DiPrete Engineering

Project # 0809-003-B08

March 17, 2026

Stormwater Management Report

70 Houghton St, Providence, RI

Assessors Plat 78, Lot 457

Applicant:

College Hill Development, LLC
10 Greene Street
Providence, RI 02904

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Executive Summary

On behalf of the Client, we are submitting drainage calculations for the proposed development at 70 Houghton Street in Providence, Rhode Island. The site is located on Assessors' Plat 78 Lot 457 and is the former location of an American Tourister manufacturing facility. The site is currently an undeveloped vacant lot that contains a large stockpile of clean embankment material from the relocation of Route 195 as well as other piles of construction/building debris that were transported to this location from other areas. Numerous subsurface explorations over the past decade have revealed various contaminants from the former manufacturing use that have been mapped and evaluated by SAGE Environmental. The client proposes to cap the existing land with impervious material and clean embankment fill sourced from the site, followed by the construction of seven (7) commercial buildings along with associated parking areas, roadways, and utility infrastructure.

The post development stormwater will be treated for water quality using Best Management Practices (BMPs). Pre-application meetings between SAGE Environmental, RIDEM, and DiPrete Engineering identified areas within the site that are suitable for infiltrating BMPs. The Site has been designed to meet the Rhode Island Stormwater Design and Installation Standards Manual (RISDISM).

To mitigate post development flows on site, a closed drainage system, a sediment forebay, a proprietary pretreatment device (Cascade Separator), and infiltration ponds are proposed. These will remove 85% or more of TSS (total suspended solids) generated by the proposed parking areas and access roads.

This report details how the site will show no net increase for all design points in stormwater runoff from pre-development to post-development conditions, and how the proposed BMPs will provide water quality treatment for stormwater runoff.

Pre-development flow rates versus post-development flow rates for each watershed are summarized below:

Subwatershed (design point)	1-yr Peak Flow		10-yr Peak Flow		100-yr Peak Flow	
	Pre	Post	Pre	Post	Pre	Post
DP-1:	3.61	0.22	17.68	10.27	49.06	46.15
DP-2:	0.60	0.10	2.02	0.64	4.85	1.93
DP-3:	0.52	0.51	1.94	1.61	6.00	5.98
Totals:	4.73	0.83	21.64	12.52	59.91	54.06

All flows in cubic feet per second (cfs)

As shown above, the project will not result in any net increases in flow rates to any of the design points.

1.0 Project Description

The purpose of this report is to specify a Stormwater Management System to be implemented in the new Project at 70 Houghton St, Providence, Rhode Island. The site totals 9.07 ac and is located on Assessor's Plat 078 Lot 457 in Providence, Rhode Island. Located off Houghton St, just beyond its intersection with Veazie Street, the site is bordered to the southwest by an adjacent property that serves as a buffer between the project area and both Wanskuck Pond and the West River. There are also isolated wetlands on the property, one of which is located in the northeastern portion of the site and has been included in the drainage analysis.

The proposed development will include seven (7) commercial buildings totaling 99,638 sf with associated parking and site improvements. The project will be serviced by public water and sewer. Water is provided by Providence Water and Sewer is provided by the Narragansett Bay Commission.

The stormwater quality will be improved by utilizing Best Management Practices (BMPs) as established by the RISDISM for the treatment of stormwater runoff from the proposed development. A closed drainage system will convey runoff to the BMPs, which will consist of sediment forebays, a proprietary pretreatment device, and infiltration ponds. The systems have been designed to meet the RIDEM Stormwater Design and Installations Standards Manual.

2.0 Site Conditions

2.1 SOILS

There are the following soil types within the analyzed area of the Site as mapped by the NRCS USDA Soil Conservation service:

Soil Symbol	Description	Hydrologic Group
CaD	Canton-Charlton-Rock outcrop complex, 15 to 35 percent slopes	B
UD	Udorthents-Urban land complex	None
Ur	Urban land	None

The onsite soils are Urban Land and Udorthents-Urban land complex which does not belong to a Hydrologic Group. Soils surrounding the site include CaD – Canton-Charlton-Rock outcrop complex. CaD is Hydrologic Group B soil. Onsite test holes indicated loamy sand onsite. Hydrologic Group B has been used for modeling a majority of the site.

Site specific soil evaluations can be found in Appendix A2.1.

2.2 EXISTING SITE CONDITIONS

The site is a previously developed lot, formerly occupied by an American Tourister Factory that was destroyed in a fire and has since been demolished. The former manufacturing use and subsequent fire have left behind several contaminants in varying concentrations across the area. The classifications,

locations, and concentrations of these contaminants have been analyzed over time and have been recently compiled into a map and associated report by SAGE Environmental. The parcel is currently vacant and undeveloped.

There are a variety of stockpiled fill materials located across the site. Centrally located on the lot is a large stockpile of clean, sandy fill material originating from the demolition of Route 195. This material, primarily embankment-quality backfill, is of good structural integrity and is intended for reuse in the proposed project build. The Rhode Island Department of Environmental Management (RIDEM) granted approval for the placement of approximately 35,000 cubic yards of this material on-site, with the intent of it being used in future construction. This approval was issued on January 12, 2010 as part of a remedial action work plan (RAWP) intended for future redevelopment of the parcel.

To the north-east of this central stockpile is additional construction debris and fill material that was imported to the site in recent years. Some of this material has been found to be contaminated. However, SAGE Environmental had filed an application for a Beneficial Use Determination (BUD) for this material. The BUD application has been approved for use, which will allow the material to remain on-site under regulated conditions.

Stormwater from the site drains off in multiple directions, resulting in three (3) design point considerations: the West River, Houghton Street, and the northeastern isolated wetland. Runoff tributary to the West River flows towards and eventually discharges into the Providence River, which ultimately drains into Narragansett Bay. Stormwater flowing towards Houghton Street is collected by a City-owned MS4 and is also discharged to the West River. Stormwater tributary to the northeastern isolated wetland remains on-site and presumably infiltrates into the ground.

None of the stormwater on either site is treated or detained before being discharged to the West River.

2.3 POST SITE CONDITIONS

The proposed drainage analysis uses stormwater management systems to control and treat runoff from the proposed development. The following BMP's are used on site and have been designed to include the following elements:

- Sediment Forebay
    - Pretreatment of roadways and sidewalks
    - 2.0' forebay depth with proposed 2:1 and 1:1 reinforced slopes.
    - The water quality storm is directed to the sand filters while other storms are bypassed within sediment forebay to the infiltration pond.
        - Equipped with primary flow to the water quality BMP.
        - Equipped with secondary weir for larger stormwater events to infiltration pond
            - Velocities < 2 ft/sec over weir from Sediment Forebay to the QP BMP.
- Cascade Separator
    - Pretreatment of roadways and sidewalks
    - Upstream bypass structure directs water quality storm volume to the Cascade unit while other storms are bypassed to primary infiltration pond
- Water Quality Infiltration Pond
    - Fully filters the water quality stormwater event through native soils.
    - Fully infiltrates Channel Protection Volume (CPv)
- Peak Mitigation Infiltration Pond
    - Fully infiltrates Channel Protection Volume (CPv)
    - Provides Overbank Flood Protection (Qp) for the 2-100 year storm events.

The above elements will be used to meet the design standards of the Rhode Island Stormwater Design and Installation Standard.

The primary goal of increasing water quality treatment is accomplished by providing water quality BMPs. Stormwater runoff mitigation is provided through the use of sediment forebays, sand filters, and infiltration ponds. Flow rates will be reduced in post-development conditions to levels no greater than the predevelopment rates for the West, Houghton Street, and on-site wetlands, which ensures that any potential impacts from the proposed development of the abutting properties/wetlands have been mitigated.

3.0 Minimum Standards

The site has been designed to meet the minimum standards as outlined in the Rhode Island Stormwater Design and Installation Standards Manual (RISDISM). The following sections outline how the site meets and exceeds the minimum required standards.

3.1 Minimum Standard 1: LID Site Planning and Design Strategies

See "Appendix A: Stormwater Management Checklist" from the RISDISM provided at the beginning of this report.

3.2 Minimum Standard 2: Groundwater Recharge

Groundwater is to be recharged per watershed based on impervious area coverage in accordance with section 3.2.2 of the RISDISM.

Groundwater recharge is determined from the following equation:

$Re_V = 1" * F * I / 12$

Where:

Re_V=Groundwater Recharge Volume (cf)

F=Recharge Factor based on Hydrologic Soil Groups (HSG) (see table below)

I=Impervious Area (sf)

HSG	Recharge Factor (F)
A	0.60
B	0.35
C	0.25
D	0.10

Recharge volume for the site is provided through the use of infiltration ponds.

Some of the site contains contaminated soils, which limits locations for infiltration opportunities. However, in accordance with RISDISM 3.2.8, infiltration is allowed where runoff has been adequately treated for pollutants of concern. SAGE Environmental conducted a site-specific evaluation and identified feasible areas for limited infiltration. Based on their findings, surface-level infiltration ponds are proposed to treat the water quality volume, fully infiltrate the channel protection volume, and provide peak mitigation for larger storm events. Refer to Appendix 3.1 for the full SAGE Environmental report.

The required recharge volume is based on all impervious areas, not just areas which are captured in the proposed BMPs.

See Appendix A3.2 for the water quality storm HydroCAD analysis. The water quality storm is calculated in HydroCAD using the 'calculate separate Pervious/Impervious runoff' option.

3.3 Minimum Standard 3: Water Quality

All stormwater is treated through an approved BMP before being discharged. The BMP treatment train includes the use of sand filters to treat the water quality volume prior to discharge to the infiltration basin that is used for peak runoff rate mitigation. The site's BMPs ultimately discharge to the West River which has a TMDL for Enterococcus. This pollutant of concern is removed via infiltration.

Water Quality Infiltration Ponds

Smaller infiltration ponds have been designed as water quality systems. Each of the WQ infiltration ponds has upstream means of bypassing larger storms around these systems. Pretreatment for the WQ infiltration ponds have been provided by either a sediment forebay or a Cascade Separator. The forebay has been sized per section 6.4 of the RISDISM, see the table below. The water quality storm is calculated in HydroCAD using the 'calculate separate Pervious/Impervious runoff' option.

BMP	Total Watershed Area (acres)	Impervious (acres)	Required Forebay Volume (cf)	Provided Forebay Volume (cf)	Required As (sf)	Provided As (sf)
Pond A	6.098	3.278	2,668	0	178	0

The proposed water quality infiltration ponds have been sized to fully infiltrate the water quality volume.

3.4 Minimum Standard 4: Conveyance and Natural Channel Protection

3.4.1 Drainage Network Design Parameters:

A. PIPES

- All drainage pipes are HDPE or equivalent unless otherwise noted.
- Manning's coefficient = 0.012 for HDPE Pipe
- Diameters & lengths as specified
- The 100-year design storm is utilized for the drainage pipe design to ensure that the drainage system contains and channels water to the BMP areas as shown on the plans.
- The rational method has been used for the closed drainage system.

B. STRUCTURES

- Catch basins – Pre-cast concrete with 4' sump unless otherwise noted and inverts as specified
- Manholes – Pre-cast concrete with inverts as specified.

C. OPEN CHANNELS SYSTEMS (SWALES)

- All open channels systems shall be grass channels unless otherwise noted
- Manning's coefficient =0.030
- Width, depth, slope and side slopes as noted on plans.
- The 100-year design storm is utilized for the open channel design to ensure that the drainage system contains and channels water to the BMP areas as shown on the plans.
- HydroCAD has been used to model the swales. See Appendix A3.5.4.4.

3.4.2 Channel Protection Volume:
The site has been designed to fully infiltrate the channel protection volume. The channel protection required has been met.

See Appendix A3.5.4.2 for the 1-year storm event HydroCAD analysis.

3.5 Minimum Standard 5: Overbank Flood Protection & Downstream Analysis

3.5.1 Method of Analysis

USDA Soil Conservation Service Method as defined by Technical Release No. 20 (TR-20) determines Stormwater runoff rate and volume. Type III rainfall distribution is utilized. Time of concentration is determined using Technical Release No 55 (TR-55) methodology, through the computer program *HydroCAD ver. 10.0* by HydroCAD Software Solutions LLC.

Infiltration ponds have been modeled in HydroCAD with 1.02 inches/hr infiltration rates per table 5-3 in section 5.3.4 of the RISDISM. Soil evaluations have been performed by DiPrete Engineering. The existing soil has a texture of sandy loam. Based on table 5-3 in section 5.3.4 of the RISDISM underlying soils have the same infiltration rate. The drainage system has been designed to mitigate all stormwater flows for the 10- and 100-year storm events. The emergency outlets have been sized to handle the 100-year storm event.

3.5.2 Design Storm

Analysis of 1-year, 10-year, and 100-year frequency storms are included. The following 24-hour rainfall intensities are obtained from the Rhode Island Stormwater Design and Installation Standards Manual, Table 3-1 for Providence County.

1 year =	2.7 inches
10 year =	4.9 inches
100 year=	8.7 inches

3.5.3 Design Point Breakdown

The site is analyzed as three (3) watershed areas. In the pre-development stage there are three (3) sub catchments. In the post development stage, there are seventeen (17) sub catchments. All watersheds will demonstrate zero increase of runoff due to the proposed development A description of each watershed and associated sub catchments are summarized as follows, for cover types see color watershed maps located in back of this report. Numbers in parentheses ( ) indicate the HydroCAD Node Number.

<u>Design Point 1 - West River:</u>

Watershed #1 flows to Design Point 1, which is the West River (DP-1). This watershed consists of the majority of on-site and off-site areas.

In pre-development conditions there is only one watershed to Design Point 1.

Pre-01 (10) contains the largest amount of impervious area and gravel areas on site. Stormwater flows overland southeast to an offsite wetland ultimately tributary to West River (DP-1).

In post development conditions there are 14 sub watersheds:

Post-01 (100) collects runoff from offsite upstream area utilizing a proposed 18'' Nyloplast yard drain (101) that bypasses the proposed site and discharges flows to the West River (DP-1).

Post-02 (102) contains an area located downstream of the project site, adjacent to the southwestern boundary and abutting the existing wetland and the West River. This area includes the southern extent of the project's LOD, where stormwater flows overland directly to DP-1 West River.

Post-03 (103) collects runoff from a portion of the upstream off-site area via an 18" Nyloplast yard drain. This system, along with a series of connecting pipes and structures, conveys runoff from parking areas, roadways, and landscaped surfaces in the northwest portion of the site to a bypass manhole (104) that diverts the water quality storm runoff to Water Quality Infiltration Pond A (123) and bypasses runoff from larger storm events to QP Infiltration Pond C (110). Runoff reaches the West River (DP-1) via infiltration through groundwater and by overland flow when the infiltration ponds overflow.

Post-04 (107) and Post-05 (108) represent the roof areas of Building #4 and Building #1, respectively. These building roofs drain directly to QP Infiltration Pond C (110) via dedicated drain lines. Runoff reaches the West River (DP-1) via infiltration through groundwater and by overland flow when the infiltration ponds overflow.

Post-06 (106) is the drainage area directly tributary to WQ Infiltration Pond A (123). In larger storm events, runoff collected in WQ Infiltration Pond A overflows to the West River (DP-1) via overland flow.

Post-07 (111) accounts for the parking areas, a portion of roadway, and landscaping areas abutting Building #1. Runoff is collected in a closed drainage system and conveyed to Forebay B (113). Forebay B discharges the water quality volume to WQ Infiltration Pond B (115), and bypasses runoff from larger storm events to QP Infiltration Pond C (110). In larger storm events, QP Infiltration Pond C overflows and runoff reaches the West River (DP-1) via overland flow.

Post-08 (112) is the drainage area directly tributary to Forebay B (113). This forebay bypasses larger storms to QP Infiltration Pond C (110) which ultimately discharges runoff to the West River (DP-1) via overland flow.

Post-09 (114) is the drainage area directly tributary to WQ Infiltration Pond B (115). Runoff reaches the West River (DP-1) via infiltration into groundwater.

Post-10 (1109) is the drainage area directly tributary to QP Infiltration Pond C (110), which ultimately discharges runoff to the West River (DP-1) via groundwater infiltration and overland flow.

Post-11 (116) is the drainage area directly tributary to the designed Swale (120). This Swale (120) also collects roof runoff from the buildings represented by Post-12 (117), Post-13 (118) and Post-14 (119). Runoff from the swale is discharged to WQ Infiltration Pond A (123), which discharges stormwater to the West River (DP-1) via groundwater infiltration and overland flow.

Below is a summary of the hydrologic parameters for the pre and post development sub-areas in Design Point 1:

	Area (acres)	CN	Tc (min)
Pre-1	11.051	68	13.7
Post-01	2.522	58	12.2
Post-02	0.561	61	6.0
Post-03	3.987	81	18.1
Post-04	1.103	98	6.0
Post-05	0.207	98	6.0
Post-06	0.309	67	6.0
Post-07	0.454	89	6.0
Post-08	0.092	61	6.0
Post-09	0.090	61	6.0
Post-10	0.460	68	6.0
Post-11	0.547	60	22.3
Post-12	0.207	98	6.0
Post-13	0.207	98	6.0
Post-14	0.207	98	6.0

Design Point 2 – Houghton Street:

Watershed #2 flows to Design Point 2 (DP-2), which is Houghton Street. This watershed consists of the eastern and southeastern portion of the site. Runoff reaches Houghton Street via overland flow, where it is collected by a public storm drainage system and discharged east towards the West River.

In predevelopment conditions there is only one watershed to Design Point 2:

Pre-02 (20) contains impervious areas from the existing drive aisle and sparsely vegetated gravel areas from the existing stockpiles of debris on site. Stormwater flows overland southwest to Design Point 2 (DP-2).

In post development conditions there is one sub watershed:

Post-15 (200) contains landscaped areas and a small portion of roadway along the southeast property line that cannot be captured in the proposed drainage system due to incompatible elevations. Runoff from this catchment area reaches Houghton Street (DP-2) via overland flow.

Below is a summary of the hydrologic parameters for the pre and post development sub-areas in Design Point 2:

	Area (acres)	CN	Tc (min)
Pre-02	0.955	75	14.5
Post-15	0.473	65	13.9

Design Point 3 – Northeastern Wetland:

Watershed #3 flows to Design Point 3 (DP-3), which is the A-Series wetland located in the northeastern portion of the site. This wetland is bordered by several stockpiles of construction debris and other human-transported materials on its southern side that will be removed during construction.

In predevelopment conditions there are two watersheds to Design Point 3 (DP-3).

Pre-03 (30) contains both off-site and on-site run-on areas tributary to the wetland. Runoff from this catchment reaches the wetland via overland flow.

Pre-04 (31) represents the wetland itself.

In post development conditions there are two sub watersheds:

Post-16 (300) consists of re-graded and reseeded wetland buffer zones, as well as upstream off-site tributary areas. Runoff from this catchment reaches the wetland via overland flow.

Post-17 (301) represents the wetland itself.

Below is a summary of the hydrologic parameters for the pre and post development sub-areas in Design Point 3:

	Area (acres)	CN	Tc (min)
Pre-03	1.370	58	12.3
Pre-04	0.441	77	0.0
Post-17A	1.957	50	12.3
Post-17B	0.435	77	0.00

3.5.4 Q_p BMP Calculations

The section includes calculations for each Qp BMP for the site. Calculations include Rip Rap Aprons and the Emergency Outlet Calculations.

The overflow weir outlets for Infiltration Ponds C and D have been sized to safely pass the 100 year storm and beyond without erosion or overtopping the embankment and maintain a minimum of one foot of freeboard. Sand filters A and B have been designed with emergency overflow outlets. Under normal conditions, no stormwater will flow over the emergency spillways for sand filters A and B.

Basin	Q(cfs)	V (ft/s)	Top of Basin	Flood Elevation
Infiltration Pond C	29.33	2.60	62.0’	60.93’
Infiltration Pond D	6.50	1.73	68.0’	66.86’

The velocity over the spillway is less than 3 ft/s thus no erosion will take place on the embankment or downstream. See attached HydroCAD.

Outlet Protection

The rip rap aprons are designed to prevent scour at the storm water outlet and to minimize the potential for downstream erosion by reducing the velocity of concentrated storm water flows.

Name	Discharge (cfs)	Do (ft)	Length (ft)	TW (ft)	Width (ft)	d-50 (in)	Riprap Class
FES-12	19.5	2.00	28	0.80	34	6	R-3
FES-14	5.4	1.25	17	0.50	21	3	R-2
FES-21	8.1	1.50	20	0.60	25	4	R-2
FES-24	5.70	1.25	17	0.50	21	4	R-2

3.5.5 Downstream Analysis

A downstream analysis is required under the following conditions:

Area of Disturbance (Acres)	Impervious Cover (%)
>5 to 10	>75
>10 to 25	>50
>25 to 50	>25
>50	All Projects

The proposed project disturbs 8.65 acres and is 4.68 acres of impervious. This is approximately 54% impervious cover. A downstream analysis is not required.

3.5.6 Overbank Flood Protection Conclusion

The tables below presents a summary of the predevelopment flows vs. the mitigated post development flows. The table shows a decrease in the rate of runoff for all storms included in the analysis.

Pre Development Flows vs. Post Development Flows Mitigated
Watershed #1: (DL-1)Watershed #1: (DP-1)
Pre development Conditions versus Post Development Conditions Flow Rates for each watershed are summarized below:

Subwatershed (design point)	1-yr Peak Flow		10-yr Peak Flow		100-yr Peak Flow	
	Pre	Post	Pre	Post	Pre	Post
DP-1:	3.61	0.22	17.68	9.63	49.06	43.69
DP-2:	0.60	0.10	2.02	0.64	4.85	1.93
DP-3:	0.52	0.51	1.94	1.61	6.00	5.98
Totals:	4.73	0.83	21.64	11.88	59.91	51.60

All flows in cubic feet per second (cfs)

3.6 Minimum Standard 6: Redevelopment and Infill Projects.
The site is not classified as a redevelopment or infill project.

3.7 Minimum Standard 7: Pollution Prevention
A Soil Erosion and Sediment Control Plan (SESC) for this development can be found under a separate document. See the Soil Erosion and Sediment Control Plan for the development prepared by DiPrete Engineering. The SESC contains information for construction pollution prevention. For post construction pollution prevention see the Operations and Maintenance (O&M) document prepared for this development by DiPrete Engineering.

3.8 Minimum Standard 8: Land Uses with High Potential Pollutant Loads (LUHPPLs)
The site is not considered a LUHPPL.

3.9 Minimum Standard 9: Illicit Discharges
There are no proposed Illicit Discharges on site. The site will be serviced by public water and sewer.

3.10 Minimum Standard 10: Construction Activity Soil Erosion, Runoff and Sedimentation and Pollution Prevention Control Measure Requirements
See the SESC for this development prepared by DiPrete Engineering.

3.11 Minimum Standard 11: Stormwater Management System Operation and Maintenance
See the O&M for this development prepared by DiPrete Engineering.

Appendix A

A2.1 Soil Evaluations

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment System Program

Site Evaluation Form
Part A – Soil Profile Description Application Number N/A

Property Owner: Stor-More RI LLC
Property Location: 550 Veazie Street, Providence, RI (Plat 78, Lots 450 & 451)
Date of Test Hole: May 6, 2016
Soil Evaluator: Chris Sutter License Number: D-4077
Weather: Clear, 70's Shaded: Yes ☐ No ☑ Time:

TH 1 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox		Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.					
HTM1	0-12"	C	S					loamy			Fill
HTM2	12-46"							sandy			Fill
R	46"										
TH 2 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox		Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.					
HTM	0-20"	C	S								Fill
C1	20-50"	C	S	2.5Y 5/4				cos	0-sg	L	1
C2	50-60"	C	S	2.5Y 5/3				vfs	0-m	vfr	7
C3	60-90"			2.5Y 4/3				gls	0-m	fri	6
R	90"										

TH 1 Soil Class HTM Total Depth 46" Impervious/Limiting Layer Depth 46" (og) GW Seepage Depth NA SHWT NA (og)

TH 2 Soil Class Ab. Till Total Depth 90" Impervious/Limiting Layer Depth 90" (og) GW Seepage Depth NA SHWT 90" (og)

Comments:

Revised 1/31/14

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment System Program

Site Evaluation Form
Part A – Soil Profile Description Application Number _____

Property Owner: Stor-More RI LLC
Property Location: 550 Veazie Street, Providence, RI (Plat 78, Lots 450 & 451)
Date of Test Hole: May 6, 2016
Soil Evaluator: Chris Sutter License Number: D-4077
Weather: Clear, 70's Shaded: Yes ☐ No ☑ Time: _____

TH 3 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
HTM	0-12"	C	S									
C	12-120"			2.5Y 5/3					vgcos	0-sg	L	1

TH 4 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
HTM	0-12"	C	S									
C	12-72"			2.5Y 5/4					cos	0-sg	L	1
R	72"											

TH 3 Soil Class Ab. Till Total Depth 120" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT >120" (og)

TH 4 Soil Class Ab. Till Total Depth 72" Impervious/Limiting Layer Depth 72" (og) GW Seepage Depth 72" SHWT 72" (og)

Comments: _____

A3.1 SAGE Infiltration Evaluation Report

A3.2 Water Quality HydroCAD Storm Analysis

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 10: Pre-01 Runoff Area=11.051 ac 1.26% Impervious Runoff Depth=0.03"
Flow Length=587' Tc=13.7 min CN=68/98 Runoff=0.12 cfs 0.024 af

Subcatchment 20: Pre-02 Runoff Area=0.955 ac 11.30% Impervious Runoff Depth=0.15"
Flow Length=718' Tc=14.5 min CN=72/98 Runoff=0.09 cfs 0.012 af

Subcatchment 30: Pre-03 Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=750' Tc=12.3 min CN=58/0 Runoff=0.00 cfs 0.000 af

Subcatchment 31: Pre-04 Runoff Area=0.441 ac 0.00% Impervious Runoff Depth=0.10"
Tc=0.0 min CN=77/0 Runoff=0.02 cfs 0.004 af

Link DP-1: DP-1 West River Inflow=0.12 cfs 0.024 af
Primary=0.12 cfs 0.024 af

Link DP-2: DP-2 Houghton St Inflow=0.09 cfs 0.012 af
Primary=0.09 cfs 0.012 af

Link DP-3: DP-3 NE Wetland Inflow=0.02 cfs 0.004 af
Primary=0.02 cfs 0.004 af

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 100: Post-01 Runoff Area=2.523 ac 3.96% Impervious Runoff Depth=0.04"
Flow Length=532' Tc=12.2 min CN=56/98 Runoff=0.09 cfs 0.008 af

Pond 101: YD-18 Peak Elev=78.01' Storage=2 cf Inflow=0.09 cfs 0.008 af
Outflow=0.09 cfs 0.008 af

Subcatchment 102: Post-02 Runoff Area=0.561 ac 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=61/0 Runoff=0.00 cfs 0.000 af

Subcatchment 103: Post-03 Runoff Area=3.987 ac 58.21% Impervious Runoff Depth=0.57"
Flow Length=930' Tc=18.1 min CN=57/98 Runoff=1.80 cfs 0.191 af

Pond 104: Bypass-11 Peak Elev=66.53' Inflow=1.80 cfs 0.191 af
Primary=1.80 cfs 0.191 af Secondary=0.00 cfs 0.000 af Outflow=1.80 cfs 0.191 af

Pond 105: Cascade (CS-5) Peak Elev=65.58' Inflow=1.80 cfs 0.191 af
15.00" Round Culvert n=0.012 L=40.0' S=0.0480 '/' Outflow=1.80 cfs 0.191 af

Subcatchment 106: Post-06 Runoff Area=0.309 ac 0.02% Impervious Runoff Depth=0.01"
Tc=6.0 min CN=67/98 Runoff=0.00 cfs 0.000 af

Subcatchment 107: Post-04 Runoff Area=1.103 ac 100.00% Impervious Runoff Depth=0.99"
Tc=6.0 min CN=0/98 Runoff=1.21 cfs 0.091 af

Subcatchment 108: Post-05 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=0.99"
Tc=6.0 min CN=0/98 Runoff=0.23 cfs 0.017 af

Subcatchment 109: Post-10 Runoff Area=0.460 ac 0.00% Impervious Runoff Depth=0.01"
Tc=6.0 min CN=68/98 Runoff=0.00 cfs 0.001 af

Pond 110: QP Infiltration Pond C Peak Elev=57.50' Storage=2,173 cf Inflow=1.43 cfs 0.108 af
Discarded=0.11 cfs 0.108 af Primary=0.00 cfs 0.000 af Outflow=0.11 cfs 0.108 af

Subcatchment 111: Post-07 Runoff Area=0.454 ac 74.44% Impervious Runoff Depth=0.73"
Tc=6.0 min CN=61/98 Runoff=0.37 cfs 0.028 af

Subcatchment 112: Post-08 Runoff Area=0.092 ac 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=61/0 Runoff=0.00 cfs 0.000 af

Pond 113: Forebay B Peak Elev=60.02' Storage=1,354 cf Inflow=0.37 cfs 0.028 af
Primary=0.27 cfs 0.028 af Secondary=0.00 cfs 0.000 af Outflow=0.27 cfs 0.028 af

Subcatchment 114: Post-09 Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=61/0 Runoff=0.00 cfs 0.000 af

Pond 115: WQ Infiltration Pond B Peak Elev=59.73' Storage=563 cf Inflow=0.27 cfs 0.028 af
Discarded=0.02 cfs 0.028 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.028 af

Subcatchment 116: Post-11 Runoff Area=0.547 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=655' Tc=22.3 min CN=60/0 Runoff=0.00 cfs 0.000 af

Subcatchment 117: Post-12 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=0.99"
Tc=6.0 min CN=0/98 Runoff=0.23 cfs 0.017 af

Subcatchment 118: Post-13 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=0.99"
Tc=6.0 min CN=0/98 Runoff=0.23 cfs 0.017 af

Subcatchment 119: Post-14 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=0.99"
Tc=6.0 min CN=0/98 Runoff=0.23 cfs 0.017 af

Reach 120: Swale Avg. Flow Depth=0.15' Max Vel=1.54 fps Inflow=0.68 cfs 0.051 af
n=0.030 L=510.0' S=0.0150 '/' Capacity=102.94 cfs Outflow=0.58 cfs 0.051 af

Pond 121: Headwall (HW-22) Peak Elev=69.66' Inflow=0.58 cfs 0.051 af
Outflow=0.58 cfs 0.051 af

Pond 122: DMH-23 Peak Elev=67.47' Inflow=0.58 cfs 0.051 af
15.00" Round Culvert n=0.012 L=46.0' S=0.0896 '/' Outflow=0.58 cfs 0.051 af

Pond 123: WQ Infiltration Pond A Peak Elev=65.14' Storage=6,649 cf Inflow=2.26 cfs 0.242 af
Discarded=0.09 cfs 0.242 af Secondary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.242 af

Subcatchment 200: Post-15 Runoff Area=0.473 ac 19.31% Impervious Runoff Depth=0.19"
Flow Length=518' Tc=13.9 min CN=57/98 Runoff=0.08 cfs 0.008 af

Subcatchment 300: Post-16 Runoff Area=1.957 ac 0.00% Impervious Runoff Depth=0.00"
Tc=12.3 min CN=50/0 Runoff=0.00 cfs 0.000 af

Subcatchment 301: Post-17 Runoff Area=0.435 ac 0.00% Impervious Runoff Depth=0.10"
Tc=0.0 min CN=77/0 Runoff=0.02 cfs 0.004 af

Link DP-1: DP-1 West River Inflow=0.09 cfs 0.008 af
Primary=0.09 cfs 0.008 af

Link DP-2: DP-2 Houghton St Inflow=0.08 cfs 0.008 af
Primary=0.08 cfs 0.008 af

Link DP-3: DP-3 NE Wetland Inflow=0.02 cfs 0.004 af
Primary=0.02 cfs 0.004 af

A3.4.2 Drainage Network Hydraulic Calculations

DiPrete Engineering
Engineers • Planners • Surveyors

Project Name: New Providence Business Park
Project Number: 0809-003-B08

10-Year Storm
Date: 4/15/2026

Structure	Area	Inlet Time	Intensity	Runoff C	Q=Cia	Q Carry over	Q Captured	Q Bypassed	Bypass Structure	Inlet Type	Curb Opening	Curb Opening	Grate Length	Grate Width	Depth	Spread
	(sf)	(min)	(in/hr)	(C)	(cfs)	(cfs)	(cfs)	(cfs)			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
1	36,877	18	3.79	0.45	1.46	0	1.16	0.30	---	Grate inlet	---	---	4	2	0.164	6.128
2	25,017	6	6.938	0.9	3.62	0	2.32	1.29	---	Grate inlet	---	---	4	2	0.228	9.244
13	12,661	6	6.938	0.9	1.83	0	1.83	0.00	---	Grate inlet	---	---	4	2	0.2	14.584
4	25,621	6	6.938	0.9	3.70	0	3.70	0.00	---	Grate inlet	---	---	4	2	0.308	15.384
7	10,510	6	6.938	0.9	1.52	0	1.52	0.00	---	Grate inlet	---	---	4	2	0.179	15.883
6	20,126	6	6.938	0.9	2.91	0	2.91	0.00	---	Grate inlet	---	---	4	2	0.265	24.492
3	34,211	9.24	5.895	0.22	1.03	0	1.03	0.00	---	Grate inlet	---	---	2	2	0.168	8.41

DiPrete Engineering
Engineers • Planners • Surveyors

Project Name: New Providence Business Park
Project Number: 0809-003-B08

25-Year Storm
Date: 4/15/2026

Pipe Analysis

Pipe ID	Pipe Length	Pipe Size	Pipe Slope	Flow Rate	Capacity Full	Velocity	Invert Down	Invert Up
	(ft)	(in)	(%)	(cfs)	(cfs)	(ft/s)	(Ft)	(ft)
25 - 26	75.59	15	3.82%	8.2	13.70	11.7	57.00	59.89
32 - 25	116.84	15	1.00%	4.2	7.01	6.0	67.16	68.33
31 - 32	52.57	15	1.00%	4.2	7.01	6.0	68.33	68.85
30 - 31	53.97	15	1.93%	4.2	9.73	7.6	68.85	69.89
29 - 30	4.24	15	1.93%	4.2	9.73	7.6	69.90	69.98
28 - 29	33.21	15	1.93%	4.2	9.73	7.7	69.98	70.62
33 - 25	48.82	15	1.58%	4.2	8.81	7.1	69.21	69.98
11 - 12	53.93	24	4.37%	11.9	51.28	13.3	57.00	59.36
10 - 11	22.19	24	0.50%	8.5	17.35	5.5	65.12	65.23
9 - 10	151.72	24	0.50%	7.7	17.35	5.3	65.23	65.99

DiPrete Engineering
Engineers • Planners • Surveyors

Project Name: New Providence Business Park
Project Number: 0809-003-B08

100-Year Storm
Date: 4/15/2026

Pipe Analysis

Pipe ID	Pipe Length	Pipe Size	Pipe Slope	Flow Rate	Capacity Full	Velocity	Invert Down	Invert Up
	(ft)	(in)	(%)	(cfs)	(cfs)	(ft/s)	(Ft)	(ft)
11 - 12	53.93	24	4.37%	15.3	51.28	14.2	57.00	59.36
10 - 11	22.19	24	0.50%	11.0	17.35	5.8	65.12	65.23
9 - 10	151.72	24	0.50%	9.9	17.35	5.7	65.23	65.99
8 - 9	34.83	18	1.00%	9.9	11.39	7.3	66.49	66.84
6 - 8	111.60	18	1.00%	10.1	11.39	7.3	66.84	67.95
4 - 6	151.50	18	0.50%	6.5	8.05	5.1	67.95	68.71
3 - 4	45.85	15	1.50%	1.6	8.58	5.4	68.96	69.65
7 - 11	151.40	18	1.00%	8.0	11.39	7.0	65.95	67.46
13 - 7	157.75	18	1.00%	6.8	11.39	6.7	67.46	69.04
2 - 13	108.26	15	0.61%	5.3	5.48	5.1	69.29	69.95

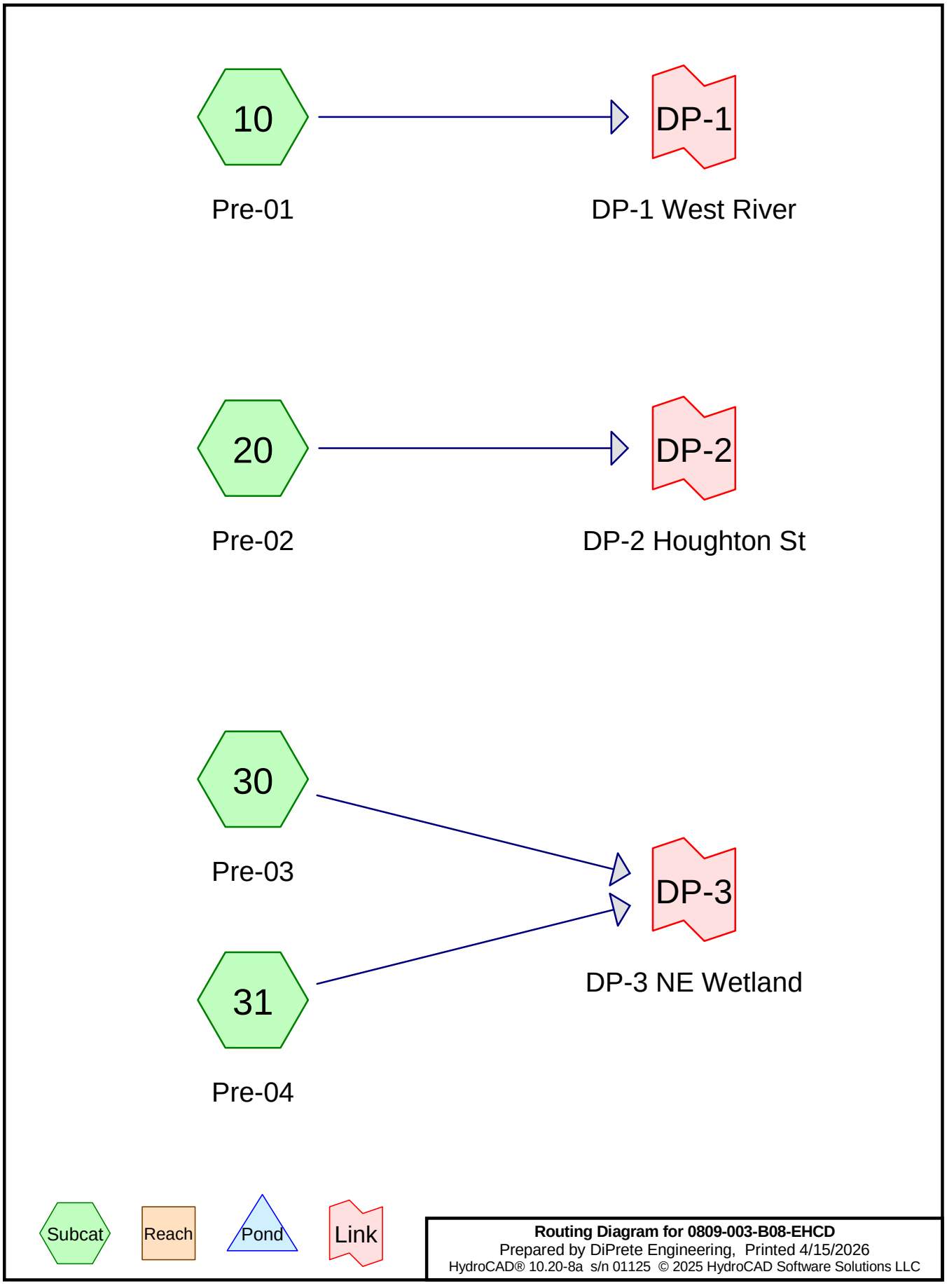
DiPrete Engineering
Engineers • Planners • Surveyors

Project Name: New Providence Business Park — 100-Year Storm
Project Number: 0809-003-B08 — Date: 4/15/2026

HGL at Structure

Structure	Rim Elevation (ft)	HGL Elevation (ft)	Rim-HGL (ft)
12	59.33	0.00	N/A
11	73.19	61.11	12.08
10	72.53	66.39	6.14
9	73.17	67.07	6.10
8	73.89	67.92	5.97
6	73.15	69.62	3.53
4	73.30	70.67	2.63
3	73.90	71.01	2.89
7	73.60	68.39	5.21
13	73.69	69.88	3.82

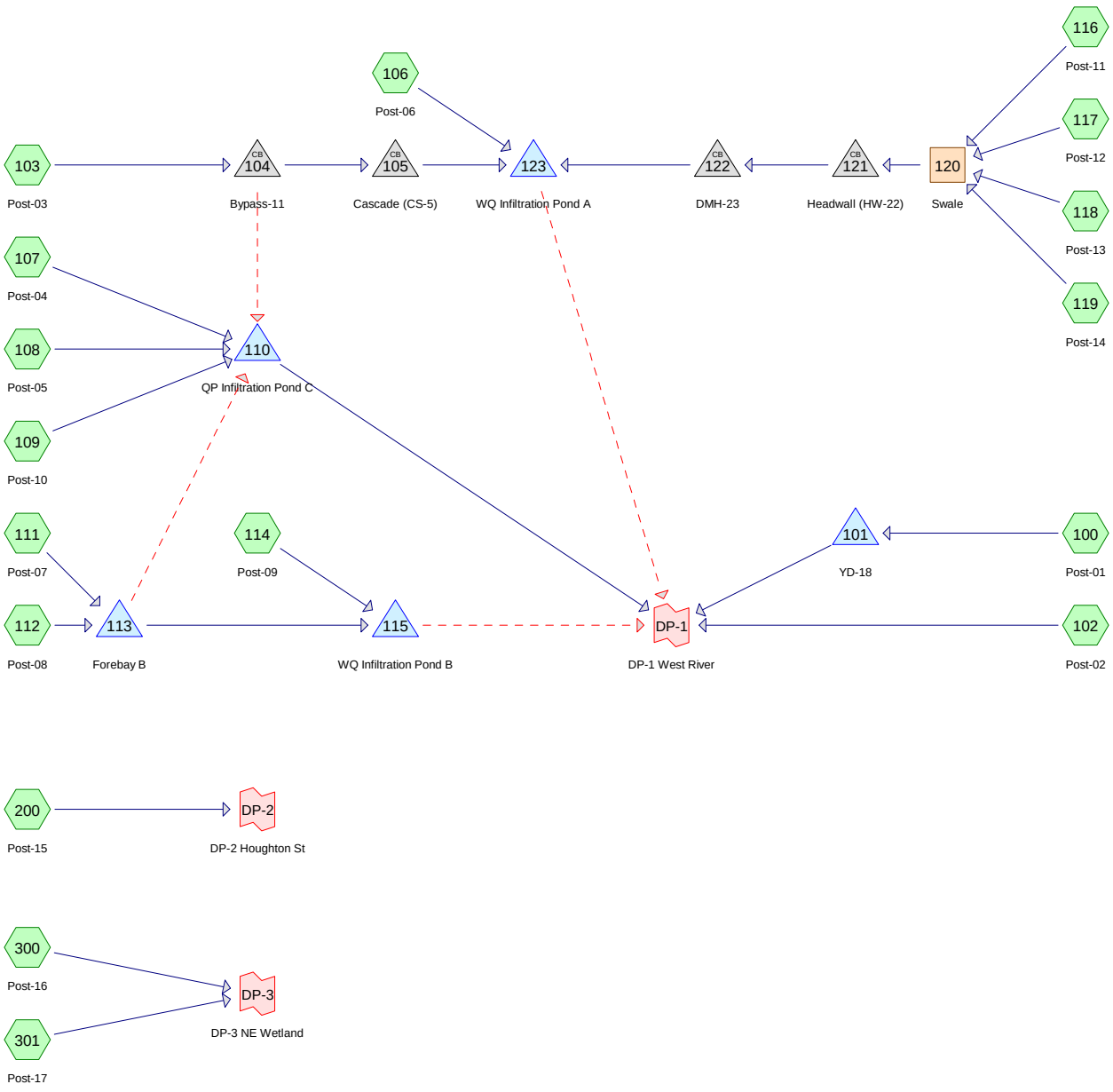
A3.5.4.1 HydroCAD Node Diagram



Routing Diagram for 0809-003-B08-EHCD
Prepared by DiPrete Engineering, Printed 4/15/2026

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.393	69	50-75% Grass cover, Fair, HSG B (10, 20, 30)
0.060	39	>75% Grass cover, Good, HSG A (20, 30)
0.469	61	>75% Grass cover, Good, HSG B (10, 20)
0.505	56	Brush, Fair, HSG B (10, 30)
0.010	77	Brush, Fair, HSG D (10, 31)
0.105	96	Gravel surface, HSG A (20, 30)
1.937	96	Gravel surface, HSG B (10, 20, 30)
0.147	98	Impervious, HSG B (10, 20)
0.100	98	Offsite Roofs, HSG B (10)
0.099	30	Woods, Good, HSG A (30)
4.554	55	Woods, Good, HSG B (10, 30)
0.437	77	Woods, Good, HSG D (10, 31)
13.817	**68**	**TOTAL AREA**



Routing Diagram for 0809-003-B08-PHCD
Prepared by DiPrete Engineering, Printed 4/15/2026

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.036	69	50-75% Grass cover, Fair, HSG B (103)
0.061	39	>75% Grass cover, Good, HSG A (300)
3.343	61	>75% Grass cover, Good, HSG B (100, 102, 103, 106, 109, 111, 112, 114, 116, 200, 300)
0.104	30	Brush, Good, HSG A (300)
0.644	48	Brush, Good, HSG B (103, 200, 300)
0.010	73	Brush, Good, HSG D (300)
2.392	98	Impervious, HSG B (100, 103, 106, 109, 111, 200)
0.100	98	Offsite Roofs, HSG B (100)
2.288	98	Roofs, HSG B (103, 107, 108, 117, 118, 119)
0.145	98	Water Surface, 0% imp, HSG B (106, 109)
0.099	30	Woods, Good, HSG A (300)
4.160	55	Woods, Good, HSG B (100, 102, 103, 116, 300)
0.436	77	Woods, Good, HSG D (103, 301)
13.817	**72**	**TOTAL AREA**

A3.5.4.2 HydroCAD 1-Year Storm Analysis

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
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 10: Pre-01 Runoff Area=11.051 ac 1.26% Impervious Runoff Depth=0.48"
Flow Length=587' Tc=13.7 min CN=68 Runoff=3.61 cfs 0.441 af

Subcatchment 20: Pre-02 Runoff Area=0.955 ac 11.30% Impervious Runoff Depth=0.77"
Flow Length=718' Tc=14.5 min CN=75 Runoff=0.60 cfs 0.061 af

Subcatchment 30: Pre-03 Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=0.18"
Flow Length=750' Tc=12.3 min CN=58 Runoff=0.09 cfs 0.021 af

Subcatchment 31: Pre-04 Runoff Area=0.441 ac 0.00% Impervious Runoff Depth=0.87"
Tc=0.0 min CN=77 Runoff=0.52 cfs 0.032 af

Link DP-1: DP-1 West River Inflow=3.61 cfs 0.441 af
Primary=3.61 cfs 0.441 af

Link DP-2: DP-2 Houghton St Inflow=0.60 cfs 0.061 af
Primary=0.60 cfs 0.061 af

Link DP-3: DP-3 NE Wetland Inflow=0.52 cfs 0.053 af
Primary=0.52 cfs 0.053 af

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
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 100: Post-01 Runoff Area=2.523 ac 3.96% Impervious Runoff Depth=0.18"
Flow Length=532' Tc=12.2 min CN=58 Runoff=0.16 cfs 0.039 af

Pond 101: YD-18 Peak Elev=78.02' Storage=4 cf Inflow=0.16 cfs 0.039 af
Outflow=0.16 cfs 0.039 af

Subcatchment 102: Post-02 Runoff Area=0.561 ac 0.00% Impervious Runoff Depth=0.26"
Tc=6.0 min CN=61 Runoff=0.07 cfs 0.012 af

Subcatchment 103: Post-03 Runoff Area=3.987 ac 58.21% Impervious Runoff Depth=1.09"
Flow Length=930' Tc=18.1 min CN=81 Runoff=3.49 cfs 0.361 af

Pond 104: Bypass-11 Peak Elev=66.74' Inflow=3.49 cfs 0.361 af
Primary=2.90 cfs 0.300 af Secondary=0.59 cfs 0.061 af Outflow=3.49 cfs 0.361 af

Pond 105: Cascade (CS-5) Peak Elev=66.67' Inflow=2.90 cfs 0.300 af
15.00" Round Culvert n=0.012 L=40.0' S=0.0480 '/' Outflow=2.90 cfs 0.300 af

Subcatchment 106: Post-06 Runoff Area=0.309 ac 0.02% Impervious Runoff Depth=0.44"
Tc=6.0 min CN=67 Runoff=0.12 cfs 0.011 af

Subcatchment 107: Post-04 Runoff Area=1.103 ac 100.00% Impervious Runoff Depth=2.47"
Tc=6.0 min CN=98 Runoff=2.88 cfs 0.227 af

Subcatchment 108: Post-05 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=2.47"
Tc=6.0 min CN=98 Runoff=0.54 cfs 0.043 af

Subcatchment 109: Post-10 Runoff Area=0.460 ac 0.00% Impervious Runoff Depth=0.48"
Tc=6.0 min CN=68 Runoff=0.19 cfs 0.018 af

Pond 110: QP Infiltration Pond C Peak Elev=58.82' Storage=9,309 cf Inflow=3.60 cfs 0.358 af
Discarded=0.15 cfs 0.358 af Primary=0.00 cfs 0.000 af Outflow=0.15 cfs 0.358 af

Subcatchment 111: Post-07 Runoff Area=0.454 ac 74.44% Impervious Runoff Depth=1.63"
Tc=6.0 min CN=89 Runoff=0.87 cfs 0.062 af

Subcatchment 112: Post-08 Runoff Area=0.092 ac 0.00% Impervious Runoff Depth=0.26"
Tc=6.0 min CN=61 Runoff=0.01 cfs 0.002 af

Pond 113: Forebay B Peak Elev=60.27' Storage=1,563 cf Inflow=0.87 cfs 0.064 af
Primary=0.69 cfs 0.055 af Secondary=0.06 cfs 0.009 af Outflow=0.69 cfs 0.064 af

Subcatchment 114: Post-09 Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=0.26"
Tc=6.0 min CN=61 Runoff=0.01 cfs 0.002 af

Pond 115: WQ Infiltration Pond B Peak Elev=60.27' Storage=1,098 cf Inflow=0.70 cfs 0.057 af
Discarded=0.03 cfs 0.057 af Secondary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.057 af

Subcatchment 116: Post-11 Runoff Area=0.547 ac 0.00% Impervious Runoff Depth=0.23"
Flow Length=655' Tc=22.3 min CN=60 Runoff=0.05 cfs 0.011 af

Subcatchment 117: Post-12 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=2.47"
Tc=6.0 min CN=98 Runoff=0.54 cfs 0.043 af

Subcatchment 118: Post-13 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=2.47"
Tc=6.0 min CN=98 Runoff=0.54 cfs 0.043 af

Subcatchment 119: Post-14 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=2.47"
Tc=6.0 min CN=98 Runoff=0.54 cfs 0.043 af

Reach 120: Swale Avg. Flow Depth=0.26' Max Vel=2.04 fps Inflow=1.62 cfs 0.138 af
n=0.030 L=510.0' S=0.0150 '/' Capacity=102.94 cfs Outflow=1.44 cfs 0.138 af

Pond 121: Headwall (HW-22) Peak Elev=69.89' Inflow=1.44 cfs 0.138 af
Outflow=1.44 cfs 0.138 af

Pond 122: DMH-23 Peak Elev=67.70' Inflow=1.44 cfs 0.138 af
15.00" Round Culvert n=0.012 L=46.0' S=0.0896 '/' Outflow=1.44 cfs 0.138 af

Pond 123: WQ Infiltration Pond A Peak Elev=66.67' Storage=13,729 cf Inflow=4.06 cfs 0.450 af
Discarded=0.13 cfs 0.450 af Secondary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.450 af

Subcatchment 200: Post-15 Runoff Area=0.473 ac 19.31% Impervious Runoff Depth=0.38"
Flow Length=518' Tc=13.9 min CN=65 Runoff=0.10 cfs 0.015 af

Subcatchment 300: Post-16 Runoff Area=1.957 ac 0.00% Impervious Runoff Depth=0.05"
Tc=12.3 min CN=50 Runoff=0.01 cfs 0.007 af

Subcatchment 301: Post-17 Runoff Area=0.435 ac 0.00% Impervious Runoff Depth=0.87"
Tc=0.0 min CN=77 Runoff=0.51 cfs 0.031 af

Link DP-1: DP-1 West River Inflow=0.22 cfs 0.051 af
Primary=0.22 cfs 0.051 af

Link DP-2: DP-2 Houghton St Inflow=0.10 cfs 0.015 af
Primary=0.10 cfs 0.015 af

Link DP-3: DP-3 NE Wetland Inflow=0.51 cfs 0.039 af
Primary=0.51 cfs 0.039 af

A3.5.4.3 HydroCAD 10-Year Storm Analysis

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
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 10: Pre-01 Runoff Area=11.051 ac 1.26% Impervious Runoff Depth=1.81"
Flow Length=587' Tc=13.7 min CN=68 Runoff=17.68 cfs 1.666 af

Subcatchment 20: Pre-02 Runoff Area=0.955 ac 11.30% Impervious Runoff Depth=2.37"
Flow Length=718' Tc=14.5 min CN=75 Runoff=2.02 cfs 0.188 af

Subcatchment 30: Pre-03 Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=1.11"
Flow Length=750' Tc=12.3 min CN=58 Runoff=1.23 cfs 0.127 af

Subcatchment 31: Pre-04 Runoff Area=0.441 ac 0.00% Impervious Runoff Depth=2.54"
Tc=0.0 min CN=77 Runoff=1.61 cfs 0.093 af

Link DP-1: DP-1 West River Inflow=17.68 cfs 1.666 af
Primary=17.68 cfs 1.666 af

Link DP-2: DP-2 Houghton St Inflow=2.02 cfs 0.188 af
Primary=2.02 cfs 0.188 af

Link DP-3: DP-3 NE Wetland Inflow=1.94 cfs 0.221 af
Primary=1.94 cfs 0.221 af

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
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 100: Post-01 Runoff Area=2.523 ac 3.96% Impervious Runoff Depth=1.11"
Flow Length=532' Tc=12.2 min CN=58 Runoff=2.27 cfs 0.234 af

Pond 101: YD-18 Peak Elev=78.30' Storage=60 cf Inflow=2.27 cfs 0.234 af
Outflow=2.27 cfs 0.234 af

Subcatchment 102: Post-02 Runoff Area=0.561 ac 0.00% Impervious Runoff Depth=1.31"
Tc=6.0 min CN=61 Runoff=0.78 cfs 0.061 af

Subcatchment 103: Post-03 Runoff Area=3.987 ac 58.21% Impervious Runoff Depth=2.90"
Flow Length=930' Tc=18.1 min CN=81 Runoff=9.53 cfs 0.963 af

Pond 104: Bypass-11 Peak Elev=67.25' Inflow=9.53 cfs 0.963 af
Primary=3.77 cfs 0.412 af Secondary=6.56 cfs 0.550 af Outflow=9.53 cfs 0.963 af

Pond 105: Cascade (CS-5) Peak Elev=67.04' Inflow=3.77 cfs 0.412 af
15.00" Round Culvert n=0.012 L=40.0' S=0.0480 '/' Outflow=3.77 cfs 0.412 af

Subcatchment 106: Post-06 Runoff Area=0.309 ac 0.02% Impervious Runoff Depth=1.73"
Tc=6.0 min CN=67 Runoff=0.61 cfs 0.045 af

Subcatchment 107: Post-04 Runoff Area=1.103 ac 100.00% Impervious Runoff Depth=4.66"
Tc=6.0 min CN=98 Runoff=5.29 cfs 0.429 af

Subcatchment 108: Post-05 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=4.66"
Tc=6.0 min CN=98 Runoff=0.99 cfs 0.080 af

Subcatchment 109: Post-10 Runoff Area=0.460 ac 0.00% Impervious Runoff Depth=1.81"
Tc=6.0 min CN=68 Runoff=0.95 cfs 0.069 af

Pond 110: QP Infiltration Pond C Peak Elev=60.49' Storage=21,310 cf Inflow=11.58 cfs 1.220 af
Discarded=0.19 cfs 0.695 af Primary=5.32 cfs 0.525 af Outflow=5.51 cfs 1.220 af

Subcatchment 111: Post-07 Runoff Area=0.454 ac 74.44% Impervious Runoff Depth=3.68"
Tc=6.0 min CN=89 Runoff=1.90 cfs 0.139 af

Subcatchment 112: Post-08 Runoff Area=0.092 ac 0.00% Impervious Runoff Depth=1.31"
Tc=6.0 min CN=61 Runoff=0.13 cfs 0.010 af

Pond 113: Forebay B Peak Elev=60.49' Storage=1,765 cf Inflow=2.03 cfs 0.149 af
Primary=0.56 cfs 0.057 af Secondary=1.90 cfs 0.092 af Outflow=1.90 cfs 0.149 af

Subcatchment 114: Post-09 Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=1.31"
Tc=6.0 min CN=61 Runoff=0.12 cfs 0.010 af

Pond 115: WQ Infiltration Pond B Peak Elev=60.49' Storage=1,355 cf Inflow=0.61 cfs 0.067 af
Discarded=0.03 cfs 0.067 af Secondary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.067 af

Subcatchment 116: Post-11 Runoff Area=0.547 ac 0.00% Impervious Runoff Depth=1.24"
Flow Length=655' Tc=22.3 min CN=60 Runoff=0.45 cfs 0.057 af

Subcatchment 117: Post-12 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=4.66"
Tc=6.0 min CN=98 Runoff=0.99 cfs 0.080 af

Subcatchment 118: Post-13 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=4.66"
Tc=6.0 min CN=98 Runoff=0.99 cfs 0.080 af

Subcatchment 119: Post-14 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=4.66"
Tc=6.0 min CN=98 Runoff=0.99 cfs 0.080 af

Reach 120: Swale Avg. Flow Depth=0.37' Max Vel=2.50 fps Inflow=3.12 cfs 0.298 af
n=0.030 L=510.0' S=0.0150 '/' Capacity=102.94 cfs Outflow=2.87 cfs 0.298 af

Pond 121: Headwall (HW-22) Peak Elev=70.18' Inflow=2.87 cfs 0.298 af
Outflow=2.87 cfs 0.298 af

Pond 122: DMH-23 Peak Elev=67.99' Inflow=2.87 cfs 0.298 af
15.00" Round Culvert n=0.012 L=46.0' S=0.0896 '/' Outflow=2.87 cfs 0.298 af

Pond 123: WQ Infiltration Pond A Peak Elev=66.86' Storage=14,759 cf Inflow=7.22 cfs 0.755 af
Discarded=0.13 cfs 0.477 af Secondary=4.10 cfs 0.278 af Outflow=4.23 cfs 0.755 af

Subcatchment 200: Post-15 Runoff Area=0.473 ac 19.31% Impervious Runoff Depth=1.59"
Flow Length=518' Tc=13.9 min CN=65 Runoff=0.64 cfs 0.063 af

Subcatchment 300: Post-16 Runoff Area=1.957 ac 0.00% Impervious Runoff Depth=0.65"
Tc=12.3 min CN=50 Runoff=0.73 cfs 0.106 af

Subcatchment 301: Post-17 Runoff Area=0.435 ac 0.00% Impervious Runoff Depth=2.54"
Tc=0.0 min CN=77 Runoff=1.59 cfs 0.092 af

Link DP-1: DP-1 West River Inflow=10.27 cfs 1.099 af
Primary=10.27 cfs 1.099 af

Link DP-2: DP-2 Houghton St Inflow=0.64 cfs 0.063 af
Primary=0.64 cfs 0.063 af

Link DP-3: DP-3 NE Wetland Inflow=1.61 cfs 0.198 af
Primary=1.61 cfs 0.198 af

A3.5.4.4 HydroCAD 25-Year Storm Analysis

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
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 10: Pre-01 Runoff Area=11.051 ac 1.26% Impervious Runoff Depth=2.70"
Flow Length=587' Tc=13.7 min CN=68 Runoff=27.04 cfs 2.485 af

Subcatchment 20: Pre-02 Runoff Area=0.955 ac 11.30% Impervious Runoff Depth=3.37"
Flow Length=718' Tc=14.5 min CN=75 Runoff=2.89 cfs 0.268 af

Subcatchment 30: Pre-03 Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=1.82"
Flow Length=750' Tc=12.3 min CN=58 Runoff=2.20 cfs 0.208 af

Subcatchment 31: Pre-04 Runoff Area=0.441 ac 0.00% Impervious Runoff Depth=3.57"
Tc=0.0 min CN=77 Runoff=2.26 cfs 0.131 af

Link DP-1: DP-1 West River Inflow=27.04 cfs 2.485 af
Primary=27.04 cfs 2.485 af

Link DP-2: DP-2 Houghton St Inflow=2.89 cfs 0.268 af
Primary=2.89 cfs 0.268 af

Link DP-3: DP-3 NE Wetland Inflow=3.03 cfs 0.339 af
Primary=3.03 cfs 0.339 af

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
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 100: Post-01 Runoff Area=2.523 ac 3.96% Impervious Runoff Depth=1.82"
Flow Length=532' Tc=12.2 min CN=58 Runoff=4.05 cfs 0.382 af

Pond 101: YD-18 Peak Elev=78.51' Storage=115 cf Inflow=4.05 cfs 0.382 af
Outflow=4.03 cfs 0.382 af

Subcatchment 102: Post-02 Runoff Area=0.561 ac 0.00% Impervious Runoff Depth=2.07"
Tc=6.0 min CN=61 Runoff=1.30 cfs 0.097 af

Subcatchment 103: Post-03 Runoff Area=3.987 ac 58.21% Impervious Runoff Depth=3.97"
Flow Length=930' Tc=18.1 min CN=81 Runoff=13.01 cfs 1.321 af

Pond 104: Bypass-11 Peak Elev=67.43' Inflow=13.01 cfs 1.321 af
Primary=2.99 cfs 0.519 af Secondary=10.02 cfs 0.801 af Outflow=13.01 cfs 1.321 af

Pond 105: Cascade (CS-5) Peak Elev=67.18' Inflow=2.99 cfs 0.519 af
15.00" Round Culvert n=0.012 L=40.0' S=0.0480 '/' Outflow=2.99 cfs 0.519 af

Subcatchment 106: Post-06 Runoff Area=0.309 ac 0.02% Impervious Runoff Depth=2.61"
Tc=6.0 min CN=67 Runoff=0.93 cfs 0.067 af

Subcatchment 107: Post-04 Runoff Area=1.103 ac 100.00% Impervious Runoff Depth=5.86"
Tc=6.0 min CN=98 Runoff=6.60 cfs 0.539 af

Subcatchment 108: Post-05 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=5.86"
Tc=6.0 min CN=98 Runoff=1.24 cfs 0.101 af

Subcatchment 109: Post-10 Runoff Area=0.460 ac 0.00% Impervious Runoff Depth=2.70"
Tc=6.0 min CN=68 Runoff=1.44 cfs 0.103 af

Pond 110: QP Infiltration Pond C Peak Elev=60.67' Storage=22,823 cf Inflow=17.88 cfs 1.688 af
Discarded=0.20 cfs 0.708 af Primary=12.93 cfs 0.981 af Outflow=13.13 cfs 1.688 af

Subcatchment 111: Post-07 Runoff Area=0.454 ac 74.44% Impervious Runoff Depth=4.83"
Tc=6.0 min CN=89 Runoff=2.46 cfs 0.183 af

Subcatchment 112: Post-08 Runoff Area=0.092 ac 0.00% Impervious Runoff Depth=2.07"
Tc=6.0 min CN=61 Runoff=0.21 cfs 0.016 af

Pond 113: Forebay B Peak Elev=60.67' Storage=1,940 cf Inflow=2.68 cfs 0.199 af
Primary=0.64 cfs 0.055 af Secondary=2.62 cfs 0.144 af Outflow=2.62 cfs 0.198 af

Subcatchment 114: Post-09 Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=2.07"
Tc=6.0 min CN=61 Runoff=0.21 cfs 0.016 af

Pond 115: WQ Infiltration Pond B Peak Elev=60.71' Storage=1,620 cf Inflow=0.75 cfs 0.070 af
Discarded=0.03 cfs 0.070 af Secondary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.070 af

Subcatchment 116: Post-11 Runoff Area=0.547 ac 0.00% Impervious Runoff Depth=1.99"
Flow Length=655' Tc=22.3 min CN=60 Runoff=0.77 cfs 0.091 af

Subcatchment 117: Post-12 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=5.86"
Tc=6.0 min CN=98 Runoff=1.24 cfs 0.101 af

Subcatchment 118: Post-13 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=5.86"
Tc=6.0 min CN=98 Runoff=1.24 cfs 0.101 af

Subcatchment 119: Post-14 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=5.86"
Tc=6.0 min CN=98 Runoff=1.24 cfs 0.101 af

Reach 120: Swale Avg. Flow Depth=0.42' Max Vel=2.70 fps Inflow=4.02 cfs 0.393 af
n=0.030 L=510.0' S=0.0150 '/' Capacity=102.94 cfs Outflow=3.74 cfs 0.393 af

Pond 121: Headwall (HW-22) Peak Elev=70.34' Inflow=3.74 cfs 0.393 af
Outflow=3.74 cfs 0.393 af

Pond 122: DMH-23 Peak Elev=68.15' Inflow=3.74 cfs 0.393 af
15.00" Round Culvert n=0.012 L=46.0' S=0.0896 '/' Outflow=3.74 cfs 0.393 af

Pond 123: WQ Infiltration Pond A Peak Elev=66.93' Storage=15,093 cf Inflow=7.27 cfs 0.980 af
Discarded=0.13 cfs 0.491 af Secondary=6.61 cfs 0.489 af Outflow=6.74 cfs 0.980 af

Subcatchment 200: Post-15 Runoff Area=0.473 ac 19.31% Impervious Runoff Depth=2.42"
Flow Length=518' Tc=13.9 min CN=65 Runoff=1.02 cfs 0.096 af

Subcatchment 300: Post-16 Runoff Area=1.957 ac 0.00% Impervious Runoff Depth=1.19"
Tc=12.3 min CN=50 Runoff=1.75 cfs 0.194 af

Subcatchment 301: Post-17 Runoff Area=0.435 ac 0.00% Impervious Runoff Depth=3.57"
Tc=0.0 min CN=77 Runoff=2.23 cfs 0.129 af

Link DP-1: DP-1 West River Inflow=22.37 cfs 1.949 af
Primary=22.37 cfs 1.949 af

Link DP-2: DP-2 Houghton St Inflow=1.02 cfs 0.096 af
Primary=1.02 cfs 0.096 af

Link DP-3: DP-3 NE Wetland Inflow=2.59 cfs 0.324 af
Primary=2.59 cfs 0.324 af

A3.5.4.5 HydroCAD 100-Year Storm Analysis

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
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 10: Pre-01 Runoff Area=11.051 ac 1.26% Impervious Runoff Depth=4.83"
Flow Length=587' Tc=13.7 min CN=68 Runoff=49.06 cfs 4.448 af

Subcatchment 20: Pre-02 Runoff Area=0.955 ac 11.30% Impervious Runoff Depth=5.68"
Flow Length=718' Tc=14.5 min CN=75 Runoff=4.85 cfs 0.452 af

Subcatchment 30: Pre-03 Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=3.63"
Flow Length=750' Tc=12.3 min CN=58 Runoff=4.66 cfs 0.414 af

Subcatchment 31: Pre-04 Runoff Area=0.441 ac 0.00% Impervious Runoff Depth=5.92"
Tc=0.0 min CN=77 Runoff=3.70 cfs 0.218 af

Link DP-1: DP-1 West River Inflow=49.06 cfs 4.448 af
Primary=49.06 cfs 4.448 af

Link DP-2: DP-2 Houghton St Inflow=4.85 cfs 0.452 af
Primary=4.85 cfs 0.452 af

Link DP-3: DP-3 NE Wetland Inflow=6.00 cfs 0.632 af
Primary=6.00 cfs 0.632 af

Summary for Subcatchment 10: Pre-01

Runoff = 49.06 cfs @ 12.19 hrs, Volume= 4.448 af, Depth= 4.83"
Routed to Link DP-1 : DP-1 West River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

	Area (ac)	CN	Description
	4.679	69	50-75% Grass cover, Fair, HSG B
	0.398	61	>75% Grass cover, Good, HSG B
	0.427	56	Brush, Fair, HSG B
	0.005	77	Brush, Fair, HSG D
*	0.001	0	Gravel roads, HSG B
	1.764	96	Gravel surface, HSG B
	0.039	98	Impervious, HSG B
	0.100	98	Offsite Roofs, HSG B
	3.637	55	Woods, Good, HSG B
	0.001	77	Woods, Good, HSG D
	11.051	68	Weighted Average
	10.912	68	98.74% Pervious Area
	0.139	98	1.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0900	0.14		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.30"
2.1	487	0.0552	3.78		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
13.7	587	Total			

Summary for Subcatchment 20: Pre-02

Runoff = 4.85 cfs @ 12.20 hrs, Volume= 0.452 af, Depth= 5.68"
Routed to Link DP-2 : DP-2 Houghton St

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.559	69	50-75% Grass cover, Fair, HSG B
0.043	39	>75% Grass cover, Good, HSG A
0.071	61	>75% Grass cover, Good, HSG B
0.040	96	Gravel surface, HSG A
0.134	96	Gravel surface, HSG B
0.108	98	Impervious, HSG B
0.955	75	Weighted Average
0.847	72	88.70% Pervious Area
0.108	98	11.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0560	0.18		**Sheet Flow, A** Grass: Dense n= 0.240 P2= 3.30"
3.1	435	0.0207	2.32		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
2.1	183	0.0049	1.42		**Shallow Concentrated Flow, C** Paved Kv= 20.3 fps
14.5	718	Total			

Summary for Subcatchment 30: Pre-03

Runoff = 4.66 cfs @ 12.18 hrs, Volume= 0.414 af, Depth= 3.63"
Routed to Link DP-3 : DP-3 NE Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.155	69	50-75% Grass cover, Fair, HSG B
0.017	39	>75% Grass cover, Good, HSG A
0.000	80	>75% Grass cover, Good, HSG D
0.078	56	Brush, Fair, HSG B
0.065	96	Gravel surface, HSG A
0.039	96	Gravel surface, HSG B
0.099	30	Woods, Good, HSG A
0.917	55	Woods, Good, HSG B
1.370	58	Weighted Average
1.370	58	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1190	0.16		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.30"
1.9	650	0.1280	5.76		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
12.3	750	Total			

Summary for Subcatchment 31: Pre-04

Runoff = 3.70 cfs @ 12.00 hrs, Volume= 0.218 af, Depth= 5.92"
Routed to Link DP-3 : DP-3 NE Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.005	77	Brush, Fair, HSG D
0.436	77	Woods, Good, HSG D
0.441	77	Weighted Average
0.441	77	100.00% Pervious Area

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

Summary for Link DP-1: DP-1 West River

Inflow Area = 11.051 ac, 1.26% Impervious, Inflow Depth = 4.83" for 100-Year event
Inflow = 49.06 cfs @ 12.19 hrs, Volume= 4.448 af
Primary = 49.06 cfs @ 12.19 hrs, Volume= 4.448 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: DP-2 Houghton St

Inflow Area = 0.955 ac, 11.30% Impervious, Inflow Depth = 5.68" for 100-Year event
Inflow = 4.85 cfs @ 12.20 hrs, Volume= 0.452 af
Primary = 4.85 cfs @ 12.20 hrs, Volume= 0.452 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: DP-3 NE Wetland

Inflow Area = 1.811 ac, 0.00% Impervious, Inflow Depth = 4.19" for 100-Year event
Inflow = 6.00 cfs @ 12.17 hrs, Volume= 0.632 af
Primary = 6.00 cfs @ 12.17 hrs, Volume= 0.632 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
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 100: Post-01 Runoff Area=2.523 ac 3.96% Impervious Runoff Depth=3.63"
Flow Length=532' Tc=12.2 min CN=58 Runoff=8.60 cfs 0.763 af

Pond 101: YD-18 Peak Elev=79.78' Storage=687 cf Inflow=8.60 cfs 0.763 af
Outflow=8.12 cfs 0.763 af

Subcatchment 102: Post-02 Runoff Area=0.561 ac 0.00% Impervious Runoff Depth=3.99"
Tc=6.0 min CN=61 Runoff=2.60 cfs 0.186 af

Subcatchment 103: Post-03 Runoff Area=3.987 ac 58.21% Impervious Runoff Depth=6.41"
Flow Length=930' Tc=18.1 min CN=81 Runoff=20.65 cfs 2.128 af

Pond 104: Bypass-11 Peak Elev=67.78' Inflow=20.65 cfs 2.128 af
Primary=3.73 cfs 0.751 af Secondary=16.93 cfs 1.377 af Outflow=20.65 cfs 2.128 af

Pond 105: Cascade (CS-5) Peak Elev=67.38' Inflow=3.73 cfs 0.751 af
15.00" Round Culvert n=0.012 L=40.0' S=0.0480 '/' Outflow=3.73 cfs 0.751 af

Subcatchment 106: Post-06 Runoff Area=0.309 ac 0.02% Impervious Runoff Depth=4.71"
Tc=6.0 min CN=67 Runoff=1.71 cfs 0.121 af

Subcatchment 107: Post-04 Runoff Area=1.103 ac 100.00% Impervious Runoff Depth=8.46"
Tc=6.0 min CN=98 Runoff=9.43 cfs 0.778 af

Subcatchment 108: Post-05 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=8.46"
Tc=6.0 min CN=98 Runoff=1.77 cfs 0.146 af

Subcatchment 109: Post-10 Runoff Area=0.460 ac 0.00% Impervious Runoff Depth=4.83"
Tc=6.0 min CN=68 Runoff=2.61 cfs 0.185 af

Pond 110: QP Infiltration Pond C Peak Elev=60.90' Storage=24,804 cf Inflow=27.61 cfs 2.740 af
Discarded=0.21 cfs 0.727 af Primary=26.63 cfs 2.013 af Outflow=26.84 cfs 2.740 af

Subcatchment 111: Post-07 Runoff Area=0.454 ac 74.44% Impervious Runoff Depth=7.37"
Tc=6.0 min CN=89 Runoff=3.67 cfs 0.279 af

Subcatchment 112: Post-08 Runoff Area=0.092 ac 0.00% Impervious Runoff Depth=3.99"
Tc=6.0 min CN=61 Runoff=0.43 cfs 0.030 af

Pond 113: Forebay B Peak Elev=60.91' Storage=2,174 cf Inflow=4.10 cfs 0.309 af
Primary=0.83 cfs 0.055 af Secondary=2.88 cfs 0.254 af Outflow=3.42 cfs 0.309 af

Subcatchment 114: Post-09 Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=3.99"
Tc=6.0 min CN=61 Runoff=0.42 cfs 0.030 af

Pond 115: WQ Infiltration Pond B Peak Elev=61.09' Storage=2,139 cf Inflow=1.22 cfs 0.085 af
Discarded=0.03 cfs 0.085 af Secondary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.085 af

Subcatchment 116: Post-11 Runoff Area=0.547 ac 0.00% Impervious Runoff Depth=3.87"
Flow Length=655' Tc=22.3 min CN=60 Runoff=1.58 cfs 0.176 af

Subcatchment 117: Post-12 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=8.46"
Tc=6.0 min CN=98 Runoff=1.77 cfs 0.146 af

Subcatchment 118: Post-13 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=8.46"
Tc=6.0 min CN=98 Runoff=1.77 cfs 0.146 af

Subcatchment 119: Post-14 Runoff Area=0.207 ac 100.00% Impervious Runoff Depth=8.46"
Tc=6.0 min CN=98 Runoff=1.77 cfs 0.146 af

Reach 120: Swale Avg. Flow Depth=0.53' Max Vel=3.03 fps Inflow=6.04 cfs 0.613 af
n=0.030 L=510.0' S=0.0150 '/' Capacity=102.94 cfs Outflow=5.69 cfs 0.613 af

Pond 121: Headwall (HW-22) Peak Elev=70.86' Inflow=5.69 cfs 0.613 af
Outflow=5.69 cfs 0.613 af

Pond 122: DMH-23 Peak Elev=68.67' Inflow=5.69 cfs 0.613 af
15.00" Round Culvert n=0.012 L=46.0' S=0.0896 '/' Outflow=5.69 cfs 0.613 af

Pond 123: WQ Infiltration Pond A Peak Elev=66.99' Storage=15,481 cf Inflow=10.48 cfs 1.485 af
Discarded=0.13 cfs 0.506 af Secondary=10.06 cfs 0.979 af Outflow=10.19 cfs 1.485 af

Subcatchment 200: Post-15 Runoff Area=0.473 ac 19.31% Impervious Runoff Depth=4.47"
Flow Length=518' Tc=13.9 min CN=65 Runoff=1.93 cfs 0.176 af

Subcatchment 300: Post-16 Runoff Area=1.957 ac 0.00% Impervious Runoff Depth=2.69"
Tc=12.3 min CN=50 Runoff=4.68 cfs 0.438 af

Subcatchment 301: Post-17 Runoff Area=0.435 ac 0.00% Impervious Runoff Depth=5.92"
Tc=0.0 min CN=77 Runoff=3.65 cfs 0.215 af

Link DP-1: DP-1 West River Inflow=46.15 cfs 3.941 af
Primary=46.15 cfs 3.941 af

Link DP-2: DP-2 Houghton St Inflow=1.93 cfs 0.176 af
Primary=1.93 cfs 0.176 af

Link DP-3: DP-3 NE Wetland Inflow=5.98 cfs 0.653 af
Primary=5.98 cfs 0.653 af

Summary for Subcatchment 100: Post-01

Runoff = 8.60 cfs @ 12.17 hrs, Volume= 0.763 af, Depth= 3.63"
Routed to Pond 101 : YD-18

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.484	61	>75% Grass cover, Good, HSG B
0.000	98	Impervious, HSG B
0.100	98	Offsite Roofs, HSG B
1.938	55	Woods, Good, HSG B
2.523	58	Weighted Average
2.423	56	96.04% Pervious Area
0.100	98	3.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	100	0.1330	0.17		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.30"
0.9	338	0.1597	6.43		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
1.2	67	0.1122	0.93	6.03	**Parabolic Channel, C** W=9.70' D=1.00' Area=6.5 sf Perim=10.0' n= 0.400
0.2	27	0.0222	2.40		**Shallow Concentrated Flow, D** Unpaved Kv= 16.1 fps
12.2	532	Total			

Summary for Pond 101: YD-18

Inflow Area = 2.523 ac, 3.96% Impervious, Inflow Depth = 3.63" for 100-Year event
Inflow = 8.60 cfs @ 12.17 hrs, Volume= 0.763 af
Outflow = 8.12 cfs @ 12.22 hrs, Volume= 0.763 af, Atten= 5%, Lag= 2.6 min
Primary = 8.12 cfs @ 12.22 hrs, Volume= 0.763 af
Routed to Link DP-1 : DP-1 West River

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 79.78' @ 12.22 hrs Surf.Area= 608 sf Storage= 687 cf

Plug-Flow detention time= 0.6 min calculated for 0.763 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (852.4 - 851.8)

Volume	Invert	Avail.Storage	Storage Description
#1	78.00'	826 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
78.00	163	0	0
80.00	663	826	826

Device	Routing	Invert	Outlet Devices
#1	Device 2	78.00'	**Nyloplast Dome 18in** Head (feet) 0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50 2.75 3.00 Disch. (cfs) 0.000 1.825 4.000 4.825 5.625 6.425 7.225 8.025 8.825 9.625 10.425 11.225 12.025
#2	Device 3	75.84'	**18.00" Round 18" Culvert** L= 165.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.84' / 72.54' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#3	Device 4	72.54'	**18.00" Round 18" HDPE** L= 82.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 72.54' / 72.12' S= 0.0051 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#4	Primary	72.12'	**18.00" Round 18" HDPE** L= 14.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 72.12' / 72.00' S= 0.0083 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=8.12 cfs @ 12.22 hrs HW=79.78' TW=0.00' (Dynamic Tailwater)
↑—**4=18" HDPE** (Passes 8.12 cfs of 22.37 cfs potential flow)
↑—**3=18" HDPE** (Passes 8.12 cfs of 21.12 cfs potential flow)
↑—**2=18" Culvert** (Passes 8.12 cfs of 15.20 cfs potential flow)
↑—**1=Nyloplast Dome 18in** (Custom Controls 8.12 cfs)

Summary for Subcatchment 102: Post-02

Runoff = 2.60 cfs @ 12.09 hrs, Volume= 0.186 af, Depth= 3.99"
Routed to Link DP-1 : DP-1 West River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.560	61	>75% Grass cover, Good, HSG B
0.001	55	Woods, Good, HSG B
0.561	61	Weighted Average
0.561	61	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min TC**

Summary for Subcatchment 103: Post-03

Runoff = 20.65 cfs @ 12.24 hrs, Volume= 2.128 af, Depth= 6.41"
Routed to Pond 104 : Bypass-11

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.036	69	50-75% Grass cover, Fair, HSG B
0.551	61	>75% Grass cover, Good, HSG B
0.007	48	Brush, Good, HSG B
1.962	98	Impervious, HSG B
0.358	98	Roofs, HSG B
1.072	55	Woods, Good, HSG B
0.001	77	Woods, Good, HSG D
3.987	81	Weighted Average
1.666	57	41.79% Pervious Area
2.321	98	58.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0900	0.14		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.30"
6.5	830	0.0177	2.14		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
18.1	930	Total			

Summary for Pond 104: Bypass-11

Inflow Area = 3.987 ac, 58.21% Impervious, Inflow Depth = 6.41" for 100-Year event
Inflow = 20.65 cfs @ 12.24 hrs, Volume= 2.128 af
Outflow = 20.65 cfs @ 12.24 hrs, Volume= 2.128 af, Atten= 0%, Lag= 0.0 min
Primary = 3.73 cfs @ 12.25 hrs, Volume= 0.751 af
Routed to Pond 105 : Cascade (CS-5)
Secondary = 16.93 cfs @ 12.24 hrs, Volume= 1.377 af
Routed to Pond 110 : QP Infiltration Pond C

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 67.78' @ 12.24 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	65.87'	**15.00" Round WQ** L= 23.8' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 65.87' / 64.92' S= 0.0399 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 3	66.60'	**4.0' 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
#3	Secondary	59.36'	**24.00" Round QP** L= 61.7' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 59.36' / 57.00' S= 0.0382 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=3.73 cfs @ 12.25 hrs HW=67.77' TW=67.38' (Dynamic Tailwater)
└**1=WQ** (Inlet Controls 3.73 cfs @ 3.04 fps)

Secondary OutFlow Max=16.92 cfs @ 12.24 hrs HW=67.78' TW=60.89' (Dynamic Tailwater)
└**3=QP** (Passes 16.92 cfs of 39.68 cfs potential flow)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 16.92 cfs @ 3.60 fps)

Summary for Pond 105: Cascade (CS-5)

Inflow Area = 3.987 ac, 58.21% Impervious, Inflow Depth = 2.26" for 100-Year event
Inflow = 3.73 cfs @ 12.25 hrs, Volume= 0.751 af
Outflow = 3.73 cfs @ 12.25 hrs, Volume= 0.751 af, Atten= 0%, Lag= 0.0 min
Primary = 3.73 cfs @ 12.25 hrs, Volume= 0.751 af
Routed to Pond 123 : WQ Infiltration Pond A

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 67.38' @ 12.23 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	64.92'	**15.00" Round WQ** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 64.92' / 63.00' S= 0.0480 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=3.74 cfs @ 12.25 hrs HW=67.38' TW=66.98' (Dynamic Tailwater)
1=WQ (Inlet Controls 3.74 cfs @ 3.05 fps)

Summary for Subcatchment 106: Post-06

Runoff = 1.71 cfs @ 12.09 hrs, Volume= 0.121 af, Depth= 4.71"
Routed to Pond 123 : WQ Infiltration Pond A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.256	61	>75% Grass cover, Good, HSG B
0.000	98	Impervious, HSG B
0.053	98	Water Surface, 0% imp, HSG B
0.309	67	Weighted Average
0.309	67	99.98% Pervious Area
0.000	98	0.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min TC**

Summary for Subcatchment 107: Post-04

Runoff = 9.43 cfs @ 12.08 hrs, Volume= 0.778 af, Depth= 8.46"
Routed to Pond 110 : QP Infiltration Pond C

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
1.103	98	Roofs, HSG B
1.103	98	100.00% Impervious Area

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

Summary for Subcatchment 108: Post-05

Runoff = 1.77 cfs @ 12.08 hrs, Volume= 0.146 af, Depth= 8.46"
Routed to Pond 110 : QP Infiltration Pond C

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.207	98	Roofs, HSG B
0.207	98	100.00% Impervious Area

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

Summary for Subcatchment 109: Post-10

Runoff = 2.61 cfs @ 12.09 hrs, Volume= 0.185 af, Depth= 4.83"
Routed to Pond 110 : QP Infiltration Pond C

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.368	61	>75% Grass cover, Good, HSG B
0.000	98	Impervious, HSG B
0.092	98	Water Surface, 0% imp, HSG B
0.460	68	Weighted Average
0.460	68	100.00% Pervious Area
0.000	98	0.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min TC**

Summary for Pond 110: QP Infiltration Pond C

Inflow Area = 1.770 ac, 74.02% Impervious, Inflow Depth = 18.58" for 100-Year event
Inflow = 27.61 cfs @ 12.13 hrs, Volume= 2.740 af
Outflow = 26.84 cfs @ 12.18 hrs, Volume= 2.740 af, Atten= 3%, Lag= 3.2 min
Discarded = 0.21 cfs @ 12.18 hrs, Volume= 0.727 af
Primary = 26.63 cfs @ 12.18 hrs, Volume= 2.013 af
Routed to Link DP-1 : DP-1 West River

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 60.90' @ 12.18 hrs Surf.Area= 8,687 sf Storage= 24,804 cf

Plug-Flow detention time= 305.5 min calculated for 2.740 af (100% of inflow)
Center-of-Mass det. time= 305.8 min (1,111.8 - 806.1)

Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	35,077 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	4,012	0	0
58.00	5,257	4,635	4,635
60.25	7,856	14,752	19,387
62.00	10,076	15,691	35,077

Device	Routing	Invert	Outlet Devices
#1	Discarded	57.00'	**1.020 in/hr Infiltration over Horizontal area** Phase-In= 0.10'
#2	Primary	60.25'	**16.0' 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=0.21 cfs @ 12.18 hrs HW=60.90' (Free Discharge)
↑—**1=Infiltration** (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=26.63 cfs @ 12.18 hrs HW=60.90' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 26.63 cfs @ 2.54 fps)

Summary for Subcatchment 111: Post-07

Runoff = 3.67 cfs @ 12.08 hrs, Volume= 0.279 af, Depth= 7.37"
Routed to Pond 113 : Forebay B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.116	61	>75% Grass cover, Good, HSG B
0.338	98	Impervious, HSG B
0.454	89	Weighted Average
0.116	61	25.56% Pervious Area
0.338	98	74.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min TC**

Summary for Subcatchment 112: Post-08

Runoff = 0.43 cfs @ 12.09 hrs, Volume= 0.030 af, Depth= 3.99"
Routed to Pond 113 : Forebay B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.092	61	>75% Grass cover, Good, HSG B
0.092	61	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min TC**

Summary for Pond 113: Forebay B

Inflow Area = 0.545 ac, 61.94% Impervious, Inflow Depth = 6.81" for 100-Year event
Inflow = 4.10 cfs @ 12.08 hrs, Volume= 0.309 af
Outflow = 3.42 cfs @ 12.10 hrs, Volume= 0.309 af, Atten= 17%, Lag= 0.9 min
Primary = 0.83 cfs @ 12.05 hrs, Volume= 0.055 af
Routed to Pond 115 : WQ Infiltration Pond B
Secondary = 2.88 cfs @ 12.15 hrs, Volume= 0.254 af
Routed to Pond 110 : QP Infiltration Pond C

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Automatic Starting Elev= 59.75' Surf.Area= 762 sf Storage= 1,142 cf
Peak Elev= 60.91' @ 12.19 hrs Surf.Area= 1,030 sf Storage= 2,174 cf (1,032 cf above start)

Plug-Flow detention time= 120.8 min calculated for 0.283 af (91% of inflow)
Center-of-Mass det. time= 48.2 min (831.0 - 782.8)

Volume	Invert	Avail.Storage	Storage Description
#1	57.75'	3,444 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.75	386	0	0
58.00	427	102	102
60.00	810	1,237	1,339
62.00	1,295	2,105	3,444

Device	Routing	Invert	Outlet Devices
#1	Primary	59.75'	**6.00" Round 6" Culvert to Sandfilter B X 3.00** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 59.75' / 59.75' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Secondary	60.25'	**10.0' long x 0.5' breadth Curb weir to detention pond** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.65 cfs @ 12.05 hrs HW=60.69' TW=60.64' (Dynamic Tailwater)
↑—**1=6" Culvert to Sandfilter B** (Inlet Controls 0.65 cfs @ 1.10 fps)

Secondary OutFlow Max=0.00 cfs @ 12.15 hrs HW=60.90' TW=60.90' (Dynamic Tailwater)
↑—**2=Curb weir to detention pond** (Controls 0.00 cfs)

Summary for Subcatchment 114: Post-09

Runoff = 0.42 cfs @ 12.09 hrs, Volume= 0.030 af, Depth= 3.99"
Routed to Pond 115 : WQ Infiltration Pond B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.090	61	>75% Grass cover, Good, HSG B
0.090	61	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min TC**

Summary for Pond 115: WQ Infiltration Pond B

Inflow Area = 0.635 ac, 53.17% Impervious, Inflow Depth = 1.60" for 100-Year event
Inflow = 1.22 cfs @ 12.07 hrs, Volume= 0.085 af
Outflow = 0.03 cfs @ 13.63 hrs, Volume= 0.085 af, Atten= 97%, Lag= 94.0 min
Discarded = 0.03 cfs @ 13.63 hrs, Volume= 0.085 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : DP-1 West River

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 61.09' @ 13.63 hrs Surf.Area= 1,431 sf Storage= 2,139 cf

Plug-Flow detention time= 663.6 min calculated for 0.085 af (100% of inflow)
Center-of-Mass det. time= 663.5 min (1,491.8 - 828.2)

Volume	Invert	Avail.Storage	Storage Description
#1	59.00'	3,615 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.00	657	0	0
59.50	817	369	369
60.00	991	452	821
60.75	1,279	851	1,672
62.00	1,830	1,943	3,615

Device	Routing	Invert	Outlet Devices
#1	Discarded	59.00'	**1.020 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#2	Secondary	61.50'	**10.0' long x 0.5' breadth Emergency Overflow 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=0.03 cfs @ 13.63 hrs HW=61.09' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=59.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Emergency Overflow Weir** (Controls 0.00 cfs)

Summary for Subcatchment 116: Post-11

Runoff = 1.58 cfs @ 12.32 hrs, Volume= 0.176 af, Depth= 3.87"
Routed to Reach 120 : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.487	61	>75% Grass cover, Good, HSG B
0.060	55	Woods, Good, HSG B
0.547	60	Weighted Average
0.547	60	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	73	0.0860	0.13		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.30"
0.2	57	0.0789	4.52		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
12.9	525	0.0230	0.68	25.25	**Parabolic Channel, C** W=28.00' D=2.00' Area=37.3 sf Perim=28.4' n= 0.400
22.3	655	Total			

Summary for Subcatchment 117: Post-12

Runoff = 1.77 cfs @ 12.08 hrs, Volume= 0.146 af, Depth= 8.46"
Routed to Reach 120 : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.207	98	Roofs, HSG B
0.207	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min TC**

Summary for Subcatchment 118: Post-13

Runoff = 1.77 cfs @ 12.08 hrs, Volume= 0.146 af, Depth= 8.46"
Routed to Reach 120 : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.207	98	Roofs, HSG B
0.207	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min TC**

Summary for Subcatchment 119: Post-14

Runoff = 1.77 cfs @ 12.08 hrs, Volume= 0.146 af, Depth= 8.46"
Routed to Reach 120 : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.207	98	Roofs, HSG B
0.207	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min TC**

Summary for Reach 120: Swale

Inflow Area = 1.167 ac, 53.10% Impervious, Inflow Depth = 6.31" for 100-Year event
Inflow = 6.04 cfs @ 12.09 hrs, Volume= 0.613 af
Outflow = 5.69 cfs @ 12.12 hrs, Volume= 0.613 af, Atten= 6%, Lag= 2.0 min
Routed to Pond 121 : Headwall (HW-22)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.03 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 0.98 fps, Avg. Travel Time= 8.7 min

Peak Storage= 958 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.53' , Surface Width= 5.15'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 102.94 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 510.0' Slope= 0.0150 '/'
Inlet Invert= 76.96', Outlet Invert= 69.31'

Summary for Pond 121: Headwall (HW-22)

Inflow Area = 1.167 ac, 53.10% Impervious, Inflow Depth = 6.31" for 100-Year event
Inflow = 5.69 cfs @ 12.12 hrs, Volume= 0.613 af
Outflow = 5.69 cfs @ 12.12 hrs, Volume= 0.613 af, Atten= 0%, Lag= 0.0 min
Primary = 5.69 cfs @ 12.12 hrs, Volume= 0.613 af
Routed to Pond 122 : DMH-23

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 70.86' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	69.31'	**15.00" Round 15" Culvert** L= 15.2' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 69.31' / 68.08' S= 0.0809 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Primary	67.12'	**15.00" Round 15" Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 67.12' / 63.00' S= 0.0896 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=5.69 cfs @ 12.12 hrs HW=70.86' TW=68.67' (Dynamic Tailwater)
↑└**2=15" Culvert** (Passes 5.69 cfs of 8.74 cfs potential flow)
↑└**1=15" Culvert** (Inlet Controls 5.69 cfs @ 4.64 fps)

Summary for Pond 122: DMH-23

Inflow Area = 1.167 ac, 53.10% Impervious, Inflow Depth = 6.31" for 100-Year event
Inflow = 5.69 cfs @ 12.12 hrs, Volume= 0.613 af
Outflow = 5.69 cfs @ 12.12 hrs, Volume= 0.613 af, Atten= 0%, Lag= 0.0 min
Primary = 5.69 cfs @ 12.12 hrs, Volume= 0.613 af
Routed to Pond 123 : WQ Infiltration Pond A

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 68.67' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	67.12'	**15.00" Round 15" HDPE** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 67.12' / 63.00' S= 0.0896 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=5.69 cfs @ 12.12 hrs HW=68.67' TW=66.99' (Dynamic Tailwater)
↑—**1=15" HDPE** (Inlet Controls 5.69 cfs @ 4.64 fps)

Summary for Pond 123: WQ Infiltration Pond A

Inflow Area = 5.463 ac, 53.82% Impervious, Inflow Depth = 3.26" for 100-Year event
Inflow = 10.48 cfs @ 12.12 hrs, Volume= 1.485 af
Outflow = 10.19 cfs @ 12.15 hrs, Volume= 1.485 af, Atten= 3%, Lag= 1.9 min
Discarded = 0.13 cfs @ 12.15 hrs, Volume= 0.506 af
Secondary = 10.06 cfs @ 12.15 hrs, Volume= 0.979 af
Routed to Link DP-1 : DP-1 West River

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 66.99' @ 12.15 hrs Surf.Area= 5,588 sf Storage= 15,481 cf

Plug-Flow detention time= 432.2 min calculated for 1.485 af (100% of inflow)
Center-of-Mass det. time= 432.2 min (1,198.8 - 766.6)

Volume	Invert	Avail.Storage	Storage Description
#1	63.00'	21,585 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
63.00	2,303	0	0
64.00	3,041	2,672	2,672
65.00	3,835	3,438	6,110
66.00	4,686	4,261	10,371
67.00	5,593	5,140	15,510
68.00	6,556	6,075	21,585

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.00'	**1.020 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#2	Secondary	66.70'	**22.0' 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=0.13 cfs @ 12.15 hrs HW=66.99' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Secondary OutFlow Max=10.06 cfs @ 12.15 hrs HW=66.99' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 10.06 cfs @ 1.55 fps)

Summary for Subcatchment 200: Post-15

Runoff = 1.93 cfs @ 12.19 hrs, Volume= 0.176 af, Depth= 4.47"
Routed to Link DP-2 : DP-2 Houghton St

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.267	61	>75% Grass cover, Good, HSG B
0.115	48	Brush, Good, HSG B
0.091	98	Impervious, HSG B
0.473	65	Weighted Average
0.382	57	80.69% Pervious Area
0.091	98	19.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.1130	0.15		**Sheet Flow, A** Grass: Bermuda n= 0.410 P2= 3.30"
3.1	418	0.0189	2.21		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
13.9	518	Total			

Summary for Subcatchment 300: Post-16

Runoff = 4.68 cfs @ 12.18 hrs, Volume= 0.438 af, Depth= 2.69"
Routed to Link DP-3 : DP-3 NE Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.061	39	>75% Grass cover, Good, HSG A
0.072	61	>75% Grass cover, Good, HSG B
0.000	80	>75% Grass cover, Good, HSG D
0.104	30	Brush, Good, HSG A
0.522	48	Brush, Good, HSG B
0.010	73	Brush, Good, HSG D
0.000	98	Impervious, HSG B
0.099	30	Woods, Good, HSG A
1.089	55	Woods, Good, HSG B
1.957	50	Weighted Average
1.957	50	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3					**Direct Entry, From EHCD**

Summary for Subcatchment 301: Post-17

Runoff = 3.65 cfs @ 12.00 hrs, Volume= 0.215 af, Depth= 5.92"
Routed to Link DP-3 : DP-3 NE Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (ac)	CN	Description
0.435	77	Woods, Good, HSG D
0.435	77	100.00% Pervious Area

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

Summary for Link DP-1: DP-1 West River

Inflow Area = 4.853 ac, 29.05% Impervious, Inflow Depth = 9.74" for 100-Year event
Inflow = 46.15 cfs @ 12.18 hrs, Volume= 3.941 af
Primary = 46.15 cfs @ 12.18 hrs, Volume= 3.941 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: DP-2 Houghton St

Inflow Area = 0.473 ac, 19.31% Impervious, Inflow Depth = 4.47" for 100-Year event
Inflow = 1.93 cfs @ 12.19 hrs, Volume= 0.176 af
Primary = 1.93 cfs @ 12.19 hrs, Volume= 0.176 af, Atten= 0%, Lag= 0.0 min

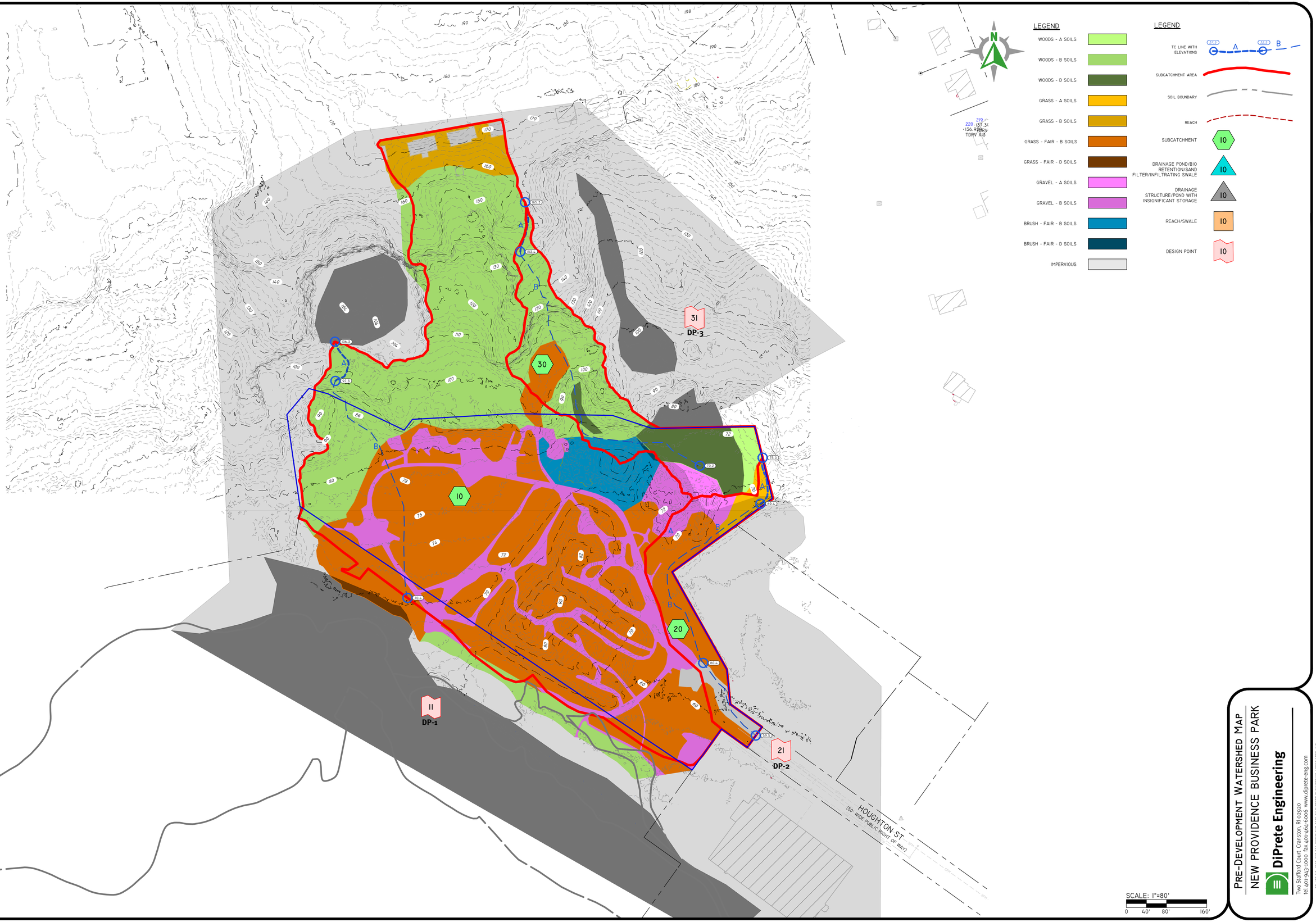
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: DP-3 NE Wetland

Inflow Area = 2.392 ac, 0.00% Impervious, Inflow Depth = 3.28" for 100-Year event
Inflow = 5.98 cfs @ 12.18 hrs, Volume= 0.653 af
Primary = 5.98 cfs @ 12.18 hrs, Volume= 0.653 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Watershed Maps



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PRE-DEVELOPMENT WATERSHED MAP

NEW PROVIDENCE BUSINESS PARK

DiPrete Engineering
Two Stafford Court Cranston, RI 02920
tel 401-943-1000 fax 401-464-6006 www.diprete-eng.com

LEGEND

- WOODS - A SOILS
- WOODS - B SOILS
- WOODS - D SOILS
- GRASS - A SOILS
- GRASS - B SOILS
- IMPERVIOUS
- BRUSH - A SOILS
- BRUSH - B SOILS
- BRUSH - D SOILS
- WATER

LEGEND

- TC LINE WITH ELEVATIONS
- SUBCATCHMENT AREA
- SOIL BOUNDARY
- REACH
- SUBCATCHMENT
- DRAINAGE POND/BIO RETENTION/SAND FILTER/INFILTRATING SWALE
- DRAINAGE STRUCTURE/POND WITH INSIGNIFICANT STORAGE
- REACH/SWALE
- DESIGN POINT

DP-3 NE WETLAND

DP-2 HOUGHTON ST

DP-1 WEST RIVER

HOUGHTON ST
(50' WIDE PUBLIC RIGHT OF WAY)

SCALE: 1"=80'
0 40' 80' 160'

POST-DEVELOPMENT WATERSHED MAP
NEW PROVIDENCE BUSINESS PARK

DiPrete Engineering
Two Stafford Court Cranston, RI 02920
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