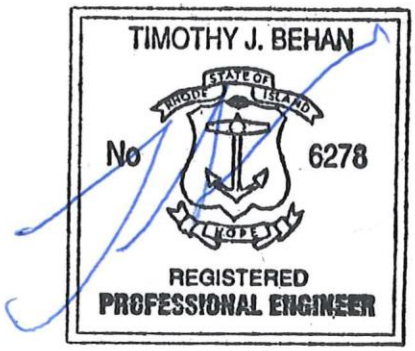
*Report for:*

# Stormwater BMP Narrative Report for
# AP 47-3 Lot 119-Proposed Sublot-B
# 523 South Road
# South Kingstown, Rhode Island
# Pre-Application Submittal

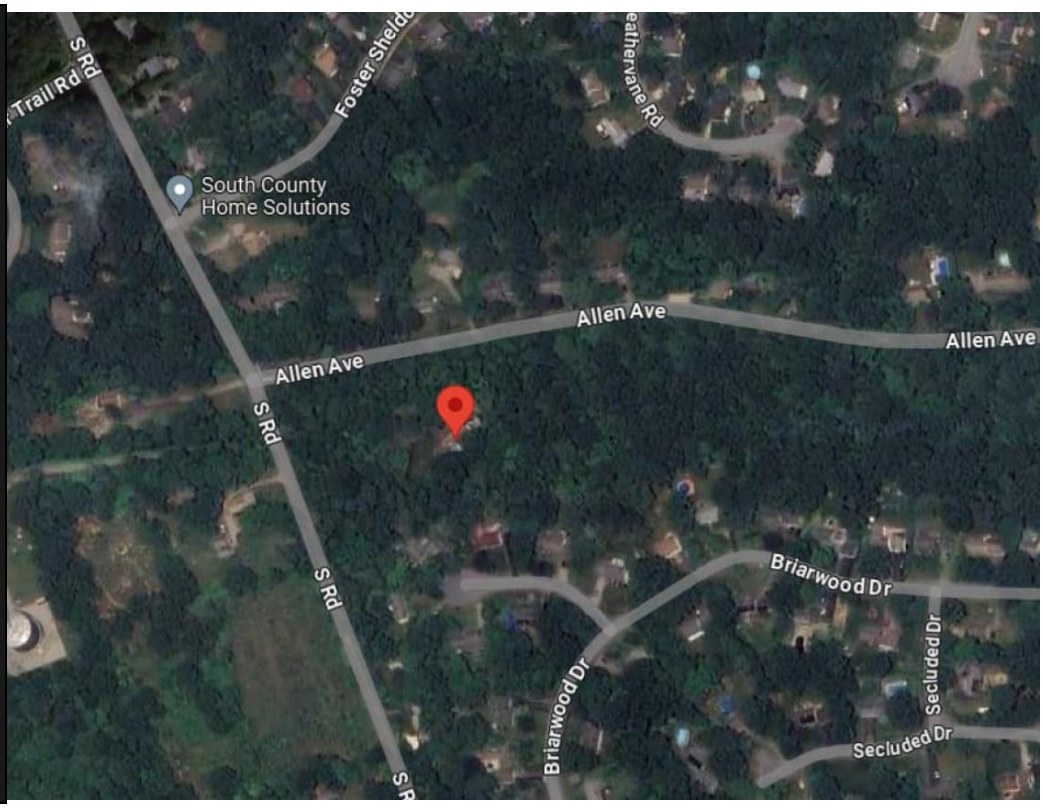



*Prepared for:*

**Atlas Land Surveying, LLC**
**91 Parkway Drive**
**Warwick, Rhode Island**

**July 2024** **CE&C #24052.00**

**REPORT**




**COMMONWEALTH ENGINEERS & CONSULTANTS, INC.**
400 SMITH STREET
RHODE ISLAND, 02908
401-273-6600

# Stormwater Narrative:

## 1.0 Introduction:

This report was prepared to document the stormwater best management practices (BMPs) proposed for the subject property located at 523 South Road, South Kingstown, Rhode Island (A.P. 47-3, Lot 119) for the proposed Sublot-B.

## 2.0 General Description/Purpose:

The applicant is proposing to subdivide the existing 3.95 acre lot into four (4) lots and construct a new single-family dwelling and associated items as detailed below on each of the three (3) new lots.

The project consists of the following major components:

- Installing sediment and erosion control devices;
- Construct a new single-family dwelling, existing OWTS connection, water line and utilities (electric/communication/cable);
- Construct a new asphalt driveway; and
- Construct stormwater BMPs for treatment of runoff generated from the proposed impervious surfaces.

## 3.0 Basis of Stormwater BMP Design:

BMP sizing and design is based on the *'State of Rhode Island Stormwater Management Guidance for Individual Single-Family Residential Lot Development'* guidance document prepared by the RIDEM/CRMC and the *Town of South Kingstown Soil Erosion, Runoff and Sediment Control Ordinance*. Note: due to site constraints the systems have been designed to the 'maximum extent possible' in accordance with these documents.

## 4.0 Stormwater BMP Design:

The seven (7) design steps detailed in this section were taken from the *'State of Rhode Island Stormwater Management Guidance for Individual Single-Family Residential Lot Development'* guidance document:

Step 1: Identify major impervious surfaces and areas ($ft^2$):

| | |
|---|---|
| Proposed Dwelling Roof: | Impervious Area = 1,836 $ft^2$ |
| Proposed new Driveway: | Impervious Area =1,089 $ft^2$ |

Step 2: Choose potential storm water management practice locations based on required regulatory setbacks. The depth to SHGWT is not required when the selected practice is a Qualifying Pervious

Area (QPA), vegetated swale, rain garden or permeable surface construction.

The stormwater management practices must meet the required minimum separation distances, or setbacks, listed in Table 1 below.

**Table 1**. Minimum Setback Distances for Rain Gardens, Infiltration Trenches, Dry Wells and Permeable Pavement Practices on Single-Family Residential Lots

| Landscape Feature | Required Setback (ft) for Infiltration Trenches and Dry Wells | Required Setback (ft) for Rain Gardens and Permeable Paving Practices |
|---|---|---|
| Public Drinking Water Supply Well – Drilled (rock), Driven, or Dug | 200 | 200 |
| Public Drinking Water Supply Well – Gravel Packed, Gravel Developed | 400 | 400 |
| Private Drinking Water Wells | 50 | 25 |
| Surface Water Drinking Water Supply Impoundment with Supply Intake | 100 | 100 |
| Tributaries that Discharge to the Surface Drinking Water Supply Impoundment | 50 | 50 |
| All Other Surface Waters | 50 | 50 |
| Up-gradient from Natural slopes > %15 | 25 | 25 |
| Down-gradient from Building Structures | 10 | 10 |
| Up-gradient from Building Structures | 10 | 10 |
| Onsite Wastewater Treatment Systems (OWTS) | 15 | 15 |
| Coastal features, coastal buffer zones, regulated freshwater wetlands | As applicable | As applicable |

The site has the following constraints:

1. buildings
2. onsite wastewater treatment systems

It is a challenge to meet all the above setbacks due to site constraints. The proposed BMPs have been designed to the 'maximum extent possible' in accordance with the *'State of Rhode Island Stormwater Management Guidance for Individual Single-Family Residential Lot Development'* using sound engineering judgement.

Step 3: Select appropriate storm water treatment practice(s) based on your site conditions and required elements for each practice. You may have to install more than one practice to meet your stormwater management requirements;

The checked box indicates which BMPs were selected:

| | Type of BMP | Justification |
|---|---|---|
| ☒ | Infiltration trench | (Proposed for Driveway) |
| ☒ | Drywell | (Proposed for Roof Runoff) |
| ☐ | Qualified pervious area | (not used) |

☒ Vegetated swale (Grass Area)
☐ Rain garden (not used)
☐ Permeable surface (not used)

Step 4: Size the selected stormwater treatment practice(s) to meet the water quality volume (WQv) requirement using drainage area and soil texture information:

**BMP #1: (Infiltration Trench for New Asphalt Driveway Runoff)**

Selected BMP = Infiltration Trench for Proposed Driveway runoff.

Sizing table is taken from the *'State of Rhode Island Stormwater Management Guidance for Individual Single-Family Residential Lot Development'* guidance document:

**Tables 10. and 11.** Sizing Guidance for Infiltration Trenches and Dry Wells

**Infiltration Trench / Dry Well Surface Area (square feet) in Sandy Soils (Sands, Loamy Sands and Sandy Loams)**

| Drainage Area (sq. ft.) | 6 in. deep | 12 in. deep | 18 in. deep | 24 in. deep | 30 in. deep | 36 in. deep | 48 in. deep |
|---|---|---|---|---|---|---|---|
| 100 | 24 | 16 | 12 | 10 | 8 | 7 | 5 |
| 200 | 48 | 32 | 24 | 19 | 16 | 14 | 11 |
| 300 | 72 | 48 | 36 | 29 | 24 | 21 | 16 |
| 400 | 96 | 64 | 48 | 39 | 32 | 28 | 21 |
| 500 | 119 | 80 | 60 | 48 | 40 | 34 | 27 |
| 600 | 143 | 96 | 72 | 58 | 48 | 41 | 32 |
| 700 | 167 | 112 | 84 | 67 | 56 | 48 | 38 |
| 800 | 191 | 128 | 96 | 77 | 64 | 55 | 43 |
| 900 | 215 | 144 | 108 | 87 | 72 | 62 | 48 |
| 1000 | 239 | 160 | 120 | 96 | 80 | 69 | 54 |

Infiltration Trenches: 1-5' wide by 3' deep by 40' long and 1-5' wide by 3' deep by 45' long

Total impervious surface area = 1,089 $ft^2$

Width of infiltration Trench = 5.00 feet
Depth of infiltration trench = 3.00 feet
Length of infiltration trench = 85.00 feet Total

Total Area provided = 425 square-feet
Total storage required = ((1,089/1,000) X 69) square-feet=75.1 square-feet

The impervious areas and the proposed infiltration trench were modeled in HydroCAD for the water quality storm of 1.2-inches, 1-Year and the 10-Year storms. The modeling shows no increase discharge from the infiltration trench for the water quality storm, see attached HydroCAD report and table below.

**BMP #2: (Underground Chambers for Roof Runoff)**

Selected BMP = underground chambers for roof runoff.

Sizing table is taken from the *'State of Rhode Island Stormwater Management Guidance for Individual Single-Family Residential Lot Development'* guidance document:

**Tables 10. and 11.** Sizing Guidance for Infiltration Trenches and Dry Wells

**Infiltration Trench / Dry Well Surface Area (square feet) in Sandy Soils (Sands, Loamy Sands and Sandy Loams)**

| Drainage Area (sq. ft.) | 6 in. deep | 12 in. deep | 18 in. deep | 24 in. deep | 30 in. deep | 36 in. deep | 48 in. deep |
|---|---|---|---|---|---|---|---|
| 100 | 24 | 16 | 12 | 10 | 8 | 7 | 5 |
| 200 | 48 | 32 | 24 | 19 | 16 | 14 | 11 |
| 300 | 72 | 48 | 36 | 29 | 24 | 21 | 16 |
| 400 | 96 | 64 | 48 | 39 | 32 | 28 | 21 |
| 500 | 119 | 80 | 60 | 48 | 40 | 34 | 27 |
| 600 | 143 | 96 | 72 | 58 | 48 | 41 | 32 |
| 700 | 167 | 112 | 84 | 67 | 56 | 48 | 38 |
| 800 | 191 | 128 | 96 | 77 | 64 | 55 | 43 |
| 900 | 215 | 144 | 108 | 87 | 72 | 62 | 48 |
| 1000 | 239 | 160 | 120 | 96 | 80 | 69 | 54 |

Infiltration Bed: Cultec chambers:

Total impervious surface area = 1,836ft$^2$

Use 10-Cultec C-100HD units in a bed of stone

Width of infiltration bed = 18.33 feet
Length of infiltration bed = 17.50 feet

Total storage provided = 0.008 acre-feet
Total storage required = 0.003 acre-feet

The impervious roof areas and the proposed infiltration bed were modeled in HydroCAD for the water quality storm of 1.2-inches, 1-Year and the 10-Year storms. The modeling shows no discharge from the infiltration system for the water quality storm, 1-Year and the 10-Year storms, see attached HydroCAD report and table below.

**BMP #3: (Vegetated Swale for Lawn Runoff)**

Selected BMP = Vegetated Swale

Vegetated swales are open vegetated channels that are designed to capture and treat stormwater runoff. They are similar in concept and construction to a rain garden, except for their long, narrow shape and longitudinal slope. They are typically vegetated with grasses (see Appendix B, Section

B.6 of the RI Stormwater Design and Installation Standards Manual for planting guidance). They may be used as a stand-alone stormwater management practice or as a conveyance to other practices.

Sizing a Vegetated Swale:

Determine the area (in square feet) of impervious surface that will drain to the swale. This is the drainage area. Use Table 5 below to choose a pre-calculated size for an 8-inch-deep swale based on the drainage area and soil texture. To do this, you may need to round up your drainage area size (don't round down to avoid under-sizing your swale). Remember that your swale should be at least 2 but less than 8 feet wide at the bottom, and the sides should have a slope no steeper than 3:1. The sizing recommendations below are based on sizing guidance in the University of Wisconsin Extension publication "Rain Gardens: a how to manual for homeowners," which can be accessed at www.dnr.state.wi.us/runoff/pdf/rg/rgmanual.pdf. Alternatively, use sizing information and equations in Chapter 5 of the RI Stormwater Design and Installation Standards Manual at www.dem.ri.gov/pubs/regs/regs/water/swmanual.pdf. Be sure to demonstrate which sizing method was used on your submitted application.

Sizing table is taken from the *'State of Rhode Island Stormwater Management Guidance for Individual Single-Family Residential Lot Development'* guidance document:

**Table 5.** Vegetated Swale Sizing Guidance

| Drainage Area (in square feet) | Bottom surface Area (in square feet) for an 8 in. deep swale | |
|---|---|---|
| | Sandy Soils* | Silty Soils* |
| 200 | 16 | 32 |
| 400 | 32 | 64 |
| 600 | 48 | 96 |
| 800 | 64 | 128 |
| 1000 | 80 | 160 |

*In lieu of a soil texture determination, use the calculated surface areas for silty soils

Vegetated Swale Calculation for Driveway:

Total pervious surface area = 4,412 $ft^2$ (Note: no impervious area to swale. Swale is for stormwater control of 1 and 10-Year storms)

Bottom Width of vegetated swale = 4.0 feet
Bottom Length of vegetated swale = 52.00 feet

Bottom Area Provided:208 $ft^2$
Bottom Area Required: None

The pervious areas and the proposed vegetated swale were modeled in HydroCAD for the water quality storm, 1-Year and 10-Year storms. The modeling shows no increase in runoff from the site. See Table below and attached HydroCAD report.

## 5.0 How potential wetland impacts have been avoided (pertaining to stormwater BMPs):

Post project water quality impacts will be mitigated by constructing BMPs for the dwelling and driveway, all of which were designed and constructed in accordance with the *'State of Rhode Island Stormwater Management Guidance for Individual Single-Family Residential Lot Development'* guidance document to the 'maximum extent possible'.

## 6.0 Town of South Kingstown Soil Erosion, Runoff and Sediment Control Ordinance

The Town of South Kingstown Soil Erosion, Runoff and Sediment Control Ordinance requires the post-development runoff rates do not exceed the pre-development rates for a 10-year storm. Additional storage for the 10-year storm has been added to the infiltration trench and the infiltration chambers and a vegetated swale was added for pervious areas. There is no increase in runoff rates for either the Water Quality Storm, 1-Year or the 10-Year Type III Storms, see attached HydroCAD Report.

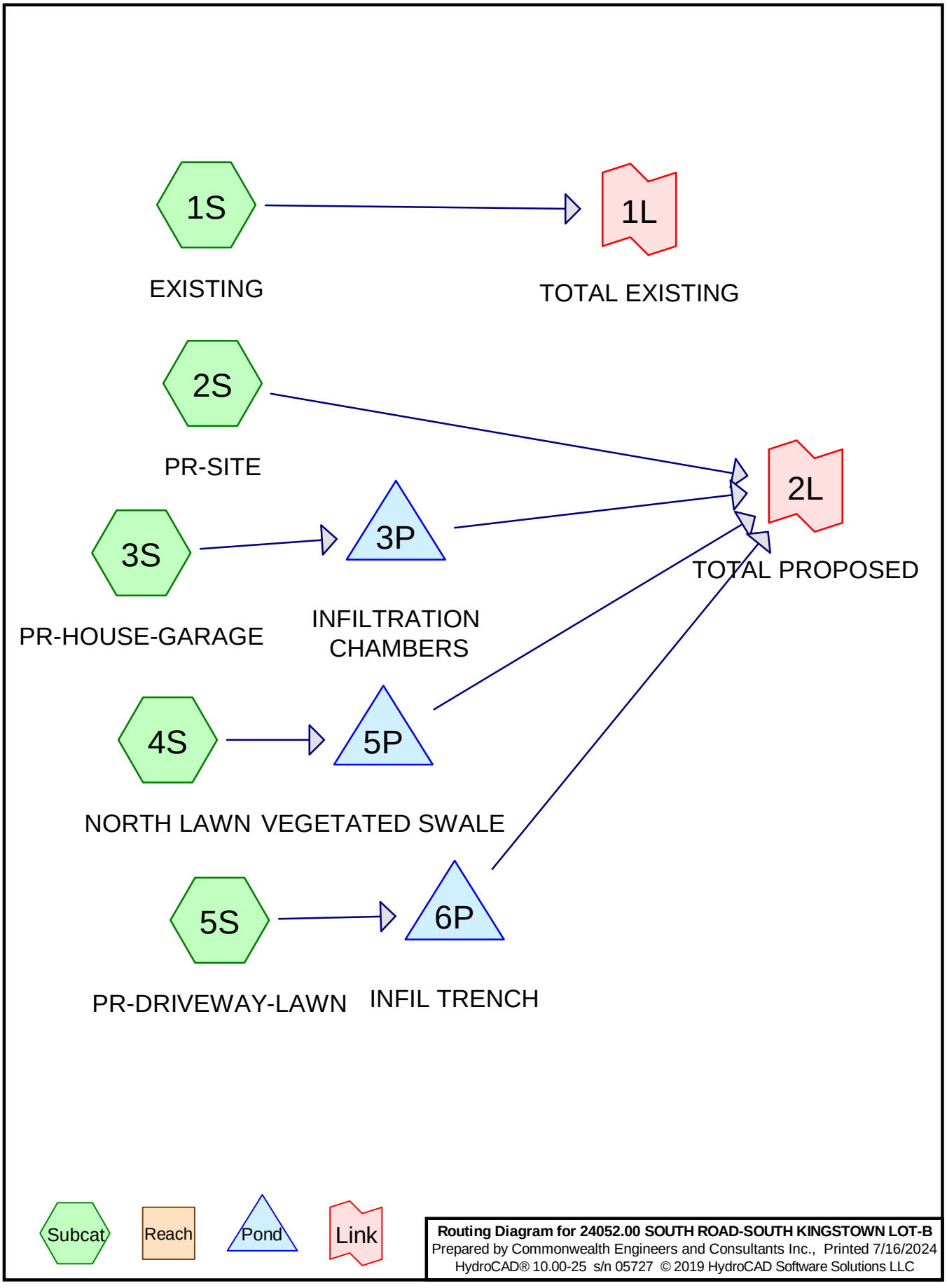
Table1: HydroCAD Modeling Summary

| | PRE-DEVELOPMENT | | POST-DEVELOPMENT | | REDUCTION | |
|---|---|---|---|---|---|---|
| | (CFS) | (ACRE FEET) | (CFS) | (ACRE FEET) | (CFS) | (ACRE FEET) |
| WATER QUALITY | 0 | 0 | 0 | 0 | 0 | 0 |
| 1-YEAR STORM | 0.02 | 0.008 | 0.02 | 0.006 | 0 | -0.002 |
| 10-YEAR STORM | 0.43 | 0.053 | 0.28 | 0.040 | -0.15 | -0.013 |

Appendix 1: HydroCAD Modeling Report for Water Quality, 1-Year and 10-year Storm Events

End of Report

HYDROCAD REPORTS




**Routing Diagram for 24052.00 SOUTH ROAD-SOUTH KINGSTOWN LOT-B**
Prepared by Commonwealth Engineers and Consultants Inc., Printed 7/16/2024
HydroCAD® 10.00-25 s/n 05727 © 2019 HydroCAD Software Solutions LLC

## Summary for Subcatchment 1S: EXISTING

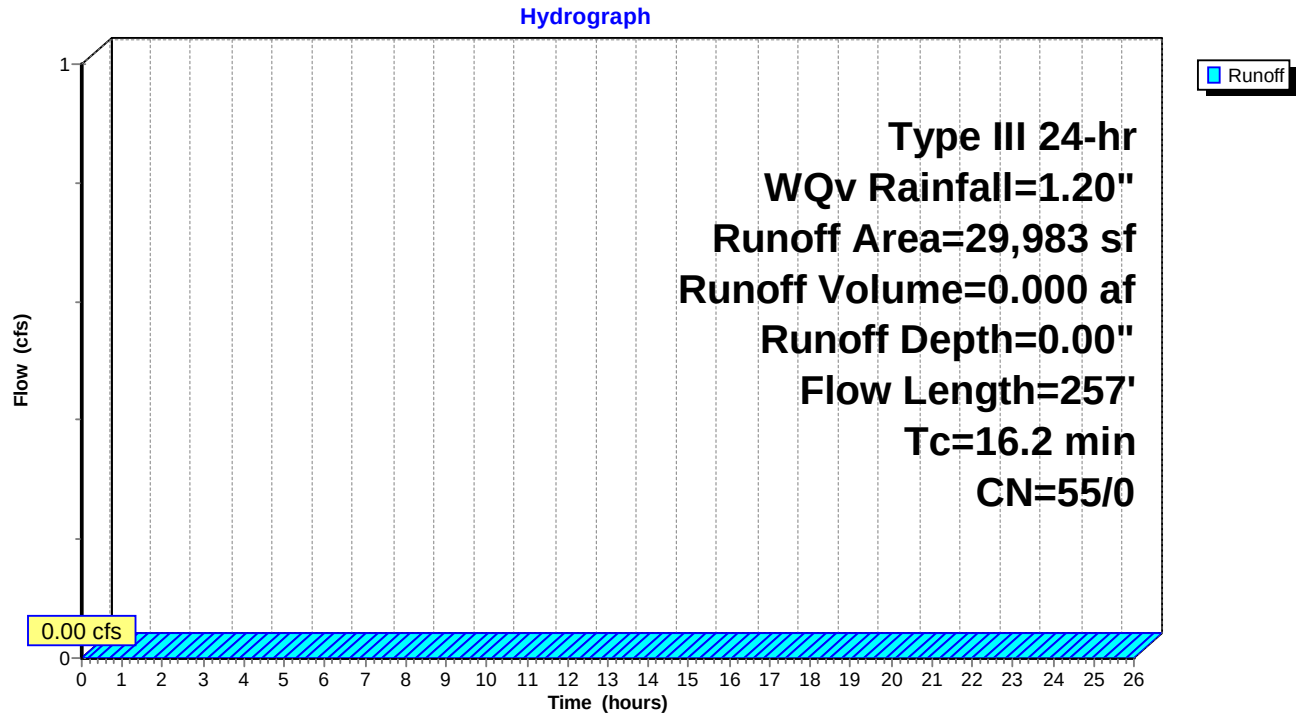
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Rainfall=1.20"

| Area (sf) | CN | Description |
|---|---|---|
| 800 | 61 | >75% Grass cover, Good, HSG B |
| 29,183 | 55 | Woods, Good, HSG B |
| 29,983 | 55 | Weighted Average |
| 29,983 | 55 | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 13.6 | 100 | 0.0600 | 0.12 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30" |
| 2.6 | 157 | 0.0410 | 1.01 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 16.2 | 257 | Total | | | |

## Subcatchment 1S: EXISTING



## Summary for Subcatchment 2S: PR-SITE

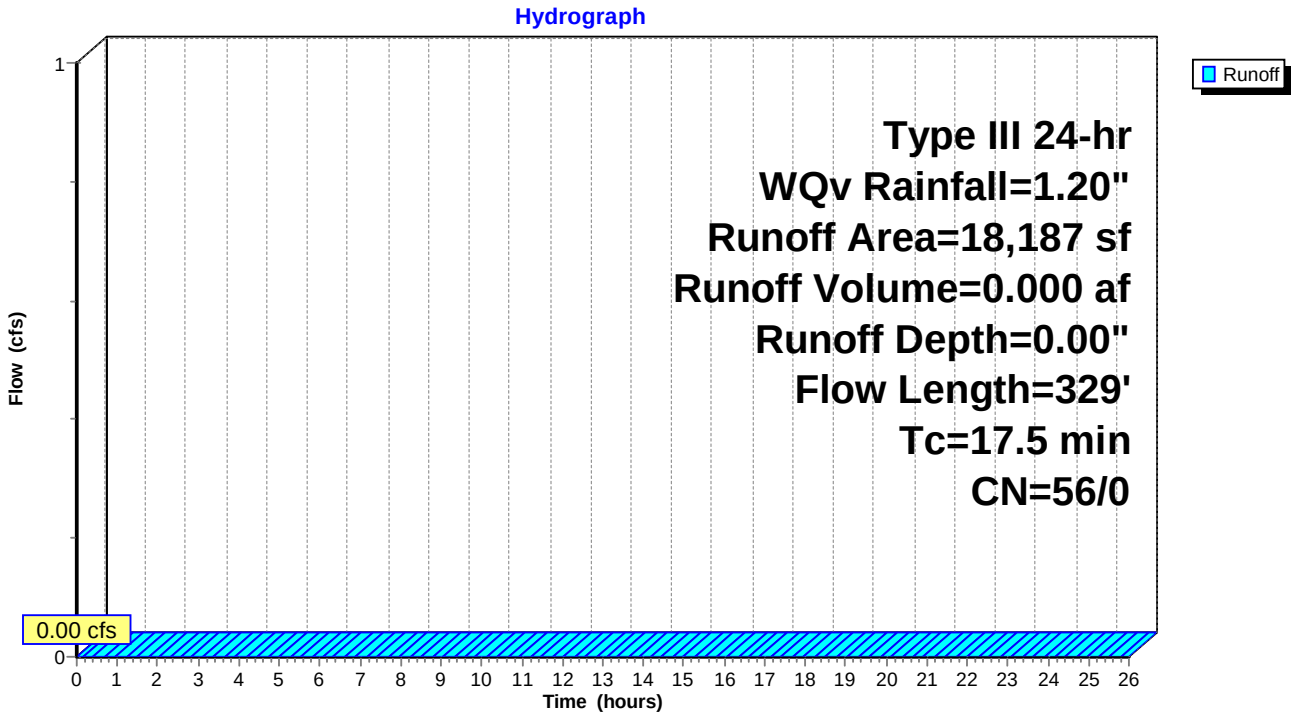
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Rainfall=1.20"

| Area (sf) | CN | Description |
|---|---|---|
| 4,002 | 61 | >75% Grass cover, Good, HSG B |
| 14,185 | 55 | Woods, Good, HSG B |
| 18,187 | 56 | Weighted Average |
| 18,187 | 56 | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 13.6 | 100 | 0.0600 | 0.12 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30" |
| 1.7 | 115 | 0.0260 | 1.13 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 2.2 | 114 | 0.0310 | 0.88 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 17.5 | 329 | Total | | | |

## Subcatchment 2S: PR-SITE



## Summary for Subcatchment 3S: PR-HOUSE-GARAGE

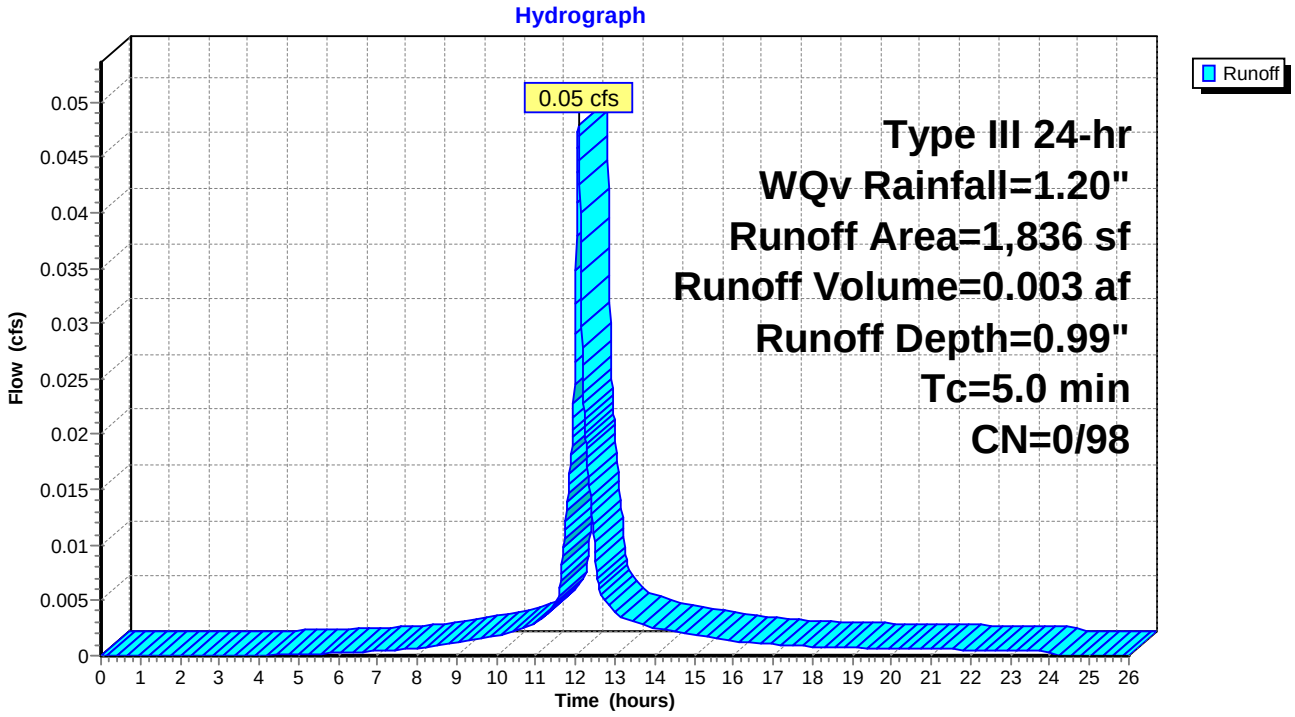
Runoff = 0.05 cfs @ 12.07 hrs, Volume= 0.003 af, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Rainfall=1.20"

| Area (sf) | CN | Description |
|---|---|---|
| 1,836 | 98 | Roofs, HSG B |
| 1,836 | 98 | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.0 | | | | | **Direct Entry, Minimum** |

### Subcatchment 3S: PR-HOUSE-GARAGE



## Summary for Subcatchment 4S: NORTH LAWN

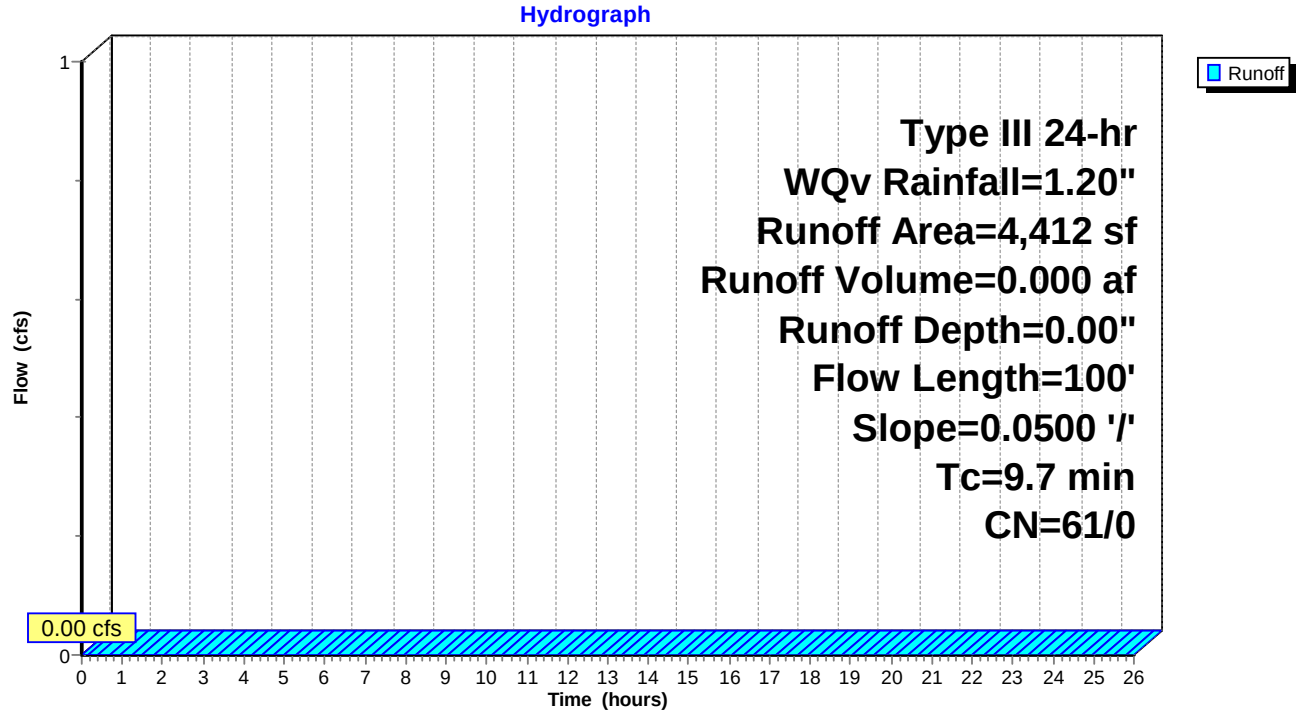
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Rainfall=1.20"

| Area (sf) | CN | Description |
|---|---|---|
| 4,412 | 61 | >75% Grass cover, Good, HSG B |
| 4,412 | 61 | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 9.7 | 100 | 0.0500 | 0.17 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30" |

## Subcatchment 4S: NORTH LAWN



## Summary for Subcatchment 5S: PR-DRIVEWAY-LAWN

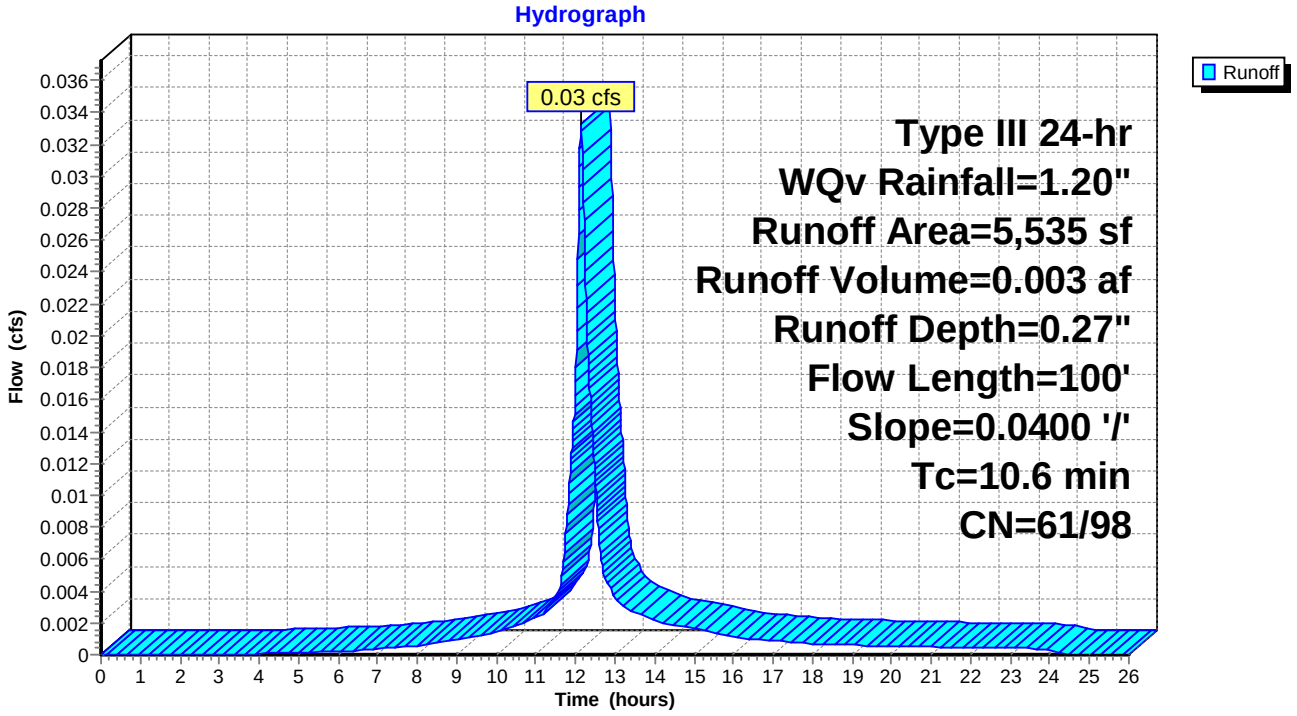
Runoff = 0.03 cfs @ 12.14 hrs, Volume= 0.003 af, Depth= 0.27"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Rainfall=1.20"

| Area (sf) | CN | Description |
|---|---|---|
| 1,535 | 98 | Paved parking, HSG B |
| 4,000 | 61 | >75% Grass cover, Good, HSG B |
| 5,535 | 71 | Weighted Average |
| 4,000 | 61 | 72.27% Pervious Area |
| 1,535 | 98 | 27.73% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 10.6 | 100 | 0.0400 | 0.16 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30" |

### Subcatchment 5S: PR-DRIVEWAY-LAWN



## Summary for Pond 3P: INFILTRATION CHAMBERS

Inflow Area = 0.042 ac,100.00% Impervious, Inflow Depth = 0.99" for WQv event
Inflow = 0.05 cfs @ 12.07 hrs, Volume= 0.003 af
Outflow = 0.01 cfs @ 11.80 hrs, Volume= 0.003 af, Atten= 84%, Lag= 0.0 min
Discarded = 0.01 cfs @ 11.80 hrs, Volume= 0.003 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 91.00' @ 12.54 hrs Surf.Area= 0.007 ac Storage= 0.001 af

Plug-Flow detention time= 33.2 min calculated for 0.003 af (100% of inflow)
Center-of-Mass det. time= 33.2 min ( 814.2 - 781.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1A | 90.60' | 0.005 af | **18.33'W x 17.50'L x 2.54'H Field A**<br>0.019 af Overall - 0.003 af Embedded = 0.015 af x 33.0% Voids |
| #2A | 91.60' | 0.003 af | **Cultec C-100HD** x 10 Inside #1<br>Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf<br>Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap<br>Row Length Adjustment= +0.50' x 1.86 sf x 5 rows |
| | | 0.008 af | Total Available Storage |

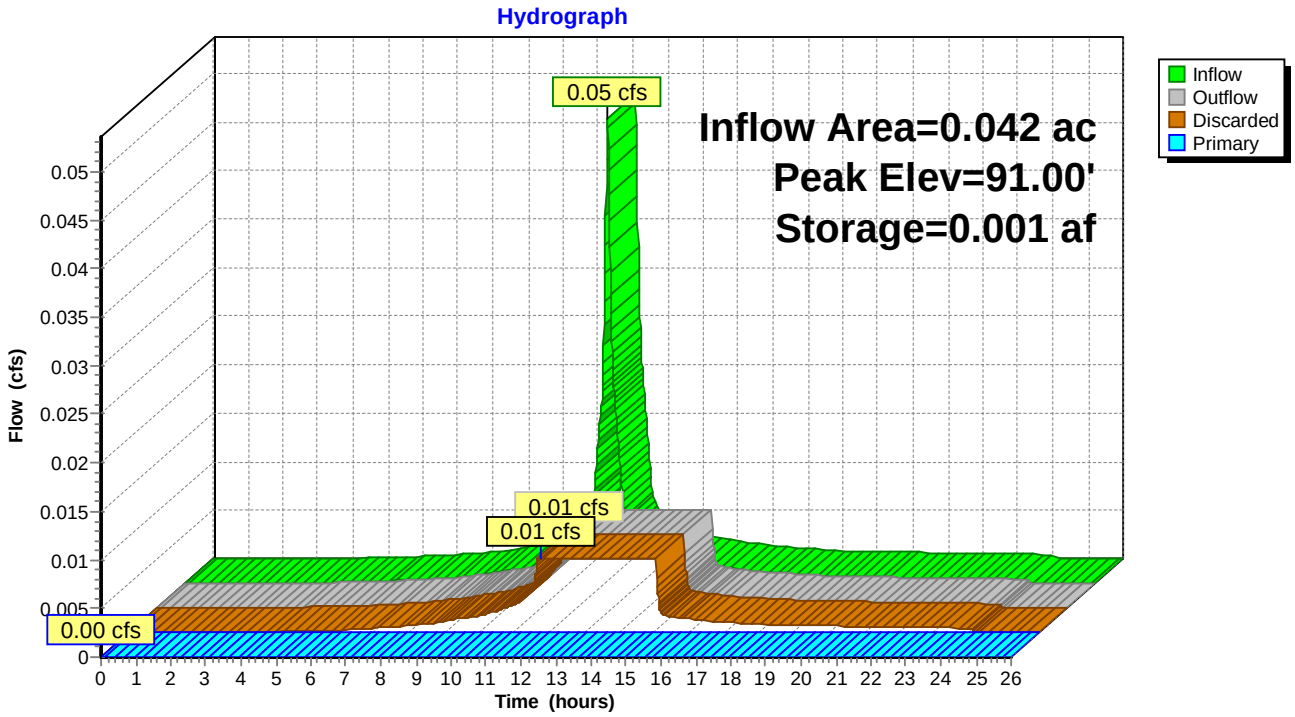
Storage Group A created with Chamber Wizard

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 90.60' | **1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01' |
| #2 | Primary | 93.10' | **8.0' long x 1.0' breadth Broad-Crested Rectangular Weir**<br>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<br>Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32 |

**Discarded OutFlow** Max=0.01 cfs @ 11.80 hrs HW=90.63' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=90.60' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Pond 3P: INFILTRATION CHAMBERS



## Summary for Pond 5P: VEGETATED SWALE

Inflow Area = 0.101 ac, 0.00% Impervious, Inflow Depth = 0.00" for WQv event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 90.00' @ 0.00 hrs Surf.Area= 205 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 90.00' | 325 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

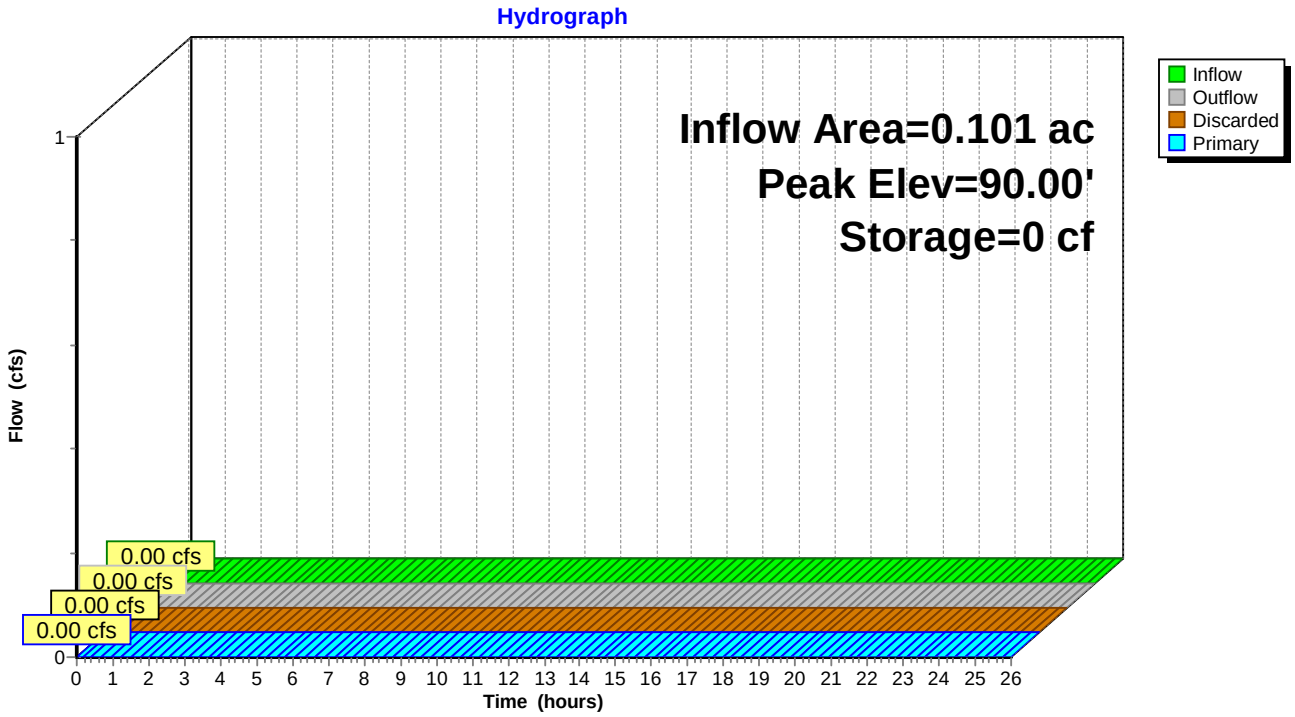
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 90.00 | 205 | 0 | 0 |
| 91.00 | 445 | 325 | 325 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 90.00' | **1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01' |
| #2 | Primary | 90.60' | **25.0' long x 0.5' breadth Broad-Crested Rectangular Weir** |
| | | | Head (feet) 0.20 0.40 0.60 0.80 1.00 |
| | | | Coef. (English) 2.80 2.92 3.08 3.30 3.32 |

**Discarded OutFlow** Max=0.00 cfs @ 0.00 hrs HW=90.00' (Free Discharge)
↑—**1=Exfiltration** ( Controls 0.00 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=90.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Pond 5P: VEGETATED SWALE



## Summary for Pond 6P: INFIL TRENCH

Inflow Area = 0.127 ac, 27.73% Impervious, Inflow Depth = 0.27" for WQv event
Inflow = 0.03 cfs @ 12.14 hrs, Volume= 0.003 af
Outflow = 0.01 cfs @ 12.03 hrs, Volume= 0.003 af, Atten= 71%, Lag= 0.0 min
Discarded = 0.01 cfs @ 12.03 hrs, Volume= 0.003 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 89.19' @ 12.54 hrs Surf.Area= 0.009 ac Storage= 0.001 af

Plug-Flow detention time= 14.3 min calculated for 0.003 af (100% of inflow)
Center-of-Mass det. time= 14.3 min ( 800.6 - 786.3 )

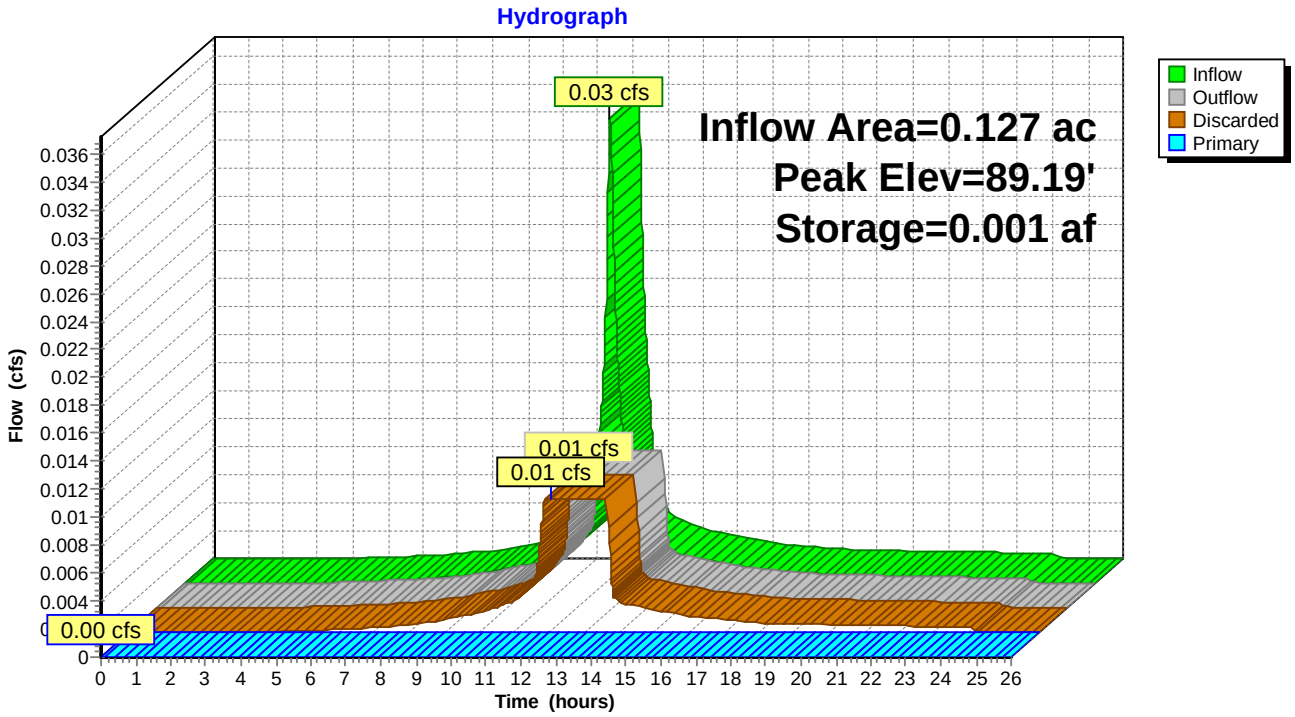
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 89.00' | 0.009 af | **5.00'W x 81.00'L x 3.00'H Prismatoid**<br>0.028 af Overall x 33.0% Voids |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 89.00' | **1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01' |
| #2 | Primary | 91.90' | **5.0' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |

**Discarded OutFlow** Max=0.01 cfs @ 12.03 hrs HW=89.03' (Free Discharge)
**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=89.00' TW=0.00' (Dynamic Tailwater)
**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Pond 6P: INFIL TRENCH

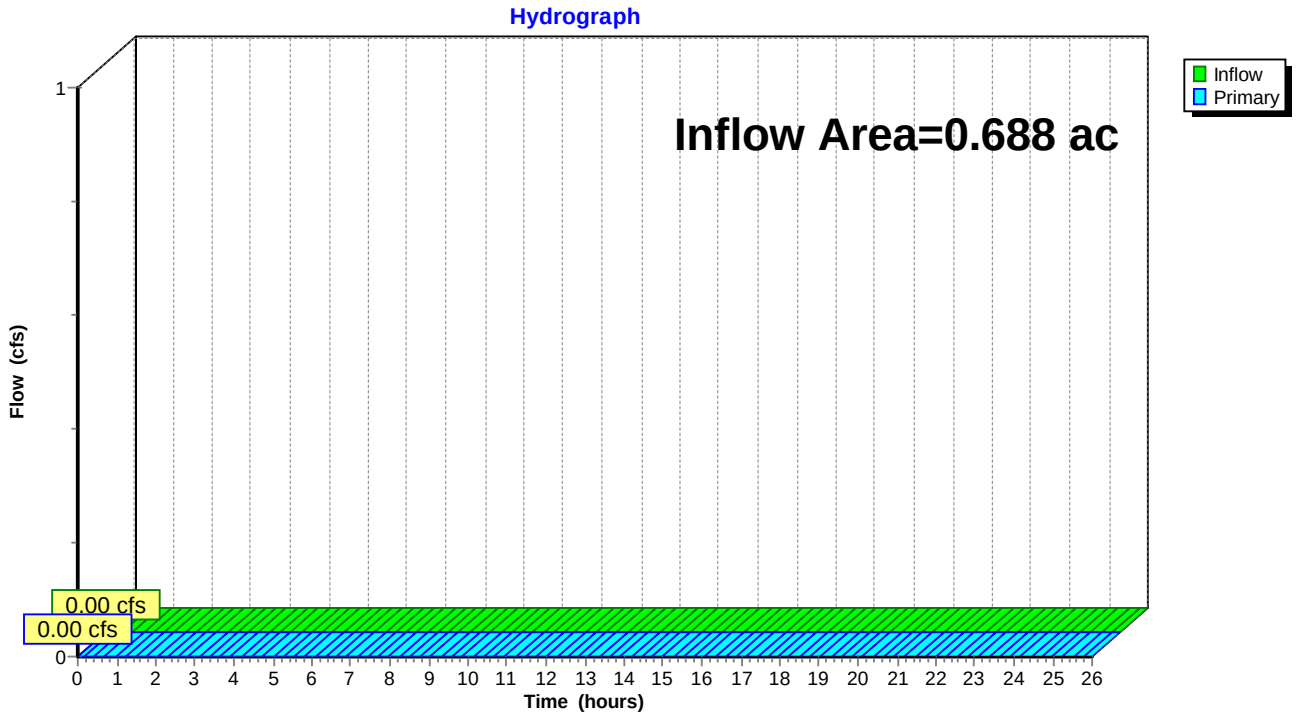


## Summary for Link 1L: TOTAL EXISTING

Inflow Area = 0.688 ac, 0.00% Impervious, Inflow Depth = 0.00" for WQv event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs

## Link 1L: TOTAL EXISTING

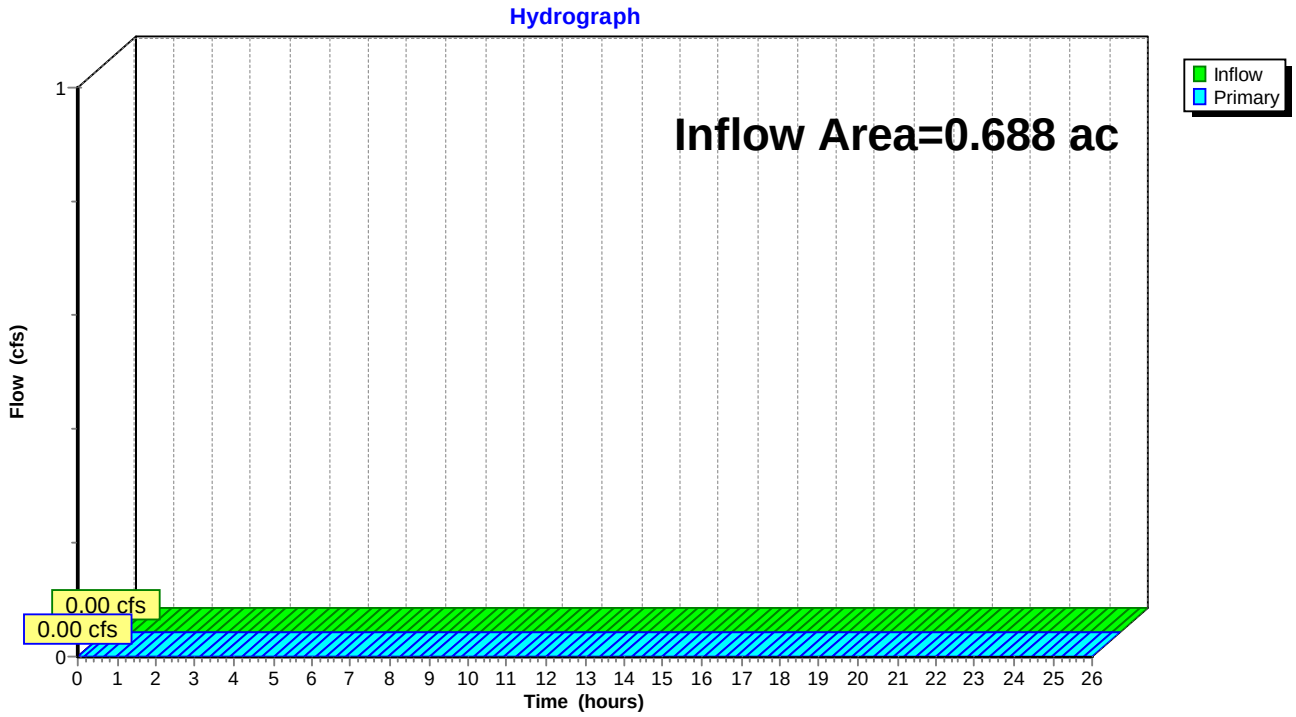


## Summary for Link 2L: TOTAL PROPOSED

Inflow Area = 0.688 ac, 11.25% Impervious, Inflow Depth = 0.00" for WQv event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs

## Link 2L: TOTAL PROPOSED



Time span=0.00-26.00 hrs, dt=0.01 hrs, 2601 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment 1S: EXISTING** Runoff Area=29,983 sf 0.00% Impervious Runoff Depth=0.14"
Flow Length=257' Tc=16.2 min CN=55 Runoff=0.02 cfs 0.008 af

**Subcatchment 2S: PR-SITE** Runoff Area=18,187 sf 0.00% Impervious Runoff Depth=0.17"
Flow Length=329' Tc=17.5 min CN=56 Runoff=0.02 cfs 0.006 af

**Subcatchment 3S: PR-HOUSE-GARAGE** Runoff Area=1,836 sf 100.00% Impervious Runoff Depth=2.57"
Tc=5.0 min CN=98 Runoff=0.12 cfs 0.009 af

**Subcatchment 4S: NORTH LAWN** Runoff Area=4,412 sf 0.00% Impervious Runoff Depth=0.29"
Flow Length=100' Slope=0.0500 '/' Tc=9.7 min CN=61 Runoff=0.01 cfs 0.002 af

**Subcatchment 5S: PR-DRIVEWAY-LAWN** Runoff Area=5,535 sf 27.73% Impervious Runoff Depth=0.65"
Flow Length=100' Slope=0.0400 '/' Tc=10.6 min CN=71 Runoff=0.07 cfs 0.007 af

**Pond 3P: INFILTRATION CHAMBERS** Peak Elev=91.82' Storage=0.004 af Inflow=0.12 cfs 0.009 af
Discarded=0.01 cfs 0.009 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.009 af

**Pond 5P: VEGETATED SWALE** Peak Elev=90.07' Storage=15 cf Inflow=0.01 cfs 0.002 af
Discarded=0.01 cfs 0.002 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.002 af

**Pond 6P: INFIL TRENCH** Peak Elev=89.73' Storage=0.002 af Inflow=0.07 cfs 0.007 af
Discarded=0.01 cfs 0.007 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.007 af

**Link 1L: TOTAL EXISTING** Inflow=0.02 cfs 0.008 af
Primary=0.02 cfs 0.008 af

**Link 2L: TOTAL PROPOSED** Inflow=0.02 cfs 0.006 af
Primary=0.02 cfs 0.006 af

**Total Runoff Area = 1.376 ac Runoff Volume = 0.032 af Average Runoff Depth = 0.28"**
**94.38% Pervious = 1.299 ac 5.62% Impervious = 0.077 ac**

Time span=0.00-26.00 hrs, dt=0.01 hrs, 2601 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment 1S: EXISTING** Runoff Area=29,983 sf 0.00% Impervious Runoff Depth=0.93"
Flow Length=257' Tc=16.2 min CN=55 Runoff=0.43 cfs 0.053 af

**Subcatchment 2S: PR-SITE** Runoff Area=18,187 sf 0.00% Impervious Runoff Depth=0.99"
Flow Length=329' Tc=17.5 min CN=56 Runoff=0.28 cfs 0.034 af

**Subcatchment 3S: PR-HOUSE-GARAGE** Runoff Area=1,836 sf 100.00% Impervious Runoff Depth=4.66"
Tc=5.0 min CN=98 Runoff=0.21 cfs 0.016 af

**Subcatchment 4S: NORTH LAWN** Runoff Area=4,412 sf 0.00% Impervious Runoff Depth=1.31"
Flow Length=100' Slope=0.0500 '/' Tc=9.7 min CN=61 Runoff=0.12 cfs 0.011 af

**Subcatchment 5S: PR-DRIVEWAY-LAWN** Runoff Area=5,535 sf 27.73% Impervious Runoff Depth=2.04"
Flow Length=100' Slope=0.0400 '/' Tc=10.6 min CN=71 Runoff=0.26 cfs 0.022 af

**Pond 3P: INFILTRATION CHAMBERS** Peak Elev=93.10' Storage=0.008 af Inflow=0.21 cfs 0.016 af
Discarded=0.01 cfs 0.012 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.012 af

**Pond 5P: VEGETATED SWALE** Peak Elev=90.61' Storage=168 cf Inflow=0.12 cfs 0.011 af
Discarded=0.01 cfs 0.009 af Primary=0.03 cfs 0.002 af Outflow=0.04 cfs 0.010 af

**Pond 6P: INFIL TRENCH** Peak Elev=91.92' Storage=0.009 af Inflow=0.26 cfs 0.022 af
Discarded=0.01 cfs 0.012 af Primary=0.05 cfs 0.004 af Outflow=0.06 cfs 0.016 af

**Link 1L: TOTAL EXISTING** Inflow=0.43 cfs 0.053 af
Primary=0.43 cfs 0.053 af

**Link 2L: TOTAL PROPOSED** Inflow=0.28 cfs 0.040 af
Primary=0.28 cfs 0.040 af

**Total Runoff Area = 1.376 ac Runoff Volume = 0.137 af Average Runoff Depth = 1.19"**
**94.38% Pervious = 1.299 ac 5.62% Impervious = 0.077 ac**