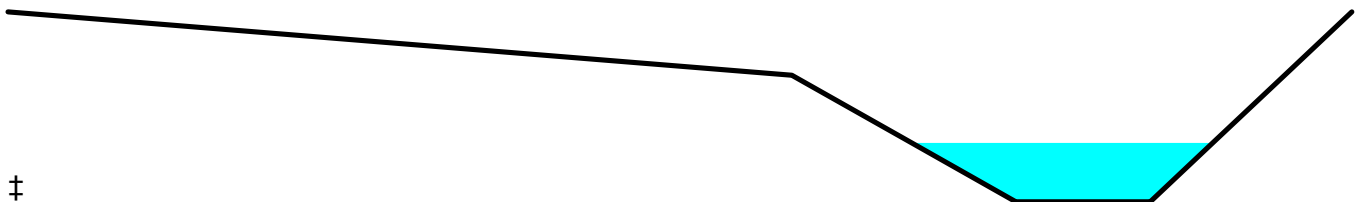
Summary for Reach 3R: Stream Reach B-B

Inflow Area = 197.931 ac, Inflow Depth = 0.76" for 2-Year event
Inflow = 35.52 cfs @ 13.95 hrs, Volume= 12.482 af
Outflow = 35.52 cfs @ 13.97 hrs, Volume= 12.482 af, Atten= 0%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.92 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.34 fps, Avg. Travel Time= 2.4 min

Peak Storage= 1,721 cf @ 13.96 hrs, Average Depth at Peak Storage= 0.93'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 388.20 cfs

Custom cross-section, Length= 190.0' Slope= 0.0132 '/' (102 Elevation Intervals)
Constant n= 0.033 Earth, grassed & winding
Inlet Invert= 159.00', Outlet Invert= 156.50'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
35.00	159.00	1.00
40.00	158.00	2.00
45.00	157.00	3.00
51.00	157.00	3.00
54.00	158.00	2.00
57.00	159.00	1.00
60.00	160.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	6.0	0	0.00
1.00	10.0	14.3	1,900	40.77
2.00	28.0	22.5	5,320	167.22
3.00	69.0	60.7	13,110	388.20

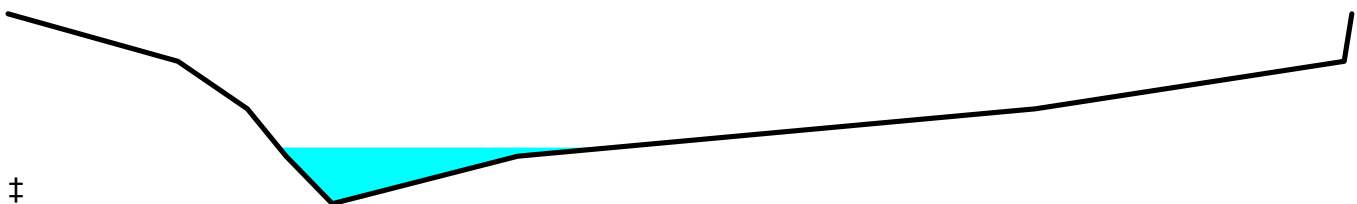
Summary for Reach 4R: Stream Reach C-C

Inflow Area = 168.161 ac, Inflow Depth = 0.76" for 2-Year event
Inflow = 32.57 cfs @ 13.85 hrs, Volume= 10.595 af
Outflow = 32.45 cfs @ 13.98 hrs, Volume= 10.595 af, Atten= 0%, Lag= 8.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.50 fps, Min. Travel Time= 4.0 min
Avg. Velocity = 0.59 fps, Avg. Travel Time= 10.2 min

Peak Storage= 7,800 cf @ 13.92 hrs, Average Depth at Peak Storage= 1.18'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 1,448.12 cfs

Custom cross-section, Length= 360.0' Slope= 0.0028 1'
Constant n= 0.033 Earth, grassed & winding
Inlet Invert= 160.00', Outlet Invert= 159.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	162.00	0.00
22.00	161.00	1.00
31.00	160.00	2.00
36.00	159.00	3.00
42.00	158.00	4.00
66.00	159.00	3.00
133.00	160.00	2.00
173.00	161.00	1.00
174.00	162.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
1.00	15.0	30.1	5,400	22.37
2.00	81.0	102.2	29,160	164.63
3.00	207.5	151.3	74,700	607.95
4.00	370.0	174.7	133,200	1,448.12

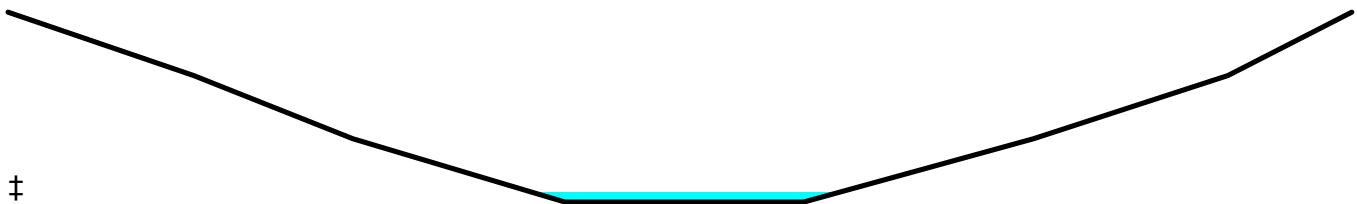
Summary for Reach 5R: Stream Reach D-D

Inflow Area = 65.380 ac, Inflow Depth = 0.67" for 2-Year event
Inflow = 19.19 cfs @ 12.95 hrs, Volume= 3.674 af
Outflow = 12.28 cfs @ 14.14 hrs, Volume= 3.674 af, Atten= 36%, Lag= 71.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.25 fps, Min. Travel Time= 41.7 min
Avg. Velocity = 0.55 fps, Avg. Travel Time= 95.0 min

Peak Storage= 30,763 cf @ 13.44 hrs, Average Depth at Peak Storage= 0.32'
Bank-Full Depth= 6.00', Capacity at Bank-Full= 3,947.38 cfs

Custom cross-section, Length= 3,130.0' Slope= 0.0042 '/' (102 Elevation Intervals)
Constant n= 0.033 Earth, grassed & winding
Inlet Invert= 173.00', Outlet Invert= 160.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	176.00	0.00
21.00	174.00	2.00
39.00	172.00	4.00
63.00	170.00	6.00
90.00	170.00	6.00
116.00	172.00	4.00
138.00	174.00	2.00
152.00	176.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	27.0	0	0.00
2.00	104.0	77.2	325,520	368.27
4.00	298.0	117.4	932,740	1,609.59
6.00	567.0	152.6	1,774,710	3,947.38

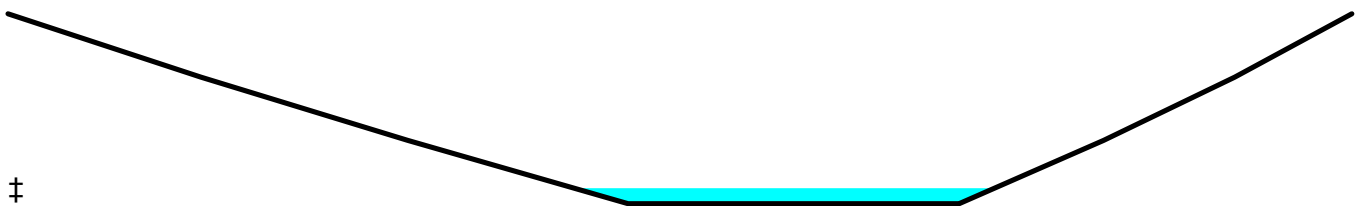
Summary for Reach 6R: Stream Reach E-E

Inflow Area = 42.110 ac, Inflow Depth = 0.63" for 2-Year event
 Inflow = 12.38 cfs @ 12.84 hrs, Volume= 2.199 af
 Outflow = 12.30 cfs @ 12.94 hrs, Volume= 2.199 af, Atten= 1%, Lag= 5.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.92 fps, Min. Travel Time= 3.4 min
 Avg. Velocity = 0.34 fps, Avg. Travel Time= 9.2 min

Peak Storage= 2,539 cf @ 12.88 hrs, Average Depth at Peak Storage= 0.25'
 Bank-Full Depth= 3.00', Capacity at Bank-Full= 1,450.55 cfs

Custom cross-section, Length= 190.0' Slope= 0.0032 '/' (102 Elevation Intervals)
 Constant n= 0.033 Earth, grassed & winding
 Inlet Invert= 173.60', Outlet Invert= 173.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	176.00	0.00
28.00	175.00	1.00
58.00	174.00	2.00
90.00	173.00	3.00
138.00	173.00	3.00
159.00	174.00	2.00
178.00	175.00	1.00
195.00	176.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	48.0	0	0.00
1.00	74.5	101.0	14,155	153.86
2.00	200.0	150.1	38,000	612.87
3.00	372.5	195.1	70,775	1,450.55

Summary for Reach 7R: Reach to Stream

Inflow Area = 4.430 ac, Inflow Depth = 0.71" for 2-Year event
 Inflow = 1.29 cfs @ 12.93 hrs, Volume= 0.264 af
 Outflow = 1.29 cfs @ 12.95 hrs, Volume= 0.264 af, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.71 fps, Min. Travel Time= 0.7 min
 Avg. Velocity = 0.97 fps, Avg. Travel Time= 1.3 min

Peak Storage= 57 cf @ 12.94 hrs, Average Depth at Peak Storage= 0.05'
 Bank-Full Depth= 2.00', Capacity at Bank-Full= 870.31 cfs

Custom cross-section, Length= 75.0' Slope= 0.0733 1/1
 Constant n= 0.033 Earth, grassed & winding
 Inlet Invert= 162.00', Outlet Invert= 156.50'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
8.00	159.00	1.00
16.00	158.00	2.00
30.00	158.00	2.00
38.00	159.00	1.00
46.00	160.00	0.00

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Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	14.0	0	0.00
1.00	22.0	30.1	1,650	217.56
2.00	60.0	46.2	4,500	870.31

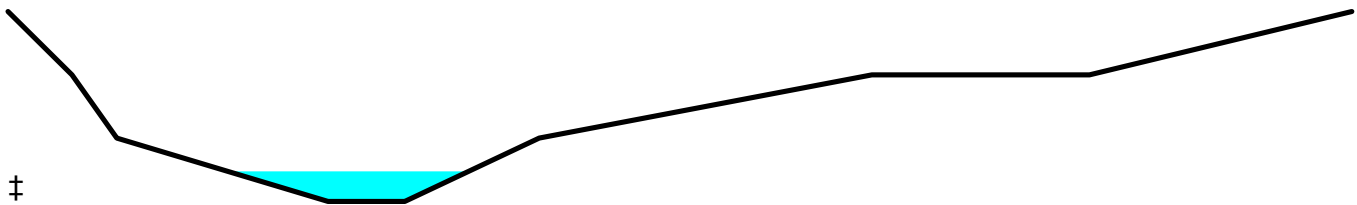
Summary for Reach 8R: Reach to Stream

Inflow Area = 102.781 ac, Inflow Depth = 0.81" for 2-Year event
 Inflow = 26.50 cfs @ 13.30 hrs, Volume= 6.921 af
 Outflow = 26.50 cfs @ 13.34 hrs, Volume= 6.921 af, Atten= 0%, Lag= 2.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.25 fps, Min. Travel Time= 1.3 min
 Avg. Velocity = 1.17 fps, Avg. Travel Time= 2.4 min

Peak Storage= 2,001 cf @ 13.32 hrs, Average Depth at Peak Storage= 0.47'
 Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,057.71 cfs

Custom cross-section, Length= 170.0' Slope= 0.0118 '/' (102 Elevation Intervals)
 Constant n= 0.033 Earth, grassed & winding
 Inlet Invert= 162.00', Outlet Invert= 160.00'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	163.00	0.00
10.00	162.00	1.00
17.00	161.00	2.00
50.00	160.00	3.00
62.00	160.00	3.00
83.00	161.00	2.00
135.00	162.00	1.00
169.00	162.00	1.00
210.00	163.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.0	0	0.00
1.00	39.0	66.0	6,630	134.08
2.00	134.5	159.1	22,865	587.29
3.00	319.0	210.2	54,230	2,057.71

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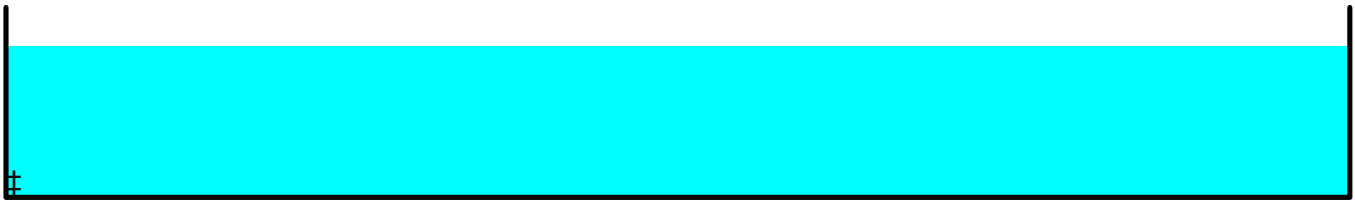
Summary for Reach 9R: Overland Flow

Inflow Area = 42.110 ac, Inflow Depth = 0.63" for 2-Year event
Inflow = 12.54 cfs @ 12.69 hrs, Volume= 2.199 af
Outflow = 12.38 cfs @ 12.84 hrs, Volume= 2.199 af, Atten= 1%, Lag= 8.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.48 fps, Min. Travel Time= 5.2 min
Avg. Velocity = 0.11 fps, Avg. Travel Time= 22.2 min

Peak Storage= 3,891 cf @ 12.76 hrs, Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 17.99 cfs

65.00' x 0.50' deep channel, n= 0.410 Sheet flow over Bermuda Grass
Length= 150.0' Slope= 0.0600 '/'
Inlet Invert= 186.00', Outlet Invert= 177.00'



Summary for Reach 10R: Riprap Swale

Inflow Area = 17.870 ac, Inflow Depth = 0.40" for 2-Year event
Inflow = 3.25 cfs @ 12.53 hrs, Volume= 0.593 af
Outflow = 3.19 cfs @ 12.65 hrs, Volume= 0.593 af, Atten= 2%, Lag= 7.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.95 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 0.93 fps, Avg. Travel Time= 8.3 min

Peak Storage= 752 cf @ 12.58 hrs, Average Depth at Peak Storage= 0.48'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 69.93 cfs

2.00' x 2.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 460.0' Slope= 0.0123 '/'
Inlet Invert= 189.66', Outlet Invert= 184.00'



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Summary for Pond 1P: 12" CPP Culvert

Inflow Area = 4.430 ac, Inflow Depth = 0.71" for 2-Year event
 Inflow = 1.30 cfs @ 12.86 hrs, Volume= 0.264 af
 Outflow = 1.29 cfs @ 12.93 hrs, Volume= 0.264 af, Atten= 1%, Lag= 4.2 min
 Primary = 1.29 cfs @ 12.93 hrs, Volume= 0.264 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 165.19' @ 12.93 hrs Surf.Area= 643 sf Storage= 182 cf

Plug-Flow detention time= 1.9 min calculated for 0.264 af (100% of inflow)
 Center-of-Mass det. time= 1.9 min (930.0 - 928.0)

Volume	Invert	Avail.Storage	Storage Description
#1	164.50'	23,203 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
164.50	0	0	0
165.00	353	88	88
166.00	1,887	1,120	1,208
167.00	4,541	3,214	4,422
168.00	8,926	6,734	11,156
169.00	15,168	12,047	23,203

Device	Routing	Invert	Outlet Devices
#1	Primary	164.50'	12.0" Round Culvert L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 162.00' S= 0.0250 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished

Primary OutFlow Max=1.29 cfs @ 12.93 hrs HW=165.19' (Free Discharge)
 ↑1=Culvert (Inlet Controls 1.29 cfs @ 2.23 fps)

Summary for Pond 2P: 42" CPP Culvert

Inflow Area = 102.781 ac, Inflow Depth = 0.81" for 2-Year event
 Inflow = 33.21 cfs @ 12.96 hrs, Volume= 6.921 af
 Outflow = 26.50 cfs @ 13.30 hrs, Volume= 6.921 af, Atten= 20%, Lag= 20.8 min
 Primary = 26.50 cfs @ 13.30 hrs, Volume= 6.921 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 164.84' @ 13.30 hrs Surf.Area= 33,173 sf Storage= 34,199 cf

Plug-Flow detention time= 16.6 min calculated for 6.921 af (100% of inflow)
 Center-of-Mass det. time= 16.6 min (943.1 - 926.6)

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Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	381,247 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.50	0	0	0
163.00	4,393	1,098	1,098
164.00	18,380	11,387	12,485
165.00	35,940	27,160	39,645
166.00	47,745	41,843	81,487
167.00	59,780	53,763	135,250
168.00	74,210	66,995	202,245
169.00	91,232	82,721	284,966
170.00	101,330	96,281	381,247

Device	Routing	Invert	Outlet Devices
#1	Primary	162.50'	42.0" Round Culvert L= 85.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 162.00' S= 0.0059 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished

Primary OutFlow Max=26.50 cfs @ 13.30 hrs HW=164.84' (Free Discharge)

←**1=Culvert** (Barrel Controls 26.50 cfs @ 5.48 fps)

Summary for Pond 3P: Level Spreader

Inflow Area = 42.110 ac, Inflow Depth = 0.63" for 2-Year event
 Inflow = 12.54 cfs @ 12.69 hrs, Volume= 2.225 af
 Outflow = 12.54 cfs @ 12.69 hrs, Volume= 2.199 af, Atten= 0%, Lag= 0.3 min
 Primary = 12.54 cfs @ 12.69 hrs, Volume= 2.199 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 186.19' @ 12.69 hrs Surf.Area= 1,594 sf Storage= 1,430 cf

Plug-Flow detention time= 9.6 min calculated for 2.199 af (99% of inflow)
 Center-of-Mass det. time= 3.0 min (923.8 - 920.8)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	2,890 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	0	0	0
185.00	390	195	195
186.00	1,500	945	1,140
187.00	2,000	1,750	2,890

Device	Routing	Invert	Outlet Devices
#1	Primary	186.00'	65.0' long x 6.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

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2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65
2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=12.53 cfs @ 12.69 hrs HW=186.19' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir** (Weir Controls 12.53 cfs @ 1.03 fps)

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Watershed 1SRunoff Area=1.510 ac Runoff Depth=1.75"
Tc=6.6 min CN=72 Runoff=2.96 cfs 0.220 af**Subcatchment 1SA: Watershed 1S**Runoff Area=4.430 ac Runoff Depth=1.60"
Tc=57.0 min CN=70 Runoff=3.24 cfs 0.592 af**Subcatchment 2S: Watershed 2S**Runoff Area=102.781 ac Runoff Depth=1.75"
Tc=63.4 min CN=72 Runoff=78.11 cfs 14.962 af**Subcatchment 2SA: Watershed 2SA**Runoff Area=24.240 ac Runoff Depth=1.75"
Tc=46.8 min CN=72 Runoff=21.92 cfs 3.529 af**Subcatchment 3S: Watershed 3S**Runoff Area=29.770 ac Runoff Depth=1.67"
Tc=45.7 min CN=71 Runoff=26.06 cfs 4.154 af**Subcatchment 3SA: Watershed 3SA**Runoff Area=17.870 ac Runoff Depth=1.08"
Tc=27.3 min CN=62 Runoff=11.77 cfs 1.613 af**Subcatchment 4S: Watershed 4S**Runoff Area=23.270 ac Runoff Depth=1.67"
Tc=64.1 min CN=71 Runoff=16.73 cfs 3.247 af**Reach 1R: BNDY (Sheepscot)**Inflow=98.99 cfs 28.289 af
Outflow=98.99 cfs 28.289 af**Reach 2R: Stream Reach A-A**Avg. Depth=1.10' Max Vel=4.24 fps Inflow=98.74 cfs 28.069 af
n=0.033 L=120.0' S=0.0125 '/' Capacity=2,370.35 cfs Outflow=98.73 cfs 28.069 af**Reach 3R: Stream Reach B-B**Avg. Depth=1.54' Max Vel=5.17 fps Inflow=97.14 cfs 27.478 af
n=0.033 L=190.0' S=0.0132 '/' Capacity=388.20 cfs Outflow=97.13 cfs 27.478 af**Reach 4R: Stream Reach C-C**Avg. Depth=1.66' Max Vel=1.78 fps Inflow=89.72 cfs 23.324 af
n=0.033 L=360.0' S=0.0028 '/' Capacity=1,448.12 cfs Outflow=89.50 cfs 23.324 af**Reach 5R: Stream Reach D-D**Avg. Depth=0.59' Max Vel=1.80 fps Inflow=48.60 cfs 8.362 af
n=0.033 L=3,130.0' S=0.0042 '/' Capacity=3,947.38 cfs Outflow=36.88 cfs 8.362 af**Reach 6R: Stream Reach E-E**Avg. Depth=0.43' Max Vel=1.28 fps Inflow=32.44 cfs 5.115 af
n=0.033 L=190.0' S=0.0032 '/' Capacity=1,450.55 cfs Outflow=32.33 cfs 5.115 af**Reach 7R: Reach to Stream**Avg. Depth=0.09' Max Vel=2.32 fps Inflow=2.94 cfs 0.592 af
n=0.033 L=75.0' S=0.0733 '/' Capacity=870.31 cfs Outflow=2.94 cfs 0.592 af**Reach 8R: Reach to Stream**Avg. Depth=0.66' Max Vel=2.72 fps Inflow=54.00 cfs 14.962 af
n=0.033 L=170.0' S=0.0118 '/' Capacity=2,057.71 cfs Outflow=54.00 cfs 14.962 af**Reach 9R: Overland Flow**Avg. Depth=0.74' Max Vel=0.67 fps Inflow=32.70 cfs 5.115 af
n=0.410 L=150.0' S=0.0600 '/' Capacity=17.99 cfs Outflow=32.44 cfs 5.115 af

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Reach 10R: Riprrap Swale

Avg. Depth=0.90' Max Vel=2.76 fps Inflow=11.77 cfs 1.613 af
n=0.040 L=460.0' S=0.0123 '/' Capacity=69.93 cfs Outflow=11.66 cfs 1.613 af

Pond 1P: 12" CPP Culvert

Peak Elev=165.97' Storage=1,148 cf Inflow=3.24 cfs 0.592 af
12.0" Round Culvert n=0.012 L=100.0' S=0.0250 '/' Outflow=2.94 cfs 0.592 af

Pond 2P: 42" CPP Culvert

Peak Elev=166.43' Storage=103,150 cf Inflow=78.11 cfs 14.962 af
42.0" Round Culvert n=0.012 L=85.0' S=0.0059 '/' Outflow=54.00 cfs 14.962 af

Pond 3P: Level Spreader

Peak Elev=186.35' Storage=1,689 cf Inflow=32.70 cfs 5.141 af
Outflow=32.70 cfs 5.115 af

Total Runoff Area = 203.871 ac Runoff Volume = 28.315 af Average Runoff Depth = 1.67"

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Summary for Subcatchment 1S: Watershed 1S

Runoff = 2.96 cfs @ 12.10 hrs, Volume= 0.220 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.40"

Area (ac)	CN	Description
* 1.510	72	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6					Direct Entry, Direct Entry

Summary for Subcatchment 1SA: Watershed 1S

Runoff = 3.24 cfs @ 12.85 hrs, Volume= 0.592 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.40"

Area (ac)	CN	Description
* 4.430	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
57.0					Direct Entry, Direct Entry

Summary for Subcatchment 2S: Watershed 2S

Runoff = 78.11 cfs @ 12.89 hrs, Volume= 14.962 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.40"

Area (ac)	CN	Description
* 102.781	72	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
63.4					Direct Entry, Direct Entry

Summary for Subcatchment 2SA: Watershed 2SA

Runoff = 21.92 cfs @ 12.68 hrs, Volume= 3.529 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.40"

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Area (ac)	CN	Description
* 24.240	72	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.8					Direct Entry, Direct Entry

Summary for Subcatchment 3S: Watershed 3S

Runoff = 26.06 cfs @ 12.65 hrs, Volume= 4.154 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.40"

Area (ac)	CN	Description
* 29.770	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.7					Direct Entry, Direct Entry

Summary for Subcatchment 3SA: Watershed 3SA

Runoff = 11.77 cfs @ 12.44 hrs, Volume= 1.613 af, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.40"

Area (ac)	CN	Description
0.010	74	>75% Grass cover, Good, HSG C
* 0.320	98	Roofs and foundations
* 16.921	60	Substation Yard
* 0.344	98	Net Add. Impervious StatCom1
* 0.275	98	New Impervious StatCom2
17.870	62	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.3					Direct Entry, Direct Entry

Summary for Subcatchment 4S: Watershed 4S

Runoff = 16.73 cfs @ 12.89 hrs, Volume= 3.247 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.40"

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Area (ac)	CN	Description
* 23.270	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
64.1					Direct Entry, Direct Entry

Summary for Reach 1R: BNDY (Sheepscot)

Inflow Area = 203.871 ac, Inflow Depth = 1.67" for 10-Year event
 Inflow = 98.99 cfs @ 13.68 hrs, Volume= 28.289 af
 Outflow = 98.99 cfs @ 13.68 hrs, Volume= 28.289 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

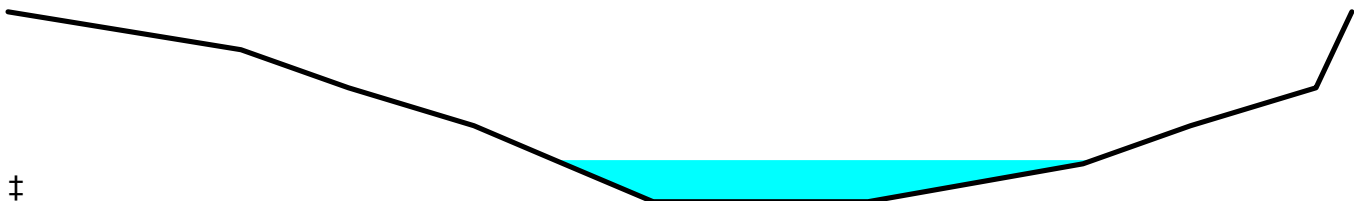
Summary for Reach 2R: Stream Reach A-A

Inflow Area = 202.361 ac, Inflow Depth = 1.66" for 10-Year event
 Inflow = 98.74 cfs @ 13.67 hrs, Volume= 28.069 af
 Outflow = 98.73 cfs @ 13.68 hrs, Volume= 28.069 af, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.24 fps, Min. Travel Time= 0.5 min
 Avg. Velocity = 1.40 fps, Avg. Travel Time= 1.4 min

Peak Storage= 2,797 cf @ 13.67 hrs, Average Depth at Peak Storage= 1.10'
 Bank-Full Depth= 5.00', Capacity at Bank-Full= 2,370.35 cfs

Custom cross-section, Length= 120.0' Slope= 0.0125 '/'
 Constant n= 0.033 Earth, grassed & winding
 Inlet Invert= 156.50', Outlet Invert= 155.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	162.00	0.00
13.00	161.00	1.00
19.00	160.00	2.00
26.00	159.00	3.00
31.00	158.00	4.00
36.00	157.00	5.00
48.00	157.00	5.00
60.00	158.00	4.00
66.00	159.00	3.00
73.00	160.00	2.00
74.00	161.00	1.00
75.00	162.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.0	0	0.00
1.00	20.5	29.1	2,460	81.64
2.00	55.0	40.3	6,600	340.57
3.00	102.0	54.5	12,240	780.22
4.00	159.5	62.0	19,140	1,508.27
5.00	227.5	76.4	27,300	2,370.35

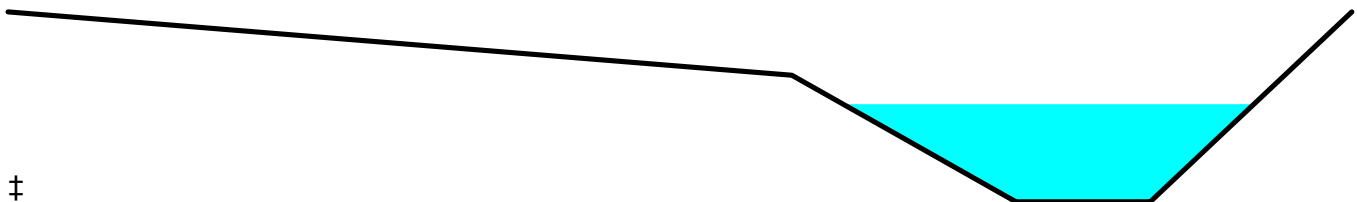
Summary for Reach 3R: Stream Reach B-B

Inflow Area = 197.931 ac, Inflow Depth = 1.67" for 10-Year event
Inflow = 97.14 cfs @ 13.66 hrs, Volume= 27.478 af
Outflow = 97.13 cfs @ 13.68 hrs, Volume= 27.478 af, Atten= 0%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.17 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.58 fps, Avg. Travel Time= 2.0 min

Peak Storage= 3,568 cf @ 13.67 hrs, Average Depth at Peak Storage= 1.54'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 388.20 cfs

Custom cross-section, Length= 190.0' Slope= 0.0132 '/' (102 Elevation Intervals)
Constant n= 0.033 Earth, grassed & winding
Inlet Invert= 159.00', Outlet Invert= 156.50'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
35.00	159.00	1.00
40.00	158.00	2.00
45.00	157.00	3.00
51.00	157.00	3.00
54.00	158.00	2.00
57.00	159.00	1.00
60.00	160.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	6.0	0	0.00
1.00	10.0	14.3	1,900	40.77
2.00	28.0	22.5	5,320	167.22
3.00	69.0	60.7	13,110	388.20

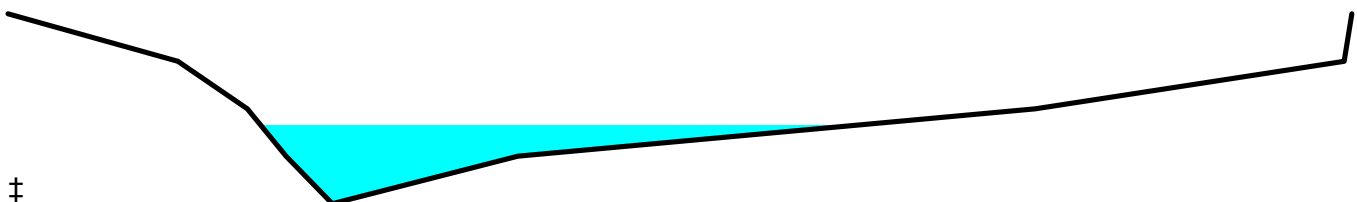
Summary for Reach 4R: Stream Reach C-C

Inflow Area = 168.161 ac, Inflow Depth = 1.66" for 10-Year event
Inflow = 89.72 cfs @ 13.59 hrs, Volume= 23.324 af
Outflow = 89.50 cfs @ 13.70 hrs, Volume= 23.324 af, Atten= 0%, Lag= 6.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.78 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.66 fps, Avg. Travel Time= 9.1 min

Peak Storage= 18,110 cf @ 13.64 hrs, Average Depth at Peak Storage= 1.66'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 1,448.12 cfs

Custom cross-section, Length= 360.0' Slope= 0.0028 1/1
Constant n= 0.033 Earth, grassed & winding
Inlet Invert= 160.00', Outlet Invert= 159.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	162.00	0.00
22.00	161.00	1.00
31.00	160.00	2.00
36.00	159.00	3.00
42.00	158.00	4.00
66.00	159.00	3.00
133.00	160.00	2.00
173.00	161.00	1.00
174.00	162.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
1.00	15.0	30.1	5,400	22.37
2.00	81.0	102.2	29,160	164.63
3.00	207.5	151.3	74,700	607.95
4.00	370.0	174.7	133,200	1,448.12

Summary for Reach 5R: Stream Reach D-D

Inflow Area = 65.380 ac, Inflow Depth = 1.53" for 10-Year event
Inflow = 48.60 cfs @ 12.82 hrs, Volume= 8.362 af
Outflow = 36.88 cfs @ 13.65 hrs, Volume= 8.362 af, Atten= 24%, Lag= 49.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.80 fps, Min. Travel Time= 29.0 min
Avg. Velocity = 0.63 fps, Avg. Travel Time= 83.5 min

Peak Storage= 64,101 cf @ 13.17 hrs, Average Depth at Peak Storage= 0.59'
Bank-Full Depth= 6.00', Capacity at Bank-Full= 3,947.38 cfs

Custom cross-section, Length= 3,130.0' Slope= 0.0042 '/' (102 Elevation Intervals)
Constant n= 0.033 Earth, grassed & winding
Inlet Invert= 173.00', Outlet Invert= 160.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	176.00	0.00
21.00	174.00	2.00
39.00	172.00	4.00
63.00	170.00	6.00
90.00	170.00	6.00
116.00	172.00	4.00
138.00	174.00	2.00
152.00	176.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	27.0	0	0.00
2.00	104.0	77.2	325,520	368.27
4.00	298.0	117.4	932,740	1,609.59
6.00	567.0	152.6	1,774,710	3,947.38

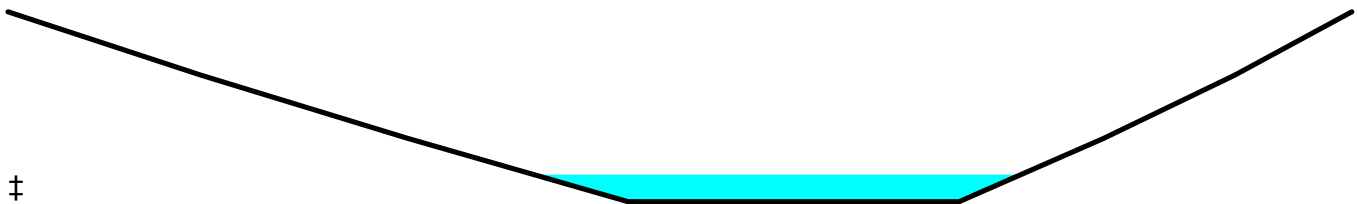
Summary for Reach 6R: Stream Reach E-E

Inflow Area = 42.110 ac, Inflow Depth = 1.46" for 10-Year event
 Inflow = 32.44 cfs @ 12.72 hrs, Volume= 5.115 af
 Outflow = 32.33 cfs @ 12.79 hrs, Volume= 5.115 af, Atten= 0%, Lag= 4.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.28 fps, Min. Travel Time= 2.5 min
 Avg. Velocity = 0.41 fps, Avg. Travel Time= 7.7 min

Peak Storage= 4,810 cf @ 12.75 hrs, Average Depth at Peak Storage= 0.43'
 Bank-Full Depth= 3.00', Capacity at Bank-Full= 1,450.55 cfs

Custom cross-section, Length= 190.0' Slope= 0.0032 '/' (102 Elevation Intervals)
 Constant n= 0.033 Earth, grassed & winding
 Inlet Invert= 173.60', Outlet Invert= 173.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	176.00	0.00
28.00	175.00	1.00
58.00	174.00	2.00
90.00	173.00	3.00
138.00	173.00	3.00
159.00	174.00	2.00
178.00	175.00	1.00
195.00	176.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	48.0	0	0.00
1.00	74.5	101.0	14,155	153.86
2.00	200.0	150.1	38,000	612.87
3.00	372.5	195.1	70,775	1,450.55

Summary for Reach 7R: Reach to Stream

Inflow Area = 4.430 ac, Inflow Depth = 1.60" for 10-Year event
 Inflow = 2.94 cfs @ 13.02 hrs, Volume= 0.592 af
 Outflow = 2.94 cfs @ 13.03 hrs, Volume= 0.592 af, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.32 fps, Min. Travel Time= 0.5 min
 Avg. Velocity = 1.09 fps, Avg. Travel Time= 1.2 min

Peak Storage= 95 cf @ 13.02 hrs, Average Depth at Peak Storage= 0.09'
 Bank-Full Depth= 2.00', Capacity at Bank-Full= 870.31 cfs

Custom cross-section, Length= 75.0' Slope= 0.0733 1/1
 Constant n= 0.033 Earth, grassed & winding
 Inlet Invert= 162.00', Outlet Invert= 156.50'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
8.00	159.00	1.00
16.00	158.00	2.00
30.00	158.00	2.00
38.00	159.00	1.00
46.00	160.00	0.00

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Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	14.0	0	0.00
1.00	22.0	30.1	1,650	217.56
2.00	60.0	46.2	4,500	870.31

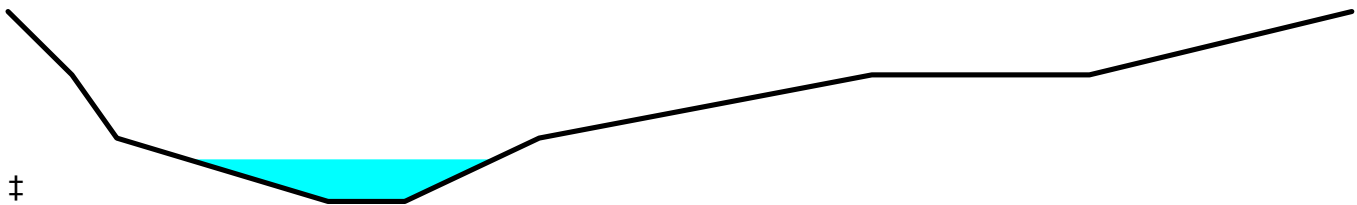
Summary for Reach 8R: Reach to Stream

Inflow Area = 102.781 ac, Inflow Depth = 1.75" for 10-Year event
 Inflow = 54.00 cfs @ 13.37 hrs, Volume= 14.962 af
 Outflow = 54.00 cfs @ 13.40 hrs, Volume= 14.962 af, Atten= 0%, Lag= 1.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.72 fps, Min. Travel Time= 1.0 min
 Avg. Velocity = 1.38 fps, Avg. Travel Time= 2.1 min

Peak Storage= 3,378 cf @ 13.38 hrs, Average Depth at Peak Storage= 0.66'
 Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,057.71 cfs

Custom cross-section, Length= 170.0' Slope= 0.0118 '/' (102 Elevation Intervals)
 Constant n= 0.033 Earth, grassed & winding
 Inlet Invert= 162.00', Outlet Invert= 160.00'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	163.00	0.00
10.00	162.00	1.00
17.00	161.00	2.00
50.00	160.00	3.00
62.00	160.00	3.00
83.00	161.00	2.00
135.00	162.00	1.00
169.00	162.00	1.00
210.00	163.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.0	0	0.00
1.00	39.0	66.0	6,630	134.08
2.00	134.5	159.1	22,865	587.29
3.00	319.0	210.2	54,230	2,057.71

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Summary for Reach 9R: Overland Flow

Inflow Area = 42.110 ac, Inflow Depth = 1.46" for 10-Year event
Inflow = 32.70 cfs @ 12.62 hrs, Volume= 5.115 af
Outflow = 32.44 cfs @ 12.72 hrs, Volume= 5.115 af, Atten= 1%, Lag= 5.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.67 fps, Min. Travel Time= 3.7 min
Avg. Velocity = 0.15 fps, Avg. Travel Time= 17.0 min

Peak Storage= 7,246 cf @ 12.66 hrs, Average Depth at Peak Storage= 0.74'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 17.99 cfs

65.00' x 0.50' deep channel, n= 0.410 Sheet flow over Bermuda Grass
Length= 150.0' Slope= 0.0600 '/'
Inlet Invert= 186.00', Outlet Invert= 177.00'



Summary for Reach 10R: Riprrap Swale

Inflow Area = 17.870 ac, Inflow Depth = 1.08" for 10-Year event
Inflow = 11.77 cfs @ 12.44 hrs, Volume= 1.613 af
Outflow = 11.66 cfs @ 12.52 hrs, Volume= 1.613 af, Atten= 1%, Lag= 5.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.76 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 1.18 fps, Avg. Travel Time= 6.5 min

Peak Storage= 1,942 cf @ 12.47 hrs, Average Depth at Peak Storage= 0.90'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 69.93 cfs

2.00' x 2.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 460.0' Slope= 0.0123 '/'
Inlet Invert= 189.66', Outlet Invert= 184.00'



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Summary for Pond 1P: 12" CPP Culvert

Inflow Area = 4.430 ac, Inflow Depth = 1.60" for 10-Year event
 Inflow = 3.24 cfs @ 12.85 hrs, Volume= 0.592 af
 Outflow = 2.94 cfs @ 13.02 hrs, Volume= 0.592 af, Atten= 9%, Lag= 10.1 min
 Primary = 2.94 cfs @ 13.02 hrs, Volume= 0.592 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 165.97' @ 13.02 hrs Surf.Area= 1,837 sf Storage= 1,148 cf

Plug-Flow detention time= 3.3 min calculated for 0.592 af (100% of inflow)
 Center-of-Mass det. time= 3.3 min (905.4 - 902.1)

Volume	Invert	Avail.Storage	Storage Description
#1	164.50'	23,203 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
164.50	0	0	0
165.00	353	88	88
166.00	1,887	1,120	1,208
167.00	4,541	3,214	4,422
168.00	8,926	6,734	11,156
169.00	15,168	12,047	23,203

Device	Routing	Invert	Outlet Devices
#1	Primary	164.50'	12.0" Round Culvert L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 162.00' S= 0.0250 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished

Primary OutFlow Max=2.94 cfs @ 13.02 hrs HW=165.97' (Free Discharge)
 ↑1=Culvert (Inlet Controls 2.94 cfs @ 3.74 fps)

Summary for Pond 2P: 42" CPP Culvert

Inflow Area = 102.781 ac, Inflow Depth = 1.75" for 10-Year event
 Inflow = 78.11 cfs @ 12.89 hrs, Volume= 14.962 af
 Outflow = 54.00 cfs @ 13.37 hrs, Volume= 14.962 af, Atten= 31%, Lag= 28.5 min
 Primary = 54.00 cfs @ 13.37 hrs, Volume= 14.962 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 166.43' @ 13.37 hrs Surf.Area= 52,925 sf Storage= 103,150 cf

Plug-Flow detention time= 22.2 min calculated for 14.958 af (100% of inflow)
 Center-of-Mass det. time= 22.2 min (924.8 - 902.6)

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Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	381,247 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.50	0	0	0
163.00	4,393	1,098	1,098
164.00	18,380	11,387	12,485
165.00	35,940	27,160	39,645
166.00	47,745	41,843	81,487
167.00	59,780	53,763	135,250
168.00	74,210	66,995	202,245
169.00	91,232	82,721	284,966
170.00	101,330	96,281	381,247

Device	Routing	Invert	Outlet Devices
#1	Primary	162.50'	42.0" Round Culvert L= 85.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 162.00' S= 0.0059 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished

Primary OutFlow Max=54.00 cfs @ 13.37 hrs HW=166.43' (Free Discharge)

↑**1=Culvert** (Inlet Controls 54.00 cfs @ 5.61 fps)

Summary for Pond 3P: Level Spreader

Inflow Area = 42.110 ac, Inflow Depth = 1.47" for 10-Year event
 Inflow = 32.70 cfs @ 12.62 hrs, Volume= 5.141 af
 Outflow = 32.70 cfs @ 12.62 hrs, Volume= 5.115 af, Atten= 0%, Lag= 0.2 min
 Primary = 32.70 cfs @ 12.62 hrs, Volume= 5.115 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 186.35' @ 12.62 hrs Surf.Area= 1,673 sf Storage= 1,689 cf

Plug-Flow detention time= 4.7 min calculated for 5.114 af (99% of inflow)
 Center-of-Mass det. time= 1.7 min (894.6 - 893.0)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	2,890 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	0	0	0
185.00	390	195	195
186.00	1,500	945	1,140
187.00	2,000	1,750	2,890

Device	Routing	Invert	Outlet Devices
#1	Primary	186.00'	65.0' long x 6.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

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2.50	3.00	3.50	4.00	4.50	5.00	5.50						
Coef. (English)	2.37	2.51	2.70	2.68	2.68	2.67	2.65	2.65	2.65			
	2.65	2.66	2.66	2.67	2.69	2.72	2.76	2.83				

Primary OutFlow Max=32.68 cfs @ 12.62 hrs HW=186.35' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir** (Weir Controls 32.68 cfs @ 1.45 fps)

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Watershed 1SRunoff Area=1.510 ac Runoff Depth=2.28"
Tc=6.6 min CN=72 Runoff=3.91 cfs 0.286 af**Subcatchment 1SA: Watershed 1S**Runoff Area=4.430 ac Runoff Depth=2.11"
Tc=57.0 min CN=70 Runoff=4.34 cfs 0.779 af**Subcatchment 2S: Watershed 2S**Runoff Area=102.781 ac Runoff Depth=2.28"
Tc=63.4 min CN=72 Runoff=103.17 cfs 19.487 af**Subcatchment 2SA: Watershed 2SA**Runoff Area=24.240 ac Runoff Depth=2.28"
Tc=46.8 min CN=72 Runoff=28.98 cfs 4.596 af**Subcatchment 3S: Watershed 3S**Runoff Area=29.770 ac Runoff Depth=2.19"
Tc=45.7 min CN=71 Runoff=34.67 cfs 5.439 af**Subcatchment 3SA: Watershed 3SA**Runoff Area=17.870 ac Runoff Depth=1.50"
Tc=27.3 min CN=62 Runoff=17.14 cfs 2.234 af**Subcatchment 4S: Watershed 4S**Runoff Area=23.270 ac Runoff Depth=2.19"
Tc=64.1 min CN=71 Runoff=22.28 cfs 4.251 af**Reach 1R: BNDY (Sheepscot)**Inflow=129.46 cfs 37.047 af
Outflow=129.46 cfs 37.047 af**Reach 2R: Stream Reach A-A**Avg. Depth=1.25' Max Vel=4.61 fps Inflow=129.13 cfs 36.761 af
n=0.033 L=120.0' S=0.0125 '/ Capacity=2,370.35 cfs Outflow=129.13 cfs 36.761 af**Reach 3R: Stream Reach B-B**Avg. Depth=1.75' Max Vel=5.55 fps Inflow=126.22 cfs 35.981 af
n=0.033 L=190.0' S=0.0132 '/ Capacity=388.20 cfs Outflow=126.21 cfs 35.981 af**Reach 4R: Stream Reach C-C**Avg. Depth=1.79' Max Vel=1.88 fps Inflow=115.98 cfs 30.542 af
n=0.033 L=360.0' S=0.0028 '/ Capacity=1,448.12 cfs Outflow=115.73 cfs 30.542 af**Reach 5R: Stream Reach D-D**Avg. Depth=0.72' Max Vel=2.01 fps Inflow=65.37 cfs 11.055 af
n=0.033 L=3,130.0' S=0.0042 '/ Capacity=3,947.38 cfs Outflow=51.85 cfs 11.055 af**Reach 6R: Stream Reach E-E**Avg. Depth=0.51' Max Vel=1.41 fps Inflow=44.06 cfs 6.804 af
n=0.033 L=190.0' S=0.0032 '/ Capacity=1,450.55 cfs Outflow=43.94 cfs 6.804 af**Reach 7R: Reach to Stream**Avg. Depth=0.10' Max Vel=2.50 fps Inflow=3.60 cfs 0.779 af
n=0.033 L=75.0' S=0.0733 '/ Capacity=870.31 cfs Outflow=3.60 cfs 0.779 af**Reach 8R: Reach to Stream**Avg. Depth=0.72' Max Vel=2.84 fps Inflow=64.23 cfs 19.487 af
n=0.033 L=170.0' S=0.0118 '/ Capacity=2,057.71 cfs Outflow=64.23 cfs 19.487 af**Reach 9R: Overland Flow**Avg. Depth=0.94' Max Vel=0.72 fps Inflow=44.44 cfs 6.804 af
n=0.410 L=150.0' S=0.0600 '/ Capacity=17.99 cfs Outflow=44.06 cfs 6.804 af

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Reach 10R: Riprrap Swale

Avg. Depth=1.07' Max Vel=3.05 fps Inflow=17.14 cfs 2.234 af
n=0.040 L=460.0' S=0.0123 '/ Capacity=69.93 cfs Outflow=16.99 cfs 2.234 af

Pond 1P: 12" CPP Culvert

Peak Elev=166.45' Storage=2,338 cf Inflow=4.34 cfs 0.779 af
12.0" Round Culvert n=0.012 L=100.0' S=0.0250 '/ Outflow=3.60 cfs 0.779 af

Pond 2P: 42" CPP Culvert

Peak Elev=167.33' Storage=156,062 cf Inflow=103.17 cfs 19.487 af
42.0" Round Culvert n=0.012 L=85.0' S=0.0059 '/ Outflow=64.23 cfs 19.487 af

Pond 3P: Level Spreader

Peak Elev=186.42' Storage=1,811 cf Inflow=44.44 cfs 6.830 af
Outflow=44.44 cfs 6.804 af

Total Runoff Area = 203.871 ac Runoff Volume = 37.073 af Average Runoff Depth = 2.18"

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Summary for Subcatchment 1S: Watershed 1S

Runoff = 3.91 cfs @ 12.10 hrs, Volume= 0.286 af, Depth= 2.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.10"

Area (ac)	CN	Description
* 1.510	72	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6					Direct Entry, Direct Entry

Summary for Subcatchment 1SA: Watershed 1S

Runoff = 4.34 cfs @ 12.80 hrs, Volume= 0.779 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.10"

Area (ac)	CN	Description
* 4.430	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
57.0					Direct Entry, Direct Entry

Summary for Subcatchment 2S: Watershed 2S

Runoff = 103.17 cfs @ 12.89 hrs, Volume= 19.487 af, Depth= 2.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.10"

Area (ac)	CN	Description
* 102.781	72	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
63.4					Direct Entry, Direct Entry

Summary for Subcatchment 2SA: Watershed 2SA

Runoff = 28.98 cfs @ 12.64 hrs, Volume= 4.596 af, Depth= 2.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.10"

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Type III 24-hr 25-Year Rainfall=5.10"

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Area (ac)	CN	Description
* 24.240	72	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.8					Direct Entry, Direct Entry

Summary for Subcatchment 3S: Watershed 3S

Runoff = 34.67 cfs @ 12.65 hrs, Volume= 5.439 af, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.10"

Area (ac)	CN	Description
* 29.770	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.7					Direct Entry, Direct Entry

Summary for Subcatchment 3SA: Watershed 3SA

Runoff = 17.14 cfs @ 12.41 hrs, Volume= 2.234 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.10"

Area (ac)	CN	Description
0.010	74	>75% Grass cover, Good, HSG C
* 0.320	98	Roofs and foundations
* 16.921	60	Substation Yard
* 0.344	98	Net Add. Impervious StatCom1
* 0.275	98	New Impervious StatCom2
17.870	62	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.3					Direct Entry, Direct Entry

Summary for Subcatchment 4S: Watershed 4S

Runoff = 22.28 cfs @ 12.89 hrs, Volume= 4.251 af, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.10"

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Area (ac)	CN	Description
* 23.270	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
64.1					Direct Entry, Direct Entry

Summary for Reach 1R: BNDY (Sheepscot)

Inflow Area = 203.871 ac, Inflow Depth = 2.18" for 25-Year event
 Inflow = 129.46 cfs @ 13.60 hrs, Volume= 37.047 af
 Outflow = 129.46 cfs @ 13.60 hrs, Volume= 37.047 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

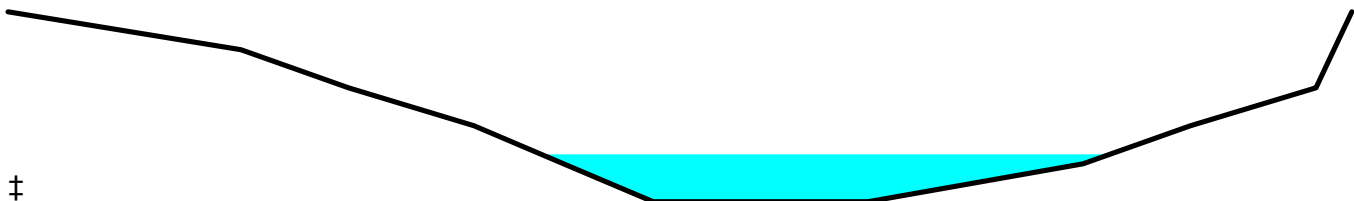
Summary for Reach 2R: Stream Reach A-A

Inflow Area = 202.361 ac, Inflow Depth = 2.18" for 25-Year event
 Inflow = 129.13 cfs @ 13.59 hrs, Volume= 36.761 af
 Outflow = 129.13 cfs @ 13.60 hrs, Volume= 36.761 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.61 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 1.48 fps, Avg. Travel Time= 1.4 min

Peak Storage= 3,358 cf @ 13.59 hrs, Average Depth at Peak Storage= 1.25'
 Bank-Full Depth= 5.00', Capacity at Bank-Full= 2,370.35 cfs

Custom cross-section, Length= 120.0' Slope= 0.0125 '/'
 Constant n= 0.033 Earth, grassed & winding
 Inlet Invert= 156.50', Outlet Invert= 155.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	162.00	0.00
13.00	161.00	1.00
19.00	160.00	2.00
26.00	159.00	3.00
31.00	158.00	4.00
36.00	157.00	5.00
48.00	157.00	5.00
60.00	158.00	4.00
66.00	159.00	3.00
73.00	160.00	2.00
74.00	161.00	1.00
75.00	162.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.0	0	0.00
1.00	20.5	29.1	2,460	81.64
2.00	55.0	40.3	6,600	340.57
3.00	102.0	54.5	12,240	780.22
4.00	159.5	62.0	19,140	1,508.27
5.00	227.5	76.4	27,300	2,370.35

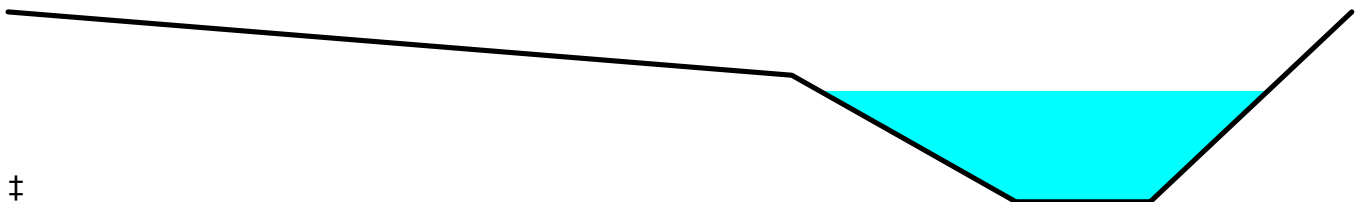
Summary for Reach 3R: Stream Reach B-B

Inflow Area = 197.931 ac, Inflow Depth = 2.18" for 25-Year event
 Inflow = 126.22 cfs @ 13.58 hrs, Volume= 35.981 af
 Outflow = 126.21 cfs @ 13.60 hrs, Volume= 35.981 af, Atten= 0%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 5.55 fps, Min. Travel Time= 0.6 min
 Avg. Velocity = 1.67 fps, Avg. Travel Time= 1.9 min

Peak Storage= 4,324 cf @ 13.59 hrs, Average Depth at Peak Storage= 1.75'
 Bank-Full Depth= 3.00', Capacity at Bank-Full= 388.20 cfs

Custom cross-section, Length= 190.0' Slope= 0.0132 '/' (102 Elevation Intervals)
 Constant n= 0.033 Earth, grassed & winding
 Inlet Invert= 159.00', Outlet Invert= 156.50'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
35.00	159.00	1.00
40.00	158.00	2.00
45.00	157.00	3.00
51.00	157.00	3.00
54.00	158.00	2.00
57.00	159.00	1.00
60.00	160.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	6.0	0	0.00
1.00	10.0	14.3	1,900	40.77
2.00	28.0	22.5	5,320	167.22
3.00	69.0	60.7	13,110	388.20

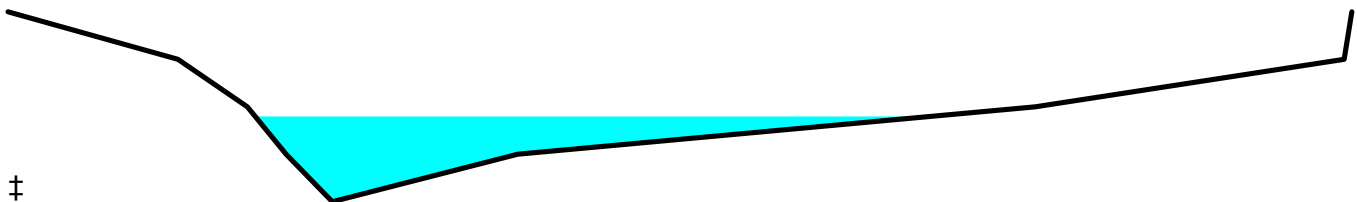
Summary for Reach 4R: Stream Reach C-C

Inflow Area = 168.161 ac, Inflow Depth = 2.18" for 25-Year event
Inflow = 115.98 cfs @ 13.53 hrs, Volume= 30.542 af
Outflow = 115.73 cfs @ 13.63 hrs, Volume= 30.542 af, Atten= 0%, Lag= 5.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.88 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 0.69 fps, Avg. Travel Time= 8.7 min

Peak Storage= 22,170 cf @ 13.57 hrs, Average Depth at Peak Storage= 1.79'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 1,448.12 cfs

Custom cross-section, Length= 360.0' Slope= 0.0028 1/1
Constant n= 0.033 Earth, grassed & winding
Inlet Invert= 160.00', Outlet Invert= 159.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	162.00	0.00
22.00	161.00	1.00
31.00	160.00	2.00
36.00	159.00	3.00
42.00	158.00	4.00
66.00	159.00	3.00
133.00	160.00	2.00
173.00	161.00	1.00
174.00	162.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
1.00	15.0	30.1	5,400	22.37
2.00	81.0	102.2	29,160	164.63
3.00	207.5	151.3	74,700	607.95
4.00	370.0	174.7	133,200	1,448.12

Summary for Reach 5R: Stream Reach D-D

Inflow Area = 65.380 ac, Inflow Depth = 2.03" for 25-Year event
Inflow = 65.37 cfs @ 12.79 hrs, Volume= 11.055 af
Outflow = 51.85 cfs @ 13.54 hrs, Volume= 11.055 af, Atten= 21%, Lag= 44.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.01 fps, Min. Travel Time= 26.0 min
Avg. Velocity = 0.66 fps, Avg. Travel Time= 79.6 min

Peak Storage= 80,932 cf @ 13.11 hrs, Average Depth at Peak Storage= 0.72'
Bank-Full Depth= 6.00', Capacity at Bank-Full= 3,947.38 cfs

Custom cross-section, Length= 3,130.0' Slope= 0.0042 '/' (102 Elevation Intervals)
Constant n= 0.033 Earth, grassed & winding
Inlet Invert= 173.00', Outlet Invert= 160.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	176.00	0.00
21.00	174.00	2.00
39.00	172.00	4.00
63.00	170.00	6.00
90.00	170.00	6.00
116.00	172.00	4.00
138.00	174.00	2.00
152.00	176.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	27.0	0	0.00
2.00	104.0	77.2	325,520	368.27
4.00	298.0	117.4	932,740	1,609.59
6.00	567.0	152.6	1,774,710	3,947.38

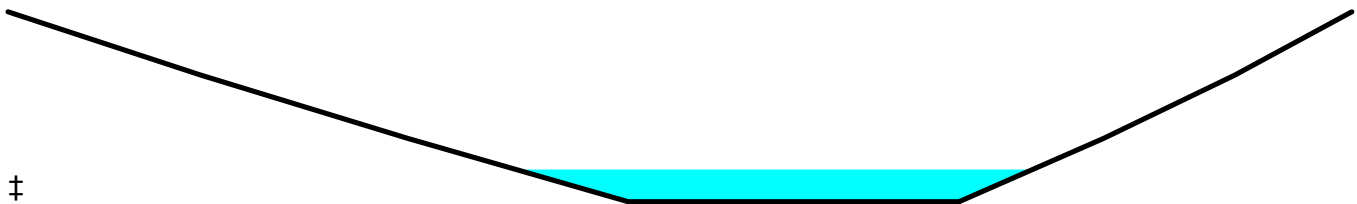
Summary for Reach 6R: Stream Reach E-E

Inflow Area = 42.110 ac, Inflow Depth = 1.94" for 25-Year event
 Inflow = 44.06 cfs @ 12.70 hrs, Volume= 6.804 af
 Outflow = 43.94 cfs @ 12.76 hrs, Volume= 6.804 af, Atten= 0%, Lag= 3.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.41 fps, Min. Travel Time= 2.2 min
 Avg. Velocity = 0.44 fps, Avg. Travel Time= 7.2 min

Peak Storage= 5,920 cf @ 12.72 hrs, Average Depth at Peak Storage= 0.51'
 Bank-Full Depth= 3.00', Capacity at Bank-Full= 1,450.55 cfs

Custom cross-section, Length= 190.0' Slope= 0.0032 '/' (102 Elevation Intervals)
 Constant n= 0.033 Earth, grassed & winding
 Inlet Invert= 173.60', Outlet Invert= 173.00'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	176.00	0.00
28.00	175.00	1.00
58.00	174.00	2.00
90.00	173.00	3.00
138.00	173.00	3.00
159.00	174.00	2.00
178.00	175.00	1.00
195.00	176.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	48.0	0	0.00
1.00	74.5	101.0	14,155	153.86
2.00	200.0	150.1	38,000	612.87
3.00	372.5	195.1	70,775	1,450.55

Summary for Reach 7R: Reach to Stream

Inflow Area = 4.430 ac, Inflow Depth = 2.11" for 25-Year event
 Inflow = 3.60 cfs @ 13.09 hrs, Volume= 0.779 af
 Outflow = 3.60 cfs @ 13.10 hrs, Volume= 0.779 af, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.50 fps, Min. Travel Time= 0.5 min
 Avg. Velocity = 1.14 fps, Avg. Travel Time= 1.1 min

Peak Storage= 108 cf @ 13.10 hrs, Average Depth at Peak Storage= 0.10'
 Bank-Full Depth= 2.00', Capacity at Bank-Full= 870.31 cfs

Custom cross-section, Length= 75.0' Slope= 0.0733 1/1
 Constant n= 0.033 Earth, grassed & winding
 Inlet Invert= 162.00', Outlet Invert= 156.50'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	160.00	0.00
8.00	159.00	1.00
16.00	158.00	2.00
30.00	158.00	2.00
38.00	159.00	1.00
46.00	160.00	0.00

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Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	14.0	0	0.00
1.00	22.0	30.1	1,650	217.56
2.00	60.0	46.2	4,500	870.31

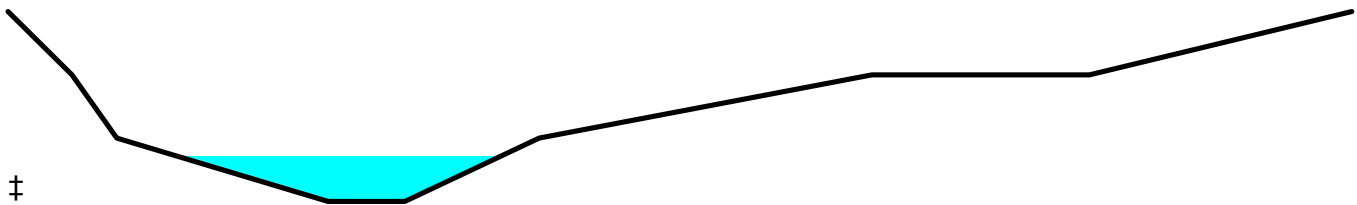
Summary for Reach 8R: Reach to Stream

Inflow Area = 102.781 ac, Inflow Depth = 2.28" for 25-Year event
 Inflow = 64.23 cfs @ 13.44 hrs, Volume= 19.487 af
 Outflow = 64.23 cfs @ 13.47 hrs, Volume= 19.487 af, Atten= 0%, Lag= 1.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.84 fps, Min. Travel Time= 1.0 min
 Avg. Velocity = 1.46 fps, Avg. Travel Time= 1.9 min

Peak Storage= 3,840 cf @ 13.45 hrs, Average Depth at Peak Storage= 0.72'
 Bank-Full Depth= 3.00', Capacity at Bank-Full= 2,057.71 cfs

Custom cross-section, Length= 170.0' Slope= 0.0118 '/' (102 Elevation Intervals)
 Constant n= 0.033 Earth, grassed & winding
 Inlet Invert= 162.00', Outlet Invert= 160.00'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	163.00	0.00
10.00	162.00	1.00
17.00	161.00	2.00
50.00	160.00	3.00
62.00	160.00	3.00
83.00	161.00	2.00
135.00	162.00	1.00
169.00	162.00	1.00
210.00	163.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	12.0	0	0.00
1.00	39.0	66.0	6,630	134.08
2.00	134.5	159.1	22,865	587.29
3.00	319.0	210.2	54,230	2,057.71

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Summary for Reach 9R: Overland Flow

Inflow Area = 42.110 ac, Inflow Depth = 1.94" for 25-Year event
Inflow = 44.44 cfs @ 12.59 hrs, Volume= 6.804 af
Outflow = 44.06 cfs @ 12.70 hrs, Volume= 6.804 af, Atten= 1%, Lag= 6.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.72 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 15.6 min

Peak Storage= 9,153 cf @ 12.64 hrs, Average Depth at Peak Storage= 0.94'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 17.99 cfs

65.00' x 0.50' deep channel, n= 0.410 Sheet flow over Bermuda Grass
Length= 150.0' Slope= 0.0600 '/'
Inlet Invert= 186.00', Outlet Invert= 177.00'



Summary for Reach 10R: Riprap Swale

Inflow Area = 17.870 ac, Inflow Depth = 1.50" for 25-Year event
Inflow = 17.14 cfs @ 12.41 hrs, Volume= 2.234 af
Outflow = 16.99 cfs @ 12.50 hrs, Volume= 2.234 af, Atten= 1%, Lag= 5.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.05 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 1.26 fps, Avg. Travel Time= 6.1 min

Peak Storage= 2,565 cf @ 12.45 hrs, Average Depth at Peak Storage= 1.07'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 69.93 cfs

2.00' x 2.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 460.0' Slope= 0.0123 '/'
Inlet Invert= 189.66', Outlet Invert= 184.00'



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Summary for Pond 1P: 12" CPP Culvert

Inflow Area = 4.430 ac, Inflow Depth = 2.11" for 25-Year event
 Inflow = 4.34 cfs @ 12.80 hrs, Volume= 0.779 af
 Outflow = 3.60 cfs @ 13.09 hrs, Volume= 0.779 af, Atten= 17%, Lag= 17.6 min
 Primary = 3.60 cfs @ 13.09 hrs, Volume= 0.779 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 166.45' @ 13.09 hrs Surf.Area= 3,092 sf Storage= 2,338 cf

Plug-Flow detention time= 4.8 min calculated for 0.779 af (100% of inflow)
 Center-of-Mass det. time= 4.8 min (898.7 - 893.9)

Volume	Invert	Avail.Storage	Storage Description
#1	164.50'	23,203 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
164.50	0	0	0
165.00	353	88	88
166.00	1,887	1,120	1,208
167.00	4,541	3,214	4,422
168.00	8,926	6,734	11,156
169.00	15,168	12,047	23,203

Device	Routing	Invert	Outlet Devices
#1	Primary	164.50'	12.0" Round Culvert L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 162.00' S= 0.0250 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished

Primary OutFlow Max=3.60 cfs @ 13.09 hrs HW=166.45' (Free Discharge)
 ↑1=Culvert (Inlet Controls 3.60 cfs @ 4.58 fps)

Summary for Pond 2P: 42" CPP Culvert

Inflow Area = 102.781 ac, Inflow Depth = 2.28" for 25-Year event
 Inflow = 103.17 cfs @ 12.89 hrs, Volume= 19.487 af
 Outflow = 64.23 cfs @ 13.44 hrs, Volume= 19.487 af, Atten= 38%, Lag= 32.9 min
 Primary = 64.23 cfs @ 13.44 hrs, Volume= 19.487 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 167.33' @ 13.44 hrs Surf.Area= 64,609 sf Storage= 156,062 cf

Plug-Flow detention time= 26.4 min calculated for 19.483 af (100% of inflow)
 Center-of-Mass det. time= 26.4 min (921.1 - 894.8)

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Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	381,247 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.50	0	0	0
163.00	4,393	1,098	1,098
164.00	18,380	11,387	12,485
165.00	35,940	27,160	39,645
166.00	47,745	41,843	81,487
167.00	59,780	53,763	135,250
168.00	74,210	66,995	202,245
169.00	91,232	82,721	284,966
170.00	101,330	96,281	381,247

Device	Routing	Invert	Outlet Devices
#1	Primary	162.50'	42.0" Round Culvert L= 85.0' CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 162.00' S= 0.0059 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished

Primary OutFlow Max=64.23 cfs @ 13.44 hrs HW=167.33' (Free Discharge)

↑**1=Culvert** (Inlet Controls 64.23 cfs @ 6.68 fps)

Summary for Pond 3P: Level Spreader

Inflow Area = 42.110 ac, Inflow Depth = 1.95" for 25-Year event
 Inflow = 44.44 cfs @ 12.58 hrs, Volume= 6.830 af
 Outflow = 44.44 cfs @ 12.59 hrs, Volume= 6.804 af, Atten= 0%, Lag= 0.2 min
 Primary = 44.44 cfs @ 12.59 hrs, Volume= 6.804 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 186.42' @ 12.59 hrs Surf.Area= 1,709 sf Storage= 1,811 cf

Plug-Flow detention time= 3.7 min calculated for 6.803 af (100% of inflow)
 Center-of-Mass det. time= 1.4 min (885.6 - 884.2)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	2,890 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	0	0	0
185.00	390	195	195
186.00	1,500	945	1,140
187.00	2,000	1,750	2,890

Device	Routing	Invert	Outlet Devices
#1	Primary	186.00'	65.0' long x 6.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

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2.50	3.00	3.50	4.00	4.50	5.00	5.50						
Coef. (English)	2.37	2.51	2.70	2.68	2.68	2.67	2.65	2.65	2.65			
	2.65	2.66	2.66	2.67	2.69	2.72	2.76	2.83				

Primary OutFlow Max=44.40 cfs @ 12.59 hrs HW=186.42' (Free Discharge)

↳ **1=Broad-Crested Rectangular Weir** (Weir Controls 44.40 cfs @ 1.63 fps)

Exhibit 12-5: DEP Stormwater Management Regulations Letter



STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

ELIAS BALDACCIO
GOVERNOR

DAVID
COX

June 5, 2008

Roy Koster
Central Maine Power
83 Edison Drive
Augusta, ME 04336

RE: DEP Stormwater Management Regulations and how they apply to
Central Maine Power Company Substations and Switchyards

Dear Mr. Koster:

I am writing to provide clarification on how substations and switchyards designed by Central Maine Power Company (CMP) can meet DEP Stormwater Management rules, Chapter 500 and the Site Location of Development Law. This letter supersedes a previous DEP letter on this subject dated February 29, 2008 and is a follow-up to further discussions between CMP and DEP staff.

Based on the report prepared by John Simon of Balance Engineering, dated March 8, 2008, regarding the stormwater runoff coefficient at CMP substations and switchyards, the required gravel fill and surface nature of these structures performs differently than most common construction practices and a modeling variance will be allowed for CMP substations and switchyards as follows:

When Flooding Standard requirements apply to a CMP project, modeling must demonstrate that peak runoff from the substation structure does not exceed predevelopment flow rates at the property line. Because of the permeability plus storage within the gravel fill and roughness of the crushed rock surface, the curve number (CN) specified in John Simon's report (March 2008) may be used for the substation area. As reported, a CN of 55 may be used for substations and switchyards that are built on areas that are mapped as HSG "A", "B", and "C", and a CN of 60 must be used when the area is mapped as HSG "D" for the HydroCAD model. However, all impervious surfaces will have to be added for an averaged curve number.

The General Standards of Chapter 500 (water quality) will be considered as met by the CMP substation/switchyard design specifications as long as the structure includes the typical CMP substation profile overlaying the natural ground surface. The soil layers within the CMP substation profile consist of 4 inches of crushed stone, 50:50 mix of 1.5"

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and 0.75" diameter stone overlaying 18 inches or more of gravel fill, MDOT 703.06 Type A. Saturation within the granular fill will detain and provide treatment for the one-inch design standard under that requirement. Groundwater can never be any higher than 18 inches below the top of the gravel fill. Other treatment considerations will need to be provided for all impervious structures anticipated on the substation and switchyard and for the roadway.

The Basic Standards of Chapter 500 (erosion and sedimentation control, inspection and maintenance, and housekeeping) will be met by the standard CMP substation and switchyard design specification and erosion control/construction plan as developed by CMP for each Stormwater Management application. These are minimum erosion control measures that will need to be maintained until the site is fully stabilized. However, based on site and weather conditions during construction, additional erosion control measures may be needed.

While there are several ways to approach the design standards discussed above, these must be considered the minimum requirements in meeting the Stormwater Management and Site Location of Development Laws. However, in some situations where the local hydrology and site conditions warrant more resource protection, additional BMPs may be required. Also, the access drive and associated roadside swales are included in the disturbed area for permitting purposes and the treatment of these areas must be addressed separately from the substation or switchyard and be treated with standard practices. The natural hydrology of these areas will need to be maintained and will have to meet all applicable standards as established in Chapter 500 (page 11, Section 5).

I hope this addresses your request and will make the DEP permitting process more straight forward. If you have further questions, please contact Marianne Hubert at (207) 287-4140.

Sincerely,



Don Witherill, Director
Watershed Management Division
Bureau of Land and Water Quality

Cc: Marianne Hubert, PE, DEP program manager
Andy Fisk, DEP L&W Bureau Director
Dan Butler, PE, TRC
Gerry Mirabile, CMP