

# Stormwater Management Report

## Proposed Industrial Building Gales Ferry, Connecticut

March 7, 2023  
Revised: April 12, 2023  
Revised: May 1, 2023

Prepared for  
Gales Ferry Intermodal, LLC  
549 South Street  
Quincy, MA 02169



**Loureiro Engineering Associates, Inc.**

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Comm. No. 045JC2.06

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## **1. INTRODUCTION**

This stormwater management report has been prepared by Loureiro Engineering Associates, Inc. (Loureiro) on behalf of Gales Ferry Intermodal LLC to provide a description and calculations for the stormwater management of the proposed 10,000 SF industrial building with a future 10,000 SF addition at 1761 Route 12 in Gales Ferry, Connecticut. The property is 158 acres with the proposed work encompassing approximately 3.68 acres of the property (hereinafter referred to as the “Site”).

### **1.1 Physical Setting**

The subject property is approximately 158 acres (ac) and is located in the Industrial zone (I). The property is the site of the former DOW Chemical manufacturing facility and been an industrial use for years. A portion of the property is currently used for the manufacturing of Styrofoam products by Americas Styrenics, a tenant of the property. The DOW Chemical facilities at the property terminated their manufacturing existence in 2011 and the former DOW Chemical manufacturing buildings have been removed from the property. The property has rail service with a rail siding and waterfront with an existing pier.

The property has inland wetlands as well as Allyn’s Pond. There is no activity with the wetland or 100 foot inland wetland upland review area with the proposed work.

The eastern boundary is bordered by Route 12 as well as some smaller industrial lots and a church that is in the R-40 zone. The western boundary is the Thames River. The northern boundary are residential lots in the R-40 zone. The southern boundary is bordered by properties zoned Commercial Marine (CM) and R-20.

### **1.2 Flood Plain and Soil Conditions**

Federal Emergency Management Agency’s (FEMA) National Flood Insurance Program (NFIP) Flood Insurance Rate Map (FIRM) Number 09011C0354G, effective July 18, 2011, for Town of Ledyard identifies a portion of the property within the Zone AE (EL12) and Zone X. The Site is located outside of any FEMA flood zones. Appendix B includes the FEMA FIRM map for the Site.

The National Resource Conservation Service (NRCS) Soil Survey for the State of Connecticut identified soils within the Site area as Agawam (29B) and as Urban Land (307). Agawam fine sandy loam corresponds with the Hydrologic Soil Group (HSG) rating B. Other soils just offsite

correspond with the HSG rating B as well. Urban Land corresponds with the Hydrologic Soil Group (HSG) rating D. HSG D soils generally have slow or unpredictable infiltration rates correlating to high runoff potential. Appendix C includes the NRCS soil map for the site.

Permeability tests were run by Loureiro on representative samples taken from the Site on March 7, 2023. Permeability results were 1.21 in/min, or 145 ft/day. Applying a factor of safety of 1.5, a permeability of 100 ft/day was used in drainage calculations.

## **2. EVALUATION OF EXISTING CONDITIONS**

### **2.1 Overview**

The property currently has an existing manufacturing area, concrete pads left and paved areas from the removal of the DOW Chemical buildings, and woods. The area of the Site is currently wooded or densely brushed, with less than 2 percent (%) impervious coverage.

### **2.2 Existing Stormwater Management**

The area of the Site currently has no existing drainage or stormwater management features. Stormwater is conveyed 100 percent (%) through surface runoff. The area of the Site currently is a plateaued mound that flows east and south then west toward the railroad tracks, which then flows downslope towards the Thames River. The section along the northern property line flows north offsite.

Through available survey information, the existing catch basin network and drainage system on the developed portion of the property flows south before discharging into Allyn's Pond. Allyn's Pond then flows west into the Thames River.

### **2.3 Existing Subcatchment Areas**

The total analyzed drainage area for the property is approximately 892,258 sf or 20.48 ac. The Site is divided into five (5) subcatchment areas. Subcatchment area 1 is comprised of the existing building foundations and paved area, with runoff being captured by the existing drainage system and discharging into Allyn's Pond, or running off through surface flow into Allyn's Pond. Subcatchment area 2 flows south through surface flow into Allyn's Brook, a tributary of Allyn's Pond, or is captured by the existing drainage system. Subcatchment area 3 flows through surface flow to a large depressed area east of the Site. This depressed area captures and infiltrates all runoff from this subcatchment. Subcatchment area 4 flows north off-Site. Subcatchment area 5 flows west through surface flow West Off-Site towards the Thames River. Drawing 1, Existing Drainage

Areas, depicts the existing drainage areas on the property. The three points of compliance (Allyn's Pond, North Off-Site, and West Off-Site) are utilized in HydroCAD to evaluate peak-flow leaving the property.

### **3. PROPOSED DEVELOPMENT**

#### **3.1 Overview**

The proposed work includes a new 10,000 SF industrial building with a future 10,000 SF addition (the addition is also considered impervious for all calculations), which will be utilized by the Applicant, for the storage and repair of marine equipment and appurtenances in conjunction with marine contracting and dredging operations. The Site will include a new parking layout, paved entrance, curbing, lighting, landscaped areas, and utilities.

#### **3.2 Proposed Subcatchment Areas**

The redeveloped Site and overall property is divided into eight (8) subcatchment areas. Subcatchment areas 1 and 2 will largely be unchanged under proposed conditions. Subcatchment area 3 will be similar to existing conditions, but will instead flow into the new drainage system instead of the depressed area on Site. Subcatchment area 4 is a large portion of the new paved area and building. Subcatchment area 5 is the western portion of the new paved area, northern landscaped area, and building. While the building addition is currently shown as gravel, it was modeled as a roof surface in hydrological analysis in anticipation of the future addition. Subcatchment area 6 is similar to subcatchment area 5 under existing conditions and will be relatively unchanged and flow west. Subcatchment area 7 will flow north off-site, similar to subcatchment area 4 under existing conditions. Subcatchment 8 is a portion of existing parking lot that will flow through an existing catch basin into the proposed drainage system. The Site work will result in an increase in impervious area for the property, from 41% to 48%. Drawing 2, Proposed Drainage Areas, depict the new drainage areas on the property.

#### **3.3 Design Criteria & Proposed Stormwater Management Systems**

The post-development stormwater runoff analysis was based on the 2-, 10-, 25-, 50-, and 100-year 24-hour storm events. The increase in impervious area requires on-site attenuation to meet the existing runoff rates as closely as possible.

The drainage improvements for the site will include a manhole, catch basin, and swale network to collect most of the paved area, landscaped area, and the entirety of the building roof. To attenuate and reduce peak flows, a subsurface infiltration system will be included in the drainage system.

The infiltration system is with 12 inches of stone surrounding the system and typical system requirements of 6 inches of stone beneath and above the system. The system is designed to fully retain and infiltrate captured runoff up to the 100-year storm event. Any runoff that outlets from the system will flow into the existing drainage system south of the Site.

To improve stormwater quality discharging from the Site, the infiltration system has been sized to hold the full water quality volume (WQV) and will include isolator rows for improved stormwater treatment and suspended solid removal. WQV calculations are provided in Appendix E.

## **4. STORMWATER MANAGEMENT EVALUATION**

### **4.1 Stormwater Runoff Calculations**

The following evaluation was prepared to identify the qualitative and quantitative stormwater runoff characteristics for the existing and proposed conditions at the site. The stormwater management system was designed for the 2-year, 10-year, 25-year, 50-year, and 100-year design storms.

#### **4.1.1 Design Methodology**

Site specific point precipitation frequency estimates used to generate peak stormwater flow were obtained from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 10 Version 3: Precipitation-Frequency Atlas of the United States, Northeastern States (rev. 2015). Precipitation-frequency estimates are based upon frequency analysis of partial duration series with a 90% confidence interval of data largely from the National Centers for Environmental Information (NCEI).

The methods described in Urban Hydrology for Small Watersheds, 2nd Edition, (Technical Release Number 55 [TR-55]) from the Natural Resources Conservation Service formerly the Soil Conservation Service – [SCS], 1986) were used to calculate stormwater peak-flow generated from pre- and post-redevelopment conditions. These methods, which are incorporated into the HydroCAD computer software program, use well documented procedures to calculate stormwater runoff volume, peak-flow rate of discharge, hydrographs and storage volumes required for floodwater reservoirs in small watersheds. The method uses the SCS Runoff Curve Number method to estimate runoff volume, calculates times of concentration, produces tabular hydrographs and estimates basin storage capacity.

#### **4.1.2 Curve Numbers**

The curve numbers (CN) values utilized for the analysis of the existing and proposed conditions included:

Existing lawn/grassed area, CN = 84 (fair grass cover, HSG D)

New grassed area, CN = 61 (Good grass cover, HSG B)

New grassed area, CN = 80 (Good grass cover, HSG D)

Brush, CN = 35 (fair condition, HSG A)

V:\CT\Gales Ferry\Route 12-1761\045JC2.06 Local Permit for Sterling Building\Working Docs\Stormwater Report

Brush, CN = 56 (fair condition, HSG B)  
 Brush, CN = 77 (fair condition, HSG D)  
 Gravel, CN = 85 (HSG B)  
 Gravel, CN = 91 (HSG D)  
 Woods, CN = 30 (Good condition, HSG A)  
 Woods, CN = 55 (Good condition, HSG B)  
 Woods, CN = 77 (Good condition, HSG D)  
 Impervious areas (pavement, roofs, etc), CN = 98

The weighted CN of the existing property is 80. The weighted CN of the property with the new Site is 82. This is due to the increase in impervious areas.

#### 4.2 Existing and Proposed Peak-Flow Comparison

With the use of subsurface infiltration, total peak flows are reduced during all analyzed storm events.

**Table 1 – Peak-Flow Comparison, Cubic Feet per Second**

	2-Year Event		10-Year Event		25-Year Event		50-year Event		100-year Event	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
Allyn's Pond	17.81	15.93	32.33	27.57	41.94	36.3	49.27	43.06	57.15	50.39
North Off-Site	0.08	0.04	0.29	0.22	0.45	0.37	0.58	0.49	0.72	0.62
West Off-Site	6.97	4.52	12.67	8.1	16.29	10.38	19.01	12.08	21.91	13.89
Existing Depression	0	0	0	0	0	0	0	0	0	0
Total West Off-Site	6.97	4.52	12.67	8.1	16.29	10.38	19.01	12.08	21.91	13.89
Total	24.86	20.49	45.29	35.89	58.68	47.05	68.86	55.63	79.78	64.9

The table shows decreasing total peak flow runoff during all analyzed storm events, ranging from 17.6 percent (%) to 20.7 percent (%). This is due to the robust proposed infiltration system capturing and fully infiltrating the Site's runoff. Off-site areas like Subcatchment 3 & 8 were graded or routed to the proposed infiltration system to influence total peak flows and volumes as much as possible, since the Site is only a small portion of the property relative to the total property. Overall, new drainage conditions should function similarly to those of existing conditions. Appendix D includes the HydroCAD report for the existing and new Site analysis.

#### 4.3 Runoff Volume

Total runoff from the property was also analyzed volumetrically to ensure similar or lower runoff volumes under new conditions as volumes under existing conditions. The results for the 2-year and 100-year storm events for the total Site and for Allyn's Pond are below:

**Table 2 – Total Runoff Volume Comparison, Cubic Feet**

	Existing (cf)	New (cf)	Volume Infiltrated (cf)	Surface Runoff Volume (cf)
2-Year	131,509	134,909	23,828	111,081
100-year	402,000	406,808	72,510	334,298

**Table 3 – Allyn's Pond Runoff Volume Comparison, Cubic Feet**

	Existing (cf)	New (cf)	Volume Infiltrated (cf)	Surface Runoff Volume (cf)
2-Year	106,483	117,709	23,828	93,881
100-year	306,055	351,693	72,510	279,183

The tables show that the new infiltration system reduces total proposed runoff volume below that of existing conditions. Therefore, receiving waters will not receive increased runoff volumes and should not be negatively impacted. Appendix D includes the HydroCAD reports showing runoff volume calculations.

#### 4.4 Water Quality

The methods described in the 2004 Connecticut Stormwater Quality Manual were utilized to calculate the WQV of the redevelopment. The WQV for the site is equivalent to the runoff generated with the first one-inch of rainfall. The developed Site is approximately 166,900 sf and 52% impervious, resulting in a WQV of 7,100 cf. The subsurface infiltration provides a storage volume of approximately 12,700 cf between the Stormtech chambers and surrounding stone. The infiltration system provides adequate amount of storage to store the WQV. In addition to the aforementioned Isolator Rows, the drainage system also leads to two (2) hydrodynamic separators before entering the subsurface chamber systems. These separators are designed to capture oil, trash, and floatables while removing total suspended solids and other pollutants. The proposed hydrodynamic separators are also designed to treat the Water Quality Flow (WQF) of 1.83 cfs. Appendix F includes the calculations used for selecting hydrodynamic separators.

#### 4.5 Stormwater System Maintenance Program

To help facilitate the function and longevity of the stormwater management system, a maintenance program and inspection checklist has been developed for the components and surrounding areas.



The maintenance includes periodic inspections, scheduled cleanings and details on identifying signs of failures in the system. A full checklist of system features shall be completed to provide a log of inspections, cleanings, repairs, and any important information regarding the system. The program will be implemented after installation with more frequent inspections early and fewer inspections after a year or when the system function becomes more predictable. The program, checklist, and past inspection/maintenance logs will be provided to the current or future owners and necessary facility personnel. The maintenance program and checklist is included as Appendix G.

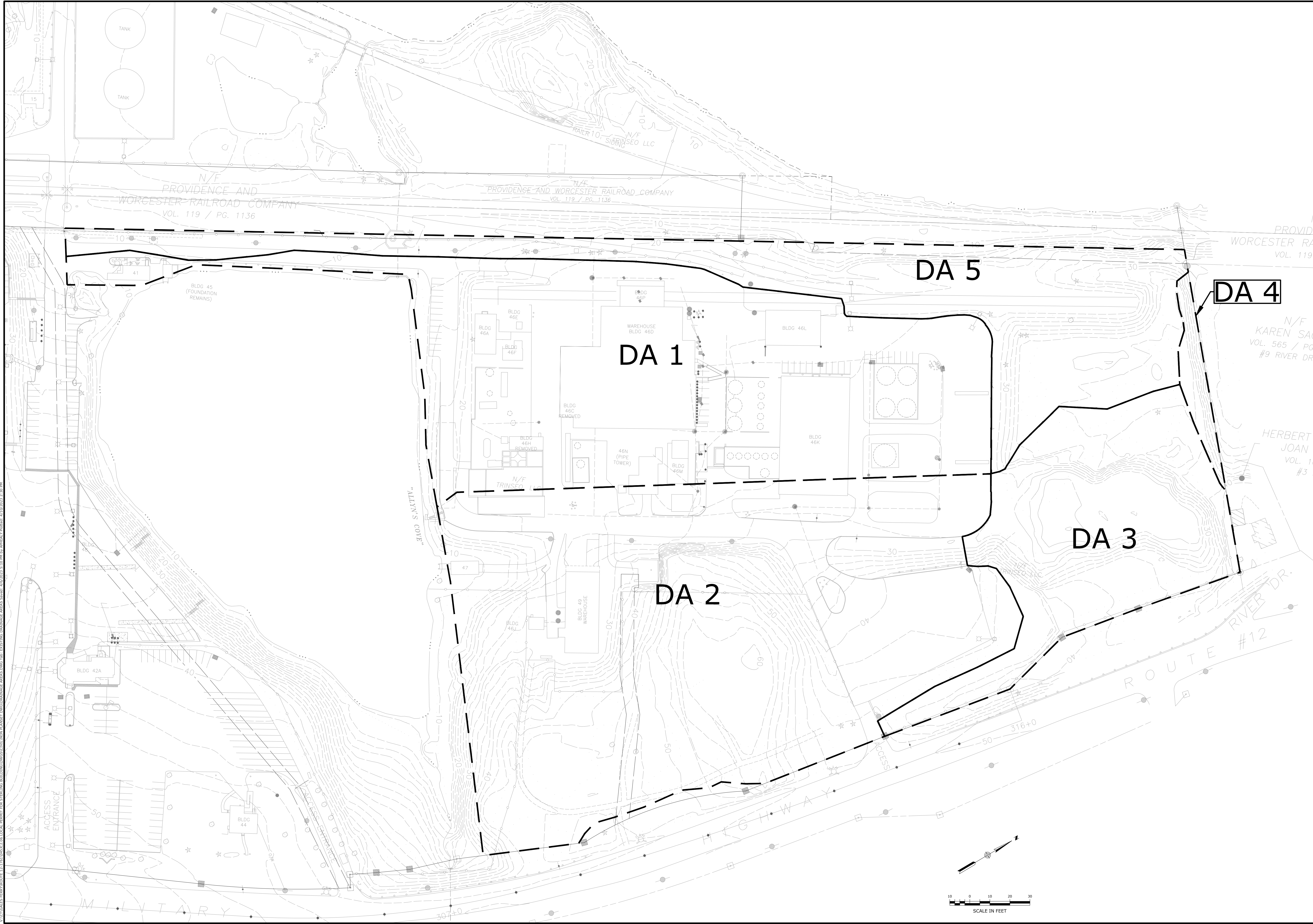
## **5. CONCLUSION**

The new Site work includes a new stormwater management system for the primary conveyance of the stormwater discharging from the site. The proposed system provides attenuation and treatment of all stormwater events leaving the Site, managing post-development runoff rates and allowing for potential groundwater recharge. The subsurface infiltration system includes Isolator Rows and sufficient storage capacity for the WQV to offer treatment of Site stormwater, along with treatment of WQF provided by hydrodynamic separators. Overall, the new drainage system will improve water quality discharging from the property while providing lower flow rates and volume to receiving waters.

## **DRAWINGS**

**Drawing 1 –Existing Drainage Areas**





V:\CT\GALES FERRY\ROUTE 12\24\0451C2.DWG LOCAL PERMIT FOR STERLING BUILDINGS\CONJUNCTION PLANET DVG\RAINAGE AREAS.DWG Job: EXISTING DRAINAGE AREAS Sheet: 4/6/2023 5:10 PM by: ARNOLD, J. D. 04/06/2023 2:30 PM

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EXISTING DRAINAGE AREAS		GALES FERRY INTERMODAL 1761 ROUTE 12, GALES FERRY, CONNECTICUT 06335		NO. OF SHEETS 2	
Loureiro Engineering Associates, Inc. Engineers • Architects • Planners • Surveyors • Energy Waste • Facility Services • Laboratory 1761 Route 12, Gales Ferry, CT 06335 Phone: 860-747-6181 • Fax: 860-747-8822 An Employee-Owned Company • www.loureiro.com ©Loureiro Engineering Associates, Inc. All Rights Reserved 2023		DATE 04/06/2023		DATE 04/06/2023	
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04/06/2023		DATE		NO. OF SHEETS 2	
SRM		DATE		NO. OF SHEETS 2	
APPR.		DATE		NO. OF SHEETS 2	

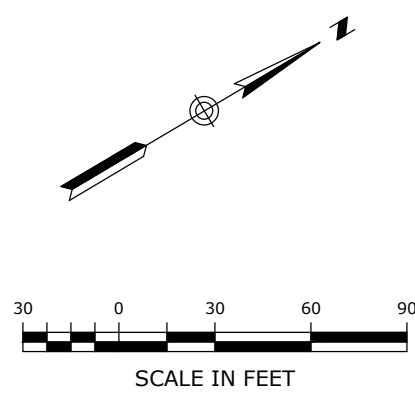


**Drawing 2 – Proposed Drainage Areas**





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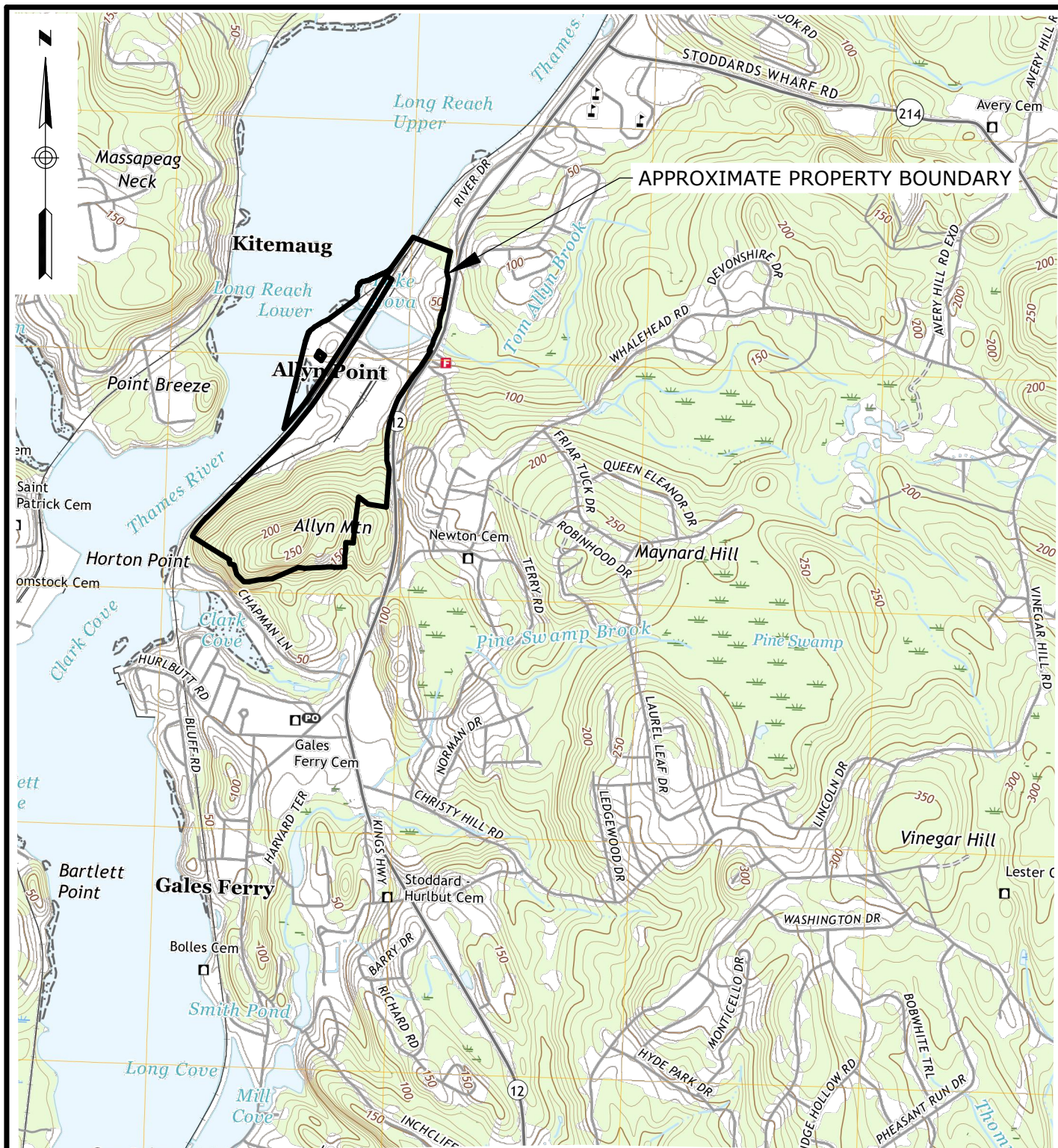
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 Loureiro Engineering Associates, Inc. Environmental • Construction • EIRIS • Energy Waste • Facility Services • Laboratory 1761 ROUTE 12, GALES FERRY, CONNECTICUT 06335 Phone: 860-747-6318 • Fax: 860-747-8822 www.loureiro.com © Loureiro Engineering Associates, Inc. All Rights Reserved 2023		DATE 04/06/2023	DATE 04/06/2023	PROPOSED DRAINAGE AREAS	
		DESIGNED BY ESP	APPROVED BY SRM	GALES FERRY INTERMODAL 1761 ROUTE 12, GALES FERRY, CONNECTICUT 06335 GALES FERRY INTERMODAL LLC 383 SOUTH STREET, SUITE 201, DANBURY, CT 06810	
REVISIONS		REVISIONS		REVISIONS	
2	REVISED PER UPDATED LAYOUT	1	REVISED PER UPDATED LAYOUT	1	REVISED PER UPDATED LAYOUT
1	REV.	1	REV.	1	REV.
DESCRIPTION OF REVISION		DESCRIPTION OF REVISION		DESCRIPTION OF REVISION	
DATE		DATE		DATE	
SRM		SRM		SRM	
APPR.		APPR.		APPR.	



## **APPENDIX A**

### **USGS Site Location Map**





**MAP REFERENCE:**

SECTION OF THE USGS 7.5 MINUTE SERIES TOPOGRAPHIC MAP  
FOR UNCASVILLE, CT; MAP VERSION DATE 2021.



Engineering • Construction • EH&S • Energy  
Waste • Facility Services • Laboratory

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**DRAINAGE REPORT  
ATTACHMENT A  
SITE LOCATION MAP**

**NEW 20,000 SF INDUSTRIAL BUILDING**

1761 ROUTE 12, GALES FERRY, CT

PREPARED FOR:

**GALES FERRY INTERMODAL LLC**

549 SOUTH STREET, QUINCY, MA

SCALE

**1" = 2,000' ±**

COMM. NO.

**045JC2.06**

DATE

**03-07-2023**

**1**

## **APPENDIX B**

### **FEMA FIREMETTE Map**



## NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

**Coastal Base Flood Elevations** shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Connecticut State Plane Zone (FIPS zone 0600). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services  
NOAA, N/NGS12  
National Geodetic Survey  
SSMC-3, #9202  
1315 East-West Highway  
Silver Spring, Maryland 20910-3282  
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

**Base map** information shown on this FIRM was derived from digital orthophotography provided by the Connecticut Department of Environmental Planning. This information was created from photography dated 2000, 2004 and 2005.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

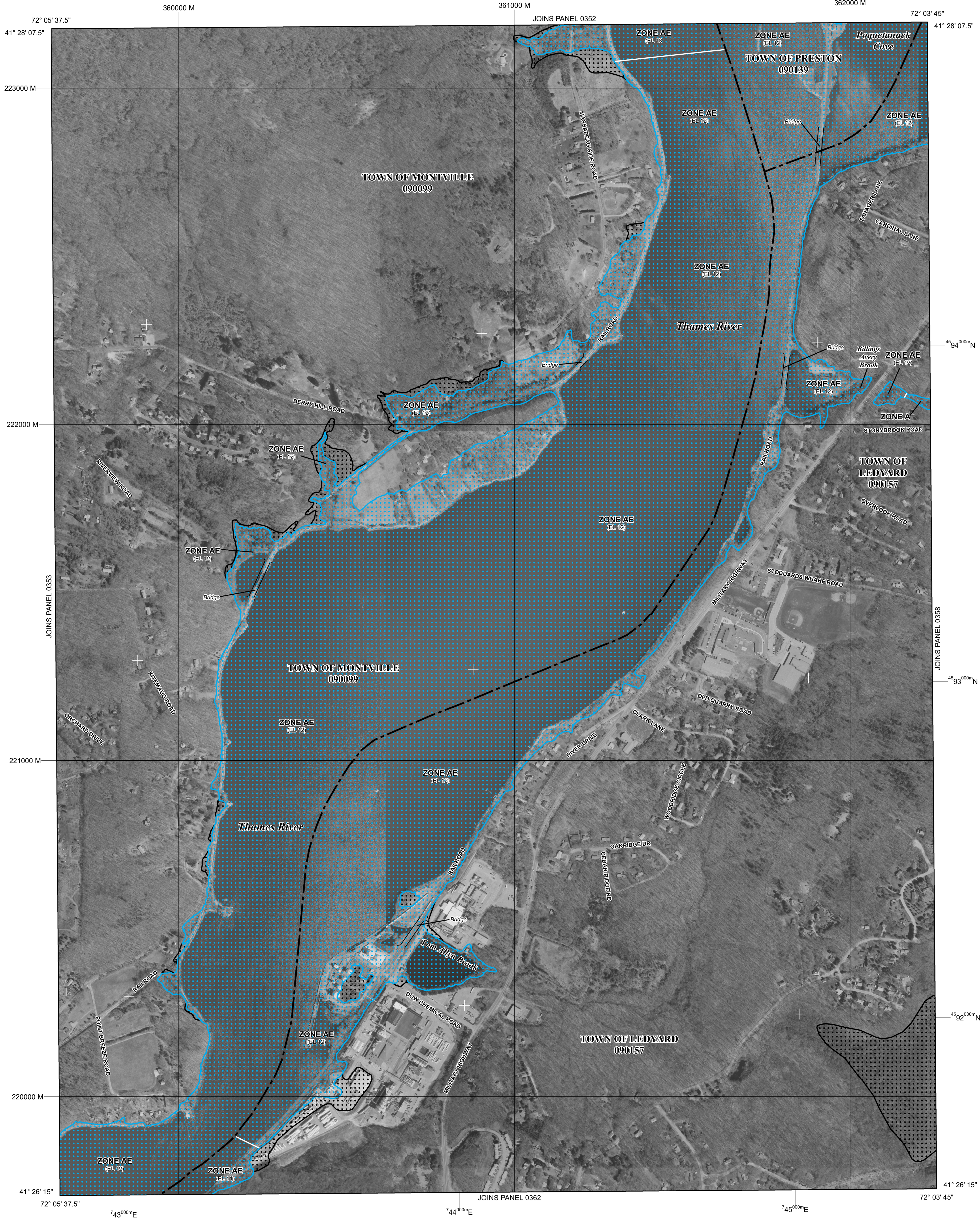
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations** and **floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

**Corporate limits** shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at <http://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/nfp>.



## LEGEND

**SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD**  
The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

**ZONE A** No Base Flood Elevations determined.  
**ZONE AE** Base Flood Elevations determined.  
**ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.  
**ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.  
**ZONE AR** Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.  
**ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.  
**ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.  
**ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

**FLOODWAY AREAS IN ZONE AE**

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

**OTHER FLOOD AREAS**

**ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.  
**ZONE D** Areas determined to be outside the 0.2% annual chance floodplain.  
**ZONE D** Areas in which flood hazards are undetermined, but possible.

**OTHER AREAS**

**COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**

**OTHERWISE PROTECTED AREAS (OPAs)**

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary  
0.2% Annual Chance Floodplain Boundary  
Floodway boundary  
Zone D boundary  
CBRS and OPA boundary  
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.  
Base Flood Elevation line and value; elevation in feet\*  
Base Flood Elevation value where uniform within zone; elevation in feet\*  
(EL 987)

\*Referenced to the North American Vertical Datum of 1988

**A** Cross section line  
**23** Transect line  
Culvert  
Bridge  
Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere  
4989000 M  
1000-meter ticks: Connecticut State Plane Zone (FIPS Zone 0600), Lambert Conformal Conic projection  
1000-meter Universal Transverse Mercator grid values, zone 18N  
DX5510 X  
Bench mark (see explanation in Notes to Users section of this FIRM panel)  
M1.5  
River Mile

MAP REPOSITORIES  
Refer to Map Repositories list on Map Index  
EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP  
July 18, 2011  
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



**MAP SCALE 1" = 500'**  
250 0 500 1000  
150 0 150 300  
FEET  
METERS

**NATIONAL FLOOD INSURANCE PROGRAM**

**PANEL 0354G**

**FIRM**  
**FLOOD INSURANCE RATE MAP**  
**NEW LONDON COUNTY,**  
**CONNECTICUT**  
**ALL JURISDICTIONS**

**PANEL 354 OF 554**  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

**CONTAINS:**

COMMUNITY	NUMBER	PANEL	SUFFIX
LEDYARD, TOWN OF	090157	0354	G
MONTVILLE, TOWN OF	090099	0354	G
PRESTON, TOWN OF	090139	0354	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

**MAP NUMBER**  
**09011C0354G**  
**EFFECTIVE DATE**  
**JULY 18, 2011**  
**Federal Emergency Management Agency**



## **APPENDIX C**

### **Natural Resources Conservation Service – Web Soil Survey**



United States  
Department of  
Agriculture

**NRCS**

Natural  
Resources  
Conservation  
Service

A product of the National  
Cooperative Soil Survey,  
a joint effort of the United  
States Department of  
Agriculture and other  
Federal agencies, State  
agencies including the  
Agricultural Experiment  
Stations, and local  
participants

# Custom Soil Resource Report for State of Connecticut



March 4, 2023

# Preface

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Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist ([http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2\\_053951](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951)).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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# How Soil Surveys Are Made

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Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

## Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

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The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

# Custom Soil Resource Report Soil Map



MAP LEGEND

**Area of Interest (AOI)**

Area of Interest (AOI)

**Soils**

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

**Special Point Features**

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

**Water Features**

Streams and Canals

**Transportation**

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

**Background**

Aerial Photography

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL: [Web Soil Survey URL](#)  
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut  
Survey Area Data: Version 22, Sep 12, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 14, 2022—Oct 6, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
29B	Agawam fine sandy loam, 3 to 8 percent slopes	5.6	21.7%
34B	Merrimac fine sandy loam, 3 to 8 percent slopes	1.7	6.6%
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	7.3	28.2%
307	Urban land	11.3	43.6%
<b>Totals for Area of Interest</b>		<b>26.0</b>	<b>100.0%</b>

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.



## State of Connecticut

### 29B—Agawam fine sandy loam, 3 to 8 percent slopes

#### Map Unit Setting

*National map unit symbol:* 2tyqx

*Elevation:* 0 to 820 feet

*Mean annual precipitation:* 36 to 71 inches

*Mean annual air temperature:* 39 to 55 degrees F

*Frost-free period:* 140 to 250 days

*Farmland classification:* All areas are prime farmland

#### Map Unit Composition

*Agawam and similar soils:* 85 percent

*Minor components:* 15 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Agawam

##### Setting

*Landform:* Outwash plains, kames, kame terraces, outwash terraces, moraines

*Landform position (two-dimensional):* Summit, shoulder, backslope, footslope

*Landform position (three-dimensional):* Crest, side slope, riser, tread, rise, dip

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Parent material:* Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from gneiss, granite, schist, and/or phyllite

##### Typical profile

*Ap - 0 to 11 inches:* fine sandy loam

*Bw1 - 11 to 16 inches:* fine sandy loam

*Bw2 - 16 to 26 inches:* fine sandy loam

*2C1 - 26 to 45 inches:* loamy fine sand

*2C2 - 45 to 55 inches:* loamy fine sand

*2C3 - 55 to 65 inches:* loamy sand

##### Properties and qualities

*Slope:* 3 to 8 percent

*Depth to restrictive feature:* 15 to 35 inches to strongly contrasting textural stratification

*Drainage class:* Well drained

*Runoff class:* Very low

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to high (0.14 to 14.17 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Maximum salinity:* Nonsaline (0.0 to 1.9 mmhos/cm)

*Available water supply, 0 to 60 inches:* Low (about 3.4 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 2s

*Hydrologic Soil Group:* B

*Ecological site:* F145XY008MA - Dry Outwash

*Hydric soil rating:* No

### **Minor Components**

#### **Sudbury**

*Percent of map unit:* 5 percent  
*Landform:* Deltas, terraces, outwash plains  
*Landform position (two-dimensional):* Footslope  
*Landform position (three-dimensional):* Tread, dip  
*Down-slope shape:* Concave  
*Across-slope shape:* Linear  
*Hydric soil rating:* No

#### **Hinckley**

*Percent of map unit:* 5 percent  
*Landform:* Deltas, kames, eskers, outwash plains  
*Landform position (two-dimensional):* Summit, shoulder, backslope  
*Landform position (three-dimensional):* Head slope, nose slope, crest, side slope, rise  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex, linear  
*Hydric soil rating:* No

#### **Merrimac**

*Percent of map unit:* 3 percent  
*Landform:* Outwash plains, outwash terraces, moraines, eskers, kames  
*Landform position (two-dimensional):* Summit, shoulder, backslope, footslope  
*Landform position (three-dimensional):* Crest, side slope, riser, tread  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Hydric soil rating:* No

#### **Windsor**

*Percent of map unit:* 2 percent  
*Landform:* Dunes, outwash plains, deltas, outwash terraces  
*Landform position (three-dimensional):* Tread, riser  
*Down-slope shape:* Convex, linear  
*Across-slope shape:* Convex, linear  
*Hydric soil rating:* No

## **34B—Merrimac fine sandy loam, 3 to 8 percent slopes**

### **Map Unit Setting**

*National map unit symbol:* 2tyqs  
*Elevation:* 0 to 1,290 feet  
*Mean annual precipitation:* 36 to 71 inches  
*Mean annual air temperature:* 39 to 55 degrees F  
*Frost-free period:* 140 to 240 days  
*Farmland classification:* All areas are prime farmland

### Map Unit Composition

*Merrimac and similar soils: 85 percent*

*Minor components: 15 percent*

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Merrimac

#### Setting

*Landform: Outwash plains, outwash terraces, moraines, eskers, kames*

*Landform position (two-dimensional): Summit, shoulder, backslope, footslope*

*Landform position (three-dimensional): Crest, side slope, riser, tread*

*Down-slope shape: Convex*

*Across-slope shape: Convex*

*Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss*

#### Typical profile

*Ap - 0 to 10 inches: fine sandy loam*

*Bw1 - 10 to 22 inches: fine sandy loam*

*Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand*

*2C - 26 to 65 inches: stratified gravel to very gravelly sand*

#### Properties and qualities

*Slope: 3 to 8 percent*

*Depth to restrictive feature: More than 80 inches*

*Drainage class: Somewhat excessively drained*

*Runoff class: Very low*

*Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)*

*Depth to water table: More than 80 inches*

*Frequency of flooding: None*

*Frequency of ponding: None*

*Calcium carbonate, maximum content: 2 percent*

*Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)*

*Sodium adsorption ratio, maximum: 1.0*

*Available water supply, 0 to 60 inches: Low (about 4.6 inches)*

#### Interpretive groups

*Land capability classification (irrigated): None specified*

*Land capability classification (nonirrigated): 2s*

*Hydrologic Soil Group: A*

*Ecological site: F145XY008MA - Dry Outwash*

*Hydric soil rating: No*

### Minor Components

#### Sudbury

*Percent of map unit: 5 percent*

*Landform: Deltas, terraces, outwash plains*

*Landform position (two-dimensional): Footslope*

*Landform position (three-dimensional): Tread, dip*

*Down-slope shape: Concave*

*Across-slope shape: Linear*

*Hydric soil rating: No*

**Hinckley**

*Percent of map unit:* 5 percent

*Landform:* Deltas, kames, eskers, outwash plains

*Landform position (two-dimensional):* Summit, shoulder, backslope

*Landform position (three-dimensional):* Head slope, nose slope, crest, side slope, rise

*Down-slope shape:* Convex

*Across-slope shape:* Convex, linear

*Hydric soil rating:* No

**Windsor**

*Percent of map unit:* 3 percent

*Landform:* Outwash terraces, dunes, deltas, outwash plains

*Landform position (two-dimensional):* Shoulder

*Landform position (three-dimensional):* Tread, riser

*Down-slope shape:* Linear, convex

*Across-slope shape:* Linear, convex

*Hydric soil rating:* No

**Agawam**

*Percent of map unit:* 2 percent

*Landform:* Outwash plains, outwash terraces, moraines, stream terraces, eskers, kames

*Landform position (three-dimensional):* Rise

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Hydric soil rating:* No

**73C—Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky**

**Map Unit Setting**

*National map unit symbol:* 2w698

*Elevation:* 0 to 1,550 feet

*Mean annual precipitation:* 36 to 71 inches

*Mean annual air temperature:* 39 to 55 degrees F

*Frost-free period:* 140 to 240 days

*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Charlton, very stony, and similar soils:* 50 percent

*Chatfield, very stony, and similar soils:* 30 percent

*Minor components:* 20 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Charlton, Very Stony**

**Setting**

*Landform:* Ridges, hills

*Landform position (two-dimensional):* Summit, shoulder, backslope

*Landform position (three-dimensional):* Side slope, crest, nose slope

## Custom Soil Resource Report

*Down-slope shape:* Convex, linear

*Across-slope shape:* Convex

*Parent material:* Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

### Typical profile

*Oe - 0 to 2 inches:* moderately decomposed plant material

*A - 2 to 4 inches:* fine sandy loam

*Bw - 4 to 27 inches:* gravelly fine sandy loam

*C - 27 to 65 inches:* gravelly fine sandy loam

### Properties and qualities

*Slope:* 3 to 15 percent

*Surface area covered with cobbles, stones or boulders:* 1.6 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Runoff class:* Low

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to high (0.14 to 14.17 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Maximum salinity:* Nonsaline (0.0 to 1.9 mmhos/cm)

*Available water supply, 0 to 60 inches:* Moderate (about 8.7 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 6s

*Hydrologic Soil Group:* B

*Ecological site:* F144AY034CT - Well Drained Till Uplands

*Hydric soil rating:* No

## Description of Chatfield, Very Stony

### Setting

*Landform:* Hills, ridges

*Landform position (two-dimensional):* Summit, shoulder, backslope

*Landform position (three-dimensional):* Nose slope, side slope, crest

*Down-slope shape:* Convex

*Across-slope shape:* Linear, convex

*Parent material:* Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

### Typical profile

*Oi - 0 to 1 inches:* slightly decomposed plant material

*A - 1 to 2 inches:* fine sandy loam

*Bw - 2 to 30 inches:* gravelly fine sandy loam

*2R - 30 to 40 inches:* bedrock

### Properties and qualities

*Slope:* 3 to 15 percent

*Surface area covered with cobbles, stones or boulders:* 1.6 percent

*Depth to restrictive feature:* 20 to 41 inches to lithic bedrock

*Drainage class:* Well drained

*Runoff class:* High

*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)

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*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Maximum salinity:* Nonsaline (0.0 to 1.9 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Low (about 4.3 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 6s  
*Hydrologic Soil Group:* B  
*Ecological site:* F144AY034CT - Well Drained Till Uplands  
*Hydric soil rating:* No

### Minor Components

#### Rock outcrop

*Percent of map unit:* 5 percent  
*Hydric soil rating:* No

#### Hollis, very stony

*Percent of map unit:* 5 percent  
*Landform:* Hills, ridges  
*Landform position (two-dimensional):* Summit, shoulder, backslope  
*Landform position (three-dimensional):* Nose slope, side slope, crest  
*Down-slope shape:* Convex  
*Across-slope shape:* Linear, convex  
*Hydric soil rating:* No

#### Leicester, very stony

*Percent of map unit:* 5 percent  
*Landform:* Drainageways, depressions  
*Down-slope shape:* Linear  
*Across-slope shape:* Concave  
*Hydric soil rating:* Yes

#### Sutton, very stony

*Percent of map unit:* 5 percent  
*Landform:* Ground moraines, hills  
*Landform position (two-dimensional):* Footslope  
*Landform position (three-dimensional):* Base slope  
*Down-slope shape:* Concave  
*Across-slope shape:* Linear  
*Hydric soil rating:* No

## 307—Urban land

### Map Unit Setting

*National map unit symbol:* 9lmh  
*Elevation:* 0 to 2,000 feet  
*Mean annual precipitation:* 43 to 56 inches

## Custom Soil Resource Report

*Mean annual air temperature:* 45 to 55 degrees F

*Frost-free period:* 120 to 185 days

*Farmland classification:* Not prime farmland

### Map Unit Composition

*Urban land:* 80 percent

*Minor components:* 20 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Urban Land

#### Typical profile

*H - 0 to 6 inches:* material

#### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 8

*Hydrologic Soil Group:* D

*Hydric soil rating:* Unranked

### Minor Components

#### Udorthents, wet substratum

*Percent of map unit:* 10 percent

*Down-slope shape:* Convex

*Across-slope shape:* Linear

*Hydric soil rating:* No

#### Unnamed, undisturbed soils

*Percent of map unit:* 10 percent

*Hydric soil rating:* No

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## Custom Soil Resource Report

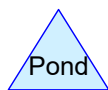
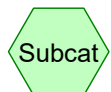
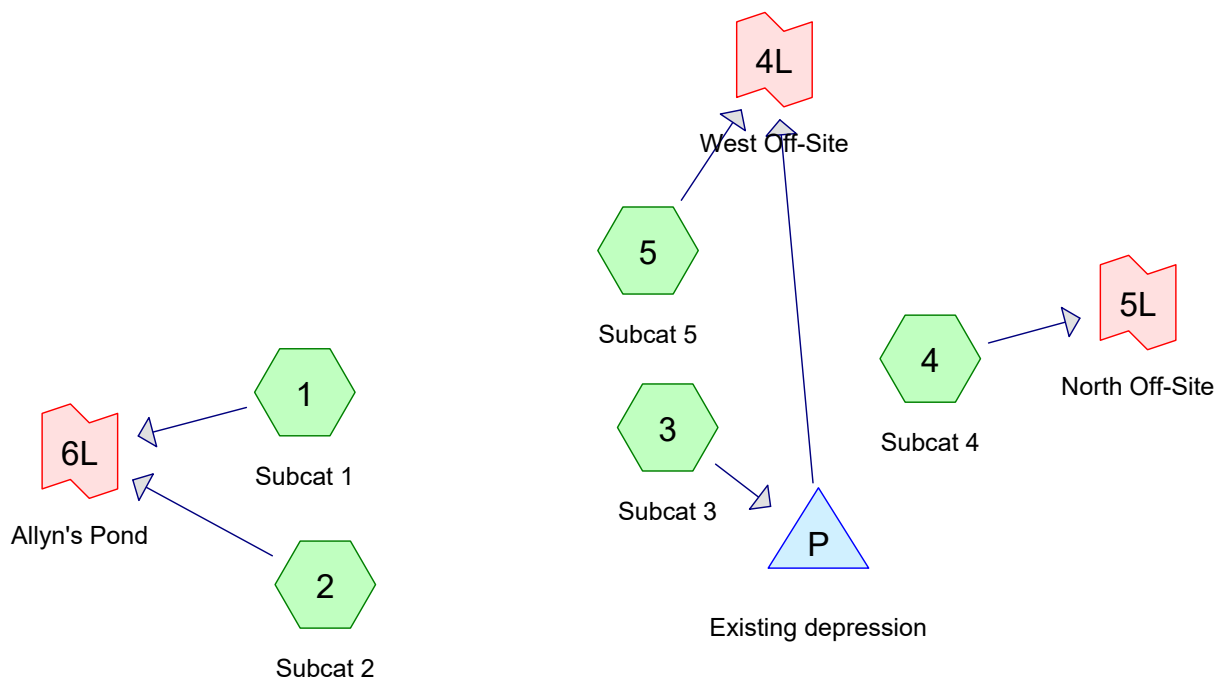
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## **APPENDIX D**

### **HydroCAD Reports**



## Existing Conditions

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### Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	Type III 24-hr		Default	24.00	1	3.46	2
2	10-yr	Type III 24-hr		Default	24.00	1	5.12	2
3	25-yr	Type III 24-hr		Default	24.00	1	6.15	2
4	50-yr	Type III 24-hr		Default	24.00	1	6.92	2
5	100-yr	Type III 24-hr		Default	24.00	1	7.74	2

## Existing Conditions

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### Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
5,408	84	50-75% Grass cover, Fair, HSG D (1, 2)
6,320	35	Brush, Fair, HSG A (3, 4)
117,684	56	Brush, Fair, HSG B (1, 2, 3, 5)
89,342	77	Brush, Fair, HSG D (1, 2, 3, 4, 5)
35,959	85	Gravel roads, HSG B (1, 2)
75,277	91	Gravel roads, HSG D (1, 2, 5)
65,824	98	Unconnected pavement, HSG B (1, 2, 3, 5)
297,862	98	Unconnected pavement, HSG D (1, 2, 5)
572	30	Woods, Good, HSG A (3)
164,356	55	Woods, Good, HSG B (2, 3, 5)
33,664	77	Woods, Good, HSG D (1, 2, 3, 5)
<b>892,267</b>	<b>80</b>	<b>TOTAL AREA</b>

## Existing Conditions

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### Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
6,892	HSG A	3, 4
383,823	HSG B	1, 2, 3, 5
0	HSG C	
501,553	HSG D	1, 2, 3, 4, 5
0	Other	
<b>892,267</b>		<b>TOTAL AREA</b>

## Existing Conditions

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### Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Nun
0	0	0	5,408	0	5,408	50-75% Grass cover, Fair	
6,320	117,684	0	89,342	0	213,345	Brush, Fair	
0	35,959	0	75,277	0	111,236	Gravel roads	
0	65,824	0	297,862	0	363,686	Unconnected pavement	
572	164,356	0	33,664	0	198,592	Woods, Good	
<b>6,892</b>	<b>383,823</b>	<b>0</b>	<b>501,553</b>	<b>0</b>	<b>892,267</b>	<b>TOTAL AREA</b>	

## Existing Conditions

Prepared by Loureiro Engineering Assoc, Inc

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Type III 24-hr 2-yr Rainfall=3.46"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

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

### Subcatchment 1: Subcat 1

Runoff Area=272,438 sf 90.85% Impervious Runoff Depth=3.11"  
Flow Length=254' Tc=28.5 min CN=97 Runoff=12.19 cfs 70,713 cf

### Subcatchment 2: Subcat 2

Runoff Area=354,049 sf 31.26% Impervious Runoff Depth=1.21"  
Flow Length=349' Tc=9.0 min CN=74 Runoff=9.99 cfs 35,771 cf

### Subcatchment 3: Subcat 3

Runoff Area=114,415 sf 0.01% Impervious Runoff Depth=0.40"  
Tc=5.0 min CN=57 Runoff=0.66 cfs 3,823 cf

### Subcatchment 4: Subcat 4

Runoff Area=8,418 sf 0.00% Impervious Runoff Depth=0.51"  
Flow Length=42' Slope=0.2755 '/' Tc=5.0 min CN=60 Runoff=0.08 cfs 361 cf

### Subcatchment 5: Subcat 5

Runoff Area=142,946 sf 3.83% Impervious Runoff Depth=1.75"  
Tc=5.0 min CN=82 Runoff=6.97 cfs 20,842 cf

### Pond P: Existing depression

Peak Elev=22.01' Storage=63 cf Inflow=0.66 cfs 3,823 cf  
Discarded=0.62 cfs 3,823 cf Primary=0.00 cfs 0 cf Outflow=0.62 cfs 3,823 cf

### Link 4L: West Off-Site

Inflow=6.97 cfs 20,842 cf  
Primary=6.97 cfs 20,842 cf

### Link 5L: North Off-Site

Inflow=0.08 cfs 361 cf  
Primary=0.08 cfs 361 cf

### Link 6L: Allyn's Pond

Inflow=17.81 cfs 106,483 cf  
Primary=17.81 cfs 106,483 cf

**Total Runoff Area = 892,267 sf Runoff Volume = 131,509 cf Average Runoff Depth = 1.77"**  
**59.24% Pervious = 528,581 sf 40.76% Impervious = 363,686 sf**



## Existing Conditions

Prepared by Loureiro Engineering Assoc, Inc

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Type III 24-hr 10-yr Rainfall=5.12"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

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

### Subcatchment 1: Subcat 1

Runoff Area=272,438 sf 90.85% Impervious Runoff Depth=4.77"  
Flow Length=254' Tc=28.5 min CN=97 Runoff=18.29 cfs 108,219 cf

### Subcatchment 2: Subcat 2

Runoff Area=354,049 sf 31.26% Impervious Runoff Depth=2.46"  
Flow Length=349' Tc=9.0 min CN=74 Runoff=21.07 cfs 72,590 cf

### Subcatchment 3: Subcat 3

Runoff Area=114,415 sf 0.01% Impervious Runoff Depth=1.17"  
Tc=5.0 min CN=57 Runoff=3.20 cfs 11,147 cf

### Subcatchment 4: Subcat 4

Runoff Area=8,418 sf 0.00% Impervious Runoff Depth=1.37"  
Flow Length=42' Slope=0.2755 ' /' Tc=5.0 min CN=60 Runoff=0.29 cfs 962 cf

### Subcatchment 5: Subcat 5

Runoff Area=142,946 sf 3.83% Impervious Runoff Depth=3.19"  
Tc=5.0 min CN=82 Runoff=12.67 cfs 37,960 cf

### Pond P: Existing depression

Peak Elev=22.06' Storage=350 cf Inflow=3.20 cfs 11,147 cf  
Discarded=2.74 cfs 11,147 cf Primary=0.00 cfs 0 cf Outflow=2.74 cfs 11,147 cf

### Link 4L: West Off-Site

Inflow=12.67 cfs 37,960 cf  
Primary=12.67 cfs 37,960 cf

### Link 5L: North Off-Site

Inflow=0.29 cfs 962 cf  
Primary=0.29 cfs 962 cf

### Link 6L: Allyn's Pond

Inflow=32.33 cfs 180,809 cf  
Primary=32.33 cfs 180,809 cf

**Total Runoff Area = 892,267 sf Runoff Volume = 230,878 cf Average Runoff Depth = 3.11"**  
**59.24% Pervious = 528,581 sf 40.76% Impervious = 363,686 sf**

## Existing Conditions

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Type III 24-hr 25-yr Rainfall=6.15"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

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

### Subcatchment 1: Subcat 1

Runoff Area=272,438 sf 90.85% Impervious Runoff Depth=5.79"  
Flow Length=254' Tc=28.5 min CN=97 Runoff=22.06 cfs 131,538 cf

### Subcatchment 2: Subcat 2

Runoff Area=354,049 sf 31.26% Impervious Runoff Depth=3.31"  
Flow Length=349' Tc=9.0 min CN=74 Runoff=28.48 cfs 97,701 cf

### Subcatchment 3: Subcat 3

Runoff Area=114,415 sf 0.01% Impervious Runoff Depth=1.77"  
Tc=5.0 min CN=57 Runoff=5.21 cfs 16,855 cf

### Subcatchment 4: Subcat 4

Runoff Area=8,418 sf 0.00% Impervious Runoff Depth=2.02"  
Flow Length=42' Slope=0.2755 '/' Tc=5.0 min CN=60 Runoff=0.45 cfs 1,417 cf

### Subcatchment 5: Subcat 5

Runoff Area=142,946 sf 3.83% Impervious Runoff Depth=4.13"  
Tc=5.0 min CN=82 Runoff=16.29 cfs 49,142 cf

### Pond P: Existing depression

Peak Elev=22.18' Storage=1,133 cf Inflow=5.21 cfs 16,855 cf  
Discarded=3.20 cfs 16,855 cf Primary=0.00 cfs 0 cf Outflow=3.20 cfs 16,855 cf

### Link 4L: West Off-Site

Inflow=16.29 cfs 49,142 cf  
Primary=16.29 cfs 49,142 cf

### Link 5L: North Off-Site

Inflow=0.45 cfs 1,417 cf  
Primary=0.45 cfs 1,417 cf

### Link 6L: Allyn's Pond

Inflow=41.94 cfs 229,239 cf  
Primary=41.94 cfs 229,239 cf

**Total Runoff Area = 892,267 sf Runoff Volume = 296,653 cf Average Runoff Depth = 3.99"**  
**59.24% Pervious = 528,581 sf 40.76% Impervious = 363,686 sf**

## Existing Conditions

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Type III 24-hr 50-yr Rainfall=6.92"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

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

### Subcatchment 1: Subcat 1

Runoff Area=272,438 sf 90.85% Impervious Runoff Depth=6.56"  
Flow Length=254' Tc=28.5 min CN=97 Runoff=24.87 cfs 148,983 cf

### Subcatchment 2: Subcat 2

Runoff Area=354,049 sf 31.26% Impervious Runoff Depth=3.97"  
Flow Length=349' Tc=9.0 min CN=74 Runoff=34.17 cfs 117,202 cf

### Subcatchment 3: Subcat 3

Runoff Area=114,415 sf 0.01% Impervious Runoff Depth=2.26"  
Tc=5.0 min CN=57 Runoff=6.85 cfs 21,550 cf

### Subcatchment 4: Subcat 4

Runoff Area=8,418 sf 0.00% Impervious Runoff Depth=2.55"  
Flow Length=42' Slope=0.2755 '/' Tc=5.0 min CN=60 Runoff=0.58 cfs 1,787 cf

### Subcatchment 5: Subcat 5

Runoff Area=142,946 sf 3.83% Impervious Runoff Depth=4.84"  
Tc=5.0 min CN=82 Runoff=19.01 cfs 57,670 cf

### Pond P: Existing depression

Peak Elev=22.30' Storage=1,980 cf Inflow=6.85 cfs 21,550 cf  
Discarded=3.64 cfs 21,550 cf Primary=0.00 cfs 0 cf Outflow=3.64 cfs 21,550 cf

### Link 4L: West Off-Site

Inflow=19.01 cfs 57,670 cf  
Primary=19.01 cfs 57,670 cf

### Link 5L: North Off-Site

Inflow=0.58 cfs 1,787 cf  
Primary=0.58 cfs 1,787 cf

### Link 6L: Allyn's Pond

Inflow=49.27 cfs 266,186 cf  
Primary=49.27 cfs 266,186 cf

**Total Runoff Area = 892,267 sf Runoff Volume = 347,192 cf Average Runoff Depth = 4.67"**  
**59.24% Pervious = 528,581 sf 40.76% Impervious = 363,686 sf**

## Existing Conditions

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Type III 24-hr 100-yr Rainfall=7.74"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

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

### Subcatchment 1: Subcat 1

Runoff Area=272,438 sf 90.85% Impervious Runoff Depth=7.38"  
Flow Length=254' Tc=28.5 min CN=97 Runoff=27.85 cfs 167,569 cf

### Subcatchment 2: Subcat 2

Runoff Area=354,049 sf 31.26% Impervious Runoff Depth=4.69"  
Flow Length=349' Tc=9.0 min CN=74 Runoff=40.32 cfs 138,487 cf

### Subcatchment 3: Subcat 3

Runoff Area=114,415 sf 0.01% Impervious Runoff Depth=2.82"  
Tc=5.0 min CN=57 Runoff=8.71 cfs 26,875 cf

### Subcatchment 4: Subcat 4

Runoff Area=8,418 sf 0.00% Impervious Runoff Depth=3.14"  
Flow Length=42' Slope=0.2755 '/' Tc=5.0 min CN=60 Runoff=0.72 cfs 2,203 cf

### Subcatchment 5: Subcat 5

Runoff Area=142,946 sf 3.83% Impervious Runoff Depth=5.61"  
Tc=5.0 min CN=82 Runoff=21.91 cfs 66,866 cf

### Pond P: Existing depression

Peak Elev=22.43' Storage=3,074 cf Inflow=8.71 cfs 26,875 cf  
Discarded=4.14 cfs 26,875 cf Primary=0.00 cfs 0 cf Outflow=4.14 cfs 26,875 cf

### Link 4L: West Off-Site

Inflow=21.91 cfs 66,866 cf  
Primary=21.91 cfs 66,866 cf

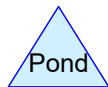
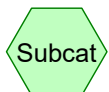
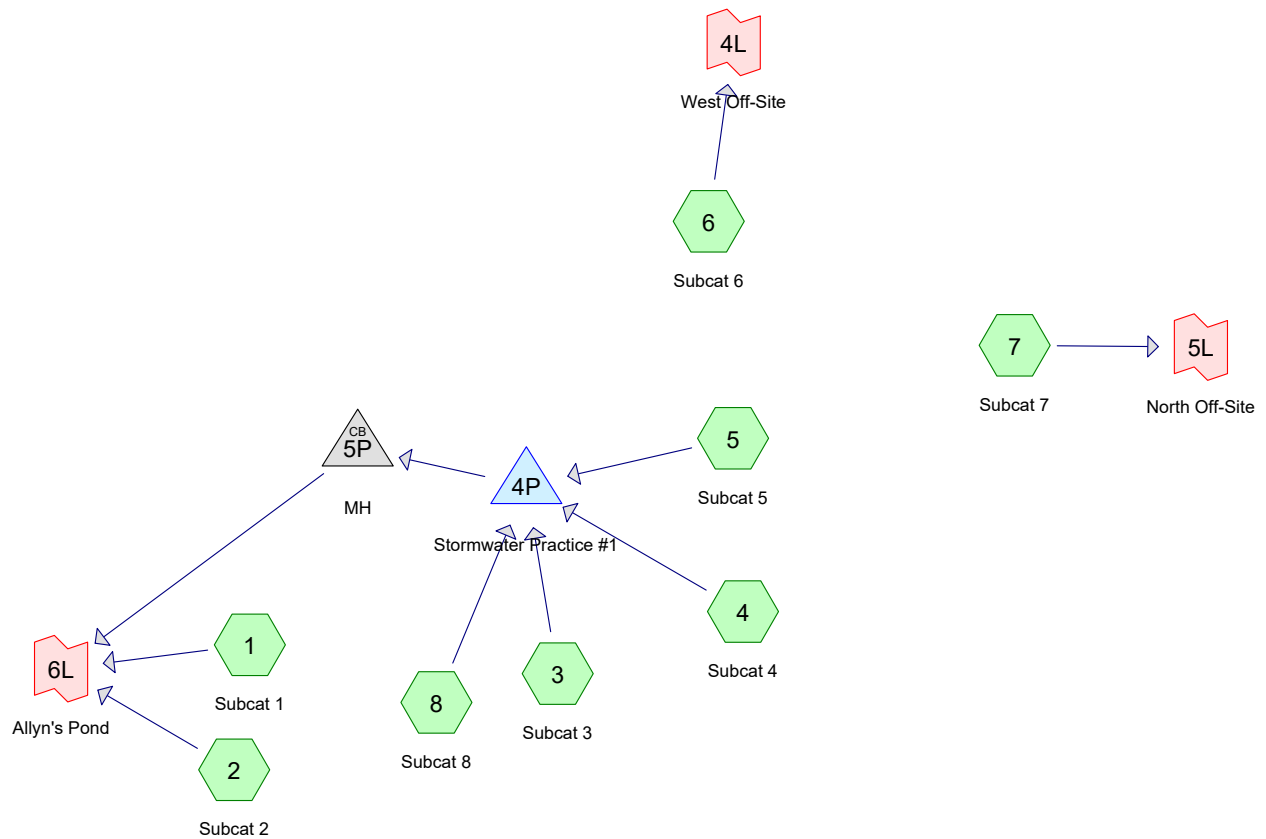
### Link 5L: North Off-Site

Inflow=0.72 cfs 2,203 cf  
Primary=0.72 cfs 2,203 cf

### Link 6L: Allyn's Pond

Inflow=57.15 cfs 306,055 cf  
Primary=57.15 cfs 306,055 cf

**Total Runoff Area = 892,267 sf Runoff Volume = 402,000 cf Average Runoff Depth = 5.41"**  
**59.24% Pervious = 528,581 sf 40.76% Impervious = 363,686 sf**



## New Conditions

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### Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	Type III 24-hr		Default	24.00	1	3.46	2
2	10-yr	Type III 24-hr		Default	24.00	1	5.12	2
3	25-yr	Type III 24-hr		Default	24.00	1	6.15	2
4	50-yr	Type III 24-hr		Default	24.00	1	6.92	2
5	100-yr	Type III 24-hr		Default	24.00	1	7.74	2

## New Conditions

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### Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
2,255	61	>75% Grass cover, Good, HSG B (1, 2)
7,702	80	>75% Grass cover, Good, HSG D (1, 2, 6)
110,052	56	Brush, Fair, HSG B (2, 3, 4, 5, 8)
66,758	77	Brush, Fair, HSG D (1, 2, 5, 6)
35,972	85	Gravel roads, HSG B (1, 2)
75,157	91	Gravel roads, HSG D (1, 2, 6)
31,543	98	Paved parking, HSG B (1, 2, 4, 5)
22,322	98	Paved parking, HSG D (4, 5)
7,398	98	Roofs, HSG B (4)
12,629	98	Roofs, HSG D (4, 5)
63,683	98	Unconnected pavement, HSG B (1, 2, 3, 8)
294,398	98	Unconnected pavement, HSG D (1, 2, 6)
6,891	30	Woods, Good, HSG A (5, 7)
132,922	55	Woods, Good, HSG B (2, 3, 5, 8)
22,467	77	Woods, Good, HSG D (1, 2, 5, 6, 7)
<b>892,149</b>	<b>82</b>	<b>TOTAL AREA</b>

## New Conditions

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### Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
6,891	HSG A	5, 7
383,826	HSG B	1, 2, 3, 4, 5, 8
0	HSG C	
501,433	HSG D	1, 2, 4, 5, 6, 7
0	Other	
<b>892,149</b>		<b>TOTAL AREA</b>



## New Conditions

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### Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
0	2,255	0	7,702	0	9,957	>75% Grass cover, Good	
0	110,052	0	66,758	0	176,810	Brush, Fair	
0	35,972	0	75,157	0	111,129	Gravel roads	
0	31,543	0	22,322	0	53,865	Paved parking	
0	7,398	0	12,629	0	20,027	Roofs	
0	63,683	0	294,398	0	358,081	Unconnected pavement	
6,891	132,922	0	22,467	0	162,280	Woods, Good	
<b>6,891</b>	<b>383,826</b>	<b>0</b>	<b>501,433</b>	<b>0</b>	<b>892,149</b>	<b>TOTAL AREA</b>	

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### Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	4P	26.30	26.00	21.0	0.0143	0.013	0.0	12.0	0.0
2	5P	24.90	24.00	90.0	0.0100	0.013	0.0	15.0	0.0

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

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

<b>Subcatchment1: Subcat 1</b>	Runoff Area=271,498 sf 89.73% Impervious Runoff Depth=3.01" Tc=28.5 min CN=96 Runoff=11.93 cfs 68,005 cf
<b>Subcatchment2: Subcat 2</b>	Runoff Area=333,861 sf 29.00% Impervious Runoff Depth=0.93" Tc=9.0 min UI Adjusted CN=69 Runoff=6.78 cfs 25,877 cf
<b>Subcatchment3: Subcat 3</b>	Runoff Area=42,130 sf 0.01% Impervious Runoff Depth=0.33" Flow Length=491' Tc=20.6 min CN=55 Runoff=0.13 cfs 1,167 cf
<b>Subcatchment4: Subcat 4</b>	Runoff Area=51,147 sf 99.72% Impervious Runoff Depth=3.23" Tc=5.0 min CN=98 Runoff=4.09 cfs 13,752 cf
<b>Subcatchment5: Subcat 5</b>	Runoff Area=48,310 sf 41.45% Impervious Runoff Depth=1.34" Flow Length=181' Tc=13.0 min CN=76 Runoff=1.35 cfs 5,380 cf
<b>Subcatchment6: Subcat 6</b>	Runoff Area=111,381 sf 4.88% Impervious Runoff Depth=1.82" Flow Length=311' Tc=11.8 min UI Adjusted CN=83 Runoff=4.52 cfs 16,939 cf
<b>Subcatchment7: Subcat 7</b>	Runoff Area=8,563 sf 0.00% Impervious Runoff Depth=0.37" Tc=5.0 min CN=56 Runoff=0.04 cfs 261 cf
<b>Subcatchment8: Subcat 8</b>	Runoff Area=25,260 sf 59.65% Impervious Runoff Depth=1.68" Tc=5.0 min CN=81 Runoff=1.18 cfs 3,528 cf
<b>Pond 4P: Stormwater Practice #1</b>	Peak Elev=24.03' Storage=74 cf Inflow=6.13 cfs 23,828 cf Discarded=6.13 cfs 23,828 cf Primary=0.00 cfs 0 cf Outflow=6.13 cfs 23,828 cf
<b>Pond 5P: MH</b>	Peak Elev=24.90' Inflow=0.00 cfs 0 cf 15.0" Round Culvert n=0.013 L=90.0' S=0.0100 '/' Outflow=0.00 cfs 0 cf
<b>Link 4L: West Off-Site</b>	Inflow=4.52 cfs 16,939 cf Primary=4.52 cfs 16,939 cf
<b>Link 5L: North Off-Site</b>	Inflow=0.04 cfs 261 cf Primary=0.04 cfs 261 cf
<b>Link 6L: Allyn's Pond</b>	Inflow=15.93 cfs 93,882 cf Primary=15.93 cfs 93,882 cf

**Total Runoff Area = 892,149 sf Runoff Volume = 134,909 cf Average Runoff Depth = 1.81"**  
**51.58% Pervious = 460,176 sf 48.42% Impervious = 431,973 sf**

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**Summary for Subcatchment 1: Subcat 1**

Runoff = 11.93 cfs @ 12.38 hrs, Volume= 68,005 cf, Depth= 3.01"  
 Routed to Link 6L : Allyn's Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 2-yr Rainfall=3.46"

Area (sf)	CN	Description
1,748	91	Gravel roads, HSG D
770	91	Gravel roads, HSG D
3,993	91	Gravel roads, HSG D
3,841	80	>75% Grass cover, Good, HSG D
2,233	80	>75% Grass cover, Good, HSG D
1,326	77	Brush, Fair, HSG D
7	77	Brush, Fair, HSG D
2,996	77	Woods, Good, HSG D
0	98	Unconnected pavement, HSG D
1	98	Unconnected pavement, HSG D
2	98	Unconnected pavement, HSG D
0	98	Unconnected pavement, HSG D
3,129	98	Unconnected pavement, HSG B
1,959	98	Unconnected pavement, HSG B
230,073	98	Unconnected pavement, HSG D
6	91	Gravel roads, HSG D
1,495	80	>75% Grass cover, Good, HSG D
2,237	77	Brush, Fair, HSG D
5,897	98	Unconnected pavement, HSG D
2,520	98	Unconnected pavement, HSG D
723	61	>75% Grass cover, Good, HSG B
6,513	85	Gravel roads, HSG B
26	98	Paved parking, HSG B
271,498	96	Weighted Average
27,890		10.27% Pervious Area
243,608		89.73% Impervious Area
243,582		99.99% Unconnected

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

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**Summary for Subcatchment 2: Subcat 2**

Runoff = 6.78 cfs @ 12.14 hrs, Volume= 25,877 cf, Depth= 0.93"  
 Routed to Link 6L : Allyn's Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 2-yr Rainfall=3.46"

Area (sf)	CN	Adj	Description
5,917	91		Gravel roads, HSG D
90	91		Gravel roads, HSG D
7,809	91		Gravel roads, HSG D
2,509	91		Gravel roads, HSG D
73	80		>75% Grass cover, Good, HSG D
0	98		Unconnected pavement, HSG D
50,466	98		Unconnected pavement, HSG D
4,451	77		Brush, Fair, HSG D
1	77		Brush, Fair, HSG D
1,970	77		Woods, Good, HSG D
21	77		Woods, Good, HSG D
4,891	91		Gravel roads, HSG D
2,543	91		Gravel roads, HSG D
417	98		Paved parking, HSG B
11,466	85		Gravel roads, HSG B
15,538	55		Woods, Good, HSG B
65	55		Woods, Good, HSG B
72,049	55		Woods, Good, HSG B
2,673	56		Brush, Fair, HSG B
155	56		Brush, Fair, HSG B
81,538	56		Brush, Fair, HSG B
0	55		Woods, Good, HSG B
2	55		Woods, Good, HSG B
0	55		Woods, Good, HSG B
0	98		Unconnected pavement, HSG B
5	98		Unconnected pavement, HSG B
8,525	98		Unconnected pavement, HSG B
34,994	98		Unconnected pavement, HSG B
0	55		Woods, Good, HSG B
1,590	55		Woods, Good, HSG B
1,532	61		>75% Grass cover, Good, HSG B
1,424	85		Gravel roads, HSG B
10,882	85		Gravel roads, HSG B
431	85		Gravel roads, HSG B
4,581	85		Gravel roads, HSG B
675	85		Gravel roads, HSG B
2,418	98		Paved parking, HSG B
1,281	56		Brush, Fair, HSG B
876	56		Brush, Fair, HSG B
333,861	73	69	Weighted Average, UI Adjusted
237,036			71.00% Pervious Area
96,825			29.00% Impervious Area
93,990			97.07% Unconnected

**New Conditions***Type III 24-hr 2-yr Rainfall=3.46"*

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0					<b>Direct Entry,</b>

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Type III 24-hr 2-yr Rainfall=3.46"

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**Summary for Subcatchment 3: Subcat 3**

Runoff = 0.13 cfs @ 12.52 hrs, Volume= 1,167 cf, Depth= 0.33"  
 Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 2-yr Rainfall=3.46"

Area (sf)	CN	Description
4,834	55	Woods, Good, HSG B
0	98	Unconnected pavement, HSG B
0	98	Unconnected pavement, HSG B
4	98	Unconnected pavement, HSG B
7,806	55	Woods, Good, HSG B
13,226	55	Woods, Good, HSG B
5,628	56	Brush, Fair, HSG B
10,633	56	Brush, Fair, HSG B
42,130	55	Weighted Average
42,126		99.99% Pervious Area
4		0.01% Impervious Area
4		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0600	0.13		<b>Sheet Flow, SHEET</b>
					Woods: Light underbrush n= 0.400 P2= 3.46"
7.3	391	0.0319	0.89		<b>Shallow Concentrated Flow, SHALLOW</b>
					Woodland Kv= 5.0 fps
20.6	491	Total			

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**Summary for Subcatchment 4: Subcat 4**

Runoff = 4.09 cfs @ 12.07 hrs, Volume= 13,752 cf, Depth= 3.23"  
Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2-yr Rainfall=3.46"

Area (sf)	CN	Description
2,731	98	Roofs, HSG D
12,210	98	Paved parking, HSG D
141	56	Brush, Fair, HSG B
28,666	98	Paved parking, HSG B
7,398	98	Roofs, HSG B
51,147	98	Weighted Average
141		0.28% Pervious Area
51,005		99.72% Impervious Area

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



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Type III 24-hr 2-yr Rainfall=3.46"

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**Summary for Subcatchment 5: Subcat 5**

Runoff = 1.35 cfs @ 12.18 hrs, Volume= 5,380 cf, Depth= 1.34"  
 Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 2-yr Rainfall=3.46"

Area (sf)	CN	Description
3,763	77	Brush, Fair, HSG D
10,111	98	Paved parking, HSG D
9,898	98	Roofs, HSG D
1,256	77	Brush, Fair, HSG D
5,506	77	Woods, Good, HSG D
3,015	30	Woods, Good, HSG A
2,286	55	Woods, Good, HSG B
9,140	55	Woods, Good, HSG B
17	98	Paved parking, HSG B
3,319	56	Brush, Fair, HSG B
48,310	76	Weighted Average
28,284		58.55% Pervious Area
20,026		41.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	100	0.0800	0.14		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.46"
1.1	81	0.0308	1.23		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
13.0	181	Total			

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Type III 24-hr 2-yr Rainfall=3.46"

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**Summary for Subcatchment 6: Subcat 6**

Runoff = 4.52 cfs @ 12.16 hrs, Volume= 16,939 cf, Depth= 1.82"  
 Routed to Link 4L : West Off-Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 2-yr Rainfall=3.46"

Area (sf)	CN	Adj	Description
34,928	91		Gravel roads, HSG D
60	80		>75% Grass cover, Good, HSG D
714	77		Woods, Good, HSG D
53,658	77		Brush, Fair, HSG D
6,574	77		Woods, Good, HSG D
658	98		Unconnected pavement, HSG D
9,952	91		Gravel roads, HSG D
58	77		Brush, Fair, HSG D
4,780	98		Unconnected pavement, HSG D
111,381	84	83	Weighted Average, UI Adjusted
105,943			95.12% Pervious Area
5,438			4.88% Impervious Area
5,438			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	101	0.1436	0.18		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.46"
2.3	210	0.0470	1.52		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
11.8	311	Total			

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Type III 24-hr 2-yr Rainfall=3.46"

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**Summary for Subcatchment 7: Subcat 7**

Runoff = 0.04 cfs @ 12.13 hrs, Volume= 261 cf, Depth= 0.37"  
Routed to Link 5L : North Off-Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2-yr Rainfall=3.46"

Area (sf)	CN	Description
4,687	77	Woods, Good, HSG D
3,876	30	Woods, Good, HSG A
0	30	Woods, Good, HSG A
8,563	56	Weighted Average
8,563		100.00% Pervious Area

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

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**Summary for Subcatchment 8: Subcat 8**

Runoff = 1.18 cfs @ 12.08 hrs, Volume= 3,528 cf, Depth= 1.68"  
Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2-yr Rainfall=3.46"

Area (sf)	CN	Description
3,807	56	Brush, Fair, HSG B
6,385	55	Woods, Good, HSG B
15,067	98	Unconnected pavement, HSG B
25,260	81	Weighted Average
10,193		40.35% Pervious Area
15,067		59.65% Impervious Area
15,067		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry,</b>

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### Summary for Pond 4P: Stormwater Practice #1

Inflow Area = 166,846 sf, 51.61% Impervious, Inflow Depth = 1.71" for 2-yr event  
Inflow = 6.13 cfs @ 12.08 hrs, Volume= 23,828 cf  
Outflow = 6.13 cfs @ 12.08 hrs, Volume= 23,828 cf, Atten= 0%, Lag= 0.2 min  
Discarded = 6.13 cfs @ 12.08 hrs, Volume= 23,828 cf  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Routed to Pond 5P : MH

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Peak Elev= 24.03' @ 12.08 hrs Surf.Area= 5,876 sf Storage= 74 cf  
Flood Elev= 26.50' Surf.Area= 5,876 sf Storage= 10,062 cf

Plug-Flow detention time= 0.2 min calculated for 23,825 cf (100% of inflow)  
Center-of-Mass det. time= 0.2 min ( 799.3 - 799.1 )

Volume	Invert	Avail.Storage	Storage Description
#1A	24.00'	5,249 cf	<b>30.00'W x 195.86'L x 3.50'H Field A</b> 20,565 cf Overall - 7,442 cf Embedded = 13,123 cf x 40.0% Voids
#2A	24.50'	7,442 cf	<b>ADS_StormTech SC-740 +Cap</b> x 162 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 162 Chambers in 6 Rows
		12,691 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.00'	<b>50.000 in/hr Exfiltration over Surface area</b>
#2	Primary	26.30'	<b>12.0" Round Culvert</b> L= 21.0' Ke= 0.500 Inlet / Outlet Invert= 26.30' / 26.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

**Discarded OutFlow** Max=6.80 cfs @ 12.08 hrs HW=24.03' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 6.80 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=24.00' (Free Discharge)

↑**2=Culvert** ( Controls 0.00 cfs)

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### Pond 4P: Stormwater Practice #1 - Chamber Wizard Field A

**Chamber Model = ADS\_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)**

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

27 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 193.86' Row Length +12.0" End Stone x 2 = 195.86' Base Length

6 Rows x 51.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.00' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

162 Chambers x 45.9 cf = 7,442.3 cf Chamber Storage

20,565.0 cf Field - 7,442.3 cf Chambers = 13,122.7 cf Stone x 40.0% Voids = 5,249.1 cf Stone Storage

Chamber Storage + Stone Storage = 12,691.3 cf = 0.291 af

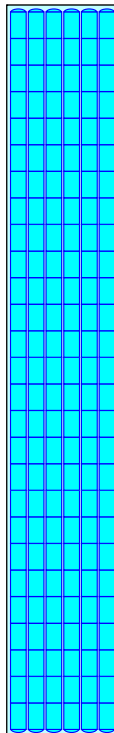
Overall Storage Efficiency = 61.7%

Overall System Size = 195.86' x 30.00' x 3.50'

162 Chambers

761.7 cy Field

486.0 cy Stone



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### Summary for Pond 5P: MH

Inflow Area = 166,846 sf, 51.61% Impervious, Inflow Depth = 0.00" for 2-yr event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Routed to Link 6L : Allyn's Pond

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 24.90' @ 0.00 hrs

Flood Elev= 27.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.90'	<b>15.0" Round Culvert</b> L= 90.0' Ke= 0.500 Inlet / Outlet Invert= 24.90' / 24.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=24.90' (Free Discharge)

↑**1=Culvert** ( Controls 0.00 cfs)

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### Summary for Link 4L: West Off-Site

Inflow Area = 111,381 sf, 4.88% Impervious, Inflow Depth = 1.82" for 2-yr event

Inflow = 4.52 cfs @ 12.16 hrs, Volume= 16,939 cf

Primary = 4.52 cfs @ 12.16 hrs, Volume= 16,939 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs



**New Conditions***Type III 24-hr 2-yr Rainfall=3.46"*

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**Summary for Link 5L: North Off-Site**

Inflow Area = 8,563 sf, 0.00% Impervious, Inflow Depth = 0.37" for 2-yr event

Inflow = 0.04 cfs @ 12.13 hrs, Volume= 261 cf

Primary = 0.04 cfs @ 12.13 hrs, Volume= 261 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

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**Summary for Link 6L: Allyn's Pond**

Inflow Area = 772,205 sf, 55.24% Impervious, Inflow Depth = 1.46" for 2-yr event

Inflow = 15.93 cfs @ 12.32 hrs, Volume= 93,882 cf

Primary = 15.93 cfs @ 12.32 hrs, Volume= 93,882 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment1: Subcat 1</b>	Runoff Area=271,498 sf 89.73% Impervious Runoff Depth=4.65" Tc=28.5 min CN=96 Runoff=18.06 cfs 105,247 cf
<b>Subcatchment2: Subcat 2</b>	Runoff Area=333,861 sf 29.00% Impervious Runoff Depth=2.05" Tc=9.0 min UI Adjusted CN=69 Runoff=16.22 cfs 56,896 cf
<b>Subcatchment3: Subcat 3</b>	Runoff Area=42,130 sf 0.01% Impervious Runoff Depth=1.04" Flow Length=491' Tc=20.6 min CN=55 Runoff=0.64 cfs 3,652 cf
<b>Subcatchment4: Subcat 4</b>	Runoff Area=51,147 sf 99.72% Impervious Runoff Depth=4.88" Tc=5.0 min CN=98 Runoff=6.09 cfs 20,812 cf
<b>Subcatchment5: Subcat 5</b>	Runoff Area=48,310 sf 41.45% Impervious Runoff Depth=2.63" Flow Length=181' Tc=13.0 min CN=76 Runoff=2.73 cfs 10,607 cf
<b>Subcatchment6: Subcat 6</b>	Runoff Area=111,381 sf 4.88% Impervious Runoff Depth=3.28" Flow Length=311' Tc=11.8 min UI Adjusted CN=83 Runoff=8.10 cfs 30,471 cf
<b>Subcatchment7: Subcat 7</b>	Runoff Area=8,563 sf 0.00% Impervious Runoff Depth=1.10" Tc=5.0 min CN=56 Runoff=0.22 cfs 788 cf
<b>Subcatchment8: Subcat 8</b>	Runoff Area=25,260 sf 59.65% Impervious Runoff Depth=3.09" Tc=5.0 min CN=81 Runoff=2.18 cfs 6,508 cf
<b>Pond 4P: Stormwater Practice #1</b>	Peak Elev=24.59' Storage=1,607 cf Inflow=10.29 cfs 41,579 cf Discarded=6.80 cfs 41,579 cf Primary=0.00 cfs 0 cf Outflow=6.80 cfs 41,579 cf
<b>Pond 5P: MH</b>	Peak Elev=24.90' Inflow=0.00 cfs 0 cf 15.0" Round Culvert n=0.013 L=90.0' S=0.0100 '/' Outflow=0.00 cfs 0 cf
<b>Link 4L: West Off-Site</b>	Inflow=8.10 cfs 30,471 cf Primary=8.10 cfs 30,471 cf
<b>Link 5L: North Off-Site</b>	Inflow=0.22 cfs 788 cf Primary=0.22 cfs 788 cf
<b>Link 6L: Allyn's Pond</b>	Inflow=27.57 cfs 162,143 cf Primary=27.57 cfs 162,143 cf

**Total Runoff Area = 892,149 sf Runoff Volume = 234,981 cf Average Runoff Depth = 3.16"**  
**51.58% Pervious = 460,176 sf 48.42% Impervious = 431,973 sf**

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**Summary for Subcatchment 1: Subcat 1**

Runoff = 18.06 cfs @ 12.38 hrs, Volume= 105,247 cf, Depth= 4.65"  
 Routed to Link 6L : Allyn's Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10-yr Rainfall=5.12"

Area (sf)	CN	Description
1,748	91	Gravel roads, HSG D
770	91	Gravel roads, HSG D
3,993	91	Gravel roads, HSG D
3,841	80	>75% Grass cover, Good, HSG D
2,233	80	>75% Grass cover, Good, HSG D
1,326	77	Brush, Fair, HSG D
7	77	Brush, Fair, HSG D
2,996	77	Woods, Good, HSG D
0	98	Unconnected pavement, HSG D
1	98	Unconnected pavement, HSG D
2	98	Unconnected pavement, HSG D
0	98	Unconnected pavement, HSG D
3,129	98	Unconnected pavement, HSG B
1,959	98	Unconnected pavement, HSG B
230,073	98	Unconnected pavement, HSG D
6	91	Gravel roads, HSG D
1,495	80	>75% Grass cover, Good, HSG D
2,237	77	Brush, Fair, HSG D
5,897	98	Unconnected pavement, HSG D
2,520	98	Unconnected pavement, HSG D
723	61	>75% Grass cover, Good, HSG B
6,513	85	Gravel roads, HSG B
26	98	Paved parking, HSG B
271,498	96	Weighted Average
27,890		10.27% Pervious Area
243,608		89.73% Impervious Area
243,582		99.99% Unconnected

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

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Type III 24-hr 10-yr Rainfall=5.12"

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**Summary for Subcatchment 2: Subcat 2**

Runoff = 16.22 cfs @ 12.13 hrs, Volume= 56,896 cf, Depth= 2.05"  
 Routed to Link 6L : Allyn's Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10-yr Rainfall=5.12"

Area (sf)	CN	Adj	Description
5,917	91		Gravel roads, HSG D
90	91		Gravel roads, HSG D
7,809	91		Gravel roads, HSG D
2,509	91		Gravel roads, HSG D
73	80		>75% Grass cover, Good, HSG D
0	98		Unconnected pavement, HSG D
50,466	98		Unconnected pavement, HSG D
4,451	77		Brush, Fair, HSG D
1	77		Brush, Fair, HSG D
1,970	77		Woods, Good, HSG D
21	77		Woods, Good, HSG D
4,891	91		Gravel roads, HSG D
2,543	91		Gravel roads, HSG D
417	98		Paved parking, HSG B
11,466	85		Gravel roads, HSG B
15,538	55		Woods, Good, HSG B
65	55		Woods, Good, HSG B
72,049	55		Woods, Good, HSG B
2,673	56		Brush, Fair, HSG B
155	56		Brush, Fair, HSG B
81,538	56		Brush, Fair, HSG B
0	55		Woods, Good, HSG B
2	55		Woods, Good, HSG B
0	55		Woods, Good, HSG B
0	98		Unconnected pavement, HSG B
5	98		Unconnected pavement, HSG B
8,525	98		Unconnected pavement, HSG B
34,994	98		Unconnected pavement, HSG B
0	55		Woods, Good, HSG B
1,590	55		Woods, Good, HSG B
1,532	61		>75% Grass cover, Good, HSG B
1,424	85		Gravel roads, HSG B
10,882	85		Gravel roads, HSG B
431	85		Gravel roads, HSG B
4,581	85		Gravel roads, HSG B
675	85		Gravel roads, HSG B
2,418	98		Paved parking, HSG B
1,281	56		Brush, Fair, HSG B
876	56		Brush, Fair, HSG B
333,861	73	69	Weighted Average, UI Adjusted
237,036			71.00% Pervious Area
96,825			29.00% Impervious Area
93,990			97.07% Unconnected

**New Conditions***Type III 24-hr 10-yr Rainfall=5.12"*

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0					<b>Direct Entry,</b>

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Type III 24-hr 10-yr Rainfall=5.12"

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**Summary for Subcatchment 3: Subcat 3**

Runoff = 0.64 cfs @ 12.34 hrs, Volume= 3,652 cf, Depth= 1.04"  
 Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10-yr Rainfall=5.12"

Area (sf)	CN	Description
4,834	55	Woods, Good, HSG B
0	98	Unconnected pavement, HSG B
0	98	Unconnected pavement, HSG B
4	98	Unconnected pavement, HSG B
7,806	55	Woods, Good, HSG B
13,226	55	Woods, Good, HSG B
5,628	56	Brush, Fair, HSG B
10,633	56	Brush, Fair, HSG B
42,130	55	Weighted Average
42,126		99.99% Pervious Area
4		0.01% Impervious Area
4		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0600	0.13		<b>Sheet Flow, SHEET</b>
					Woods: Light underbrush n= 0.400 P2= 3.46"
7.3	391	0.0319	0.89		<b>Shallow Concentrated Flow, SHALLOW</b>
					Woodland Kv= 5.0 fps
20.6	491	Total			

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Type III 24-hr 10-yr Rainfall=5.12"

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**Summary for Subcatchment 4: Subcat 4**

Runoff = 6.09 cfs @ 12.07 hrs, Volume= 20,812 cf, Depth= 4.88"  
 Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10-yr Rainfall=5.12"

Area (sf)	CN	Description
2,731	98	Roofs, HSG D
12,210	98	Paved parking, HSG D
141	56	Brush, Fair, HSG B
28,666	98	Paved parking, HSG B
7,398	98	Roofs, HSG B
51,147	98	Weighted Average
141		0.28% Pervious Area
51,005		99.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry,</b>



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Type III 24-hr 10-yr Rainfall=5.12"

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**Summary for Subcatchment 5: Subcat 5**

Runoff = 2.73 cfs @ 12.18 hrs, Volume= 10,607 cf, Depth= 2.63"  
 Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10-yr Rainfall=5.12"

Area (sf)	CN	Description
3,763	77	Brush, Fair, HSG D
10,111	98	Paved parking, HSG D
9,898	98	Roofs, HSG D
1,256	77	Brush, Fair, HSG D
5,506	77	Woods, Good, HSG D
3,015	30	Woods, Good, HSG A
2,286	55	Woods, Good, HSG B
9,140	55	Woods, Good, HSG B
17	98	Paved parking, HSG B
3,319	56	Brush, Fair, HSG B
48,310	76	Weighted Average
28,284		58.55% Pervious Area
20,026		41.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	100	0.0800	0.14		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.46"
1.1	81	0.0308	1.23		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
13.0	181	Total			

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Type III 24-hr 10-yr Rainfall=5.12"

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**Summary for Subcatchment 6: Subcat 6**

Runoff = 8.10 cfs @ 12.16 hrs, Volume= 30,471 cf, Depth= 3.28"  
 Routed to Link 4L : West Off-Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10-yr Rainfall=5.12"

Area (sf)	CN	Adj	Description
34,928	91		Gravel roads, HSG D
60	80		>75% Grass cover, Good, HSG D
714	77		Woods, Good, HSG D
53,658	77		Brush, Fair, HSG D
6,574	77		Woods, Good, HSG D
658	98		Unconnected pavement, HSG D
9,952	91		Gravel roads, HSG D
58	77		Brush, Fair, HSG D
4,780	98		Unconnected pavement, HSG D
111,381	84	83	Weighted Average, UI Adjusted
105,943			95.12% Pervious Area
5,438			4.88% Impervious Area
5,438			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	101	0.1436	0.18		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.46"
2.3	210	0.0470	1.52		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
11.8	311	Total			

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**Summary for Subcatchment 7: Subcat 7**

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 788 cf, Depth= 1.10"  
Routed to Link 5L : North Off-Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10-yr Rainfall=5.12"

Area (sf)	CN	Description
4,687	77	Woods, Good, HSG D
3,876	30	Woods, Good, HSG A
0	30	Woods, Good, HSG A
8,563	56	Weighted Average
8,563		100.00% Pervious Area

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

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Type III 24-hr 10-yr Rainfall=5.12"

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**Summary for Subcatchment 8: Subcat 8**

Runoff = 2.18 cfs @ 12.07 hrs, Volume= 6,508 cf, Depth= 3.09"  
 Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10-yr Rainfall=5.12"

Area (sf)	CN	Description
3,807	56	Brush, Fair, HSG B
6,385	55	Woods, Good, HSG B
15,067	98	Unconnected pavement, HSG B
25,260	81	Weighted Average
10,193		40.35% Pervious Area
15,067		59.65% Impervious Area
15,067		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry,</b>

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### Summary for Pond 4P: Stormwater Practice #1

Inflow Area = 166,846 sf, 51.61% Impervious, Inflow Depth = 2.99" for 10-yr event  
Inflow = 10.29 cfs @ 12.08 hrs, Volume= 41,579 cf  
Outflow = 6.80 cfs @ 12.01 hrs, Volume= 41,579 cf, Atten= 34%, Lag= 0.0 min  
Discarded = 6.80 cfs @ 12.01 hrs, Volume= 41,579 cf  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Routed to Pond 5P : MH

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Peak Elev= 24.59' @ 12.23 hrs Surf.Area= 5,876 sf Storage= 1,607 cf  
Flood Elev= 26.50' Surf.Area= 5,876 sf Storage= 10,062 cf

Plug-Flow detention time= 0.9 min calculated for 41,575 cf (100% of inflow)  
Center-of-Mass det. time= 0.9 min ( 795.6 - 794.7 )

Volume	Invert	Avail.Storage	Storage Description
#1A	24.00'	5,249 cf	<b>30.00'W x 195.86'L x 3.50'H Field A</b> 20,565 cf Overall - 7,442 cf Embedded = 13,123 cf x 40.0% Voids
#2A	24.50'	7,442 cf	<b>ADS_StormTech SC-740 +Cap</b> x 162 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 162 Chambers in 6 Rows
		12,691 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.00'	<b>50.000 in/hr Exfiltration over Surface area</b>
#2	Primary	26.30'	<b>12.0" Round Culvert</b> L= 21.0' Ke= 0.500 Inlet / Outlet Invert= 26.30' / 26.00' S= 0.0143 ' S= 0.0143 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

**Discarded OutFlow** Max=6.80 cfs @ 12.01 hrs HW=24.04' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 6.80 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=24.00' (Free Discharge)

↑**2=Culvert** ( Controls 0.00 cfs)

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### Pond 4P: Stormwater Practice #1 - Chamber Wizard Field A

**Chamber Model = ADS\_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)**

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

27 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 193.86' Row Length +12.0" End Stone x 2 = 195.86' Base Length

6 Rows x 51.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.00' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

162 Chambers x 45.9 cf = 7,442.3 cf Chamber Storage

20,565.0 cf Field - 7,442.3 cf Chambers = 13,122.7 cf Stone x 40.0% Voids = 5,249.1 cf Stone Storage

Chamber Storage + Stone Storage = 12,691.3 cf = 0.291 af

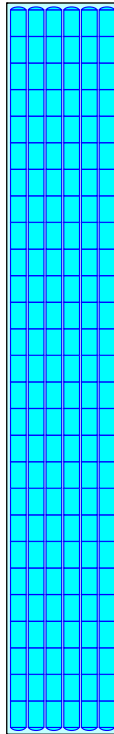
Overall Storage Efficiency = 61.7%

Overall System Size = 195.86' x 30.00' x 3.50'

162 Chambers

761.7 cy Field

486.0 cy Stone



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### Summary for Pond 5P: MH

Inflow Area = 166,846 sf, 51.61% Impervious, Inflow Depth = 0.00" for 10-yr event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Routed to Link 6L : Allyn's Pond

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 24.90' @ 0.00 hrs

Flood Elev= 27.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.90'	<b>15.0" Round Culvert</b> L= 90.0' Ke= 0.500 Inlet / Outlet Invert= 24.90' / 24.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=24.90' (Free Discharge)

↑**1=Culvert** ( Controls 0.00 cfs)

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*Type III 24-hr 10-yr Rainfall=5.12"*

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**Summary for Link 4L: West Off-Site**

Inflow Area = 111,381 sf, 4.88% Impervious, Inflow Depth = 3.28" for 10-yr event  
Inflow = 8.10 cfs @ 12.16 hrs, Volume= 30,471 cf  
Primary = 8.10 cfs @ 12.16 hrs, Volume= 30,471 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs



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**Summary for Link 5L: North Off-Site**

Inflow Area = 8,563 sf, 0.00% Impervious, Inflow Depth = 1.10" for 10-yr event

Inflow = 0.22 cfs @ 12.09 hrs, Volume= 788 cf

Primary = 0.22 cfs @ 12.09 hrs, Volume= 788 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

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*Type III 24-hr 10-yr Rainfall=5.12"*

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**Summary for Link 6L: Allyn's Pond**

Inflow Area = 772,205 sf, 55.24% Impervious, Inflow Depth = 2.52" for 10-yr event

Inflow = 27.57 cfs @ 12.17 hrs, Volume= 162,143 cf

Primary = 27.57 cfs @ 12.17 hrs, Volume= 162,143 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

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Type III 24-hr 25-yr Rainfall=6.15"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

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

<b>Subcatchment1: Subcat 1</b>	Runoff Area=271,498 sf 89.73% Impervious Runoff Depth=5.68" Tc=28.5 min CN=96 Runoff=21.83 cfs 128,436 cf
<b>Subcatchment2: Subcat 2</b>	Runoff Area=333,861 sf 29.00% Impervious Runoff Depth=2.83" Tc=9.0 min UI Adjusted CN=69 Runoff=22.78 cfs 78,740 cf
<b>Subcatchment3: Subcat 3</b>	Runoff Area=42,130 sf 0.01% Impervious Runoff Depth=1.60" Flow Length=491' Tc=20.6 min CN=55 Runoff=1.08 cfs 5,634 cf
<b>Subcatchment4: Subcat 4</b>	Runoff Area=51,147 sf 99.72% Impervious Runoff Depth=5.91" Tc=5.0 min CN=98 Runoff=7.33 cfs 25,197 cf
<b>Subcatchment5: Subcat 5</b>	Runoff Area=48,310 sf 41.45% Impervious Runoff Depth=3.51" Flow Length=181' Tc=13.0 min CN=76 Runoff=3.65 cfs 14,130 cf
<b>Subcatchment6: Subcat 6</b>	Runoff Area=111,381 sf 4.88% Impervious Runoff Depth=4.23" Flow Length=311' Tc=11.8 min UI Adjusted CN=83 Runoff=10.38 cfs 39,269 cf
<b>Subcatchment7: Subcat 7</b>	Runoff Area=8,563 sf 0.00% Impervious Runoff Depth=1.69" Tc=5.0 min CN=56 Runoff=0.37 cfs 1,203 cf
<b>Subcatchment8: Subcat 8</b>	Runoff Area=25,260 sf 59.65% Impervious Runoff Depth=4.02" Tc=5.0 min CN=81 Runoff=2.81 cfs 8,463 cf
<b>Pond 4P: Stormwater Practice #1</b>	Peak Elev=25.11' Storage=4,136 cf Inflow=13.07 cfs 53,425 cf Discarded=6.80 cfs 53,425 cf Primary=0.00 cfs 0 cf Outflow=6.80 cfs 53,425 cf
<b>Pond 5P: MH</b>	Peak Elev=24.90' Inflow=0.00 cfs 0 cf 15.0" Round Culvert n=0.013 L=90.0' S=0.0100 '/' Outflow=0.00 cfs 0 cf
<b>Link 4L: West Off-Site</b>	Inflow=10.38 cfs 39,269 cf Primary=10.38 cfs 39,269 cf
<b>Link 5L: North Off-Site</b>	Inflow=0.37 cfs 1,203 cf Primary=0.37 cfs 1,203 cf
<b>Link 6L: Allyn's Pond</b>	Inflow=36.30 cfs 207,176 cf Primary=36.30 cfs 207,176 cf

**Total Runoff Area = 892,149 sf Runoff Volume = 301,073 cf Average Runoff Depth = 4.05"**  
**51.58% Pervious = 460,176 sf 48.42% Impervious = 431,973 sf**

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Type III 24-hr 25-yr Rainfall=6.15"

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**Summary for Subcatchment 1: Subcat 1**

Runoff = 21.83 cfs @ 12.38 hrs, Volume= 128,436 cf, Depth= 5.68"  
 Routed to Link 6L : Allyn's Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-yr Rainfall=6.15"

Area (sf)	CN	Description
1,748	91	Gravel roads, HSG D
770	91	Gravel roads, HSG D
3,993	91	Gravel roads, HSG D
3,841	80	>75% Grass cover, Good, HSG D
2,233	80	>75% Grass cover, Good, HSG D
1,326	77	Brush, Fair, HSG D
7	77	Brush, Fair, HSG D
2,996	77	Woods, Good, HSG D
0	98	Unconnected pavement, HSG D
1	98	Unconnected pavement, HSG D
2	98	Unconnected pavement, HSG D
0	98	Unconnected pavement, HSG D
3,129	98	Unconnected pavement, HSG B
1,959	98	Unconnected pavement, HSG B
230,073	98	Unconnected pavement, HSG D
6	91	Gravel roads, HSG D
1,495	80	>75% Grass cover, Good, HSG D
2,237	77	Brush, Fair, HSG D
5,897	98	Unconnected pavement, HSG D
2,520	98	Unconnected pavement, HSG D
723	61	>75% Grass cover, Good, HSG B
6,513	85	Gravel roads, HSG B
26	98	Paved parking, HSG B
271,498	96	Weighted Average
27,890		10.27% Pervious Area
243,608		89.73% Impervious Area
243,582		99.99% Unconnected

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

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**Summary for Subcatchment 2: Subcat 2**

Runoff = 22.78 cfs @ 12.13 hrs, Volume= 78,740 cf, Depth= 2.83"  
 Routed to Link 6L : Allyn's Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-yr Rainfall=6.15"

Area (sf)	CN	Adj	Description
5,917	91		Gravel roads, HSG D
90	91		Gravel roads, HSG D
7,809	91		Gravel roads, HSG D
2,509	91		Gravel roads, HSG D
73	80		>75% Grass cover, Good, HSG D
0	98		Unconnected pavement, HSG D
50,466	98		Unconnected pavement, HSG D
4,451	77		Brush, Fair, HSG D
1	77		Brush, Fair, HSG D
1,970	77		Woods, Good, HSG D
21	77		Woods, Good, HSG D
4,891	91		Gravel roads, HSG D
2,543	91		Gravel roads, HSG D
417	98		Paved parking, HSG B
11,466	85		Gravel roads, HSG B
15,538	55		Woods, Good, HSG B
65	55		Woods, Good, HSG B
72,049	55		Woods, Good, HSG B
2,673	56		Brush, Fair, HSG B
155	56		Brush, Fair, HSG B
81,538	56		Brush, Fair, HSG B
0	55		Woods, Good, HSG B
2	55		Woods, Good, HSG B
0	55		Woods, Good, HSG B
0	98		Unconnected pavement, HSG B
5	98		Unconnected pavement, HSG B
8,525	98		Unconnected pavement, HSG B
34,994	98		Unconnected pavement, HSG B
0	55		Woods, Good, HSG B
1,590	55		Woods, Good, HSG B
1,532	61		>75% Grass cover, Good, HSG B
1,424	85		Gravel roads, HSG B
10,882	85		Gravel roads, HSG B
431	85		Gravel roads, HSG B
4,581	85		Gravel roads, HSG B
675	85		Gravel roads, HSG B
2,418	98		Paved parking, HSG B
1,281	56		Brush, Fair, HSG B
876	56		Brush, Fair, HSG B
333,861	73	69	Weighted Average, UI Adjusted
237,036			71.00% Pervious Area
96,825			29.00% Impervious Area
93,990			97.07% Unconnected

**New Conditions***Type III 24-hr 25-yr Rainfall=6.15"*

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0					<b>Direct Entry,</b>

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Type III 24-hr 25-yr Rainfall=6.15"

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**Summary for Subcatchment 3: Subcat 3**

Runoff = 1.08 cfs @ 12.33 hrs, Volume= 5,634 cf, Depth= 1.60"  
 Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-yr Rainfall=6.15"

Area (sf)	CN	Description
4,834	55	Woods, Good, HSG B
0	98	Unconnected pavement, HSG B
0	98	Unconnected pavement, HSG B
4	98	Unconnected pavement, HSG B
7,806	55	Woods, Good, HSG B
13,226	55	Woods, Good, HSG B
5,628	56	Brush, Fair, HSG B
10,633	56	Brush, Fair, HSG B
42,130	55	Weighted Average
42,126		99.99% Pervious Area
4		0.01% Impervious Area
4		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0600	0.13		<b>Sheet Flow, SHEET</b>
					Woods: Light underbrush n= 0.400 P2= 3.46"
7.3	391	0.0319	0.89		<b>Shallow Concentrated Flow, SHALLOW</b>
					Woodland Kv= 5.0 fps
20.6	491	Total			

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*Type III 24-hr 25-yr Rainfall=6.15"*

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**Summary for Subcatchment 4: Subcat 4**

Runoff = 7.33 cfs @ 12.07 hrs, Volume= 25,197 cf, Depth= 5.91"  
 Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-yr Rainfall=6.15"

Area (sf)	CN	Description
2,731	98	Roofs, HSG D
12,210	98	Paved parking, HSG D
141	56	Brush, Fair, HSG B
28,666	98	Paved parking, HSG B
7,398	98	Roofs, HSG B
51,147	98	Weighted Average
141		0.28% Pervious Area
51,005		99.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry,</b>

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Type III 24-hr 25-yr Rainfall=6.15"

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**Summary for Subcatchment 5: Subcat 5**

Runoff = 3.65 cfs @ 12.18 hrs, Volume= 14,130 cf, Depth= 3.51"  
 Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-yr Rainfall=6.15"

Area (sf)	CN	Description
3,763	77	Brush, Fair, HSG D
10,111	98	Paved parking, HSG D
9,898	98	Roofs, HSG D
1,256	77	Brush, Fair, HSG D
5,506	77	Woods, Good, HSG D
3,015	30	Woods, Good, HSG A
2,286	55	Woods, Good, HSG B
9,140	55	Woods, Good, HSG B
17	98	Paved parking, HSG B
3,319	56	Brush, Fair, HSG B
48,310	76	Weighted Average
28,284		58.55% Pervious Area
20,026		41.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	100	0.0800	0.14		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.46"
1.1	81	0.0308	1.23		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
13.0	181	Total			

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Type III 24-hr 25-yr Rainfall=6.15"

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**Summary for Subcatchment 6: Subcat 6**

Runoff = 10.38 cfs @ 12.16 hrs, Volume= 39,269 cf, Depth= 4.23"  
 Routed to Link 4L : West Off-Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-yr Rainfall=6.15"

Area (sf)	CN	Adj	Description
34,928	91		Gravel roads, HSG D
60	80		>75% Grass cover, Good, HSG D
714	77		Woods, Good, HSG D
53,658	77		Brush, Fair, HSG D
6,574	77		Woods, Good, HSG D
658	98		Unconnected pavement, HSG D
9,952	91		Gravel roads, HSG D
58	77		Brush, Fair, HSG D
4,780	98		Unconnected pavement, HSG D
111,381	84	83	Weighted Average, UI Adjusted
105,943			95.12% Pervious Area
5,438			4.88% Impervious Area
5,438			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	101	0.1436	0.18		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.46"
2.3	210	0.0470	1.52		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
11.8	311	Total			

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Type III 24-hr 25-yr Rainfall=6.15"

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**Summary for Subcatchment 7: Subcat 7**

Runoff = 0.37 cfs @ 12.08 hrs, Volume= 1,203 cf, Depth= 1.69"  
Routed to Link 5L : North Off-Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25-yr Rainfall=6.15"

Area (sf)	CN	Description
4,687	77	Woods, Good, HSG D
3,876	30	Woods, Good, HSG A
0	30	Woods, Good, HSG A
8,563	56	Weighted Average
8,563		100.00% Pervious Area

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

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Type III 24-hr 25-yr Rainfall=6.15"

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**Summary for Subcatchment 8: Subcat 8**

Runoff = 2.81 cfs @ 12.07 hrs, Volume= 8,463 cf, Depth= 4.02"  
Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25-yr Rainfall=6.15"

Area (sf)	CN	Description
3,807	56	Brush, Fair, HSG B
6,385	55	Woods, Good, HSG B
15,067	98	Unconnected pavement, HSG B
25,260	81	Weighted Average
10,193		40.35% Pervious Area
15,067		59.65% Impervious Area
15,067		100.00% Unconnected

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



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Type III 24-hr 25-yr Rainfall=6.15"

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### Summary for Pond 4P: Stormwater Practice #1

Inflow Area = 166,846 sf, 51.61% Impervious, Inflow Depth = 3.84" for 25-yr event  
Inflow = 13.07 cfs @ 12.08 hrs, Volume= 53,425 cf  
Outflow = 6.80 cfs @ 11.98 hrs, Volume= 53,425 cf, Atten= 48%, Lag= 0.0 min  
Discarded = 6.80 cfs @ 11.98 hrs, Volume= 53,425 cf  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Routed to Pond 5P : MH

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Peak Elev= 25.11' @ 12.35 hrs Surf.Area= 5,876 sf Storage= 4,136 cf  
Flood Elev= 26.50' Surf.Area= 5,876 sf Storage= 10,062 cf

Plug-Flow detention time= 2.4 min calculated for 53,419 cf (100% of inflow)  
Center-of-Mass det. time= 2.4 min ( 794.6 - 792.2 )

Volume	Invert	Avail.Storage	Storage Description
#1A	24.00'	5,249 cf	<b>30.00'W x 195.86'L x 3.50'H Field A</b> 20,565 cf Overall - 7,442 cf Embedded = 13,123 cf x 40.0% Voids
#2A	24.50'	7,442 cf	<b>ADS_StormTech SC-740 +Cap x 162 Inside #1</b> Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 162 Chambers in 6 Rows
		12,691 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.00'	<b>50.000 in/hr Exfiltration over Surface area</b>
#2	Primary	26.30'	<b>12.0" Round Culvert</b> L= 21.0' Ke= 0.500 Inlet / Outlet Invert= 26.30' / 26.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

**Discarded OutFlow** Max=6.80 cfs @ 11.98 hrs HW=24.04' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 6.80 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=24.00' (Free Discharge)

↑**2=Culvert** ( Controls 0.00 cfs)

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### Pond 4P: Stormwater Practice #1 - Chamber Wizard Field A

**Chamber Model = ADS\_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)**

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

27 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 193.86' Row Length +12.0" End Stone x 2 = 195.86' Base Length

6 Rows x 51.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.00' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

162 Chambers x 45.9 cf = 7,442.3 cf Chamber Storage

20,565.0 cf Field - 7,442.3 cf Chambers = 13,122.7 cf Stone x 40.0% Voids = 5,249.1 cf Stone Storage

Chamber Storage + Stone Storage = 12,691.3 cf = 0.291 af

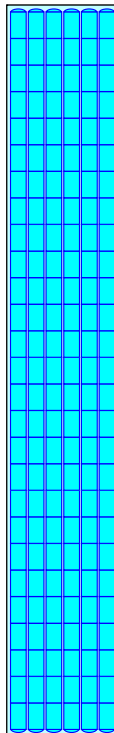
Overall Storage Efficiency = 61.7%

Overall System Size = 195.86' x 30.00' x 3.50'

162 Chambers

761.7 cy Field

486.0 cy Stone



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Type III 24-hr 25-yr Rainfall=6.15"

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### Summary for Pond 5P: MH

Inflow Area = 166,846 sf, 51.61% Impervious, Inflow Depth = 0.00" for 25-yr event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Routed to Link 6L : Allyn's Pond

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 24.90' @ 0.00 hrs

Flood Elev= 27.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.90'	<b>15.0" Round Culvert</b> L= 90.0' Ke= 0.500 Inlet / Outlet Invert= 24.90' / 24.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=24.90' (Free Discharge)

↑**1=Culvert** ( Controls 0.00 cfs)

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*Type III 24-hr 25-yr Rainfall=6.15"*

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### Summary for Link 4L: West Off-Site

Inflow Area = 111,381 sf, 4.88% Impervious, Inflow Depth = 4.23" for 25-yr event  
Inflow = 10.38 cfs @ 12.16 hrs, Volume= 39,269 cf  
Primary = 10.38 cfs @ 12.16 hrs, Volume= 39,269 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

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*Type III 24-hr 25-yr Rainfall=6.15"*

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**Summary for Link 5L: North Off-Site**

Inflow Area = 8,563 sf, 0.00% Impervious, Inflow Depth = 1.69" for 25-yr event

Inflow = 0.37 cfs @ 12.08 hrs, Volume= 1,203 cf

Primary = 0.37 cfs @ 12.08 hrs, Volume= 1,203 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

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*Type III 24-hr 25-yr Rainfall=6.15"*

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**Summary for Link 6L: Allyn's Pond**

Inflow Area = 772,205 sf, 55.24% Impervious, Inflow Depth = 3.22" for 25-yr event

Inflow = 36.30 cfs @ 12.15 hrs, Volume= 207,176 cf

Primary = 36.30 cfs @ 12.15 hrs, Volume= 207,176 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

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Type III 24-hr 50-yr Rainfall=6.92"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment1: Subcat 1</b>	Runoff Area=271,498 sf 89.73% Impervious Runoff Depth=6.44" Tc=28.5 min CN=96 Runoff=24.64 cfs 145,793 cf
<b>Subcatchment2: Subcat 2</b>	Runoff Area=333,861 sf 29.00% Impervious Runoff Depth=3.45" Tc=9.0 min UI Adjusted CN=69 Runoff=27.90 cfs 95,942 cf
<b>Subcatchment3: Subcat 3</b>	Runoff Area=42,130 sf 0.01% Impervious Runoff Depth=2.07" Flow Length=491' Tc=20.6 min CN=55 Runoff=1.45 cfs 7,279 cf
<b>Subcatchment4: Subcat 4</b>	Runoff Area=51,147 sf 99.72% Impervious Runoff Depth=6.68" Tc=5.0 min CN=98 Runoff=8.26 cfs 28,476 cf
<b>Subcatchment5: Subcat 5</b>	Runoff Area=48,310 sf 41.45% Impervious Runoff Depth=4.19" Flow Length=181' Tc=13.0 min CN=76 Runoff=4.35 cfs 16,853 cf
<b>Subcatchment6: Subcat 6</b>	Runoff Area=111,381 sf 4.88% Impervious Runoff Depth=4.95" Flow Length=311' Tc=11.8 min UI Adjusted CN=83 Runoff=12.08 cfs 45,966 cf
<b>Subcatchment7: Subcat 7</b>	Runoff Area=8,563 sf 0.00% Impervious Runoff Depth=2.17" Tc=5.0 min CN=56 Runoff=0.49 cfs 1,546 cf
<b>Subcatchment8: Subcat 8</b>	Runoff Area=25,260 sf 59.65% Impervious Runoff Depth=4.73" Tc=5.0 min CN=81 Runoff=3.29 cfs 9,958 cf
<b>Pond 4P: Stormwater Practice #1</b>	Peak Elev=25.65' Storage=6,617 cf Inflow=15.18 cfs 62,565 cf Discarded=6.80 cfs 62,565 cf Primary=0.00 cfs 0 cf Outflow=6.80 cfs 62,565 cf
<b>Pond 5P: MH</b>	Peak Elev=24.90' Inflow=0.00 cfs 0 cf 15.0" Round Culvert n=0.013 L=90.0' S=0.0100 '/' Outflow=0.00 cfs 0 cf
<b>Link 4L: West Off-Site</b>	Inflow=12.08 cfs 45,966 cf Primary=12.08 cfs 45,966 cf
<b>Link 5L: North Off-Site</b>	Inflow=0.49 cfs 1,546 cf Primary=0.49 cfs 1,546 cf
<b>Link 6L: Allyn's Pond</b>	Inflow=43.06 cfs 241,735 cf Primary=43.06 cfs 241,735 cf

**Total Runoff Area = 892,149 sf Runoff Volume = 351,813 cf Average Runoff Depth = 4.73"**  
**51.58% Pervious = 460,176 sf 48.42% Impervious = 431,973 sf**



**New Conditions**

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Type III 24-hr 50-yr Rainfall=6.92"

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**Summary for Subcatchment 1: Subcat 1**

Runoff = 24.64 cfs @ 12.38 hrs, Volume= 145,793 cf, Depth= 6.44"  
 Routed to Link 6L : Allyn's Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-yr Rainfall=6.92"

Area (sf)	CN	Description
1,748	91	Gravel roads, HSG D
770	91	Gravel roads, HSG D
3,993	91	Gravel roads, HSG D
3,841	80	>75% Grass cover, Good, HSG D
2,233	80	>75% Grass cover, Good, HSG D
1,326	77	Brush, Fair, HSG D
7	77	Brush, Fair, HSG D
2,996	77	Woods, Good, HSG D
0	98	Unconnected pavement, HSG D
1	98	Unconnected pavement, HSG D
2	98	Unconnected pavement, HSG D
0	98	Unconnected pavement, HSG D
3,129	98	Unconnected pavement, HSG B
1,959	98	Unconnected pavement, HSG B
230,073	98	Unconnected pavement, HSG D
6	91	Gravel roads, HSG D
1,495	80	>75% Grass cover, Good, HSG D
2,237	77	Brush, Fair, HSG D
5,897	98	Unconnected pavement, HSG D
2,520	98	Unconnected pavement, HSG D
723	61	>75% Grass cover, Good, HSG B
6,513	85	Gravel roads, HSG B
26	98	Paved parking, HSG B
271,498	96	Weighted Average
27,890		10.27% Pervious Area
243,608		89.73% Impervious Area
243,582		99.99% Unconnected

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

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Type III 24-hr 50-yr Rainfall=6.92"

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**Summary for Subcatchment 2: Subcat 2**

Runoff = 27.90 cfs @ 12.13 hrs, Volume= 95,942 cf, Depth= 3.45"  
 Routed to Link 6L : Allyn's Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-yr Rainfall=6.92"

Area (sf)	CN	Adj	Description
5,917	91		Gravel roads, HSG D
90	91		Gravel roads, HSG D
7,809	91		Gravel roads, HSG D
2,509	91		Gravel roads, HSG D
73	80		>75% Grass cover, Good, HSG D
0	98		Unconnected pavement, HSG D
50,466	98		Unconnected pavement, HSG D
4,451	77		Brush, Fair, HSG D
1	77		Brush, Fair, HSG D
1,970	77		Woods, Good, HSG D
21	77		Woods, Good, HSG D
4,891	91		Gravel roads, HSG D
2,543	91		Gravel roads, HSG D
417	98		Paved parking, HSG B
11,466	85		Gravel roads, HSG B
15,538	55		Woods, Good, HSG B
65	55		Woods, Good, HSG B
72,049	55		Woods, Good, HSG B
2,673	56		Brush, Fair, HSG B
155	56		Brush, Fair, HSG B
81,538	56		Brush, Fair, HSG B
0	55		Woods, Good, HSG B
2	55		Woods, Good, HSG B
0	55		Woods, Good, HSG B
0	98		Unconnected pavement, HSG B
5	98		Unconnected pavement, HSG B
8,525	98		Unconnected pavement, HSG B
34,994	98		Unconnected pavement, HSG B
0	55		Woods, Good, HSG B
1,590	55		Woods, Good, HSG B
1,532	61		>75% Grass cover, Good, HSG B
1,424	85		Gravel roads, HSG B
10,882	85		Gravel roads, HSG B
431	85		Gravel roads, HSG B
4,581	85		Gravel roads, HSG B
675	85		Gravel roads, HSG B
2,418	98		Paved parking, HSG B
1,281	56		Brush, Fair, HSG B
876	56		Brush, Fair, HSG B
333,861	73	69	Weighted Average, UI Adjusted
237,036			71.00% Pervious Area
96,825			29.00% Impervious Area
93,990			97.07% Unconnected

**New Conditions***Type III 24-hr 50-yr Rainfall=6.92"*

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0					<b>Direct Entry,</b>

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Type III 24-hr 50-yr Rainfall=6.92"

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**Summary for Subcatchment 3: Subcat 3**

Runoff = 1.45 cfs @ 12.31 hrs, Volume= 7,279 cf, Depth= 2.07"  
 Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-yr Rainfall=6.92"

Area (sf)	CN	Description
4,834	55	Woods, Good, HSG B
0	98	Unconnected pavement, HSG B
0	98	Unconnected pavement, HSG B
4	98	Unconnected pavement, HSG B
7,806	55	Woods, Good, HSG B
13,226	55	Woods, Good, HSG B
5,628	56	Brush, Fair, HSG B
10,633	56	Brush, Fair, HSG B
42,130	55	Weighted Average
42,126		99.99% Pervious Area
4		0.01% Impervious Area
4		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0600	0.13		<b>Sheet Flow, SHEET</b>
					Woods: Light underbrush n= 0.400 P2= 3.46"
7.3	391	0.0319	0.89		<b>Shallow Concentrated Flow, SHALLOW</b>
					Woodland Kv= 5.0 fps
20.6	491	Total			

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Type III 24-hr 50-yr Rainfall=6.92"

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**Summary for Subcatchment 4: Subcat 4**

Runoff = 8.26 cfs @ 12.07 hrs, Volume= 28,476 cf, Depth= 6.68"  
 Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-yr Rainfall=6.92"

Area (sf)	CN	Description
2,731	98	Roofs, HSG D
12,210	98	Paved parking, HSG D
141	56	Brush, Fair, HSG B
28,666	98	Paved parking, HSG B
7,398	98	Roofs, HSG B
51,147	98	Weighted Average
141		0.28% Pervious Area
51,005		99.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry,</b>

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Type III 24-hr 50-yr Rainfall=6.92"

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**Summary for Subcatchment 5: Subcat 5**

Runoff = 4.35 cfs @ 12.18 hrs, Volume= 16,853 cf, Depth= 4.19"  
 Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-yr Rainfall=6.92"

Area (sf)	CN	Description
3,763	77	Brush, Fair, HSG D
10,111	98	Paved parking, HSG D
9,898	98	Roofs, HSG D
1,256	77	Brush, Fair, HSG D
5,506	77	Woods, Good, HSG D
3,015	30	Woods, Good, HSG A
2,286	55	Woods, Good, HSG B
9,140	55	Woods, Good, HSG B
17	98	Paved parking, HSG B
3,319	56	Brush, Fair, HSG B
48,310	76	Weighted Average
28,284		58.55% Pervious Area
20,026		41.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	100	0.0800	0.14		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.46"
1.1	81	0.0308	1.23		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
13.0	181	Total			

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Type III 24-hr 50-yr Rainfall=6.92"

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**Summary for Subcatchment 6: Subcat 6**

Runoff = 12.08 cfs @ 12.16 hrs, Volume= 45,966 cf, Depth= 4.95"  
 Routed to Link 4L : West Off-Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-yr Rainfall=6.92"

Area (sf)	CN	Adj	Description
34,928	91		Gravel roads, HSG D
60	80		>75% Grass cover, Good, HSG D
714	77		Woods, Good, HSG D
53,658	77		Brush, Fair, HSG D
6,574	77		Woods, Good, HSG D
658	98		Unconnected pavement, HSG D
9,952	91		Gravel roads, HSG D
58	77		Brush, Fair, HSG D
4,780	98		Unconnected pavement, HSG D
111,381	84	83	Weighted Average, UI Adjusted
105,943			95.12% Pervious Area
5,438			4.88% Impervious Area
5,438			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	101	0.1436	0.18		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.46"
2.3	210	0.0470	1.52		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
11.8	311	Total			



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Type III 24-hr 50-yr Rainfall=6.92"

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**Summary for Subcatchment 7: Subcat 7**

Runoff = 0.49 cfs @ 12.08 hrs, Volume= 1,546 cf, Depth= 2.17"  
Routed to Link 5L : North Off-Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Type III 24-hr 50-yr Rainfall=6.92"

Area (sf)	CN	Description
4,687	77	Woods, Good, HSG D
3,876	30	Woods, Good, HSG A
0	30	Woods, Good, HSG A
8,563	56	Weighted Average
8,563		100.00% Pervious Area

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

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Type III 24-hr 50-yr Rainfall=6.92"

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**Summary for Subcatchment 8: Subcat 8**

Runoff = 3.29 cfs @ 12.07 hrs, Volume= 9,958 cf, Depth= 4.73"  
Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Type III 24-hr 50-yr Rainfall=6.92"

Area (sf)	CN	Description
3,807	56	Brush, Fair, HSG B
6,385	55	Woods, Good, HSG B
15,067	98	Unconnected pavement, HSG B
25,260	81	Weighted Average
10,193		40.35% Pervious Area
15,067		59.65% Impervious Area
15,067		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry,</b>

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Type III 24-hr 50-yr Rainfall=6.92"

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**Summary for Pond 4P: Stormwater Practice #1**

Inflow Area = 166,846 sf, 51.61% Impervious, Inflow Depth = 4.50" for 50-yr event  
 Inflow = 15.18 cfs @ 12.08 hrs, Volume= 62,565 cf  
 Outflow = 6.80 cfs @ 11.95 hrs, Volume= 62,565 cf, Atten= 55%, Lag= 0.0 min  
 Discarded = 6.80 cfs @ 11.95 hrs, Volume= 62,565 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Routed to Pond 5P : MH

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Peak Elev= 25.65' @ 12.41 hrs Surf.Area= 5,876 sf Storage= 6,617 cf  
 Flood Elev= 26.50' Surf.Area= 5,876 sf Storage= 10,062 cf

Plug-Flow detention time= 4.0 min calculated for 62,559 cf (100% of inflow)  
 Center-of-Mass det. time= 4.0 min ( 794.5 - 790.4 )

Volume	Invert	Avail.Storage	Storage Description
#1A	24.00'	5,249 cf	<b>30.00'W x 195.86'L x 3.50'H Field A</b> 20,565 cf Overall - 7,442 cf Embedded = 13,123 cf x 40.0% Voids
#2A	24.50'	7,442 cf	<b>ADS_StormTech SC-740 +Cap x 162 Inside #1</b> Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 162 Chambers in 6 Rows
		12,691 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.00'	<b>50.000 in/hr Exfiltration over Surface area</b>
#2	Primary	26.30'	<b>12.0" Round Culvert</b> L= 21.0' Ke= 0.500 Inlet / Outlet Invert= 26.30' / 26.00' S= 0.0143 ' S= 0.0143 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

**Discarded OutFlow** Max=6.80 cfs @ 11.95 hrs HW=24.04' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 6.80 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=24.00' (Free Discharge)↑**2=Culvert** ( Controls 0.00 cfs)

## New Conditions

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Type III 24-hr 50-yr Rainfall=6.92"

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### Pond 4P: Stormwater Practice #1 - Chamber Wizard Field A

**Chamber Model = ADS\_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)**

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

27 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 193.86' Row Length +12.0" End Stone x 2 = 195.86' Base Length

6 Rows x 51.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.00' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

162 Chambers x 45.9 cf = 7,442.3 cf Chamber Storage

20,565.0 cf Field - 7,442.3 cf Chambers = 13,122.7 cf Stone x 40.0% Voids = 5,249.1 cf Stone Storage

Chamber Storage + Stone Storage = 12,691.3 cf = 0.291 af

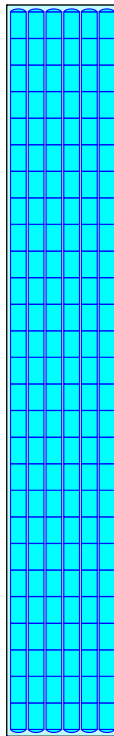
Overall Storage Efficiency = 61.7%

Overall System Size = 195.86' x 30.00' x 3.50'

162 Chambers

761.7 cy Field

486.0 cy Stone



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Type III 24-hr 50-yr Rainfall=6.92"

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### Summary for Pond 5P: MH

Inflow Area = 166,846 sf, 51.61% Impervious, Inflow Depth = 0.00" for 50-yr event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
Routed to Link 6L : Allyn's Pond

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 24.90' @ 0.00 hrs

Flood Elev= 27.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.90'	<b>15.0" Round Culvert</b> L= 90.0' Ke= 0.500 Inlet / Outlet Invert= 24.90' / 24.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=24.90' (Free Discharge)

↑**1=Culvert** ( Controls 0.00 cfs)

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*Type III 24-hr 50-yr Rainfall=6.92"*

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**Summary for Link 4L: West Off-Site**

Inflow Area = 111,381 sf, 4.88% Impervious, Inflow Depth = 4.95" for 50-yr event

Inflow = 12.08 cfs @ 12.16 hrs, Volume= 45,966 cf

Primary = 12.08 cfs @ 12.16 hrs, Volume= 45,966 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

**New Conditions***Type III 24-hr 50-yr Rainfall=6.92"*

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**Summary for Link 5L: North Off-Site**

Inflow Area = 8,563 sf, 0.00% Impervious, Inflow Depth = 2.17" for 50-yr event

Inflow = 0.49 cfs @ 12.08 hrs, Volume= 1,546 cf

Primary = 0.49 cfs @ 12.08 hrs, Volume= 1,546 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs



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*Type III 24-hr 50-yr Rainfall=6.92"*

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**Summary for Link 6L: Allyn's Pond**

Inflow Area = 772,205 sf, 55.24% Impervious, Inflow Depth = 3.76" for 50-yr event

Inflow = 43.06 cfs @ 12.15 hrs, Volume= 241,735 cf

Primary = 43.06 cfs @ 12.15 hrs, Volume= 241,735 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

## New Conditions

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Type III 24-hr 100-yr Rainfall=7.74"

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Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

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

<b>Subcatchment1: Subcat 1</b>	Runoff Area=271,498 sf 89.73% Impervious Runoff Depth=7.26" Tc=28.5 min CN=96 Runoff=27.63 cfs 164,290 cf
<b>Subcatchment2: Subcat 2</b>	Runoff Area=333,861 sf 29.00% Impervious Runoff Depth=4.13" Tc=9.0 min UI Adjusted CN=69 Runoff=33.49 cfs 114,892 cf
<b>Subcatchment3: Subcat 3</b>	Runoff Area=42,130 sf 0.01% Impervious Runoff Depth=2.61" Flow Length=491' Tc=20.6 min CN=55 Runoff=1.87 cfs 9,156 cf
<b>Subcatchment4: Subcat 4</b>	Runoff Area=51,147 sf 99.72% Impervious Runoff Depth=7.50" Tc=5.0 min CN=98 Runoff=9.24 cfs 31,968 cf
<b>Subcatchment5: Subcat 5</b>	Runoff Area=48,310 sf 41.45% Impervious Runoff Depth=4.92" Flow Length=181' Tc=13.0 min CN=76 Runoff=5.10 cfs 19,815 cf
<b>Subcatchment6: Subcat 6</b>	Runoff Area=111,381 sf 4.88% Impervious Runoff Depth=5.73" Flow Length=311' Tc=11.8 min UI Adjusted CN=83 Runoff=13.89 cfs 53,179 cf
<b>Subcatchment7: Subcat 7</b>	Runoff Area=8,563 sf 0.00% Impervious Runoff Depth=2.71" Tc=5.0 min CN=56 Runoff=0.62 cfs 1,936 cf
<b>Subcatchment8: Subcat 8</b>	Runoff Area=25,260 sf 59.65% Impervious Runoff Depth=5.50" Tc=5.0 min CN=81 Runoff=3.81 cfs 11,572 cf
<b>Pond 4P: Stormwater Practice #1</b>	Peak Elev=26.40' Storage=9,696 cf Inflow=17.46 cfs 72,510 cf Discarded=6.80 cfs 72,494 cf Primary=0.04 cfs 17 cf Outflow=6.84 cfs 72,510 cf
<b>Pond 5P: MH</b>	Peak Elev=25.00' Inflow=0.04 cfs 17 cf 15.0" Round Culvert n=0.013 L=90.0' S=0.0100 '/' Outflow=0.04 cfs 17 cf
<b>Link 4L: West Off-Site</b>	Inflow=13.89 cfs 53,179 cf Primary=13.89 cfs 53,179 cf
<b>Link 5L: North Off-Site</b>	Inflow=0.62 cfs 1,936 cf Primary=0.62 cfs 1,936 cf
<b>Link 6L: Allyn's Pond</b>	Inflow=50.39 cfs 279,199 cf Primary=50.39 cfs 279,199 cf

**Total Runoff Area = 892,149 sf Runoff Volume = 406,808 cf Average Runoff Depth = 5.47"**  
**51.58% Pervious = 460,176 sf 48.42% Impervious = 431,973 sf**

**New Conditions**

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Type III 24-hr 100-yr Rainfall=7.74"

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**Summary for Subcatchment 1: Subcat 1**

Runoff = 27.63 cfs @ 12.38 hrs, Volume= 164,290 cf, Depth= 7.26"  
 Routed to Link 6L : Allyn's Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 100-yr Rainfall=7.74"

Area (sf)	CN	Description
1,748	91	Gravel roads, HSG D
770	91	Gravel roads, HSG D
3,993	91	Gravel roads, HSG D
3,841	80	>75% Grass cover, Good, HSG D
2,233	80	>75% Grass cover, Good, HSG D
1,326	77	Brush, Fair, HSG D
7	77	Brush, Fair, HSG D
2,996	77	Woods, Good, HSG D
0	98	Unconnected pavement, HSG D
1	98	Unconnected pavement, HSG D
2	98	Unconnected pavement, HSG D
0	98	Unconnected pavement, HSG D
3,129	98	Unconnected pavement, HSG B
1,959	98	Unconnected pavement, HSG B
230,073	98	Unconnected pavement, HSG D
6	91	Gravel roads, HSG D
1,495	80	>75% Grass cover, Good, HSG D
2,237	77	Brush, Fair, HSG D
5,897	98	Unconnected pavement, HSG D
2,520	98	Unconnected pavement, HSG D
723	61	>75% Grass cover, Good, HSG B
6,513	85	Gravel roads, HSG B
26	98	Paved parking, HSG B
271,498	96	Weighted Average
27,890		10.27% Pervious Area
243,608		89.73% Impervious Area
243,582		99.99% Unconnected

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

**New Conditions**

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Type III 24-hr 100-yr Rainfall=7.74"

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**Summary for Subcatchment 2: Subcat 2**

Runoff = 33.49 cfs @ 12.13 hrs, Volume= 114,892 cf, Depth= 4.13"  
 Routed to Link 6L : Allyn's Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 100-yr Rainfall=7.74"

Area (sf)	CN	Adj	Description
5,917	91		Gravel roads, HSG D
90	91		Gravel roads, HSG D
7,809	91		Gravel roads, HSG D
2,509	91		Gravel roads, HSG D
73	80		>75% Grass cover, Good, HSG D
0	98		Unconnected pavement, HSG D
50,466	98		Unconnected pavement, HSG D
4,451	77		Brush, Fair, HSG D
1	77		Brush, Fair, HSG D
1,970	77		Woods, Good, HSG D
21	77		Woods, Good, HSG D
4,891	91		Gravel roads, HSG D
2,543	91		Gravel roads, HSG D
417	98		Paved parking, HSG B
11,466	85		Gravel roads, HSG B
15,538	55		Woods, Good, HSG B
65	55		Woods, Good, HSG B
72,049	55		Woods, Good, HSG B
2,673	56		Brush, Fair, HSG B
155	56		Brush, Fair, HSG B
81,538	56		Brush, Fair, HSG B
0	55		Woods, Good, HSG B
2	55		Woods, Good, HSG B
0	55		Woods, Good, HSG B
0	98		Unconnected pavement, HSG B
5	98		Unconnected pavement, HSG B
8,525	98		Unconnected pavement, HSG B
34,994	98		Unconnected pavement, HSG B
0	55		Woods, Good, HSG B
1,590	55		Woods, Good, HSG B
1,532	61		>75% Grass cover, Good, HSG B
1,424	85		Gravel roads, HSG B
10,882	85		Gravel roads, HSG B
431	85		Gravel roads, HSG B
4,581	85		Gravel roads, HSG B
675	85		Gravel roads, HSG B
2,418	98		Paved parking, HSG B
1,281	56		Brush, Fair, HSG B
876	56		Brush, Fair, HSG B
333,861	73	69	Weighted Average, UI Adjusted
237,036			71.00% Pervious Area
96,825			29.00% Impervious Area
93,990			97.07% Unconnected

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0					<b>Direct Entry,</b>

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Type III 24-hr 100-yr Rainfall=7.74"

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**Summary for Subcatchment 3: Subcat 3**

Runoff = 1.87 cfs @ 12.30 hrs, Volume= 9,156 cf, Depth= 2.61"  
 Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 100-yr Rainfall=7.74"

Area (sf)	CN	Description
4,834	55	Woods, Good, HSG B
0	98	Unconnected pavement, HSG B
0	98	Unconnected pavement, HSG B
4	98	Unconnected pavement, HSG B
7,806	55	Woods, Good, HSG B
13,226	55	Woods, Good, HSG B
5,628	56	Brush, Fair, HSG B
10,633	56	Brush, Fair, HSG B
42,130	55	Weighted Average
42,126		99.99% Pervious Area
4		0.01% Impervious Area
4		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0600	0.13		<b>Sheet Flow, SHEET</b>
					Woods: Light underbrush n= 0.400 P2= 3.46"
7.3	391	0.0319	0.89		<b>Shallow Concentrated Flow, SHALLOW</b>
					Woodland Kv= 5.0 fps
20.6	491	Total			

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**Summary for Subcatchment 4: Subcat 4**

Runoff = 9.24 cfs @ 12.07 hrs, Volume= 31,968 cf, Depth= 7.50"  
Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100-yr Rainfall=7.74"

Area (sf)	CN	Description
2,731	98	Roofs, HSG D
12,210	98	Paved parking, HSG D
141	56	Brush, Fair, HSG B
28,666	98	Paved parking, HSG B
7,398	98	Roofs, HSG B
51,147	98	Weighted Average
141		0.28% Pervious Area
51,005		99.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry,</b>

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Type III 24-hr 100-yr Rainfall=7.74"

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**Summary for Subcatchment 5: Subcat 5**

Runoff = 5.10 cfs @ 12.18 hrs, Volume= 19,815 cf, Depth= 4.92"  
 Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 100-yr Rainfall=7.74"

Area (sf)	CN	Description
3,763	77	Brush, Fair, HSG D
10,111	98	Paved parking, HSG D
9,898	98	Roofs, HSG D
1,256	77	Brush, Fair, HSG D
5,506	77	Woods, Good, HSG D
3,015	30	Woods, Good, HSG A
2,286	55	Woods, Good, HSG B
9,140	55	Woods, Good, HSG B
17	98	Paved parking, HSG B
3,319	56	Brush, Fair, HSG B
48,310	76	Weighted Average
28,284		58.55% Pervious Area
20,026		41.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	100	0.0800	0.14		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.46"
1.1	81	0.0308	1.23		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
13.0	181	Total			



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Type III 24-hr 100-yr Rainfall=7.74"

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**Summary for Subcatchment 6: Subcat 6**

Runoff = 13.89 cfs @ 12.16 hrs, Volume= 53,179 cf, Depth= 5.73"  
 Routed to Link 4L : West Off-Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 100-yr Rainfall=7.74"

Area (sf)	CN	Adj	Description
34,928	91		Gravel roads, HSG D
60	80		>75% Grass cover, Good, HSG D
714	77		Woods, Good, HSG D
53,658	77		Brush, Fair, HSG D
6,574	77		Woods, Good, HSG D
658	98		Unconnected pavement, HSG D
9,952	91		Gravel roads, HSG D
58	77		Brush, Fair, HSG D
4,780	98		Unconnected pavement, HSG D
111,381	84	83	Weighted Average, UI Adjusted
105,943			95.12% Pervious Area
5,438			4.88% Impervious Area
5,438			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	101	0.1436	0.18		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.46"
2.3	210	0.0470	1.52		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
11.8	311	Total			

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**Summary for Subcatchment 7: Subcat 7**

Runoff = 0.62 cfs @ 12.08 hrs, Volume= 1,936 cf, Depth= 2.71"  
Routed to Link 5L : North Off-Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100-yr Rainfall=7.74"

Area (sf)	CN	Description
4,687	77	Woods, Good, HSG D
3,876	30	Woods, Good, HSG A
0	30	Woods, Good, HSG A
8,563	56	Weighted Average
8,563		100.00% Pervious Area

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

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Type III 24-hr 100-yr Rainfall=7.74"

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**Summary for Subcatchment 8: Subcat 8**

Runoff = 3.81 cfs @ 12.07 hrs, Volume= 11,572 cf, Depth= 5.50"  
Routed to Pond 4P : Stormwater Practice #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100-yr Rainfall=7.74"

Area (sf)	CN	Description
3,807	56	Brush, Fair, HSG B
6,385	55	Woods, Good, HSG B
15,067	98	Unconnected pavement, HSG B
25,260	81	Weighted Average
10,193		40.35% Pervious Area
15,067		59.65% Impervious Area
15,067		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry,</b>

**New Conditions**

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Type III 24-hr 100-yr Rainfall=7.74"

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**Summary for Pond 4P: Stormwater Practice #1**

Inflow Area = 166,846 sf, 51.61% Impervious, Inflow Depth = 5.22" for 100-yr event  
 Inflow = 17.46 cfs @ 12.08 hrs, Volume= 72,510 cf  
 Outflow = 6.84 cfs @ 12.46 hrs, Volume= 72,510 cf, Atten= 61%, Lag= 22.8 min  
 Discarded = 6.80 cfs @ 11.90 hrs, Volume= 72,494 cf  
 Primary = 0.04 cfs @ 12.46 hrs, Volume= 17 cf  
 Routed to Pond 5P : MH

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Peak Elev= 26.40' @ 12.46 hrs Surf.Area= 5,876 sf Storage= 9,696 cf  
 Flood Elev= 26.50' Surf.Area= 5,876 sf Storage= 10,062 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 6.2 min ( 794.8 - 788.6 )

Volume	Invert	Avail.Storage	Storage Description
#1A	24.00'	5,249 cf	<b>30.00'W x 195.86'L x 3.50'H Field A</b> 20,565 cf Overall - 7,442 cf Embedded = 13,123 cf x 40.0% Voids
#2A	24.50'	7,442 cf	<b>ADS_StormTech SC-740 +Cap x 162 Inside #1</b> Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 162 Chambers in 6 Rows
		12,691 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.00'	<b>50.000 in/hr Exfiltration over Surface area</b>
#2	Primary	26.30'	<b>12.0" Round Culvert</b> L= 21.0' Ke= 0.500 Inlet / Outlet Invert= 26.30' / 26.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

**Discarded OutFlow** Max=6.80 cfs @ 11.90 hrs HW=24.04' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 6.80 cfs)**Primary OutFlow** Max=0.04 cfs @ 12.46 hrs HW=26.40' (Free Discharge)↑**2=Culvert** (Inlet Controls 0.04 cfs @ 1.07 fps)

## New Conditions

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### Pond 4P: Stormwater Practice #1 - Chamber Wizard Field A

**Chamber Model = ADS\_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)**

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

27 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 193.86' Row Length +12.0" End Stone x 2 = 195.86' Base Length

6 Rows x 51.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.00' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

162 Chambers x 45.9 cf = 7,442.3 cf Chamber Storage

20,565.0 cf Field - 7,442.3 cf Chambers = 13,122.7 cf Stone x 40.0% Voids = 5,249.1 cf Stone Storage

Chamber Storage + Stone Storage = 12,691.3 cf = 0.291 af

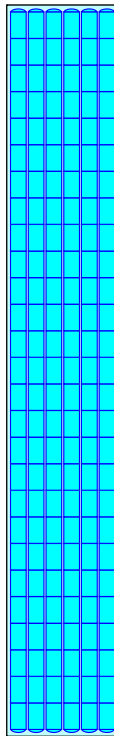
Overall Storage Efficiency = 61.7%

Overall System Size = 195.86' x 30.00' x 3.50'

162 Chambers

761.7 cy Field

486.0 cy Stone



## New Conditions

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Type III 24-hr 100-yr Rainfall=7.74"

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### Summary for Pond 5P: MH

Inflow Area = 166,846 sf, 51.61% Impervious, Inflow Depth = 0.00" for 100-yr event  
Inflow = 0.04 cfs @ 12.46 hrs, Volume= 17 cf  
Outflow = 0.04 cfs @ 12.46 hrs, Volume= 17 cf, Atten= 0%, Lag= 0.0 min  
Primary = 0.04 cfs @ 12.46 hrs, Volume= 17 cf  
Routed to Link 6L : Allyn's Pond

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Peak Elev= 25.00' @ 12.46 hrs

Flood Elev= 27.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.90'	<b>15.0" Round Culvert</b> L= 90.0' Ke= 0.500 Inlet / Outlet Invert= 24.90' / 24.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=0.04 cfs @ 12.46 hrs HW=25.00' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.04 cfs @ 1.48 fps)

**New Conditions***Type III 24-hr 100-yr Rainfall=7.74"*

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**Summary for Link 4L: West Off-Site**

Inflow Area = 111,381 sf, 4.88% Impervious, Inflow Depth = 5.73" for 100-yr event  
Inflow = 13.89 cfs @ 12.16 hrs, Volume= 53,179 cf  
Primary = 13.89 cfs @ 12.16 hrs, Volume= 53,179 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

## New Conditions

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*Type III 24-hr 100-yr Rainfall=7.74"*

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### Summary for Link 5L: North Off-Site

Inflow Area = 8,563 sf, 0.00% Impervious, Inflow Depth = 2.71" for 100-yr event  
Inflow = 0.62 cfs @ 12.08 hrs, Volume= 1,936 cf  
Primary = 0.62 cfs @ 12.08 hrs, Volume= 1,936 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs



**New Conditions***Type III 24-hr 100-yr Rainfall=7.74"*

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**Summary for Link 6L: Allyn's Pond**

Inflow Area = 772,205 sf, 55.24% Impervious, Inflow Depth = 4.34" for 100-yr event

Inflow = 50.39 cfs @ 12.15 hrs, Volume= 279,199 cf

Primary = 50.39 cfs @ 12.15 hrs, Volume= 279,199 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

## **APPENDIX E**

### **Water Quality Volume and Water Quality Flow Calculations**

## Water Quality Volume and Water Quality Flow Worksheet

Watershed: DA-3, DA-4, DA-5, DA-8

Condition: Proposed

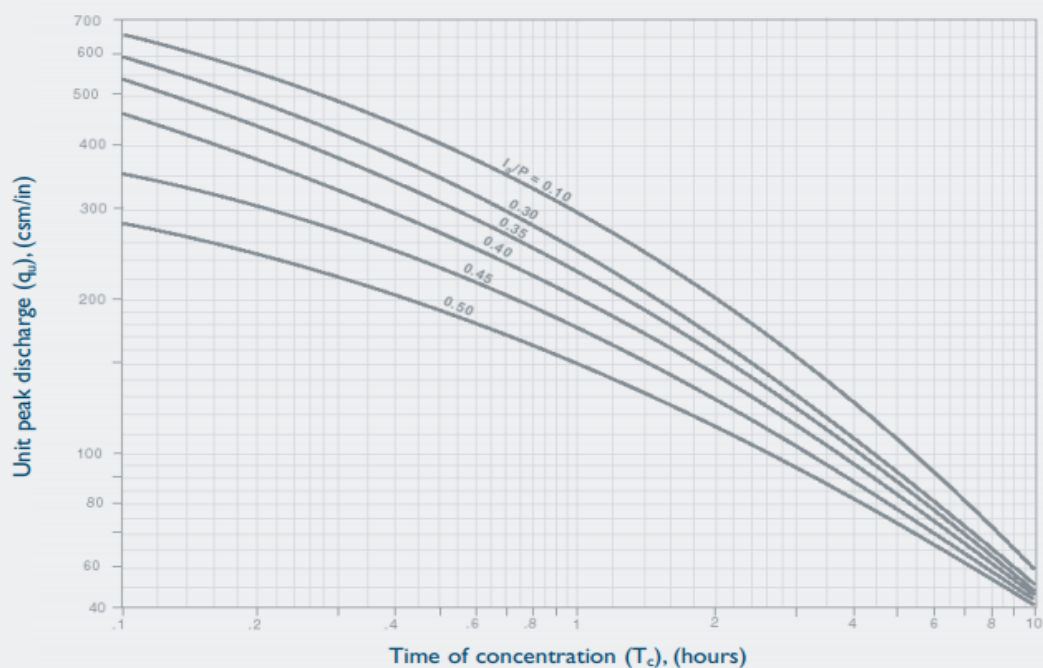
### Water Quality Volume

Design Precipitation, P:	1	in
Percent Impervious Cover, I:	52%	
Volumetric Runoff Coefficient, R:	0.514	
Area, A:	3.80	acres
Water Quality Volume, WQV:	7,097	C.F.

### Water Quality Flow

Runoff Depth, Q:	0.514	in
Runoff Curve Number, CN:	94	
Time of Concentration, T <sub>c</sub> : (>=10 min)	10.0	min
Time of Concentration, T <sub>c</sub> :	0.167	hr
Initial Abstraction, I <sub>a</sub> :	0.128	in
I <sub>a</sub> /P:	0.128	
Unit Peak Discharge, q <sub>u</sub> :	600	csn/in (from Exhibit 4-111 below)
Area, A:	0.00594	mi <sup>2</sup>
Water Quality Flow, WQF:	1.83	cfs

**Exhibit 4-111 Unit peak discharge (q<sub>u</sub>) for NRCS (SCS) type III rainfall distribution**



## **APPENDIX F**

### **Hydrodynamic Separator calculations**

# Hydrodynamic Separation Product Calculator

Gales Ferry Intermodal LLC

HDS #1

CDS CDS5653-10-C

Project Information					
Project Name	Gales Ferry Intermodal LLC			Option #	A
Country	UNITED_STATES	State	Connecticut	City	Gales Ferry

Contact Information			
First Name	Susan	Last Name	Marquardt
Company	Loureiro Engineering Associates, Inc.	Phone #	860-448-0400
Email	srmarquardt@loureiro.com		

Design Criteria					
Site Designation	HDS #1			Sizing Method	Treatment Flow Rate
Screening Required?	No	Treatment Flow Rate	5.00	Peak Flow (cfs)	7.72
Groundwater Depth (ft)	10 - 15	Pipe Invert Depth (ft)	0 - 5	Bedrock Depth (ft)	10 - 15
Multiple Inlets?	Yes	Grate Inlet Required?	No	Pipe Size (in)	12.00
Required Particle Size Distribution?	No	90° between two inlets?	No		

Treatment Selection				
Treatment Unit	CDS	System Model	CDS5653-10-C	
Target Removal	80%	Particle Size Distribution (PSD)	50	

# Hydrodynamic Separation Product Calculator

Gales Ferry Intermodal LLC

HDS #2

CDS CDS4045-8-C

Project Information					
Project Name	Gales Ferry Intermodal LLC			Option #	A
Country	UNITED_STATES	State	Connecticut	City	Gales Ferry

Contact Information			
First Name	Susan	Last Name	Marquardt
Company	Loureiro Engineering Associates, Inc.	Phone #	860-448-0400
Email	srmarquardt@loureiro.com		

Design Criteria					
Site Designation	HDS #2			Sizing Method	Treatment Flow Rate
Screening Required?	No	Treatment Flow Rate	3.52	Peak Flow (cfs)	5.33
Groundwater Depth (ft)	10 - 15	Pipe Invert Depth (ft)	0 - 5	Bedrock Depth (ft)	10 - 15
Multiple Inlets?	No	Grate Inlet Required?	No	Pipe Size (in)	12.00
Required Particle Size Distribution?	No	90° between two inlets?	N/A		

Treatment Selection				
Treatment Unit	CDS	System Model	CDS4045-8-C	
Target Removal	80%	Particle Size Distribution (PSD)	50	

## **APPENDIX G**

### **Stormwater Management Maintenance Program and Inspection Checklist**

## **Stormwater Management System Maintenance Program**

---

There shall be periodic maintenance of the stormwater systems on the property after installation. In order to ensure effective performance of the system, the following stormwater maintenance program has been established. The property owner will be responsible for implementation of this program. A log and schedule of all inspections, cleanings, and repairs shall be maintained by the property owner. All maintenance documents shall be transferred to any future owners upon sale or transfer of the property.

A. Catch basins/Manholes

Catch basins are designed with sumps for the purpose of collecting coarse sediment. All catch basins should be inspected two times per year, specifically during times for high levels of maintenance around the site. Sediment should be removed when it extends to within 6 inches of the outlet pipe invert or not less than once per year. Cleanout should be facilitated via vacuum truck or other means that accomplish sediment removal. The sediment shall be disposed of in an approved off-site location in accordance with town and state requirements.

B. Asphalt

Asphalt areas should be swept annually. Ideal sweeping timeframe is in the spring after winter sanding or salting for deicing. Deicing chemicals should be kept to a minimum during the winter months.

C. Subsurface detention systems

Underground detention systems shall be inspected through the surface openings quarterly and sediment/debris shall be removed as needed to ensure proper functioning of structures and inlets/outlets. Areas of disturbance that may be as a result of cleaning shall be seeded and planted in accordance with the original planting plan. Associated structures shall be maintained yearly, or more frequently, as required, by the condition of the site and system. Waste material will be properly disposed of off-site.

D. Lawn and vegetated areas

Vegetated cover shall be maintained on all earth surfaces to minimize soil erosion. Fertilizer use should be minimized and applied using careful application processes.



1761 Route 12, Gales Ferry,CT

## Stormwater Management System Maintenance Checklist

Inspection Date: \_\_\_\_\_

Inspector: \_\_\_\_\_

Maintenance Item	Satisfactory	Unsatisfactory	Comments
<b>Drainage Structures</b>			
Sedimentation Accumulation			
Large Floating Debris			
Inlet/Outlet			
Structure walls			
Riser			
Frame and Cover			
<b>Subsurface Infiltration System</b>			
Settling Over System			
Sedimentation Accumulation			
Large Floating Debris			
Inspection Structure Integrity			
Inspection Structure Frame and Cover			
<b>Surrounding Lawn and Vegetated Areas</b>			
Signs of Erosion			
Ponding/Settling			
Overgrowth			

Additional Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_