HANCOCK ASSOCIATES

LAND SURVEYING

CIVIL ENGINEERING

WETLAND SCIENCE

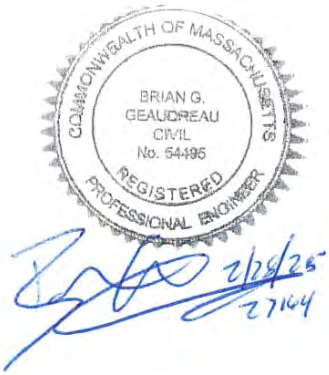
Stormwater Report

In Support Of

A Comprehensive Permit and Notice of Intent Filling

For

2041 Bridge Street
(Map 19, Lot 39)
Dracut, MA



PREPARED BY:
Hancock Associates
#27164

PREPARED FOR:
Marsh Hill Management, LLC
February 2025

Table of Contents

Tables

Appendices

Introduction

Marsh Hill Management, LLC proposes to construct a multi-family residential building at the property of 2041 Bridge Street, Dracut, MA located at the intersection of Marsh Hill Road and Bridge Street. Associated infrastructure related to the building will be constructed and includes paved vehicular and pedestrian ways, stormwater management systems, and utility services. The project area is currently comprised of undeveloped wooded land. The project area is accessed by Marsh Hill Road and consists of 5.3± acres and is bounded by Bridge Street to the west, Marsh Hill Road to the south, A.L. Prime Gas Station to the North and the Old Pasture Road residential subdivision to the east. Elevations on site range from 178 in the southeastern corner of the lot and drop to 137 due west at the edge of the wetlands, in the middle of the property and extend to the western property line on Bridge Street.

The project site is located on the side of a hill with wetlands located at the toe slope. In the existing condition, stormwater runoff runs down the hill side to the wetlands. The proposed stormwater system was designed to mimic the existing drainage pattern.

The proposed stormwater management system will include catch basins with deep sumps and hoods and hydrodynamic separators which will convey stormwater from the proposed parking areas and buildings to underground infiltration systems via a network of pipes. The proposed underground infiltration systems will reduce peak rates of runoff by promoting infiltration. Overflow from underground infiltration systems is governed by outlet control structure (OCS) and conveyed to the wetlands via flared end structures (FES) and energy dissipating rip rap aprons.

The proposed stormwater management system was designed to meet the Stormwater Management Standards described in the Massachusetts Stormwater Handbook and the town of Dracut's local Stormwater Management requirements. The following report describes the system's compliance with these standards.

Standard 1: No New Untreated Discharges

The Massachusetts Stormwater Handbook states that no new stormwater conveyances may discharge untreated stormwater directly to or cause erosions in wetlands or waters of the Commonwealth. Stormwater from the site will be collected via deep sump catch basins with hoods and a network of pipes. The network of pipes connects to a hydrodynamic separator which provides 44% pretreatment. Flows from the hydrodynamic separator then outlet into underground infiltration systems, providing an additional 80% TSS removal. Overflow from the underground infiltration systems flows to energy dissipating rip rap aprons to prevent scouring and erosion to the wetland resource area.

Standard 2: Peak Rate Attenuation

The Massachusetts Stormwater Handbook states that stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. A summary of the existing and proposed discharge rates follows. The proposed condition discharge rates of runoff are at or below the existing rates to the same discharge points. Please see the attached "Pre-Development Watershed Plan" and "Post Development Watershed Plan" figures (Appendix IV) and HydroCAD output (Appendix V) for more information.

For the purpose of these calculations the following assumptions were made:

- MassMapper online GIS elevation data was used to delineate watershed boundary upgradient of the project area where on-site survey did not gather data.
- The same total watershed area of the drainage areas is used to compare the existing and proposed.
- The Natural Resources Conservation Service (NRCS) Web Soil Survey of Middlesex County defines soils in the project area as:
    - 300B, Montauk fine sandy loam, 3 to 8 percent slopes, Hydrologic Soil Group C

  - 300C, Montauk fine sandy loam, 8 to 15 percent slopes, Hydrologic Soil Group C
  - 51A, Swansea Muck, 0 to 3 percent slopes, Hydrologic Soil Group B/D
- On-site soil testing has confirmed Hydrologic Soils Groups and confirmed the presence of sandy parent soils in certain areas of the site.

One drainage areas have been modeled to represent the existing condition:

- Drainage Area 1S consists of wooded, paved and landscaped areas mapped as Hydrologic Soil Group C soils. Stormwater runoff from 1S drains via overland flow to the wetlands at the western half of the property.

In the proposed condition a stormwater management system will collect and treat stormwater runoff from the project site. This system will include deep sump hooded catch basins, isolator rows, and underground infiltration systems. Ten main drainage areas have been modeled to represent the proposed condition:

- Drainage Area 10S consists of wooded, paved, and landscaped areas mapped as Hydrologic Soil Group C soils. Stormwater runoff from 10S drains via overland flow to the wetlands at the western half of the property.
- Drainage Areas 11S, 12S, 13S, 14S, 15S, & 16S consists of wooded, paved, and landscaped areas mapped as Hydrologic Soil Group C soils. Stormwater runoff from these subcatchments drains via overland flow to deep sump and hooded catch basin/area drains. From the catch basins/area drains, stormwater travels to the underground infiltration systems via a network of pipes and drain manholes. From the underground infiltration systems discharge will then flow to the wetlands at the western half of the property via a flared end structure and rip rap aprons.
- Drainage Area, 20S consists of roof areas from the proposed building and mapped as Hydrologic Soil Group C soils. Stormwater runoff from 20S is captured by gutters and directed to downspouts. From the downspouts, stormwater travels to the underground infiltration systems via a network of pipes and drain manholes. From the underground infiltration systems discharge will then flow to the wetlands at the western half of the property via a flared end structure and rip rap aprons.
- Drainage Area, 21S & 22S consists of wooded, paved, and landscaped areas from off-site stormwater flows mapped as Hydrologic Soil Group C soils. Stormwater runoff from these subcatchments drains via overland flow to grassed drainage swales before being directed to a double grate, deep sump and hooded catch basin. From the catch basins, stormwater travels to a flared end structure and rip rap apron where discharge will then flow to the wetlands at the western half of the property.
- Drainage Area 17S consists of approximately 600 SF of pavement at the proposed driveway entrance to the site which is not captured internally by the site. The runoff from this portion of the site flows to the municipal drainage system in Marsh Hill Road which ultimately discharges to Peppermint Brook as the on site wetlands do as well.
- The analysis point 10R is representative of the combined wetlands and Peppermint Brook which are connected via a 12” concrete pipe located under bridge street. Runoff flows overland through the wetlands, and through the street drainage system to ultimately discharge to Peppermint Brook.

The following table compares the peak rates of runoff under the existing and proposed conditions using the latest NRCC Extreme Precipitation data:

Table 1: Peak Rates of Runoff

Discharge Point	Peak Rate (cfs)							
	2-Year Storm (3.04" Rainfall Depth)		10-Year Storm (4.60" Rainfall Depth)		25-Year Storm (5.83" Rainfall Depth)		100-Year Storm (8.37" Rainfall Depth)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1S/10R	3.79	2.75	9.08	6.20	13.75	10.29	23.97	20.96

cfs – Cubic Feet per Second

Standard 3: Recharge

The Massachusetts Stormwater Handbook states that loss of annual recharge to groundwater shall be eliminated or minimized. The annual recharge from the post-development site shall approximate the annual recharge from the pre-development conditions based on soil type. Recharge volumes are provided for all of the proposed impervious areas. For the purpose of these calculations, all of the development areas are considered to be Hydrologic Soil Group C. The required recharge volume is 0.25" multiplied by the area of impervious surfaces. Please see the attached Hydrocad summaries for the recharge volumes provided within the infiltration chambers (Appendix VI). The required volume is as follows:

Required Recharge Volume, HSG C = Target Depth * Impervious Area = 0.25" * 56,970 SF = 1,187 CF

The recharge volume is provided below the lowest outlets within the underground infiltration systems. The total recharge volume provided is 8,508 cubic feet. Since the volume provided is greater than the required recharge volume, the standard is met.

P.UIS1 = 1,892 CF
P.UIS2 = 2,397 CF
P.UIS3 = 3,944 CF
P.UIS4 = 275 CF

TOTAL = 8,508 CF

The Massachusetts Stormwater Handbook states that the recharge volume must drain within 72 hours. Observations in deep hole soil testing performed on-site indicate that the soil that the chamber system will be installed upon is sand. Please see the soil testing logs shown on the Grading Drainage and Utility Plan in the Permit Site Plan Set. The following "drawdown" calculation assumes two different Rawl's Rates; a Rawl's Rate of 2.41 inches per hour, corresponding to texture class "Loamy Sand" for P.UIS 2 & 3 and assumes a Rawl's Rate of 8.27 inches per hour, corresponding to texture class "Sand" for P.UIS 1 & 4. The Rawl's rates used in the calculations below are based on in situ soil testing to determine soil texture classification.

P.UIS1
Drawdown Time = Storage Volume / (Rawl's Rate * Bottom Area)
= 1,892 CF / (8.27 in/hr * 1,435 SF) = 1.9 Hours

P.UIS2
Drawdown Time = Storage Volume / (Rawl's Rate * Bottom Area)
= 2,397 CF / (2.41 in/hr * 1,271 SF) = 9.4 Hours

P.UIS3
Drawdown Time = Storage Volume / (Rawl's Rate * Bottom Area)
= 3,944 CF / (2.41 in/hr * 1,924 SF) = 10.2 Hours

P.UIS4
Drawdown Time = Storage Volume / (Rawl's Rate * Bottom Area)
= 275 CF / (8.27 in/hr * 364 SF) = 1.1 Hours

Since the drawdown times listed above are less than 72 hours, the requirement is met.

Standard 4: Water Quality

State Requirements:
The Massachusetts Stormwater Handbook states that systems shall be designed to remove 80% of the average annual post-development construction load of Total Suspended Solids (TSS) and 44% pretreatment for areas of rapidly infiltrating soils (infiltration rate > 2.4 inches per hour).

Water Quality Depth = 1" (for soils with infiltration rates > 2.4 inchers per hour)
Water Quality Volume = 1" x Impervious Area = 1" x 56,970 SF = 4,748 CF

Since 8,508 CF (>4,748 CF) is retained via the underground infiltration systems, the standard is met.

Local Requirements:
Per the requirements of the Town of Dracut Stormwater Rules and Regulations, stormwater runoff from vehicular paved areas will be treated for at least 90% TSS (Total Suspended Solids) and 60% Total Phosphorus (TP). To achieve this, 1" multiplied by the total post construction impervious area shall be retained.

Required Retention Depth = 1" (per local requirements)
Required Retention Volume = 1" x Impervious Area = 1" x 56,970 SF = 4,748 CF

Since 8,508 CF (>4,748 CF) is retained via the underground infiltration systems, the standard is met for TSS and TP removal.

TSS Removal Train per State Requirements
Contech CDS TSS removal calculations
Calculations for average TSS removal for each proposed CDS system is provided in Appendix VIII.

Isolator Row Sizing calculations
Per the StormTech Design Manual:
MC-3500 chambers are rated for a 0.24 cfs treatment flow rate for a minimum of 80% TSS removal.
SC-310 chambers are rated for a 0.10 cfs treatment flow rate for a minimum of 80% TSS removal.

The Massachusetts Department of Environmental Protection Wetlands Program Standard Method to Convert Required Water Quality Volume to a Discharge Rate for Sizing Flow Based Manufactured Proprietary Stormwater Treatment Practices, the Q rate associated with the 1-inch water quality volume is calculated using the following equation:

Q1 = (qu)(A)(WQV)

Where:

Q1 = flow rate associated with first 1-inch of runoff
qu = the unit peak discharge, in csm/in. [per Figure 4 on page 7 in MassDEP Q Rate, Sept. 10, 2013]
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1-inch in this case)

TSS Removal for P.UIS-1
Tc = 0.1 hr
qu = 774 csm/in
A = 9,485 SF
Q1 = (774 csm/in)(9,485 SF / 27,878,400 SF/mi2)(1.0 in)
Q1 = 0.26 CFS (2 MC-3500 isolator row chambers req.) – 9 Provided therefore 80% treatment is provided
Pretreatment
Deep Sump Hooded Catch Basin…… 25% (1 - [0.25 x 1.00] = 0.75 remaining)
Contech CDS1515-3……89.4% (0.75 – [0.894 x .75] = 0.0795 remaining)
Total Pretreatment = 92.05% > 44%

Treatment
Isolator Row & Stormtech MC-3500…… 80% (0.0795 - [0.80 x 0.0795] = 0.0159 remaining)
Total Suspended Solids Removal 98.4% ([1.00 – 0.0159] x 100 = 98.4%)

TSS Removal for P.UIS-2
Tc = 0.1 hr
qu = 752 csm/in
A = 3,750 SF
Q1 = (754 csm/in)(3,750 SF / 27,878,400 SF/mi2)(0.5 in)
Q1 = .05 CFS (1 MC-3500 isolator row chambers req.) – 7 Provided therefore 80% treatment is provided
Pretreatment
Deep Sump Hooded Catch Basin …….. 25% (1 – [0.25 x 1.00] = 0.75 remaining)

Treatment
Isolator Row & Stormtech MC-3500…… 80% (0.75 - [0.80 x 0.75] = 0.15 remaining)
Total Suspended Solids Removal 85% ([1.00 – 0.15] x 100 = 85%)

TSS Removal for P.UIS-3
Tc = 0.1 hr
qu = 774 csm/in
A = 17,350 SF
Q1 = (774 csm/in)(17,350SF / 27,878,400 SF/mi2)(1.0 in)
Q1 = 0.48 CFS (2 MC-3500 isolator row chamber req.)
Pretreatment
Deep Sump Hooded Catch Basin…… 25% (1 - [0.25 x 1.00] = 0.75 remaining)

Treatment
Isolator Row & Stormtech MC 3500…… 80% (0.75 - [0.80 x 0.75] = 0.15 remaining)
Total Suspended Solids Removal 85% ([1.00 – 0.15] x 100 = 85%)

TSS Removal for P.UIS-4
Tc = 0.1 hr
qu = 774 csm/in
A = 3,250 SF
Q1 = (774 csm/in)(3,250SF / 27,878,400 SF/mi2)(1.0 in)
Q1 = 0.09 CFS (1 SC-310 isolator row chamber req.)
Pretreatment
Deep Sump Hooded Catch Basin…… 25% (1 - [0.25 x 1.00] = 0.75 remaining)
Contech CDS1515-3……95.7% (0.75 – [0.957 x .75] = 0.03225 remaining)
Total Pretreatment = 96.8% > 44%
Treatment
Isolator Row & Stormtech SC 310……80% (0.03225 - [0.80 x 0.03225] = 0.00645 remaining)
Total Suspended Solids Removal 99.4% ([1.00 – 0.00645] x 100 = 99.4%)

Standard 5: Land Uses with Higher Potential Pollutant Loads

The proposed project is not a Land Use with Higher Potential Pollutant Load (LUHPPL).

Standard 6: Critical Area

The proposed project does not discharge to a Critical Area

Standard 7: Redevelopment

The proposed project is not a redevelopment.

Standard 8: Construction Period Pollution Prevention and Erosion & Sedimentation Control

Best management practices (BMP) for erosion and sedimentation control are staked, silt fences, compost wood fiber sock, hydro seeding, and phased development. Many stormwater BMP technologies (e.g., infiltration technologies) are not designed to handle the high concentrations of sediments typically found in construction runoff and must be protected from construction-related sediment loadings. Construction BMP's **must** be maintained. In developing the proposed project certain measures will be implemented to minimize impacts erosion and sedimentation could have on surrounding areas. This section addresses items that involve proper construction techniques, close surveillance of workmanship, and immediate response to emergency situations. The developer must be prepared to provide whatever reasonable measures are necessary to protect the environment during construction and to stabilize all disturbed areas as soon as construction ends. Construction period pollution prevention and erosion and sediment control shall meet the requirements for the 2022 EPA Construction General Permit for all projects requiring coverage under the CGP.

Pre-Construction

1. The contractor shall have a stockpile of materials required to control erosion on-site to be used to supplement or repair erosion control devices. These materials shall include, but are not limited to compost wood fiber sock, silt fence, compost wood fiber sock and crushed stone.
2. The contractor is responsible for erosion control on site and shall utilize erosion control measures where needed, regardless of whether the measures are specified on the plan or in the order of conditions.

Preliminary Site Work

1. Excavated materials should be stockpiled, separating the topsoil for future use on the site. Erosion control shall be utilized along the down slope side of the piles and side slopes shall not exceed 2:1.
2. If intense rainfall is anticipated, the installation of supplemental straw bale dikes, silt fences, or armored dikes shall be considered.
3. Unsuitable excavated material shall be removed from the site.
4. Construction entrance shall be installed.
5. Existing catch basins shall be protected with silt sacks.

Ongoing Site Work

1. Erosion control measures shall be regularly inspected and replaced as needed.
2. Dewatering shall be done in a manner so as not to transmit silt, sand or particulate matter to the receiving water or existing drainage system.

Landscaping

1. Landscaping shall occur as soon as possible to provide permanent stabilization of disturbed surfaces.
2. If the season or adverse weather conditions do not allow the establishment of vegetation, temporary mulching with straw, wood chips weighted with snow fence or branches, or other methods shall be provided.
3. A minimum of 4 inches of topsoil shall be placed and its surface smoothed to the specified grades.
4. The use of herbicides is strongly discouraged.
5. Hydro seeding is encouraged for steep slopes. Application rates on slopes greater than 3:1 shall have a minimum seeding rate of 5-lbs/1000 SF. A latex or fiber tackifier shall be used on these slopes at a minimum rate of 50 lbs. of tackifier per 500 gallons of water used.

Standard 9: Operations and Maintenance Plan

The information provided herein is intended to provide the base information for operation and maintenance of the site in perpetuity subject to updates and revisions as required at a future date. As such all future property owners must be notified in writing of this plan and be provided with a copy of this plan, a complete set of the design drawings and/or a completed as-built plan showing all the drainage features as they were constructed, which are considered part of this document. Please see the attached Operations and Maintenance Log (Appendix IX).

Stormwater management system owner:	Marsh Hill Management, LLC
The party responsible for operation and maintenance:	Marsh Hill Management, LLC

Preliminary Stormwater Operation and Maintenance Budget

Quarterly Inspection and Maintenance x $1,250 per visit = $5,000 annually

Illicit Discharge - Practices to Minimize Storm Water Contamination

- All waste materials will be collected and stored in a securely lidded metal dumpster.
- All trash and debris from the site will be deposited in the dumpster. The dumpster will be emptied on a regular schedule prior to being over full.
- All personnel will be instructed regarding the correct procedure for waste disposal.
- Good housekeeping and spill control practices will be followed to minimize storm water contamination from petroleum products, paints, and cleaning products.
- All site vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage.
- Spill kits will be provided with any activity that could provide contamination.
- All paint containers and curing compounds will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewers, but will be properly disposed according to the manufacturer's instructions.
- All spills will be cleaned up immediately upon discovery. Spills large enough to reach the storm sewers will be reported to the Massachusetts Department of Environmental Protection Northeast Regional Office at 1-888-304-1133.

Deep Sump Hooded Catch Basins

Inspect deep sump catch basins four times per year including the end of the foliage and snow removal seasons. Sediments must also be removed four times per year or when the depth of deposits is greater than or equal to one half the depth of the sump. Vacuum trucks are to be used to remove trapped sediment and supernatant.

Although catch basin debris often contains concentrations of oil and hazardous materials such as petroleum hydrocarbons and metals, MassDEP classifies them as solid waste. Any contaminated materials must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.00, and handled as hazardous waste. MassDEP regulations prohibit landfills from accepting materials that contain free draining liquids.

Hydrodynamic separators

Hydrodynamic separators will be inspected and cleaned in strict accordance with the manufacturer's recommendations and requirements.

Infiltration Basins

The infiltration basins shall be inspected in early May and the second half of October. Any accumulated silt, trash, or debris shall be removed from the infiltration basins. Outlet control structures should be cleaned as required for proper function. Note any settlement or erosion around drainage inlets, stabilize any eroded areas. The discharge ponds shall be inspected for stability, erosion, siltation and obstructions. Any obstructions including any woody vegetation in the flow path shall be removed. Rip-rap shall be replenished as needed. If silt reaches half way up the rip-rap, it shall be removed and the rocks replaced or replenished as needed.

Roof Drain Leaders

Routine roof inspections shall be performed two times per year. The roof shall be kept clean and free of debris, and the roof drainage systems shall be kept clear. Gutters and downspouts shall be cleaned at least twice per year, or more frequently as necessary.

Vegetated Areas Maintenance

Although not a structural component of the drainage system, the maintenance of vegetated areas may affect the functioning of stormwater management practices. This includes the health/density of vegetative cover and activities such as the application and disposal of lawn and garden care products, disposal of leaves and yard trimmings.

Initial Post-Construction Inspection

During the initial period of vegetation establishment pruning and weeding are required twice in first year by contractor or owner. Any dead vegetation/plantings found after the first year will be replaced. Proper mulching is mandatory and regular watering may be required initially to ensure proper establishment of new vegetation.

Long-Term Maintenance

The planted areas shall be inspected on a semi-annual basis and any litter removed. Weeds and invasive plant species shall be removed by hand. Maintain planted areas adjacent to pavement to prevent soil washout. Immediately clean any soil deposits on pavement. Leaf litter and other detritus shall be removed twice per year. If needed to maintain aesthetic appearance, perennial plantings may be trimmed at the end of the growing season.

Trees and shrubs shall be inspected twice per year to evaluate health and attended to as necessary. Seeded ground cover or grass areas shall not receive mulching. Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming. Plant alternative mixtures of grass species in the event of unsuccessful establishment. The grass vegetation should not be cut to a height less than four inches.

Pesticide/Herbicide Usage

No pesticides are to be used unless a single spot treatment is required for a specific control application.

2041 Bridge Street, Dracut, MA – Post Construction Maintenance

Operations and Maintenance Log
Inspections for Year:_____

Structural Best Management Practice (Frequency)	Action	Date Completed	Completed By	Comments
Deep Sump Hooded Catch Basin– Inspect/clean four times per year. Clean when sump is 50% full.	Inspect/ Clean			
	Inspect/ Clean			
	Inspect/ Clean			
	Inspect/ Clean			
Stormtech Chambers– Inspect four times per year. Clean per manufacturer's requirements.	Inspect/ Clean			
	Inspect/ Clean			
	Inspect/ Clean			
	Inspect/ Clean			
Roof Drain Leaders – Inspect/clean twice per year.	Inspect/Clean			
	Inspect/Clean			
Vegetated Areas Maintenance – Inspect twice per year. Maintain as required.	Inspect			
	Inspect			

(1) Refer to the Massachusetts Stormwater Management, Volume Two: Stormwater Technical Handbook (March 1997) for recommendations regarding frequency for inspection and maintenance of specific BMP's.

(2) Inspections to be conducted by qualified professional such as an environmental scientist or civil engineer.

Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.
Other notes: (Included deviations from: Con Comm. Order of Conditions, PB Approval, Construction Sequence and Approved Plan).

Stormwater Control Manager:_____

Standard 10: Prohibition of Illicit Discharges

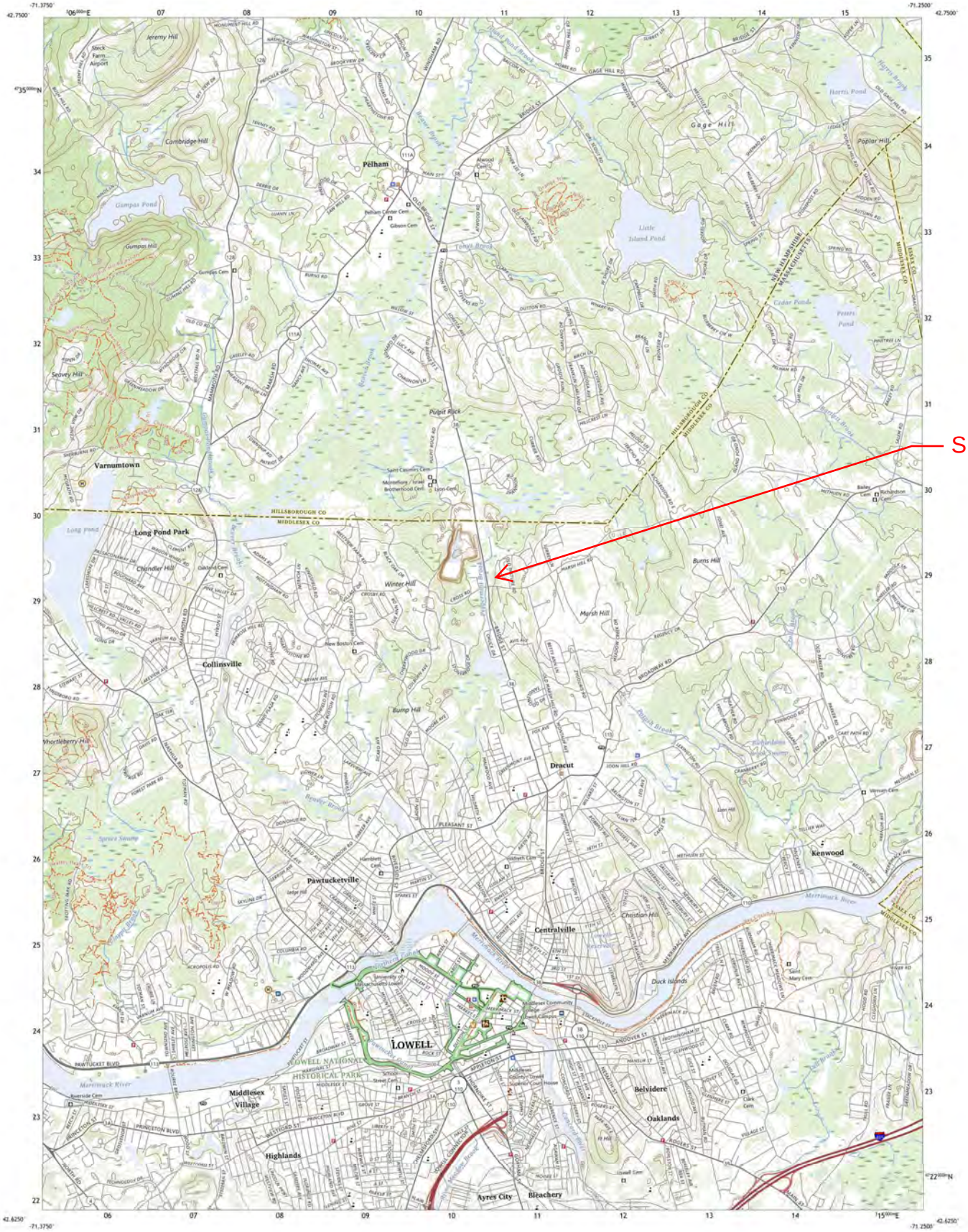
No illicit discharges currently exist and no future illicit discharges will be allowed including wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, soil, or grease.

Appendix I Locus Map

USGS
science for a changing world
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

LOWELL QUADRANGLE
MASSACHUSETTS - NEW HAMPSHIRE
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 19T
This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery	NAIP, October 2018 - October 2018		
Roads	U.S. Census Bureau		2018
Names	GNIS, 1974 - 2024		
Hydrography	National Hydrography Dataset, 2004 - 2023		
Contours	National Elevation Dataset,		2023
Boundaries	Multiple sources; see Publication Info for more detail	2020 -	2022
Wetlands	FWS, National Wetlands Inventory	1985 -	2017

UTM GRID AND 2023 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard.

ROAD CLASSIFICATION
Expressway, Local Connector, Secondary Hwy, Local Road, Ramp, 4WD, Interstate Route, US Route, State Route

1 Nashua North
2 Windham
3 Salem Depot
4 Nashua South
5 Lawrence
6 Westford
7 Billerica
8 Wilmington

LOWELL, MA, NH
2024

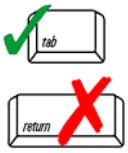
Appendix II Stormwater Checklist

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- [X] No disturbance to any Wetland Resource Areas
- [ ] Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- [ ] Reduced Impervious Area (Redevelopment Only)
- [ ] Minimizing disturbance to existing trees and shrubs
- [ ] LID Site Design Credit Requested:
  - [ ] Credit 1
  - [ ] Credit 2
  - [ ] Credit 3
- [ ] Use of "country drainage" versus curb and gutter conveyance and pipe
- [ ] Bioretention Cells (includes Rain Gardens)
- [ ] Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- [ ] Treebox Filter
- [ ] Water Quality Swale
- [ ] Grass Channel
- [ ] Green Roof
- [X] Other (describe): underground infiltration system

Standard 1: No New Untreated Discharges

- [X] No new untreated discharges
- [X] Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- [ ] Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☒ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☒ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

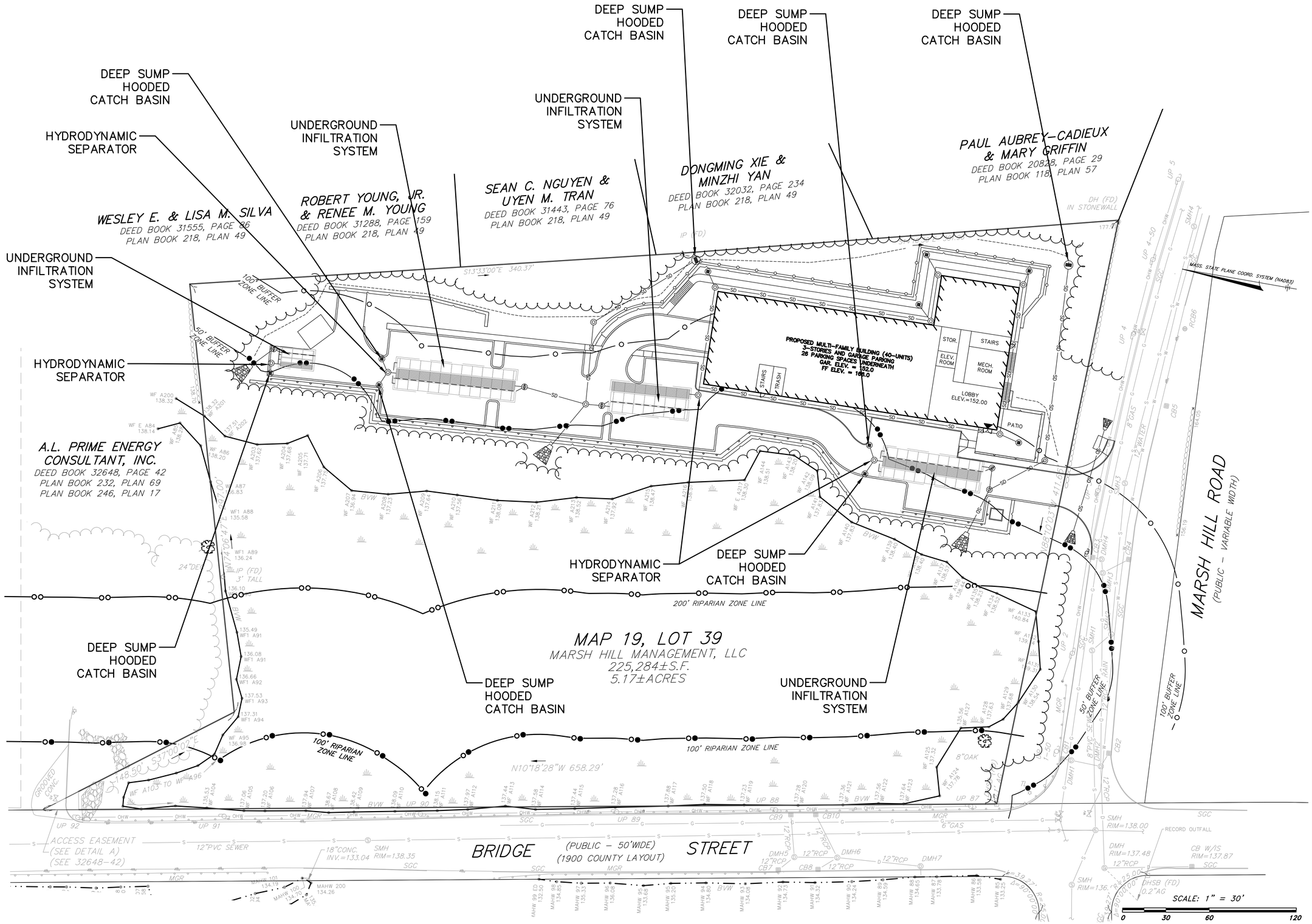
Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Appendix III Stormwater Best Management Practice Plan



COMPREHENSIVE PERMIT SITE PLAN

PROPERTY ADDRESS:

2041 BRIDGE STREET
Dracut, Massachusetts 01826

PREPARED FOR:

Marsh Hill Management, LLC
39 Myrtle Street
Lowell, Massachusetts 01854

HANCOCK ASSOCIATES

Civil Engineers

Land Surveyors

Environmental Consultants

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NO.	BY	APP	DATE	ISSUE/REVISION DESCRIPTION

DATE:	03/05/25	DESIGN BY:	RCT/MJS
SCALE:	AS SHOWN	DRAWN BY:	RCT/MJS
APPR'D BY:	BGG	CHECK BY:	JP

STORMWATER BEST MANAGEMENT PRACTICES PLAN

DWG: 27164-SP1.dwg	BMP
LAYOUT: BMP	
SHEET: 1 OF 1	
JOB NO.: 27164	

Appendix IV NRCS Soils Map

Soil Map—Middlesex County, Massachusetts
(2041 Bridge Street, Dracut, MA)

Map Scale: 1:5,310 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

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
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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:
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: Middlesex County, Massachusetts
Survey Area Data: Version 22, Sep 9, 2022

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

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 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
1	Water	1.4	1.1%
6A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	1.3	1.0%
51A	Swansea muck, 0 to 1 percent slopes	14.0	11.1%
53A	Freetown muck, ponded, 0 to 1 percent slopes	13.8	10.9%
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	15.2	12.0%
73B	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	0.4	0.3%
103B	Charlton-Hollis-Rock outcrop complex, 3 to 8 percent slopes	5.5	4.4%
103C	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	1.4	1.1%
104C	Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes	4.1	3.2%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	2.2	1.7%
300B	Montauk fine sandy loam, 3 to 8 percent slopes	11.7	9.2%
300C	Montauk fine sandy loam, 8 to 15 percent slopes	12.2	9.6%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	2.7	2.1%
311C	Woodbridge fine sandy loam, 8 to 15 percent slopes, very stony	11.4	9.0%
315B	Scituate fine sandy loam, 3 to 8 percent slopes	13.7	10.8%
420B	Canton fine sandy loam, 3 to 8 percent slopes	15.3	12.1%
601	Pits, quarry	0.2	0.2%
Totals for Area of Interest		**126.5**	**100.0%**

Middlesex County, Massachusetts

51A—Swansea muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2trl2
Elevation: 0 to 1,140 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

Swansea and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Swansea

Setting

Landform: Bogs, swamps
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material over loose sandy and gravelly glaciofluvial deposits

Typical profile

Oa1 - 0 to 24 inches: muck
Oa2 - 24 to 34 inches: muck
Cg - 34 to 79 inches: coarse sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
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: About 0 to 6 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Very high (about 16.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: B/D
Ecological site: F144AY043MA - Acidic Organic Wetlands
Hydric soil rating: Yes

Minor Components

Freetown

Percent of map unit: 10 percent
Landform: Bogs, swamps
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 22, Sep 9, 2022

Middlesex County, Massachusetts

300B—Montauk fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyrh
Elevation: 0 to 1,030 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

Montauk and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Montauk

Setting

Landform: Recessionial moraines, ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 4 inches: fine sandy loam
Bw1 - 4 to 26 inches: fine sandy loam
Bw2 - 26 to 34 inches: sandy loam
2Cd - 34 to 72 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 18 to 37 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 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: C

Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Scituate
Percent of map unit: 6 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Canton
Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury
Percent of map unit: 4 percent
Landform: Depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 22, Sep 9, 2022

Middlesex County, Massachusetts

300C—Montauk fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w80p
Elevation: 0 to 1,100 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: Farmland of statewide importance

Map Unit Composition

Montauk and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Montauk

Setting

Landform: Recessionial moraines, ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 4 inches: fine sandy loam
Bw1 - 4 to 26 inches: fine sandy loam
Bw2 - 26 to 34 inches: sandy loam
2Cd - 34 to 72 inches: gravelly loamy sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 18 to 37 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 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C

Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Scituate
Percent of map unit: 6 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

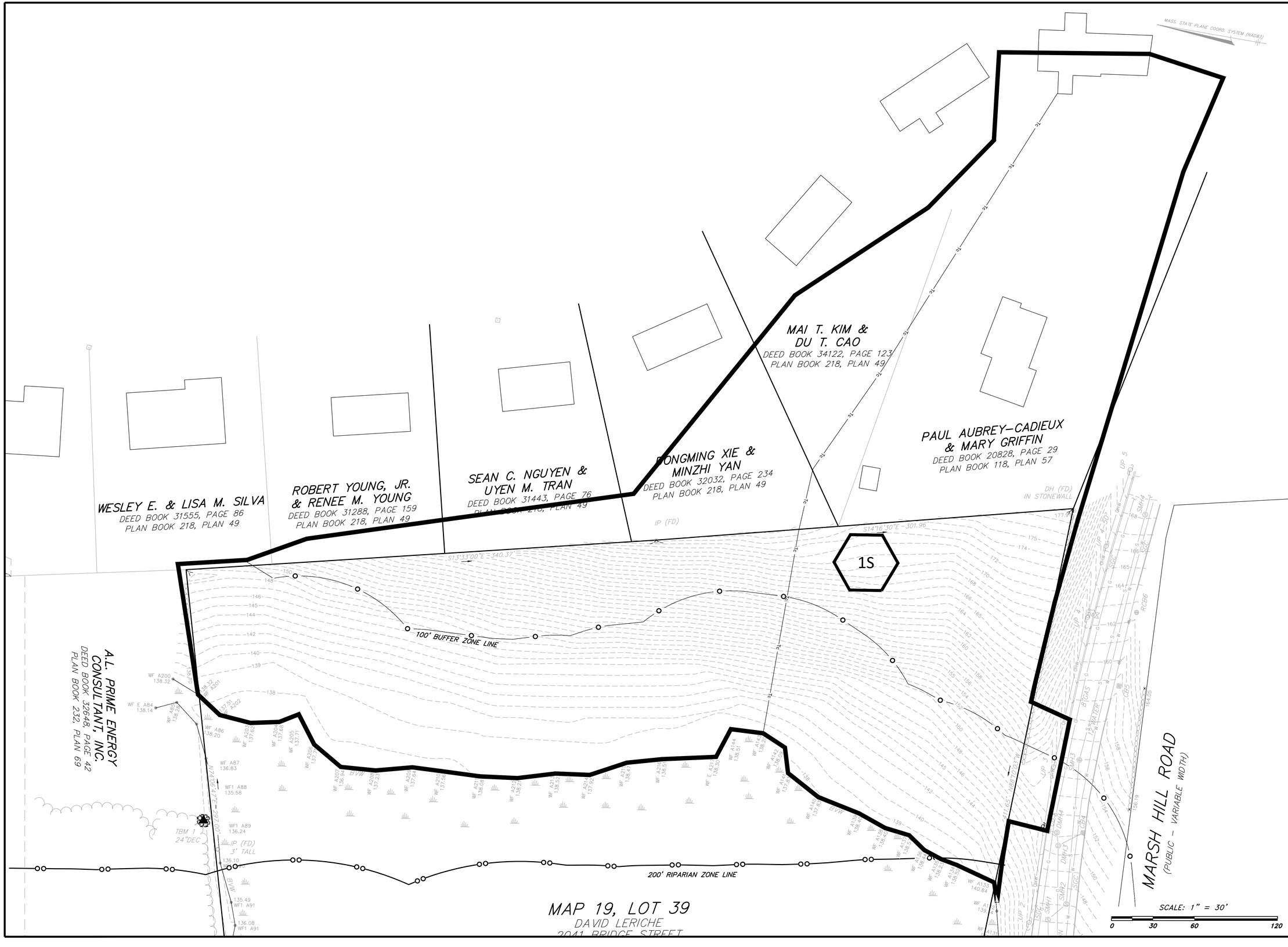
Canton
Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury
Percent of map unit: 4 percent
Landform: Depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 22, Sep 9, 2022

Appendix V Existing and Proposed Drainage Figures



LOCUS MAP SCALE: 1" = 500'

PROPERTY ADDRESS:

2041 BRIDGE STREET
Dracut, Massachusetts 01826

PREPARED FOR:

Marsh Hill Management, LLC

39 Myrtle Street
Lowell, Massachusetts 01854

HANCOCK ASSOCIATES

Civil Engineers

Land Surveyors

Environmental Consultants

34 CHELMSFORD ST., CHELMSFORD, MA 01824
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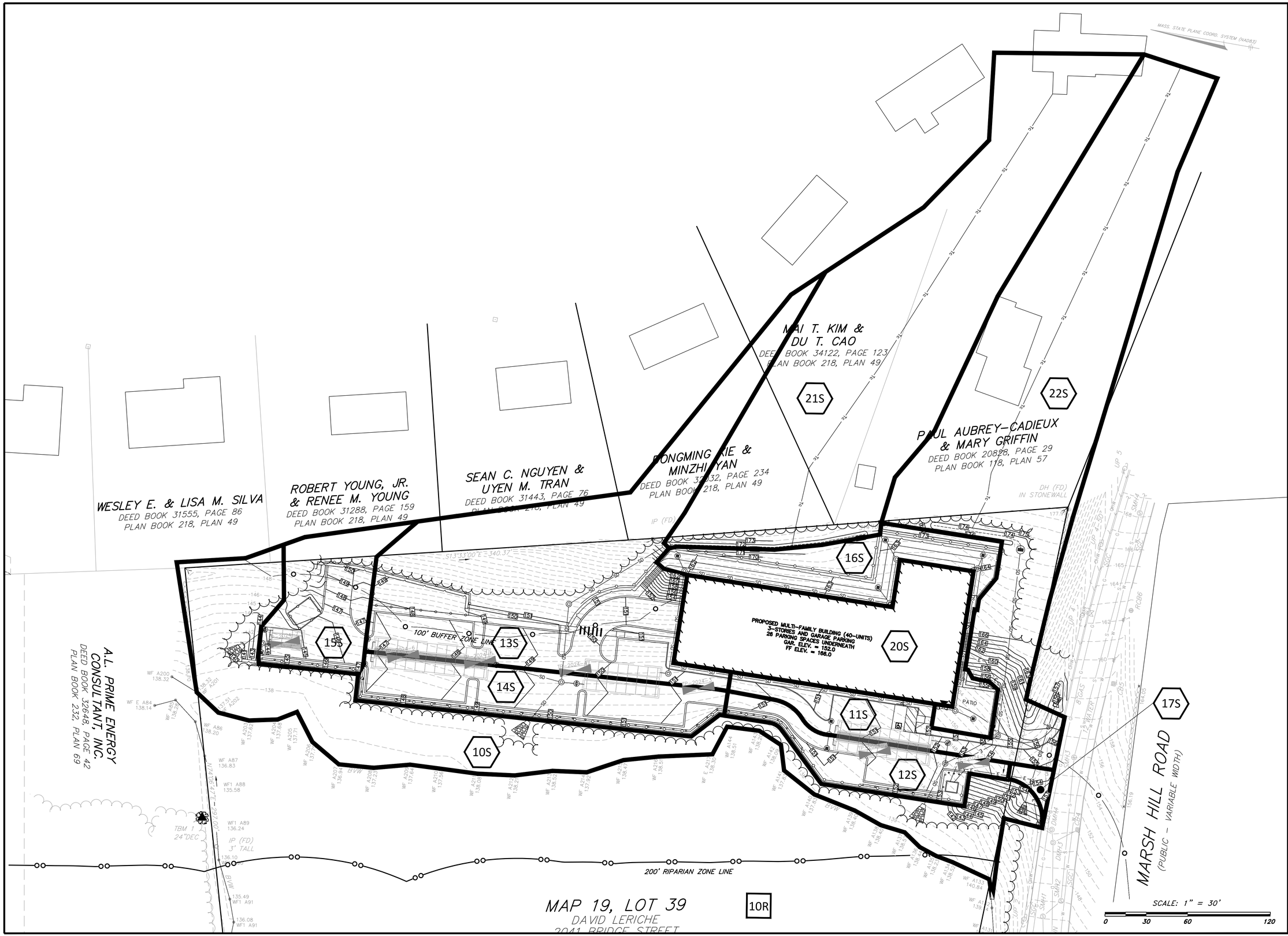
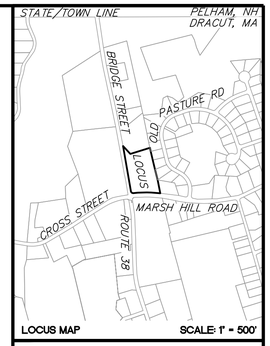
NO.	BY	APP	DATE	ISSUE/REVISION DESCRIPTION

DATE:	09/17/24	DESIGN BY:	RT/MJS
SCALE:	AS SHOWN	DRAWN BY:	RT/MJS
APPR'D BY:	BG	CHECK BY:	JP

PRE DEVELOPMENT SUBCATCHMENT PLAN

DWG: 27164-SP1.dwg	PRE
LAYOUT: PRE	
SHEET: 1 OF 1	
JOB NO.: 27164	





PROPERTY ADDRESS:

2041 BRIDGE STREET
Dracut, Massachusetts 01826

PREPARED FOR:

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NO.	BY	APP	DATE	ISSUE/REVISION DESCRIPTION

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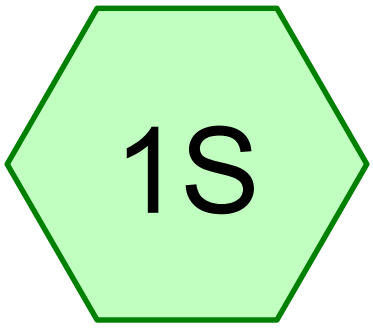
SCALE:	AS SHOWN	DRAWN BY:	RT/MJS
APPR'D BY:	BG	CHECK BY:	JP

POST DEVELOPMENT SUBCATCHMENT PLAN

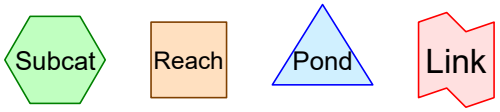
DWG: 27164-SP1.dwg	POST
LAYOUT: POST	
SHEET: 1 OF 1	
JOB NO.: 27164	

Appendix VI Hydrocad Output



Overland to Wetlands

PRE DEVELOPMENT



Routing Diagram for 27164-1
Prepared by Hancock Associates, Printed 3/7/2025

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
78,235	74	>75% Grass cover, Good, HSG C (1S)
3,745	98	Paved parking, HSG C (1S)
4,485	98	Roofs, HSG C (1S)
107,210	70	Woods, Good, HSG C (1S)
193,675	**73**	**TOTAL AREA**

Summary for Subcatchment 1S: Overland to Wetlands

Runoff = 3.79 cfs @ 12.14 hrs, Volume= 14,200 cf, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.04"

Area (sf)	CN	Description
107,210	70	Woods, Good, HSG C
3,745	98	Paved parking, HSG C
4,485	98	Roofs, HSG C
78,235	74	>75% Grass cover, Good, HSG C
193,675	73	Weighted Average
185,445		95.75% Pervious Area
8,230		4.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.23		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.15"
3.2	300	0.0500	1.57		**Shallow Concentrated Flow, Shallow Flow** Short Grass Pasture Kv= 7.0 fps
1.0	150	0.2400	2.45		**Shallow Concentrated Flow, Shallow Flow - Slope & Cover Change** Woodland Kv= 5.0 fps
1.3	60	0.0250	0.79		**Shallow Concentrated Flow, Shallow Flow - Slope Change** Woodland Kv= 5.0 fps
9.2	560	Total			

Summary for Subcatchment 1S: Overland to Wetlands

Runoff = 9.08 cfs @ 12.13 hrs, Volume= 31,751 cf, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
107,210	70	Woods, Good, HSG C
3,745	98	Paved parking, HSG C
4,485	98	Roofs, HSG C
78,235	74	>75% Grass cover, Good, HSG C
193,675	73	Weighted Average
185,445		95.75% Pervious Area
8,230		4.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.23		**Sheet Flow, Sheet Flow**
					Grass: Short n= 0.150 P2= 3.15"
3.2	300	0.0500	1.57		**Shallow Concentrated Flow, Shallow Flow**
					Short Grass Pasture Kv= 7.0 fps
1.0	150	0.2400	2.45		**Shallow Concentrated Flow, Shallow Flow - Slope & Cover Change**
					Woodland Kv= 5.0 fps
1.3	60	0.0250	0.79		**Shallow Concentrated Flow, Shallow Flow - Slope Change**
					Woodland Kv= 5.0 fps
9.2	560	Total			

Summary for Subcatchment 1S: Overland to Wetlands

Runoff = 13.75 cfs @ 12.13 hrs, Volume= 47,490 cf, Depth> 2.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.83"

Area (sf)	CN	Description
107,210	70	Woods, Good, HSG C
3,745	98	Paved parking, HSG C
4,485	98	Roofs, HSG C
78,235	74	>75% Grass cover, Good, HSG C
193,675	73	Weighted Average
185,445		95.75% Pervious Area
8,230		4.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.23		**Sheet Flow, Sheet Flow**
					Grass: Short n= 0.150 P2= 3.15"
3.2	300	0.0500	1.57		**Shallow Concentrated Flow, Shallow Flow**
					Short Grass Pasture Kv= 7.0 fps
1.0	150	0.2400	2.45		**Shallow Concentrated Flow, Shallow Flow - Slope & Cover Change**
					Woodland Kv= 5.0 fps
1.3	60	0.0250	0.79		**Shallow Concentrated Flow, Shallow Flow - Slope Change**
					Woodland Kv= 5.0 fps
9.2	560	Total			

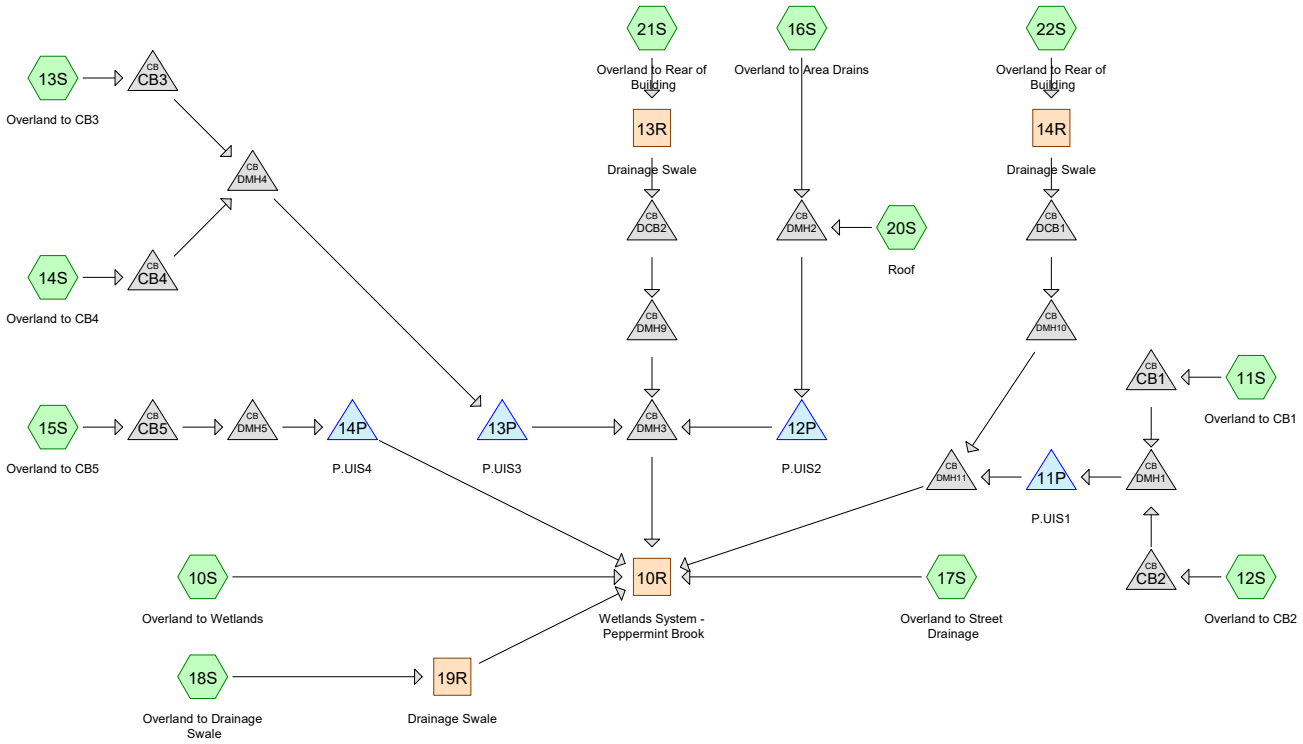
Summary for Subcatchment 1S: Overland to Wetlands

Runoff = 23.97 cfs @ 12.13 hrs, Volume= 82,802 cf, Depth> 5.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.37"

Area (sf)	CN	Description
107,210	70	Woods, Good, HSG C
3,745	98	Paved parking, HSG C
4,485	98	Roofs, HSG C
78,235	74	>75% Grass cover, Good, HSG C
193,675	73	Weighted Average
185,445		95.75% Pervious Area
8,230		4.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.23		**Sheet Flow, Sheet Flow**
					Grass: Short n= 0.150 P2= 3.15"
3.2	300	0.0500	1.57		**Shallow Concentrated Flow, Shallow Flow**
					Short Grass Pasture Kv= 7.0 fps
1.0	150	0.2400	2.45		**Shallow Concentrated Flow, Shallow Flow - Slope & Cover Change**
					Woodland Kv= 5.0 fps
1.3	60	0.0250	0.79		**Shallow Concentrated Flow, Shallow Flow - Slope Change**
					Woodland Kv= 5.0 fps
9.2	560	Total			



POST DEVELOPMENT

Subcat Reach Pond Link

Routing Diagram for 27164-1
Prepared by Hancock Associates, Printed 3/7/2025
HydroCAD® 10.20-3h s/n 00711 © 2024 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
106,075	74	>75% Grass cover, Good, HSG C (10S, 11S, 12S, 13S, 14S, 15S, 16S, 18S, 21S, 22S)
35,600	98	Paved parking, HSG C (11S, 12S, 13S, 14S, 15S, 16S, 17S, 22S)
2,415	98	Retaining Wall, HSG C (12S, 13S, 14S, 15S, 16S)
19,085	98	Roofs, HSG C (20S, 21S, 22S)
30,500	70	Woods, Good, HSG C (10S, 11S, 18S, 21S, 22S)
193,675	**80**	**TOTAL AREA**

Summary for Subcatchment 10S: Overland to Wetlands

Runoff = 0.49 cfs @ 12.10 hrs, Volume= 1,690 cf, Depth> 0.78"
Routed to Reach 10R : Wetlands System - Peppermint Brook

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.04"

Area (sf)	CN	Description
19,600	70	Woods, Good, HSG C
6,325	74	>75% Grass cover, Good, HSG C
25,925	71	Weighted Average
25,925		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.1800	0.16		**Sheet Flow, Sheet Flow**
					Woods: Light underbrush n= 0.400 P2= 3.15"
0.2	20	0.1400	1.87		**Shallow Concentrated Flow, Shallow Flow**
					Woodland Kv= 5.0 fps
0.5	45	0.0560	1.66		**Shallow Concentrated Flow, Shallow Flow - Slope & Cover Change**
					Short Grass Pasture Kv= 7.0 fps
5.9	115	Total			

Summary for Subcatchment 11S: Overland to CB1

Runoff = 0.61 cfs @ 12.09 hrs, Volume= 1,908 cf, Depth> 1.34"
Routed to Pond CB1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.04"

Area (sf)	CN	Description
5,500	98	Paved parking, HSG C
8,920	74	>75% Grass cover, Good, HSG C
2,630	70	Woods, Good, HSG C
17,050	81	Weighted Average
11,550		67.74% Pervious Area
5,500		32.26% Impervious Area

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

Summary for Subcatchment 12S: Overland to CB2

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,011 cf, Depth> 2.11"
Routed to Pond CB2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.04"

Area (sf)	CN	Description
3,545	98	Paved parking, HSG C
* 440	98	Retaining Wall, HSG C
1,775	74	>75% Grass cover, Good, HSG C
5,760	91	Weighted Average
1,775		30.82% Pervious Area
3,985		69.18% Impervious Area

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

Summary for Subcatchment 13S: Overland to CB3

Runoff = 0.76 cfs @ 12.09 hrs, Volume= 2,388 cf, Depth> 2.11"
Routed to Pond CB3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.04"

Area (sf)	CN	Description
9,580	98	Paved parking, HSG C
* 325	98	Retaining Wall, HSG C
3,700	74	>75% Grass cover, Good, HSG C
13,605	91	Weighted Average
3,700		27.20% Pervious Area
9,905		72.80% Impervious Area

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

Summary for Subcatchment 14S: Overland to CB4

Runoff = 0.58 cfs @ 12.08 hrs, Volume= 1,866 cf, Depth> 2.39"
Routed to Pond CB4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.04"

Area (sf)	CN	Description
7,175	98	Paved parking, HSG C
* 590	98	Retaining Wall, HSG C
1,615	74	>75% Grass cover, Good, HSG C
9,380	94	Weighted Average
1,615		17.22% Pervious Area
7,765		82.78% Impervious Area

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

Summary for Subcatchment 15S: Overland to CB5

Runoff = 0.25 cfs @ 12.09 hrs, Volume= 794 cf, Depth> 2.11"
Routed to Pond CB5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.04"

	Area (sf)	CN	Description
	2,985	98	Paved parking, HSG C
*	225	98	Retaining Wall, HSG C
	1,315	74	>75% Grass cover, Good, HSG C
	4,525	91	Weighted Average
	1,315		29.06% Pervious Area
	3,210		70.94% Impervious Area

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

Summary for Subcatchment 16S: Overland to Area Drains

Runoff = 0.39 cfs @ 12.09 hrs, Volume= 1,215 cf, Depth> 1.55"
Routed to Pond DMH2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.04"

	Area (sf)	CN	Description
	2,915	98	Paved parking, HSG C
*	835	98	Retaining Wall, HSG C
	5,670	74	>75% Grass cover, Good, HSG C
	9,420	84	Weighted Average
	5,670		60.19% Pervious Area
	3,750		39.81% Impervious Area

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

Summary for Subcatchment 17S: Overland to Street Drainage

Runoff = 0.04 cfs @ 12.08 hrs, Volume= 136 cf, Depth> 2.81"
Routed to Reach 10R : Wetlands System - Peppermint Brook

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.04"

Area (sf)	CN	Description
580	98	Paved parking, HSG C
580		100.00% Impervious Area

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

Summary for Subcatchment 18S: Overland to Drainage Swale

Runoff = 0.52 cfs @ 12.00 hrs, Volume= 1,436 cf, Depth> 0.88"
Routed to Reach 19R : Drainage Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.04"

Area (sf)	CN	Description
4,935	70	Woods, Good, HSG C
14,605	74	>75% Grass cover, Good, HSG C
19,540	73	Weighted Average
19,540		100.00% Pervious Area

Summary for Subcatchment 20S: Roof

Runoff = 1.02 cfs @ 12.08 hrs, Volume= 3,538 cf, Depth> 2.81"
Routed to Pond DMH2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.04"

Area (sf)	CN	Description
15,130	98	Roofs, HSG C
15,130		100.00% Impervious Area

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

Summary for Subcatchment 21S: Overland to Rear of Building

Runoff = 1.05 cfs @ 12.11 hrs, Volume= 3,549 cf, Depth> 0.99"
Routed to Reach 13R : Drainage Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.04"

Area (sf)	CN	Description
38,735	74	>75% Grass cover, Good, HSG C
2,910	70	Woods, Good, HSG C
1,575	98	Roofs, HSG C
43,220	75	Weighted Average
41,645		96.36% Pervious Area
1,575		3.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.23		**Sheet Flow, Sheet Flow**
					Grass: Short n= 0.150 P2= 3.15"
3.2	300	0.0500	1.57		**Shallow Concentrated Flow, Shallow Flow**
					Short Grass Pasture Kv= 7.0 fps
0.2	30	0.2400	2.45		**Shallow Concentrated Flow, Shallow Flow - Slope & Cover Change**
					Woodland Kv= 5.0 fps
7.1	380	Total			

Summary for Subcatchment 22S: Overland to Rear of Building

Runoff = 0.93 cfs @ 12.10 hrs, Volume= 2,993 cf, Depth> 1.22"
Routed to Reach 14R : Drainage Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.04"

Area (sf)	CN	Description
23,415	74	>75% Grass cover, Good, HSG C
425	70	Woods, Good, HSG C
2,380	98	Roofs, HSG C
3,320	98	Paved parking, HSG C
29,540	79	Weighted Average
23,840		80.70% Pervious Area
5,700		19.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.23		**Sheet Flow, Sheet Flow**
					Grass: Short n= 0.150 P2= 3.15"
1.9	180	0.0500	1.57		**Shallow Concentrated Flow, Shallow Flow**
					Short Grass Pasture Kv= 7.0 fps
0.2	30	0.0200	2.87		**Shallow Concentrated Flow, Shallow Flow - Slope & Cover Change**
					Paved Kv= 20.3 fps
0.8	110	0.1000	2.21		**Shallow Concentrated Flow, Shallow Flow -Slope & Cover Change**
					Short Grass Pasture Kv= 7.0 fps
6.6	370	Total			

Summary for Reach 10R: Wetlands System - Peppermint Brook

Inflow Area = 193,675 sf, 29.48% Impervious, Inflow Depth > 0.61" for 2-Year event
Inflow = 2.75 cfs @ 12.11 hrs, Volume= 9,791 cf
Outflow = 2.75 cfs @ 12.11 hrs, Volume= 9,791 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach 13R: Drainage Swale

Inflow Area = 43,220 sf, 3.64% Impervious, Inflow Depth > 0.99" for 2-Year event
Inflow = 1.05 cfs @ 12.11 hrs, Volume= 3,549 cf
Outflow = 1.03 cfs @ 12.13 hrs, Volume= 3,542 cf, Atten= 2%, Lag= 1.0 min
Routed to Pond DCB2 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.61 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 4.5 min

Peak Storage= 92 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.18' , Surface Width= 4.08'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 25.08 cfs

3.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 9.00'
Length= 145.0' Slope= 0.0069 '/'
Inlet Invert= 172.00', Outlet Invert= 171.00'

‡

Summary for Reach 14R: Drainage Swale

Inflow Area = 29,540 sf, 19.30% Impervious, Inflow Depth > 1.22" for 2-Year event
Inflow = 0.93 cfs @ 12.10 hrs, Volume= 2,993 cf
Outflow = 0.93 cfs @ 12.11 hrs, Volume= 2,991 cf, Atten= 0%, Lag= 0.5 min
Routed to Pond DCB1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.61 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.50 fps, Avg. Travel Time= 2.2 min

Peak Storage= 37 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.16' , Surface Width= 3.99'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 26.49 cfs

3.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 9.00'
Length= 65.0' Slope= 0.0077 '/'
Inlet Invert= 174.00', Outlet Invert= 173.50'

‡

Summary for Reach 19R: Drainage Swale

Inflow Area = 19,540 sf, 0.00% Impervious, Inflow Depth > 0.88" for 2-Year event
Inflow = 0.52 cfs @ 12.00 hrs, Volume= 1,436 cf
Outflow = 0.48 cfs @ 12.03 hrs, Volume= 1,433 cf, Atten= 8%, Lag= 1.4 min
Routed to Reach 10R : Wetlands System - Peppermint Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.14 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 1.00 fps, Avg. Travel Time= 5.7 min

Peak Storage= 52 cf @ 12.03 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 2.02'
Bank-Full Depth= 0.50' Flow Area= 1.5 sf, Capacity= 12.44 cfs

1.50' x 0.50' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 4.50'
Length= 340.0' Slope= 0.0882 '/'
Inlet Invert= 172.00', Outlet Invert= 142.00'

‡

Summary for Pond 11P: P.UIS1

Inflow Area = 22,810 sf, 41.58% Impervious, Inflow Depth > 1.54" for 2-Year event
Inflow = 0.93 cfs @ 12.09 hrs, Volume= 2,919 cf
Outflow = 0.27 cfs @ 11.99 hrs, Volume= 2,918 cf, Atten= 71%, Lag= 0.0 min
Discarded = 0.27 cfs @ 11.99 hrs, Volume= 2,918 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond DMH11 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 145.07' @ 12.45 hrs Surf.Area= 1,435 sf Storage= 512 cf

Plug-Flow detention time= 9.1 min calculated for 2,918 cf (100% of inflow)
Center-of-Mass det. time= 9.0 min (837.4 - 828.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	144.25'	2,065 cf	**22.75'W x 63.06'L x 5.50'H Field A** 7,890 cf Overall - 2,728 cf Embedded = 5,162 cf x 40.0% Voids
#2A	145.00'	2,728 cf	**ADS_StormTech MC-3500 d +Cap** x 24 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 24 Chambers in 3 Rows Cap Storage= 14.9 cf x 2 x 3 rows = 89.4 cf
		4,793 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	144.25'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Device 3	148.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	146.00'	**12.0" Round Culvert** L= 13.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 146.00' / 145.80' S= 0.0154 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	146.25'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.27 cfs @ 11.99 hrs HW=144.32' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=144.25' TW=142.80' (Dynamic Tailwater)
└**3=Culvert** (Controls 0.00 cfs)
  └**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 12P: P.UIS2

Inflow Area = 24,550 sf, 76.90% Impervious, Inflow Depth > 2.32" for 2-Year event
Inflow = 1.42 cfs @ 12.09 hrs, Volume= 4,752 cf
Outflow = 0.07 cfs @ 11.18 hrs, Volume= 4,033 cf, Atten= 95%, Lag= 0.0 min
Discarded = 0.07 cfs @ 11.18 hrs, Volume= 4,033 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond DMH3 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 143.02' @ 14.43 hrs Surf.Area= 1,271 sf Storage= 2,177 cf

Plug-Flow detention time= 245.3 min calculated for 4,033 cf (85% of inflow)
Center-of-Mass det. time= 179.8 min (955.8 - 775.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	140.50'	1,838 cf	**22.75'W x 55.89'L x 5.50'H Field A** 6,993 cf Overall - 2,398 cf Embedded = 4,595 cf x 40.0% Voids
#2A	141.25'	2,398 cf	**ADS_StormTech MC-3500 d +Cap** x 21 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 21 Chambers in 3 Rows Cap Storage= 14.9 cf x 2 x 3 rows = 89.4 cf
		4,236 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.50'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Device 3	145.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	139.50'	**12.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 139.50' / 139.10' S= 0.0400 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	143.25'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.07 cfs @ 11.18 hrs HW=140.56' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=140.50' TW=139.00' (Dynamic Tailwater)
└**3=Culvert** (Passes 0.00 cfs of 2.11 cfs potential flow)
  └**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 13P: P.UIS3

Inflow Area = 22,985 sf, 76.88% Impervious, Inflow Depth > 2.22" for 2-Year event
Inflow = 1.34 cfs @ 12.09 hrs, Volume= 4,254 cf
Outflow = 0.11 cfs @ 11.69 hrs, Volume= 4,254 cf, Atten= 92%, Lag= 0.0 min
Discarded = 0.11 cfs @ 11.69 hrs, Volume= 4,254 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond DMH3 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 141.93' @ 13.14 hrs Surf.Area= 1,924 sf Storage= 1,662 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 125.1 min (922.0 - 796.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	140.50'	2,746 cf	**22.75'W x 84.57'L x 5.50'H Field A** 10,582 cf Overall - 3,718 cf Embedded = 6,864 cf x 40.0% Voids
#2A	141.25'	3,718 cf	**ADS_StormTech MC-3500 d +Cap** x 33 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 33 Chambers in 3 Rows Cap Storage= 14.9 cf x 2 x 3 rows = 89.4 cf
		6,463 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Device 3	145.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	141.00'	**12.0" Round Culvert** L= 31.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 141.00' / 139.90' S= 0.0355 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	143.45'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.11 cfs @ 11.69 hrs HW=140.56' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=140.50' TW=139.00' (Dynamic Tailwater)
└**3=Culvert** (Controls 0.00 cfs)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 14P: P.UIS4

Inflow Area = 4,525 sf, 70.94% Impervious, Inflow Depth > 2.11" for 2-Year event
Inflow = 0.25 cfs @ 12.09 hrs, Volume= 794 cf
Outflow = 0.07 cfs @ 11.88 hrs, Volume= 794 cf, Atten= 72%, Lag= 0.0 min
Discarded = 0.07 cfs @ 11.88 hrs, Volume= 794 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Reach 10R : Wetlands System - Peppermint Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 140.58' @ 12.44 hrs Surf.Area= 364 sf Storage= 148 cf

Plug-Flow detention time= 10.3 min calculated for 794 cf (100% of inflow)

Center-of-Mass det. time= 10.2 min (814.0 - 803.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	139.80'	269 cf	**14.83'W x 24.56'L x 2.33'H Field A** 850 cf Overall - 177 cf Embedded = 673 cf x 40.0% Voids
#2A	140.30'	177 cf	**ADS_StormTech SC-310 +Cap** x 12 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 4 Rows
		446 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	139.80'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	141.10'	**12.0" Round Culvert** L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 141.10' / 140.20' S= 0.0529 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.07 cfs @ 11.88 hrs HW=139.83' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=139.80' TW=0.00' (Dynamic Tailwater)
2=Culvert (Controls 0.00 cfs)

Summary for Pond CB1:

Inflow Area = 17,050 sf, 32.26% Impervious, Inflow Depth > 1.34" for 2-Year event
Inflow = 0.61 cfs @ 12.09 hrs, Volume= 1,908 cf
Outflow = 0.61 cfs @ 12.09 hrs, Volume= 1,908 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.61 cfs @ 12.09 hrs, Volume= 1,908 cf
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 147.30' @ 12.09 hrs
Flood Elev= 150.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.85'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 146.85' / 146.50' S= 0.0700 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.61 cfs @ 12.09 hrs HW=147.30' TW=145.94' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.61 cfs @ 1.80 fps)

Summary for Pond CB2:

Inflow Area = 5,760 sf, 69.18% Impervious, Inflow Depth > 2.11" for 2-Year event
Inflow = 0.32 cfs @ 12.09 hrs, Volume= 1,011 cf
Outflow = 0.32 cfs @ 12.09 hrs, Volume= 1,011 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.32 cfs @ 12.09 hrs, Volume= 1,011 cf
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 147.17' @ 12.09 hrs
Flood Elev= 150.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.85'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 146.85' / 146.50' S= 0.0700 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.32 cfs @ 12.09 hrs HW=147.17' TW=145.94' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.32 cfs @ 1.51 fps)

Summary for Pond CB3:

Inflow Area = 13,605 sf, 72.80% Impervious, Inflow Depth > 2.11" for 2-Year event
Inflow = 0.76 cfs @ 12.09 hrs, Volume= 2,388 cf
Outflow = 0.76 cfs @ 12.09 hrs, Volume= 2,388 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.76 cfs @ 12.09 hrs, Volume= 2,388 cf
Routed to Pond DMH4 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 143.87' @ 12.09 hrs
Flood Elev= 146.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	143.30'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 143.30' / 143.20' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.76 cfs @ 12.09 hrs HW=143.87' TW=143.69' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.76 cfs @ 1.62 fps)

Summary for Pond CB4:

Inflow Area = 9,380 sf, 82.78% Impervious, Inflow Depth > 2.39" for 2-Year event
Inflow = 0.58 cfs @ 12.08 hrs, Volume= 1,866 cf
Outflow = 0.58 cfs @ 12.08 hrs, Volume= 1,866 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.58 cfs @ 12.08 hrs, Volume= 1,866 cf
Routed to Pond DMH4 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 143.82' @ 12.09 hrs
Flood Elev= 146.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	143.30'	**12.0" Round Culvert** L= 6.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 143.30' / 143.20' S= 0.0167 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.57 cfs @ 12.08 hrs HW=143.82' TW=143.69' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.57 cfs @ 1.38 fps)

Summary for Pond CB5:

Inflow Area = 4,525 sf, 70.94% Impervious, Inflow Depth > 2.11" for 2-Year event
Inflow = 0.25 cfs @ 12.09 hrs, Volume= 794 cf
Outflow = 0.25 cfs @ 12.09 hrs, Volume= 794 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.25 cfs @ 12.09 hrs, Volume= 794 cf
Routed to Pond DMH5 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 140.88' @ 12.09 hrs
Flood Elev= 143.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	140.60'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 140.60' / 140.50' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.25 cfs @ 12.09 hrs HW=140.88' TW=140.68' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 0.25 cfs @ 1.42 fps)

Summary for Pond DCB1:

Inflow Area = 29,540 sf, 19.30% Impervious, Inflow Depth > 1.21" for 2-Year event
Inflow = 0.93 cfs @ 12.11 hrs, Volume= 2,991 cf
Outflow = 0.93 cfs @ 12.11 hrs, Volume= 2,991 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.93 cfs @ 12.11 hrs, Volume= 2,991 cf
Routed to Pond DMH10 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 170.57' @ 12.11 hrs
Flood Elev= 173.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	170.00'	**12.0" Round Culvert** L= 131.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 170.00' / 150.00' S= 0.1527 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.92 cfs @ 12.11 hrs HW=170.57' TW=146.97' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 0.92 cfs @ 2.02 fps)

Summary for Pond DCB2:

Inflow Area = 43,220 sf, 3.64% Impervious, Inflow Depth > 0.98" for 2-Year event
Inflow = 1.03 cfs @ 12.13 hrs, Volume= 3,542 cf
Outflow = 1.03 cfs @ 12.13 hrs, Volume= 3,542 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.03 cfs @ 12.13 hrs, Volume= 3,542 cf
Routed to Pond DMH9 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 161.60' @ 12.13 hrs
Flood Elev= 172.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	161.00'	**12.0" Round Culvert** L= 78.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.00' / 148.60' S= 0.1590 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.03 cfs @ 12.13 hrs HW=161.60' TW=149.10' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.03 cfs @ 2.08 fps)

Summary for Pond DMH1:

Inflow Area = 22,810 sf, 41.58% Impervious, Inflow Depth > 1.54" for 2-Year event
Inflow = 0.93 cfs @ 12.09 hrs, Volume= 2,919 cf
Outflow = 0.93 cfs @ 12.09 hrs, Volume= 2,919 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.93 cfs @ 12.09 hrs, Volume= 2,919 cf
Routed to Pond 11P : P.UIS1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 145.94' @ 12.09 hrs
Flood Elev= 150.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	145.50'	**24.0" Round Culvert** L= 4.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 145.50' / 145.11' S= 0.0975 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.93 cfs @ 12.09 hrs HW=145.94' TW=144.61' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.93 cfs @ 1.79 fps)

Summary for Pond DMH10:

Inflow Area = 29,540 sf, 19.30% Impervious, Inflow Depth > 1.21" for 2-Year event
Inflow = 0.93 cfs @ 12.11 hrs, Volume= 2,991 cf
Outflow = 0.93 cfs @ 12.11 hrs, Volume= 2,991 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.93 cfs @ 12.11 hrs, Volume= 2,991 cf
Routed to Pond DMH11 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 146.97' @ 12.11 hrs
Flood Elev= 154.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.40'	**12.0" Round Culvert** L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 146.40' / 145.80' S= 0.0140 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.92 cfs @ 12.11 hrs HW=146.97' TW=143.28' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.92 cfs @ 2.02 fps)

Summary for Pond DMH11:

Inflow Area = 52,350 sf, 29.01% Impervious, Inflow Depth > 0.69" for 2-Year event
Inflow = 0.93 cfs @ 12.11 hrs, Volume= 2,991 cf
Outflow = 0.93 cfs @ 12.11 hrs, Volume= 2,991 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.93 cfs @ 12.11 hrs, Volume= 2,991 cf
Routed to Reach 10R : Wetlands System - Peppermint Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 143.28' @ 12.11 hrs
Flood Elev= 152.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	142.80'	**18.0" Round Culvert** L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 142.80' / 141.50' S= 0.0433 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.92 cfs @ 12.11 hrs HW=143.28' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.92 cfs @ 1.87 fps)

Summary for Pond DMH2:

Inflow Area = 24,550 sf, 76.90% Impervious, Inflow Depth > 2.32" for 2-Year event
Inflow = 1.42 cfs @ 12.09 hrs, Volume= 4,752 cf
Outflow = 1.42 cfs @ 12.09 hrs, Volume= 4,752 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.42 cfs @ 12.09 hrs, Volume= 4,752 cf
Routed to Pond 12P : P.UIS2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 143.02' @ 14.44 hrs
Flood Elev= 150.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	141.35'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 141.35' / 141.25' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.36 cfs @ 12.09 hrs HW=142.11' TW=141.80' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.36 cfs @ 2.12 fps)

Summary for Pond DMH3:

Inflow Area = 90,755 sf, 42.01% Impervious, Inflow Depth > 0.47" for 2-Year event
Inflow = 1.03 cfs @ 12.13 hrs, Volume= 3,542 cf
Outflow = 1.03 cfs @ 12.13 hrs, Volume= 3,542 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.03 cfs @ 12.13 hrs, Volume= 3,542 cf
Routed to Reach 10R : Wetlands System - Peppermint Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 139.51' @ 12.13 hrs
Flood Elev= 149.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	**18.0" Round Culvert** L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 139.00' / 138.50' S= 0.0152 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.03 cfs @ 12.13 hrs HW=139.51' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.03 cfs @ 1.92 fps)

Summary for Pond DMH4:

Inflow Area = 22,985 sf, 76.88% Impervious, Inflow Depth > 2.22" for 2-Year event
Inflow = 1.34 cfs @ 12.09 hrs, Volume= 4,254 cf
Outflow = 1.34 cfs @ 12.09 hrs, Volume= 4,254 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.34 cfs @ 12.09 hrs, Volume= 4,254 cf
Routed to Pond 13P : P.UIS3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 143.69' @ 12.09 hrs
Flood Elev= 146.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	143.10'	**18.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 143.10' / 141.25' S= 0.3700 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.34 cfs @ 12.09 hrs HW=143.69' TW=141.35' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 1.34 cfs @ 2.07 fps)

Summary for Pond DMH5:

Inflow Area = 4,525 sf, 70.94% Impervious, Inflow Depth > 2.11" for 2-Year event
Inflow = 0.25 cfs @ 12.09 hrs, Volume= 794 cf
Outflow = 0.25 cfs @ 12.09 hrs, Volume= 794 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.25 cfs @ 12.09 hrs, Volume= 794 cf
Routed to Pond 14P : P.UIS4

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 140.68' @ 12.09 hrs
Flood Elev= 143.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	140.40'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 140.40' / 140.30' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.25 cfs @ 12.09 hrs HW=140.68' TW=140.25' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 0.25 cfs @ 1.42 fps)

Summary for Pond DMH9:

Inflow Area = 43,220 sf, 3.64% Impervious, Inflow Depth > 0.98" for 2-Year event
Inflow = 1.03 cfs @ 12.13 hrs, Volume= 3,542 cf
Outflow = 1.03 cfs @ 12.13 hrs, Volume= 3,542 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.03 cfs @ 12.13 hrs, Volume= 3,542 cf
Routed to Pond DMH3 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 149.10' @ 12.13 hrs
Flood Elev= 154.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	148.50'	**12.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 148.50' / 139.90' S= 0.1564 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.03 cfs @ 12.13 hrs HW=149.10' TW=139.51' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 1.03 cfs @ 2.08 fps)

Summary for Subcatchment 10S: Overland to Wetlands

Runoff = 1.25 cfs @ 12.09 hrs, Volume= 3,925 cf, Depth> 1.82"
Routed to Reach 10R : Wetlands System - Peppermint Brook

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
19,600	70	Woods, Good, HSG C
6,325	74	>75% Grass cover, Good, HSG C
25,925	71	Weighted Average
25,925		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.1800	0.16		**Sheet Flow, Sheet Flow**
					Woods: Light underbrush n= 0.400 P2= 3.15"
0.2	20	0.1400	1.87		**Shallow Concentrated Flow, Shallow Flow**
					Woodland Kv= 5.0 fps
0.5	45	0.0560	1.66		**Shallow Concentrated Flow, Shallow Flow - Slope & Cover Change**
					Short Grass Pasture Kv= 7.0 fps
5.9	115	Total			

Summary for Subcatchment 11S: Overland to CB1

Runoff = 1.21 cfs @ 12.09 hrs, Volume= 3,739 cf, Depth> 2.63"
Routed to Pond CB1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
5,500	98	Paved parking, HSG C
8,920	74	>75% Grass cover, Good, HSG C
2,630	70	Woods, Good, HSG C
17,050	81	Weighted Average
11,550		67.74% Pervious Area
5,500		32.26% Impervious Area

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

Summary for Subcatchment 12S: Overland to CB2

Runoff = 0.54 cfs @ 12.08 hrs, Volume= 1,724 cf, Depth> 3.59"
Routed to Pond CB2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
3,545	98	Paved parking, HSG C
* 440	98	Retaining Wall, HSG C
1,775	74	>75% Grass cover, Good, HSG C
5,760	91	Weighted Average
1,775		30.82% Pervious Area
3,985		69.18% Impervious Area

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

Summary for Subcatchment 13S: Overland to CB3

Runoff = 1.27 cfs @ 12.08 hrs, Volume= 4,072 cf, Depth> 3.59"
Routed to Pond CB3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
9,580	98	Paved parking, HSG C
* 325	98	Retaining Wall, HSG C
3,700	74	>75% Grass cover, Good, HSG C
13,605	91	Weighted Average
3,700		27.20% Pervious Area
9,905		72.80% Impervious Area

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

Summary for Subcatchment 14S: Overland to CB4

Runoff = 0.92 cfs @ 12.08 hrs, Volume= 3,057 cf, Depth> 3.91"
Routed to Pond CB4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
7,175	98	Paved parking, HSG C
* 590	98	Retaining Wall, HSG C
1,615	74	>75% Grass cover, Good, HSG C
9,380	94	Weighted Average
1,615		17.22% Pervious Area
7,765		82.78% Impervious Area

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

Summary for Subcatchment 15S: Overland to CB5

Runoff = 0.42 cfs @ 12.08 hrs, Volume= 1,354 cf, Depth> 3.59"
Routed to Pond CB5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

	Area (sf)	CN	Description
	2,985	98	Paved parking, HSG C
*	225	98	Retaining Wall, HSG C
	1,315	74	>75% Grass cover, Good, HSG C
	4,525	91	Weighted Average
	1,315		29.06% Pervious Area
	3,210		70.94% Impervious Area

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

Summary for Subcatchment 16S: Overland to Area Drains

Runoff = 0.73 cfs @ 12.09 hrs, Volume= 2,279 cf, Depth> 2.90"
Routed to Pond DMH2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

	Area (sf)	CN	Description
	2,915	98	Paved parking, HSG C
*	835	98	Retaining Wall, HSG C
	5,670	74	>75% Grass cover, Good, HSG C
	9,420	84	Weighted Average
	5,670		60.19% Pervious Area
	3,750		39.81% Impervious Area

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

Summary for Subcatchment 17S: Overland to Street Drainage

Runoff = 0.06 cfs @ 12.08 hrs, Volume= 211 cf, Depth> 4.36"
Routed to Reach 10R : Wetlands System - Peppermint Brook

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
580	98	Paved parking, HSG C
580		100.00% Impervious Area

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

Summary for Subcatchment 18S: Overland to Drainage Swale

Runoff = 1.25 cfs @ 12.00 hrs, Volume= 3,210 cf, Depth> 1.97"
Routed to Reach 19R : Drainage Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
4,935	70	Woods, Good, HSG C
14,605	74	>75% Grass cover, Good, HSG C
19,540	73	Weighted Average
19,540		100.00% Pervious Area

Summary for Subcatchment 20S: Roof

Runoff = 1.56 cfs @ 12.08 hrs, Volume= 5,498 cf, Depth> 4.36"
Routed to Pond DMH2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
15,130	98	Roofs, HSG C
15,130		100.00% Impervious Area

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

Summary for Subcatchment 21S: Overland to Rear of Building

Runoff = 2.37 cfs @ 12.11 hrs, Volume= 7,656 cf, Depth> 2.13"
Routed to Reach 13R : Drainage Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
38,735	74	>75% Grass cover, Good, HSG C
2,910	70	Woods, Good, HSG C
1,575	98	Roofs, HSG C
43,220	75	Weighted Average
41,645		96.36% Pervious Area
1,575		3.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.23		**Sheet Flow, Sheet Flow**
					Grass: Short n= 0.150 P2= 3.15"
3.2	300	0.0500	1.57		**Shallow Concentrated Flow, Shallow Flow**
					Short Grass Pasture Kv= 7.0 fps
0.2	30	0.2400	2.45		**Shallow Concentrated Flow, Shallow Flow - Slope & Cover Change**
					Woodland Kv= 5.0 fps
7.1	380	Total			

Summary for Subcatchment 22S: Overland to Rear of Building

Runoff = 1.92 cfs @ 12.10 hrs, Volume= 6,049 cf, Depth> 2.46"
Routed to Reach 14R : Drainage Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
23,415	74	>75% Grass cover, Good, HSG C
425	70	Woods, Good, HSG C
2,380	98	Roofs, HSG C
3,320	98	Paved parking, HSG C
29,540	79	Weighted Average
23,840		80.70% Pervious Area
5,700		19.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.23		**Sheet Flow, Sheet Flow**
					Grass: Short n= 0.150 P2= 3.15"
1.9	180	0.0500	1.57		**Shallow Concentrated Flow, Shallow Flow**
					Short Grass Pasture Kv= 7.0 fps
0.2	30	0.0200	2.87		**Shallow Concentrated Flow, Shallow Flow - Slope & Cover Change**
					Paved Kv= 20.3 fps
0.8	110	0.1000	2.21		**Shallow Concentrated Flow, Shallow Flow -Slope & Cover Change**
					Short Grass Pasture Kv= 7.0 fps
6.6	370	Total			

Summary for Reach 10R: Wetlands System - Peppermint Brook

Inflow Area = 193,675 sf, 29.48% Impervious, Inflow Depth > 1.43" for 10-Year event
Inflow = 6.20 cfs @ 12.10 hrs, Volume= 23,043 cf
Outflow = 6.20 cfs @ 12.10 hrs, Volume= 23,043 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach 13R: Drainage Swale

Inflow Area = 43,220 sf, 3.64% Impervious, Inflow Depth > 2.13" for 10-Year event
Inflow = 2.37 cfs @ 12.11 hrs, Volume= 7,656 cf
Outflow = 2.34 cfs @ 12.12 hrs, Volume= 7,646 cf, Atten= 1%, Lag= 0.8 min
Routed to Pond DCB2 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.11 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 0.66 fps, Avg. Travel Time= 3.6 min

Peak Storage= 161 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.29' , Surface Width= 4.72'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 25.08 cfs

3.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 9.00'
Length= 145.0' Slope= 0.0069 '/'
Inlet Invert= 172.00', Outlet Invert= 171.00'

‡

Summary for Reach 14R: Drainage Swale

Inflow Area = 29,540 sf, 19.30% Impervious, Inflow Depth > 2.46" for 10-Year event
Inflow = 1.92 cfs @ 12.10 hrs, Volume= 6,049 cf
Outflow = 1.91 cfs @ 12.10 hrs, Volume= 6,046 cf, Atten= 0%, Lag= 0.4 min
Routed to Pond DCB1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.05 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 1.8 min

Peak Storage= 61 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.25' , Surface Width= 4.49'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 26.49 cfs

3.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 9.00'
Length= 65.0' Slope= 0.0077 '/'
Inlet Invert= 174.00', Outlet Invert= 173.50'

‡

Summary for Reach 19R: Drainage Swale

Inflow Area = 19,540 sf, 0.00% Impervious, Inflow Depth > 1.97" for 10-Year event
Inflow = 1.25 cfs @ 12.00 hrs, Volume= 3,210 cf
Outflow = 1.18 cfs @ 12.02 hrs, Volume= 3,205 cf, Atten= 6%, Lag= 0.9 min
Routed to Reach 10R : Wetlands System - Peppermint Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.20 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 1.26 fps, Avg. Travel Time= 4.5 min

Peak Storage= 95 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 2.37'
Bank-Full Depth= 0.50' Flow Area= 1.5 sf, Capacity= 12.44 cfs

1.50' x 0.50' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 4.50'
Length= 340.0' Slope= 0.0882 '/'
Inlet Invert= 172.00', Outlet Invert= 142.00'

‡

Summary for Pond 11P: P.UIS1

Inflow Area = 22,810 sf, 41.58% Impervious, Inflow Depth > 2.87" for 10-Year event
Inflow = 1.75 cfs @ 12.09 hrs, Volume= 5,463 cf
Outflow = 0.27 cfs @ 11.79 hrs, Volume= 5,463 cf, Atten= 84%, Lag= 0.0 min
Discarded = 0.27 cfs @ 11.79 hrs, Volume= 5,463 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond DMH11 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 145.98' @ 12.58 hrs Surf.Area= 1,435 sf Storage= 1,583 cf

Plug-Flow detention time= 36.6 min calculated for 5,463 cf (100% of inflow)
Center-of-Mass det. time= 36.6 min (848.1 - 811.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	144.25'	2,065 cf	**22.75'W x 63.06'L x 5.50'H Field A** 7,890 cf Overall - 2,728 cf Embedded = 5,162 cf x 40.0% Voids
#2A	145.00'	2,728 cf	**ADS_StormTech MC-3500 d +Cap** x 24 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 24 Chambers in 3 Rows Cap Storage= 14.9 cf x 2 x 3 rows = 89.4 cf
		4,793 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	144.25'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Device 3	148.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	146.00'	**12.0" Round Culvert** L= 13.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 146.00' / 145.80' S= 0.0154 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	146.25'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.27 cfs @ 11.79 hrs HW=144.31' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=144.25' TW=142.80' (Dynamic Tailwater)
└**3=Culvert** (Controls 0.00 cfs)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 12P: P.UIS2

Inflow Area = 24,550 sf, 76.90% Impervious, Inflow Depth > 3.80" for 10-Year event
Inflow = 2.29 cfs @ 12.08 hrs, Volume= 7,776 cf
Outflow = 0.85 cfs @ 12.33 hrs, Volume= 6,355 cf, Atten= 63%, Lag= 14.8 min
Discarded = 0.07 cfs @ 9.96 hrs, Volume= 4,431 cf
Primary = 0.78 cfs @ 12.33 hrs, Volume= 1,924 cf
Routed to Pond DMH3 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 143.67' @ 12.33 hrs Surf.Area= 1,271 sf Storage= 2,779 cf

Plug-Flow detention time= 175.0 min calculated for 6,355 cf (82% of inflow)
Center-of-Mass det. time= 101.9 min (869.6 - 767.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	140.50'	1,838 cf	**22.75'W x 55.89'L x 5.50'H Field A** 6,993 cf Overall - 2,398 cf Embedded = 4,595 cf x 40.0% Voids
#2A	141.25'	2,398 cf	**ADS_StormTech MC-3500 d +Cap** x 21 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 21 Chambers in 3 Rows Cap Storage= 14.9 cf x 2 x 3 rows = 89.4 cf
		4,236 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.50'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Device 3	145.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	139.50'	**12.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 139.50' / 139.10' S= 0.0400 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	143.25'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.07 cfs @ 9.96 hrs HW=140.56' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.78 cfs @ 12.33 hrs HW=143.67' TW=139.72' (Dynamic Tailwater)
└**3=Culvert** (Passes 0.78 cfs of 5.72 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 0.78 cfs @ 2.21 fps)

Summary for Pond 13P: P.UIS3

Inflow Area = 22,985 sf, 76.88% Impervious, Inflow Depth > 3.72" for 10-Year event
Inflow = 2.19 cfs @ 12.08 hrs, Volume= 7,128 cf
Outflow = 0.11 cfs @ 11.16 hrs, Volume= 5,977 cf, Atten= 95%, Lag= 0.0 min
Discarded = 0.11 cfs @ 11.16 hrs, Volume= 5,977 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond DMH3 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 143.05' @ 14.40 hrs Surf.Area= 1,924 sf Storage= 3,379 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 187.1 min (970.2 - 783.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	140.50'	2,746 cf	**22.75'W x 84.57'L x 5.50'H Field A** 10,582 cf Overall - 3,718 cf Embedded = 6,864 cf x 40.0% Voids
#2A	141.25'	3,718 cf	**ADS_StormTech MC-3500 d +Cap** x 33 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 33 Chambers in 3 Rows Cap Storage= 14.9 cf x 2 x 3 rows = 89.4 cf
		6,463 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Device 3	145.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	141.00'	**12.0" Round Culvert** L= 31.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 141.00' / 139.90' S= 0.0355 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	143.45'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.11 cfs @ 11.16 hrs HW=140.56' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=140.50' TW=139.00' (Dynamic Tailwater)
└**3=Culvert** (Controls 0.00 cfs)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 14P: P.UIS4

Inflow Area = 4,525 sf, 70.94% Impervious, Inflow Depth > 3.59" for 10-Year event
Inflow = 0.42 cfs @ 12.08 hrs, Volume= 1,354 cf
Outflow = 0.16 cfs @ 12.32 hrs, Volume= 1,354 cf, Atten= 62%, Lag= 14.3 min
Discarded = 0.07 cfs @ 11.72 hrs, Volume= 1,268 cf
Primary = 0.09 cfs @ 12.32 hrs, Volume= 87 cf
Routed to Reach 10R : Wetlands System - Peppermint Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 141.26' @ 12.32 hrs Surf.Area= 364 sf Storage= 310 cf

Plug-Flow detention time= 21.9 min calculated for 1,354 cf (100% of inflow)

Center-of-Mass det. time= 21.8 min (810.8 - 789.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	139.80'	269 cf	**14.83'W x 24.56'L x 2.33'H Field A** 850 cf Overall - 177 cf Embedded = 673 cf x 40.0% Voids
#2A	140.30'	177 cf	**ADS_StormTech SC-310 +Cap** x 12 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 4 Rows
		446 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	139.80'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	141.10'	**12.0" Round Culvert** L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 141.10' / 140.20' S= 0.0529 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.07 cfs @ 11.72 hrs HW=139.83' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.09 cfs @ 12.32 hrs HW=141.26' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 0.09 cfs @ 1.09 fps)

Summary for Pond CB1:

Inflow Area = 17,050 sf, 32.26% Impervious, Inflow Depth > 2.63" for 10-Year event
Inflow = 1.21 cfs @ 12.09 hrs, Volume= 3,739 cf
Outflow = 1.21 cfs @ 12.09 hrs, Volume= 3,739 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.21 cfs @ 12.09 hrs, Volume= 3,739 cf
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 147.51' @ 12.09 hrs
Flood Elev= 150.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.85'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 146.85' / 146.50' S= 0.0700 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.21 cfs @ 12.09 hrs HW=147.51' TW=146.12' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.21 cfs @ 2.19 fps)

Summary for Pond CB2:

Inflow Area = 5,760 sf, 69.18% Impervious, Inflow Depth > 3.59" for 10-Year event
Inflow = 0.54 cfs @ 12.08 hrs, Volume= 1,724 cf
Outflow = 0.54 cfs @ 12.08 hrs, Volume= 1,724 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.54 cfs @ 12.08 hrs, Volume= 1,724 cf
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 147.27' @ 12.08 hrs
Flood Elev= 150.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.85'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 146.85' / 146.50' S= 0.0700 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.54 cfs @ 12.08 hrs HW=147.27' TW=146.12' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.54 cfs @ 1.73 fps)

Summary for Pond CB3:

Inflow Area = 13,605 sf, 72.80% Impervious, Inflow Depth > 3.59" for 10-Year event
Inflow = 1.27 cfs @ 12.08 hrs, Volume= 4,072 cf
Outflow = 1.27 cfs @ 12.08 hrs, Volume= 4,072 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.27 cfs @ 12.08 hrs, Volume= 4,072 cf
Routed to Pond DMH4 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 144.11' @ 12.09 hrs
Flood Elev= 146.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	143.30'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 143.30' / 143.20' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.26 cfs @ 12.08 hrs HW=144.11' TW=143.88' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.26 cfs @ 1.84 fps)

Summary for Pond CB4:

Inflow Area = 9,380 sf, 82.78% Impervious, Inflow Depth > 3.91" for 10-Year event
Inflow = 0.92 cfs @ 12.08 hrs, Volume= 3,057 cf
Outflow = 0.92 cfs @ 12.08 hrs, Volume= 3,057 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.92 cfs @ 12.08 hrs, Volume= 3,057 cf
Routed to Pond DMH4 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 144.03' @ 12.09 hrs
Flood Elev= 146.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	143.30'	**12.0" Round Culvert** L= 6.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 143.30' / 143.20' S= 0.0167 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.91 cfs @ 12.08 hrs HW=144.03' TW=143.88' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.91 cfs @ 1.49 fps)

Summary for Pond CB5:

Inflow Area = 4,525 sf, 70.94% Impervious, Inflow Depth > 3.59" for 10-Year event
Inflow = 0.42 cfs @ 12.08 hrs, Volume= 1,354 cf
Outflow = 0.42 cfs @ 12.08 hrs, Volume= 1,354 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.42 cfs @ 12.08 hrs, Volume= 1,354 cf
Routed to Pond DMH5 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 141.27' @ 12.34 hrs
Flood Elev= 143.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	140.60'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 140.60' / 140.50' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.41 cfs @ 12.08 hrs HW=140.97' TW=140.79' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 0.41 cfs @ 2.32 fps)

Summary for Pond DCB1:

Inflow Area = 29,540 sf, 19.30% Impervious, Inflow Depth > 2.46" for 10-Year event
Inflow = 1.91 cfs @ 12.10 hrs, Volume= 6,046 cf
Outflow = 1.91 cfs @ 12.10 hrs, Volume= 6,046 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.91 cfs @ 12.10 hrs, Volume= 6,046 cf
Routed to Pond DMH10 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 170.90' @ 12.10 hrs
Flood Elev= 173.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	170.00'	**12.0" Round Culvert** L= 131.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 170.00' / 150.00' S= 0.1527 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.91 cfs @ 12.10 hrs HW=170.90' TW=147.30' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 1.91 cfs @ 2.56 fps)

Summary for Pond DCB2:

Inflow Area = 43,220 sf, 3.64% Impervious, Inflow Depth > 2.12" for 10-Year event
Inflow = 2.34 cfs @ 12.12 hrs, Volume= 7,646 cf
Outflow = 2.34 cfs @ 12.12 hrs, Volume= 7,646 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.34 cfs @ 12.12 hrs, Volume= 7,646 cf
Routed to Pond DMH9 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 162.11' @ 12.12 hrs
Flood Elev= 172.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	161.00'	**12.0" Round Culvert** L= 78.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.00' / 148.60' S= 0.1590 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.34 cfs @ 12.12 hrs HW=162.11' TW=149.61' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.34 cfs @ 2.98 fps)

Summary for Pond DMH1:

Inflow Area = 22,810 sf, 41.58% Impervious, Inflow Depth > 2.87" for 10-Year event
Inflow = 1.75 cfs @ 12.09 hrs, Volume= 5,463 cf
Outflow = 1.75 cfs @ 12.09 hrs, Volume= 5,463 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.75 cfs @ 12.09 hrs, Volume= 5,463 cf
Routed to Pond 11P : P.UIS1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 146.12' @ 12.09 hrs
Flood Elev= 150.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	145.50'	**24.0" Round Culvert** L= 4.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 145.50' / 145.11' S= 0.0975 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=1.74 cfs @ 12.09 hrs HW=146.12' TW=145.21' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.74 cfs @ 2.11 fps)

Summary for Pond DMH10:

Inflow Area = 29,540 sf, 19.30% Impervious, Inflow Depth > 2.46" for 10-Year event
Inflow = 1.91 cfs @ 12.10 hrs, Volume= 6,046 cf
Outflow = 1.91 cfs @ 12.10 hrs, Volume= 6,046 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.91 cfs @ 12.10 hrs, Volume= 6,046 cf
Routed to Pond DMH11 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 147.30' @ 12.10 hrs
Flood Elev= 154.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.40'	**12.0" Round Culvert** L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 146.40' / 145.80' S= 0.0140 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.91 cfs @ 12.10 hrs HW=147.30' TW=143.52' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.91 cfs @ 2.56 fps)

Summary for Pond DMH11:

Inflow Area = 52,350 sf, 29.01% Impervious, Inflow Depth > 1.39" for 10-Year event
Inflow = 1.91 cfs @ 12.10 hrs, Volume= 6,046 cf
Outflow = 1.91 cfs @ 12.10 hrs, Volume= 6,046 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.91 cfs @ 12.10 hrs, Volume= 6,046 cf
Routed to Reach 10R : Wetlands System - Peppermint Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 143.52' @ 12.10 hrs
Flood Elev= 152.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	142.80'	**18.0" Round Culvert** L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 142.80' / 141.50' S= 0.0433 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.91 cfs @ 12.10 hrs HW=143.52' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.91 cfs @ 2.28 fps)

Summary for Pond DMH2:

Inflow Area = 24,550 sf, 76.90% Impervious, Inflow Depth > 3.80" for 10-Year event
Inflow = 2.29 cfs @ 12.08 hrs, Volume= 7,777 cf
Outflow = 2.29 cfs @ 12.08 hrs, Volume= 7,776 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.29 cfs @ 12.08 hrs, Volume= 7,776 cf
Routed to Pond 12P : P.UIS2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 143.76' @ 12.30 hrs
Flood Elev= 150.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	141.35'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 141.35' / 141.25' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.13 cfs @ 12.08 hrs HW=143.27' TW=142.77' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.13 cfs @ 2.71 fps)

Summary for Pond DMH3:

Inflow Area = 90,755 sf, 42.01% Impervious, Inflow Depth > 1.27" for 10-Year event
Inflow = 2.34 cfs @ 12.12 hrs, Volume= 9,571 cf
Outflow = 2.34 cfs @ 12.12 hrs, Volume= 9,571 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.34 cfs @ 12.12 hrs, Volume= 9,571 cf
Routed to Reach 10R : Wetlands System - Peppermint Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 139.81' @ 12.12 hrs
Flood Elev= 149.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	**18.0" Round Culvert** L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 139.00' / 138.50' S= 0.0152 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=2.34 cfs @ 12.12 hrs HW=139.81' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.34 cfs @ 2.41 fps)

Summary for Pond DMH4:

Inflow Area = 22,985 sf, 76.88% Impervious, Inflow Depth > 3.72" for 10-Year event
Inflow = 2.19 cfs @ 12.08 hrs, Volume= 7,128 cf
Outflow = 2.19 cfs @ 12.08 hrs, Volume= 7,128 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.19 cfs @ 12.08 hrs, Volume= 7,128 cf
Routed to Pond 13P : P.UIS3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 143.88' @ 12.08 hrs
Flood Elev= 146.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	143.10'	**18.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 143.10' / 141.25' S= 0.3700 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=2.19 cfs @ 12.08 hrs HW=143.88' TW=141.83' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.19 cfs @ 2.37 fps)

Summary for Pond DMH5:

Inflow Area = 4,525 sf, 70.94% Impervious, Inflow Depth > 3.59" for 10-Year event
Inflow = 0.42 cfs @ 12.08 hrs, Volume= 1,354 cf
Outflow = 0.42 cfs @ 12.08 hrs, Volume= 1,354 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.42 cfs @ 12.08 hrs, Volume= 1,354 cf
Routed to Pond 14P : P.UIS4

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 141.27' @ 12.33 hrs
Flood Elev= 143.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	140.40'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 140.40' / 140.30' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.35 cfs @ 12.08 hrs HW=140.79' TW=140.67' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.35 cfs @ 1.87 fps)

Summary for Pond DMH9:

Inflow Area = 43,220 sf, 3.64% Impervious, Inflow Depth > 2.12" for 10-Year event
Inflow = 2.34 cfs @ 12.12 hrs, Volume= 7,646 cf
Outflow = 2.34 cfs @ 12.12 hrs, Volume= 7,646 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.34 cfs @ 12.12 hrs, Volume= 7,646 cf
Routed to Pond DMH3 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 149.61' @ 12.12 hrs
Flood Elev= 154.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	148.50'	**12.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 148.50' / 139.90' S= 0.1564 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.34 cfs @ 12.12 hrs HW=149.61' TW=139.81' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.34 cfs @ 2.98 fps)

Summary for Subcatchment 10S: Overland to Wetlands

Runoff = 1.93 cfs @ 12.09 hrs, Volume= 5,960 cf, Depth> 2.76"
Routed to Reach 10R : Wetlands System - Peppermint Brook

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.83"

Area (sf)	CN	Description
19,600	70	Woods, Good, HSG C
6,325	74	>75% Grass cover, Good, HSG C
25,925	71	Weighted Average
25,925		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.1800	0.16		**Sheet Flow, Sheet Flow**
					Woods: Light underbrush n= 0.400 P2= 3.15"
0.2	20	0.1400	1.87		**Shallow Concentrated Flow, Shallow Flow**
					Woodland Kv= 5.0 fps
0.5	45	0.0560	1.66		**Shallow Concentrated Flow, Shallow Flow - Slope & Cover Change**
					Short Grass Pasture Kv= 7.0 fps
5.9	115	Total			

Summary for Subcatchment 11S: Overland to CB1

Runoff = 1.70 cfs @ 12.09 hrs, Volume= 5,293 cf, Depth> 3.73"
Routed to Pond CB1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.83"

Area (sf)	CN	Description
5,500	98	Paved parking, HSG C
8,920	74	>75% Grass cover, Good, HSG C
2,630	70	Woods, Good, HSG C
17,050	81	Weighted Average
11,550		67.74% Pervious Area
5,500		32.26% Impervious Area

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

Summary for Subcatchment 12S: Overland to CB2

Runoff = 0.70 cfs @ 12.08 hrs, Volume= 2,298 cf, Depth> 4.79"
Routed to Pond CB2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.83"

Area (sf)	CN	Description
3,545	98	Paved parking, HSG C
* 440	98	Retaining Wall, HSG C
1,775	74	>75% Grass cover, Good, HSG C
5,760	91	Weighted Average
1,775		30.82% Pervious Area
3,985		69.18% Impervious Area

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

Summary for Subcatchment 13S: Overland to CB3

Runoff = 1.66 cfs @ 12.08 hrs, Volume= 5,427 cf, Depth> 4.79"
Routed to Pond CB3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.83"

Area (sf)	CN	Description
9,580	98	Paved parking, HSG C
* 325	98	Retaining Wall, HSG C
3,700	74	>75% Grass cover, Good, HSG C
13,605	91	Weighted Average
3,700		27.20% Pervious Area
9,905		72.80% Impervious Area

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

Summary for Subcatchment 14S: Overland to CB4

Runoff = 1.19 cfs @ 12.08 hrs, Volume= 4,005 cf, Depth> 5.12"
Routed to Pond CB4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.83"

Area (sf)	CN	Description
7,175	98	Paved parking, HSG C
* 590	98	Retaining Wall, HSG C
1,615	74	>75% Grass cover, Good, HSG C
9,380	94	Weighted Average
1,615		17.22% Pervious Area
7,765		82.78% Impervious Area

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

Summary for Subcatchment 15S: Overland to CB5

Runoff = 0.55 cfs @ 12.08 hrs, Volume= 1,805 cf, Depth> 4.79"
Routed to Pond CB5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.83"

	Area (sf)	CN	Description
	2,985	98	Paved parking, HSG C
*	225	98	Retaining Wall, HSG C
	1,315	74	>75% Grass cover, Good, HSG C
	4,525	91	Weighted Average
	1,315		29.06% Pervious Area
	3,210		70.94% Impervious Area

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

Summary for Subcatchment 16S: Overland to Area Drains

Runoff = 1.01 cfs @ 12.09 hrs, Volume= 3,166 cf, Depth> 4.03"
Routed to Pond DMH2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.83"

	Area (sf)	CN	Description
	2,915	98	Paved parking, HSG C
*	835	98	Retaining Wall, HSG C
	5,670	74	>75% Grass cover, Good, HSG C
	9,420	84	Weighted Average
	5,670		60.19% Pervious Area
	3,750		39.81% Impervious Area

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

Summary for Subcatchment 17S: Overland to Street Drainage

Runoff = 0.08 cfs @ 12.08 hrs, Volume= 270 cf, Depth> 5.59"
Routed to Reach 10R : Wetlands System - Peppermint Brook

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.83"

Area (sf)	CN	Description
580	98	Paved parking, HSG C
580		100.00% Impervious Area

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

Summary for Subcatchment 18S: Overland to Drainage Swale

Runoff = 1.90 cfs @ 12.00 hrs, Volume= 4,801 cf, Depth> 2.95"
Routed to Reach 19R : Drainage Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.83"

Area (sf)	CN	Description
4,935	70	Woods, Good, HSG C
14,605	74	>75% Grass cover, Good, HSG C
19,540	73	Weighted Average
19,540		100.00% Pervious Area

Summary for Subcatchment 20S: Roof

Runoff = 1.98 cfs @ 12.08 hrs, Volume= 7,045 cf, Depth> 5.59"
Routed to Pond DMH2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.83"

Area (sf)	CN	Description
15,130	98	Roofs, HSG C
15,130		100.00% Impervious Area

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

Summary for Subcatchment 21S: Overland to Rear of Building

Runoff = 3.51 cfs @ 12.10 hrs, Volume= 11,285 cf, Depth> 3.13"
Routed to Reach 13R : Drainage Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.83"

Area (sf)	CN	Description
38,735	74	>75% Grass cover, Good, HSG C
2,910	70	Woods, Good, HSG C
1,575	98	Roofs, HSG C
43,220	75	Weighted Average
41,645		96.36% Pervious Area
1,575		3.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.23		**Sheet Flow, Sheet Flow**
					Grass: Short n= 0.150 P2= 3.15"
3.2	300	0.0500	1.57		**Shallow Concentrated Flow, Shallow Flow**
					Short Grass Pasture Kv= 7.0 fps
0.2	30	0.2400	2.45		**Shallow Concentrated Flow, Shallow Flow - Slope & Cover Change**
					Woodland Kv= 5.0 fps
7.1	380	Total			

Summary for Subcatchment 22S: Overland to Rear of Building

Runoff = 2.74 cfs @ 12.10 hrs, Volume= 8,675 cf, Depth> 3.52"
Routed to Reach 14R : Drainage Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.83"

Area (sf)	CN	Description
23,415	74	>75% Grass cover, Good, HSG C
425	70	Woods, Good, HSG C
2,380	98	Roofs, HSG C
3,320	98	Paved parking, HSG C
29,540	79	Weighted Average
23,840		80.70% Pervious Area
5,700		19.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.23		**Sheet Flow, Sheet Flow**
					Grass: Short n= 0.150 P2= 3.15"
1.9	180	0.0500	1.57		**Shallow Concentrated Flow, Shallow Flow**
					Short Grass Pasture Kv= 7.0 fps
0.2	30	0.0200	2.87		**Shallow Concentrated Flow, Shallow Flow - Slope & Cover Change**
					Paved Kv= 20.3 fps
0.8	110	0.1000	2.21		**Shallow Concentrated Flow, Shallow Flow -Slope & Cover Change**
					Short Grass Pasture Kv= 7.0 fps
6.6	370	Total			

Summary for Reach 10R: Wetlands System - Peppermint Brook

Inflow Area = 193,675 sf, 29.48% Impervious, Inflow Depth > 2.27" for 25-Year event
Inflow = 10.29 cfs @ 12.11 hrs, Volume= 36,634 cf
Outflow = 10.29 cfs @ 12.11 hrs, Volume= 36,634 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach 13R: Drainage Swale

Inflow Area = 43,220 sf, 3.64% Impervious, Inflow Depth > 3.13" for 25-Year event
Inflow = 3.51 cfs @ 12.10 hrs, Volume= 11,285 cf
Outflow = 3.48 cfs @ 12.12 hrs, Volume= 11,273 cf, Atten= 1%, Lag= 0.7 min
Routed to Pond DCB2 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.38 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.74 fps, Avg. Travel Time= 3.3 min

Peak Storage= 212 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.36' , Surface Width= 5.15'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 25.08 cfs

3.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 9.00'
Length= 145.0' Slope= 0.0069 '/'
Inlet Invert= 172.00', Outlet Invert= 171.00'

‡

Summary for Reach 14R: Drainage Swale

Inflow Area = 29,540 sf, 19.30% Impervious, Inflow Depth > 3.52" for 25-Year event
Inflow = 2.74 cfs @ 12.10 hrs, Volume= 8,675 cf
Outflow = 2.74 cfs @ 12.10 hrs, Volume= 8,670 cf, Atten= 0%, Lag= 0.4 min
Routed to Pond DCB1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.30 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 1.6 min

Peak Storage= 77 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.30' , Surface Width= 4.83'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 26.49 cfs

3.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 9.00'
Length= 65.0' Slope= 0.0077 '/'
Inlet Invert= 174.00', Outlet Invert= 173.50'

‡

Summary for Reach 19R: Drainage Swale

Inflow Area = 19,540 sf, 0.00% Impervious, Inflow Depth > 2.95" for 25-Year event
Inflow = 1.90 cfs @ 12.00 hrs, Volume= 4,801 cf
Outflow = 1.80 cfs @ 12.01 hrs, Volume= 4,794 cf, Atten= 5%, Lag= 0.8 min
Routed to Reach 10R : Wetlands System - Peppermint Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.78 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 1.41 fps, Avg. Travel Time= 4.0 min

Peak Storage= 128 cf @ 12.01 hrs
Average Depth at Peak Storage= 0.18' , Surface Width= 2.60'
Bank-Full Depth= 0.50' Flow Area= 1.5 sf, Capacity= 12.44 cfs

1.50' x 0.50' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 4.50'
Length= 340.0' Slope= 0.0882 '/'
Inlet Invert= 172.00', Outlet Invert= 142.00'

‡

Summary for Pond 11P: P.UIS1

Inflow Area = 22,810 sf, 41.58% Impervious, Inflow Depth > 3.99" for 25-Year event
Inflow = 2.41 cfs @ 12.09 hrs, Volume= 7,590 cf
Outflow = 0.67 cfs @ 12.44 hrs, Volume= 7,590 cf, Atten= 72%, Lag= 21.4 min
Discarded = 0.27 cfs @ 11.70 hrs, Volume= 7,030 cf
Primary = 0.39 cfs @ 12.44 hrs, Volume= 560 cf
Routed to Pond DMH11 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 146.56' @ 12.44 hrs Surf.Area= 1,435 sf Storage= 2,238 cf

Plug-Flow detention time= 48.0 min calculated for 7,587 cf (100% of inflow)
Center-of-Mass det. time= 48.0 min (850.7 - 802.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	144.25'	2,065 cf	**22.75'W x 63.06'L x 5.50'H Field A** 7,890 cf Overall - 2,728 cf Embedded = 5,162 cf x 40.0% Voids
#2A	145.00'	2,728 cf	**ADS_StormTech MC-3500 d +Cap** x 24 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 24 Chambers in 3 Rows Cap Storage= 14.9 cf x 2 x 3 rows = 89.4 cf
		4,793 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	144.25'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Device 3	148.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	146.00'	**12.0" Round Culvert** L= 13.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 146.00' / 145.80' S= 0.0154 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	146.25'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.27 cfs @ 11.70 hrs HW=144.31' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=0.39 cfs @ 12.44 hrs HW=146.56' TW=143.37' (Dynamic Tailwater)
└**3=Culvert** (Passes 0.39 cfs of 0.91 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 0.39 cfs @ 1.90 fps)

Summary for Pond 12P: P.UIS2

Inflow Area = 24,550 sf, 76.90% Impervious, Inflow Depth > 4.99" for 25-Year event
Inflow = 2.99 cfs @ 12.08 hrs, Volume= 10,211 cf
Outflow = 1.62 cfs @ 12.21 hrs, Volume= 8,518 cf, Atten= 46%, Lag= 7.5 min
Discarded = 0.07 cfs @ 9.14 hrs, Volume= 4,670 cf
Primary = 1.55 cfs @ 12.21 hrs, Volume= 3,848 cf
Routed to Pond DMH3 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 144.17' @ 12.21 hrs Surf.Area= 1,271 sf Storage= 3,194 cf

Plug-Flow detention time= 138.1 min calculated for 8,515 cf (83% of inflow)
Center-of-Mass det. time= 69.3 min (832.6 - 763.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	140.50'	1,838 cf	**22.75'W x 55.89'L x 5.50'H Field A** 6,993 cf Overall - 2,398 cf Embedded = 4,595 cf x 40.0% Voids
#2A	141.25'	2,398 cf	**ADS_StormTech MC-3500 d +Cap** x 21 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 21 Chambers in 3 Rows Cap Storage= 14.9 cf x 2 x 3 rows = 89.4 cf
		4,236 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.50'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Device 3	145.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	139.50'	**12.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 139.50' / 139.10' S= 0.0400 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	143.25'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.07 cfs @ 9.14 hrs HW=140.56' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=1.55 cfs @ 12.21 hrs HW=144.17' TW=140.11' (Dynamic Tailwater)
└**3=Culvert** (Passes 1.55 cfs of 6.01 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 1.55 cfs @ 3.94 fps)

Summary for Pond 13P: P.UIS3

Inflow Area = 22,985 sf, 76.88% Impervious, Inflow Depth > 4.92" for 25-Year event
Inflow = 2.85 cfs @ 12.08 hrs, Volume= 9,432 cf
Outflow = 0.33 cfs @ 12.70 hrs, Volume= 7,296 cf, Atten= 88%, Lag= 37.1 min
Discarded = 0.11 cfs @ 10.51 hrs, Volume= 6,320 cf
Primary = 0.22 cfs @ 12.70 hrs, Volume= 976 cf
Routed to Pond DMH3 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 143.65' @ 12.70 hrs Surf.Area= 1,924 sf Storage= 4,217 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 148.8 min (924.8 - 776.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	140.50'	2,746 cf	**22.75'W x 84.57'L x 5.50'H Field A** 10,582 cf Overall - 3,718 cf Embedded = 6,864 cf x 40.0% Voids
#2A	141.25'	3,718 cf	**ADS_StormTech MC-3500 d +Cap** x 33 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 33 Chambers in 3 Rows Cap Storage= 14.9 cf x 2 x 3 rows = 89.4 cf
		6,463 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Device 3	145.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	141.00'	**12.0" Round Culvert** L= 31.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 141.00' / 139.90' S= 0.0355 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	143.45'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.11 cfs @ 10.51 hrs HW=140.56' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.22 cfs @ 12.70 hrs HW=143.65' TW=139.54' (Dynamic Tailwater)
└**3=Culvert** (Passes 0.22 cfs of 4.38 cfs potential flow)
├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└**4=Orifice/Grate** (Orifice Controls 0.22 cfs @ 1.52 fps)

Summary for Pond 14P: P.UIS4

Inflow Area = 4,525 sf, 70.94% Impervious, Inflow Depth > 4.79" for 25-Year event
Inflow = 0.55 cfs @ 12.08 hrs, Volume= 1,805 cf
Outflow = 0.38 cfs @ 12.17 hrs, Volume= 1,805 cf, Atten= 32%, Lag= 5.0 min
Discarded = 0.07 cfs @ 11.66 hrs, Volume= 1,523 cf
Primary = 0.31 cfs @ 12.17 hrs, Volume= 282 cf
Routed to Reach 10R : Wetlands System - Peppermint Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 141.41' @ 12.17 hrs Surf.Area= 364 sf Storage= 338 cf

Plug-Flow detention time= 20.2 min calculated for 1,804 cf (100% of inflow)

Center-of-Mass det. time= 20.2 min (801.5 - 781.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	139.80'	269 cf	**14.83'W x 24.56'L x 2.33'H Field A** 850 cf Overall - 177 cf Embedded = 673 cf x 40.0% Voids
#2A	140.30'	177 cf	**ADS_StormTech SC-310 +Cap** x 12 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 4 Rows
		446 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	139.80'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	141.10'	**12.0" Round Culvert** L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 141.10' / 140.20' S= 0.0529 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.07 cfs @ 11.66 hrs HW=139.83' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.31 cfs @ 12.17 hrs HW=141.41' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 0.31 cfs @ 1.49 fps)

Summary for Pond CB1:

Inflow Area = 17,050 sf, 32.26% Impervious, Inflow Depth > 3.73" for 25-Year event
Inflow = 1.70 cfs @ 12.09 hrs, Volume= 5,293 cf
Outflow = 1.70 cfs @ 12.09 hrs, Volume= 5,293 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.70 cfs @ 12.09 hrs, Volume= 5,293 cf
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 147.68' @ 12.09 hrs
Flood Elev= 150.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.85'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 146.85' / 146.50' S= 0.0700 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.70 cfs @ 12.09 hrs HW=147.68' TW=146.23' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.70 cfs @ 2.45 fps)

Summary for Pond CB2:

Inflow Area = 5,760 sf, 69.18% Impervious, Inflow Depth > 4.79" for 25-Year event
Inflow = 0.70 cfs @ 12.08 hrs, Volume= 2,298 cf
Outflow = 0.70 cfs @ 12.08 hrs, Volume= 2,298 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.70 cfs @ 12.08 hrs, Volume= 2,298 cf
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 147.33' @ 12.08 hrs
Flood Elev= 150.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.85'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 146.85' / 146.50' S= 0.0700 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.70 cfs @ 12.08 hrs HW=147.33' TW=146.23' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.70 cfs @ 1.87 fps)

Summary for Pond CB3:

Inflow Area = 13,605 sf, 72.80% Impervious, Inflow Depth > 4.79" for 25-Year event
Inflow = 1.66 cfs @ 12.08 hrs, Volume= 5,427 cf
Outflow = 1.66 cfs @ 12.08 hrs, Volume= 5,427 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.66 cfs @ 12.08 hrs, Volume= 5,427 cf
Routed to Pond DMH4 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 144.31' @ 12.09 hrs
Flood Elev= 146.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	143.30'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 143.30' / 143.20' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.65 cfs @ 12.08 hrs HW=144.31' TW=144.00' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.65 cfs @ 2.10 fps)

Summary for Pond CB4:

Inflow Area = 9,380 sf, 82.78% Impervious, Inflow Depth > 5.12" for 25-Year event
Inflow = 1.19 cfs @ 12.08 hrs, Volume= 4,005 cf
Outflow = 1.19 cfs @ 12.08 hrs, Volume= 4,005 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.19 cfs @ 12.08 hrs, Volume= 4,005 cf
Routed to Pond DMH4 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 144.19' @ 12.09 hrs
Flood Elev= 146.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	143.30'	**12.0" Round Culvert** L= 6.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 143.30' / 143.20' S= 0.0167 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.18 cfs @ 12.08 hrs HW=144.18' TW=144.00' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.18 cfs @ 1.60 fps)

Summary for Pond CB5:

Inflow Area = 4,525 sf, 70.94% Impervious, Inflow Depth > 4.79" for 25-Year event
Inflow = 0.55 cfs @ 12.08 hrs, Volume= 1,805 cf
Outflow = 0.55 cfs @ 12.08 hrs, Volume= 1,805 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.55 cfs @ 12.08 hrs, Volume= 1,805 cf
Routed to Pond DMH5 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 141.44' @ 12.18 hrs
Flood Elev= 143.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	140.60'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 140.60' / 140.50' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.41 cfs @ 12.08 hrs HW=141.12' TW=141.05' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 0.41 cfs @ 1.00 fps)

Summary for Pond DCB1:

Inflow Area = 29,540 sf, 19.30% Impervious, Inflow Depth > 3.52" for 25-Year event
Inflow = 2.74 cfs @ 12.10 hrs, Volume= 8,670 cf
Outflow = 2.74 cfs @ 12.10 hrs, Volume= 8,670 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.74 cfs @ 12.10 hrs, Volume= 8,670 cf
Routed to Pond DMH10 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 171.34' @ 12.10 hrs
Flood Elev= 173.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	170.00'	**12.0" Round Culvert** L= 131.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 170.00' / 150.00' S= 0.1527 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.74 cfs @ 12.10 hrs HW=171.34' TW=147.74' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 2.74 cfs @ 3.48 fps)

Summary for Pond DCB2:

Inflow Area = 43,220 sf, 3.64% Impervious, Inflow Depth > 3.13" for 25-Year event
Inflow = 3.48 cfs @ 12.12 hrs, Volume= 11,273 cf
Outflow = 3.48 cfs @ 12.12 hrs, Volume= 11,273 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.48 cfs @ 12.12 hrs, Volume= 11,273 cf
Routed to Pond DMH9 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 162.86' @ 12.12 hrs
Flood Elev= 172.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	161.00'	**12.0" Round Culvert** L= 78.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.00' / 148.60' S= 0.1590 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.47 cfs @ 12.12 hrs HW=162.85' TW=150.35' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 3.47 cfs @ 4.42 fps)

Summary for Pond DMH1:

Inflow Area = 22,810 sf, 41.58% Impervious, Inflow Depth > 3.99" for 25-Year event
Inflow = 2.41 cfs @ 12.09 hrs, Volume= 7,590 cf
Outflow = 2.41 cfs @ 12.09 hrs, Volume= 7,590 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.41 cfs @ 12.09 hrs, Volume= 7,590 cf
Routed to Pond 11P : P.UIS1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 146.57' @ 12.44 hrs
Flood Elev= 150.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	145.50'	**24.0" Round Culvert** L= 4.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 145.50' / 145.11' S= 0.0975 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=2.40 cfs @ 12.09 hrs HW=146.23' TW=145.59' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.40 cfs @ 2.30 fps)

Summary for Pond DMH10:

Inflow Area = 29,540 sf, 19.30% Impervious, Inflow Depth > 3.52" for 25-Year event
Inflow = 2.74 cfs @ 12.10 hrs, Volume= 8,670 cf
Outflow = 2.74 cfs @ 12.10 hrs, Volume= 8,670 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.74 cfs @ 12.10 hrs, Volume= 8,670 cf
Routed to Pond DMH11 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 147.74' @ 12.10 hrs
Flood Elev= 154.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.40'	**12.0" Round Culvert** L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 146.40' / 145.80' S= 0.0140 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.74 cfs @ 12.10 hrs HW=147.74' TW=143.68' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.74 cfs @ 3.48 fps)

Summary for Pond DMH11:

Inflow Area = 52,350 sf, 29.01% Impervious, Inflow Depth > 2.12" for 25-Year event
Inflow = 2.74 cfs @ 12.10 hrs, Volume= 9,231 cf
Outflow = 2.74 cfs @ 12.10 hrs, Volume= 9,231 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.74 cfs @ 12.10 hrs, Volume= 9,231 cf
Routed to Reach 10R : Wetlands System - Peppermint Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 143.68' @ 12.10 hrs
Flood Elev= 152.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	142.80'	**18.0" Round Culvert** L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 142.80' / 141.50' S= 0.0433 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=2.74 cfs @ 12.10 hrs HW=143.68' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.74 cfs @ 2.53 fps)

Summary for Pond DMH2:

Inflow Area = 24,550 sf, 76.90% Impervious, Inflow Depth > 4.99" for 25-Year event
Inflow = 2.99 cfs @ 12.08 hrs, Volume= 10,211 cf
Outflow = 2.99 cfs @ 12.08 hrs, Volume= 10,211 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.99 cfs @ 12.08 hrs, Volume= 10,211 cf
Routed to Pond 12P : P.UIS2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 144.72' @ 12.11 hrs
Flood Elev= 150.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	141.35'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 141.35' / 141.25' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.85 cfs @ 12.08 hrs HW=144.58' TW=143.67' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.85 cfs @ 3.63 fps)

Summary for Pond DMH3:

Inflow Area = 90,755 sf, 42.01% Impervious, Inflow Depth > 2.13" for 25-Year event
Inflow = 4.77 cfs @ 12.13 hrs, Volume= 16,097 cf
Outflow = 4.77 cfs @ 12.13 hrs, Volume= 16,097 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.77 cfs @ 12.13 hrs, Volume= 16,097 cf
Routed to Reach 10R : Wetlands System - Peppermint Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 140.26' @ 12.13 hrs
Flood Elev= 149.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	**18.0" Round Culvert** L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 139.00' / 138.50' S= 0.0152 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=4.76 cfs @ 12.13 hrs HW=140.26' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 4.76 cfs @ 3.01 fps)

Summary for Pond DMH4:

Inflow Area = 22,985 sf, 76.88% Impervious, Inflow Depth > 4.92" for 25-Year event
Inflow = 2.85 cfs @ 12.08 hrs, Volume= 9,432 cf
Outflow = 2.85 cfs @ 12.08 hrs, Volume= 9,432 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.85 cfs @ 12.08 hrs, Volume= 9,432 cf
Routed to Pond 13P : P.UIS3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 144.01' @ 12.08 hrs
Flood Elev= 146.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	143.10'	**18.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 143.10' / 141.25' S= 0.3700 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=2.85 cfs @ 12.08 hrs HW=144.00' TW=142.30' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.85 cfs @ 2.56 fps)

Summary for Pond DMH5:

Inflow Area = 4,525 sf, 70.94% Impervious, Inflow Depth > 4.79" for 25-Year event
Inflow = 0.55 cfs @ 12.08 hrs, Volume= 1,805 cf
Outflow = 0.55 cfs @ 12.08 hrs, Volume= 1,805 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.55 cfs @ 12.08 hrs, Volume= 1,805 cf
Routed to Pond 14P : P.UIS4

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 141.42' @ 12.17 hrs
Flood Elev= 143.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	140.40'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 140.40' / 140.30' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.08 hrs HW=141.05' TW=141.05' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Summary for Pond DMH9:

Inflow Area = 43,220 sf, 3.64% Impervious, Inflow Depth > 3.13" for 25-Year event
Inflow = 3.48 cfs @ 12.12 hrs, Volume= 11,273 cf
Outflow = 3.48 cfs @ 12.12 hrs, Volume= 11,273 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.48 cfs @ 12.12 hrs, Volume= 11,273 cf
Routed to Pond DMH3 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 150.36' @ 12.12 hrs
Flood Elev= 154.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	148.50'	**12.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 148.50' / 139.90' S= 0.1564 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.47 cfs @ 12.12 hrs HW=150.35' TW=140.24' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 3.47 cfs @ 4.42 fps)

Summary for Subcatchment 10S: Overland to Wetlands

Runoff = 3.43 cfs @ 12.09 hrs, Volume= 10,579 cf, Depth> 4.90"
Routed to Reach 10R : Wetlands System - Peppermint Brook

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.37"

Area (sf)	CN	Description
19,600	70	Woods, Good, HSG C
6,325	74	>75% Grass cover, Good, HSG C
25,925	71	Weighted Average
25,925		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.1800	0.16		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.15"
0.2	20	0.1400	1.87		**Shallow Concentrated Flow, Shallow Flow** Woodland Kv= 5.0 fps
0.5	45	0.0560	1.66		**Shallow Concentrated Flow, Shallow Flow - Slope & Cover Change** Short Grass Pasture Kv= 7.0 fps
5.9	115	Total			

Summary for Subcatchment 11S: Overland to CB1

Runoff = 2.74 cfs @ 12.09 hrs, Volume= 8,647 cf, Depth> 6.09"
Routed to Pond CB1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.37"

Area (sf)	CN	Description
5,500	98	Paved parking, HSG C
8,920	74	>75% Grass cover, Good, HSG C
2,630	70	Woods, Good, HSG C
17,050	81	Weighted Average
11,550		67.74% Pervious Area
5,500		32.26% Impervious Area

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

Summary for Subcatchment 12S: Overland to CB2

Runoff = 1.05 cfs @ 12.08 hrs, Volume= 3,496 cf, Depth> 7.28"
Routed to Pond CB2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.37"

Area (sf)	CN	Description
3,545	98	Paved parking, HSG C
* 440	98	Retaining Wall, HSG C
1,775	74	>75% Grass cover, Good, HSG C
5,760	91	Weighted Average
1,775		30.82% Pervious Area
3,985		69.18% Impervious Area

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

Summary for Subcatchment 13S: Overland to CB3

Runoff = 2.47 cfs @ 12.08 hrs, Volume= 8,258 cf, Depth> 7.28"
Routed to Pond CB3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.37"

Area (sf)	CN	Description
9,580	98	Paved parking, HSG C
* 325	98	Retaining Wall, HSG C
3,700	74	>75% Grass cover, Good, HSG C
13,605	91	Weighted Average
3,700		27.20% Pervious Area
9,905		72.80% Impervious Area

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

Summary for Subcatchment 14S: Overland to CB4

Runoff = 1.74 cfs @ 12.08 hrs, Volume= 5,975 cf, Depth> 7.64"
Routed to Pond CB4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.37"

Area (sf)	CN	Description
7,175	98	Paved parking, HSG C
* 590	98	Retaining Wall, HSG C
1,615	74	>75% Grass cover, Good, HSG C
9,380	94	Weighted Average
1,615		17.22% Pervious Area
7,765		82.78% Impervious Area

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

Summary for Subcatchment 15S: Overland to CB5

Runoff = 0.82 cfs @ 12.08 hrs, Volume= 2,747 cf, Depth> 7.28"
Routed to Pond CB5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.37"

	Area (sf)	CN	Description
	2,985	98	Paved parking, HSG C
*	225	98	Retaining Wall, HSG C
	1,315	74	>75% Grass cover, Good, HSG C
	4,525	91	Weighted Average
	1,315		29.06% Pervious Area
	3,210		70.94% Impervious Area

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

Summary for Subcatchment 16S: Overland to Area Drains

Runoff = 1.58 cfs @ 12.09 hrs, Volume= 5,059 cf, Depth> 6.44"
Routed to Pond DMH2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.37"

	Area (sf)	CN	Description
	2,915	98	Paved parking, HSG C
*	835	98	Retaining Wall, HSG C
	5,670	74	>75% Grass cover, Good, HSG C
	9,420	84	Weighted Average
	5,670		60.19% Pervious Area
	3,750		39.81% Impervious Area

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

Summary for Subcatchment 17S: Overland to Street Drainage

Runoff = 0.11 cfs @ 12.08 hrs, Volume= 393 cf, Depth> 8.12"
Routed to Reach 10R : Wetlands System - Peppermint Brook

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.37"

Area (sf)	CN	Description
580	98	Paved parking, HSG C
580		100.00% Impervious Area

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

Summary for Subcatchment 18S: Overland to Drainage Swale

Runoff = 3.30 cfs @ 12.00 hrs, Volume= 8,368 cf, Depth> 5.14"
Routed to Reach 19R : Drainage Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.37"

Area (sf)	CN	Description
4,935	70	Woods, Good, HSG C
14,605	74	>75% Grass cover, Good, HSG C
19,540	73	Weighted Average
19,540		100.00% Pervious Area

Summary for Subcatchment 20S: Roof

Runoff = 2.85 cfs @ 12.08 hrs, Volume= 10,243 cf, Depth> 8.12"
Routed to Pond DMH2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.37"

Area (sf)	CN	Description
15,130	98	Roofs, HSG C
15,130		100.00% Impervious Area

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

Summary for Subcatchment 21S: Overland to Rear of Building

Runoff = 5.99 cfs @ 12.10 hrs, Volume= 19,341 cf, Depth> 5.37"
Routed to Reach 13R : Drainage Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.37"

Area (sf)	CN	Description
38,735	74	>75% Grass cover, Good, HSG C
2,910	70	Woods, Good, HSG C
1,575	98	Roofs, HSG C
43,220	75	Weighted Average
41,645		96.36% Pervious Area
1,575		3.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.23		**Sheet Flow, Sheet Flow**
					Grass: Short n= 0.150 P2= 3.15"
3.2	300	0.0500	1.57		**Shallow Concentrated Flow, Shallow Flow**
					Short Grass Pasture Kv= 7.0 fps
0.2	30	0.2400	2.45		**Shallow Concentrated Flow, Shallow Flow - Slope & Cover Change**
					Woodland Kv= 5.0 fps
7.1	380	Total			

Summary for Subcatchment 22S: Overland to Rear of Building

Runoff = 4.49 cfs @ 12.09 hrs, Volume= 14,393 cf, Depth> 5.85"
Routed to Reach 14R : Drainage Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.37"

Area (sf)	CN	Description
23,415	74	>75% Grass cover, Good, HSG C
425	70	Woods, Good, HSG C
2,380	98	Roofs, HSG C
3,320	98	Paved parking, HSG C
29,540	79	Weighted Average
23,840		80.70% Pervious Area
5,700		19.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.23		**Sheet Flow, Sheet Flow**
					Grass: Short n= 0.150 P2= 3.15"
1.9	180	0.0500	1.57		**Shallow Concentrated Flow, Shallow Flow**
					Short Grass Pasture Kv= 7.0 fps
0.2	30	0.0200	2.87		**Shallow Concentrated Flow, Shallow Flow - Slope & Cover Change**
					Paved Kv= 20.3 fps
0.8	110	0.1000	2.21		**Shallow Concentrated Flow, Shallow Flow -Slope & Cover Change**
					Short Grass Pasture Kv= 7.0 fps
6.6	370	Total			

Summary for Reach 10R: Wetlands System - Peppermint Brook

Inflow Area = 193,675 sf, 29.48% Impervious, Inflow Depth > 4.30" for 100-Year event
Inflow = 20.96 cfs @ 12.13 hrs, Volume= 69,471 cf
Outflow = 20.96 cfs @ 12.13 hrs, Volume= 69,471 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach 13R: Drainage Swale

Inflow Area = 43,220 sf, 3.64% Impervious, Inflow Depth > 5.37" for 100-Year event
Inflow = 5.99 cfs @ 12.10 hrs, Volume= 19,341 cf
Outflow = 5.95 cfs @ 12.11 hrs, Volume= 19,325 cf, Atten= 1%, Lag= 0.6 min
Routed to Pond DCB2 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.80 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.86 fps, Avg. Travel Time= 2.8 min

Peak Storage= 308 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.48' , Surface Width= 5.87'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 25.08 cfs

3.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 9.00'
Length= 145.0' Slope= 0.0069 '/'
Inlet Invert= 172.00', Outlet Invert= 171.00'

‡

Summary for Reach 14R: Drainage Swale

Inflow Area = 29,540 sf, 19.30% Impervious, Inflow Depth > 5.85" for 100-Year event
Inflow = 4.49 cfs @ 12.09 hrs, Volume= 14,393 cf
Outflow = 4.48 cfs @ 12.10 hrs, Volume= 14,387 cf, Atten= 0%, Lag= 0.3 min
Routed to Pond DCB1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.67 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 0.78 fps, Avg. Travel Time= 1.4 min

Peak Storage= 109 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.40' , Surface Width= 5.40'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 26.49 cfs

3.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 9.00'
Length= 65.0' Slope= 0.0077 '/'
Inlet Invert= 174.00', Outlet Invert= 173.50'

‡

Summary for Reach 19R: Drainage Swale

Inflow Area = 19,540 sf, 0.00% Impervious, Inflow Depth > 5.14" for 100-Year event
Inflow = 3.30 cfs @ 12.00 hrs, Volume= 8,368 cf
Outflow = 3.16 cfs @ 12.01 hrs, Volume= 8,360 cf, Atten= 4%, Lag= 0.7 min
Routed to Reach 10R : Wetlands System - Peppermint Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.66 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.64 fps, Avg. Travel Time= 3.5 min

Peak Storage= 190 cf @ 12.01 hrs
Average Depth at Peak Storage= 0.25' , Surface Width= 2.99'
Bank-Full Depth= 0.50' Flow Area= 1.5 sf, Capacity= 12.44 cfs

1.50' x 0.50' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 4.50'
Length= 340.0' Slope= 0.0882 '/'
Inlet Invert= 172.00', Outlet Invert= 142.00'

‡

Summary for Pond 11P: P.UIS1

Inflow Area = 22,810 sf, 41.58% Impervious, Inflow Depth > 6.39" for 100-Year event
Inflow = 3.78 cfs @ 12.09 hrs, Volume= 12,144 cf
Outflow = 2.22 cfs @ 12.19 hrs, Volume= 12,143 cf, Atten= 41%, Lag= 6.5 min
Discarded = 0.27 cfs @ 11.44 hrs, Volume= 9,213 cf
Primary = 1.95 cfs @ 12.19 hrs, Volume= 2,930 cf
Routed to Pond DMH11 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 147.02' @ 12.19 hrs Surf.Area= 1,435 sf Storage= 2,736 cf

Plug-Flow detention time= 42.4 min calculated for 12,143 cf (100% of inflow)
Center-of-Mass det. time= 42.3 min (832.7 - 790.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	144.25'	2,065 cf	**22.75'W x 63.06'L x 5.50'H Field A** 7,890 cf Overall - 2,728 cf Embedded = 5,162 cf x 40.0% Voids
#2A	145.00'	2,728 cf	**ADS_StormTech MC-3500 d +Cap** x 24 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 24 Chambers in 3 Rows Cap Storage= 14.9 cf x 2 x 3 rows = 89.4 cf
		4,793 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	144.25'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Device 3	148.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	146.00'	**12.0" Round Culvert** L= 13.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 146.00' / 145.80' S= 0.0154 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	146.25'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.27 cfs @ 11.44 hrs HW=144.31' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=1.94 cfs @ 12.19 hrs HW=147.02' TW=144.08' (Dynamic Tailwater)
└**3=Culvert** (Passes 1.94 cfs of 2.16 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 1.94 cfs @ 2.99 fps)

Summary for Pond 12P: P.UIS2

Inflow Area = 24,550 sf, 76.90% Impervious, Inflow Depth > 7.48" for 100-Year event
Inflow = 4.43 cfs @ 12.08 hrs, Volume= 15,302 cf
Outflow = 3.61 cfs @ 12.14 hrs, Volume= 13,199 cf, Atten= 19%, Lag= 3.5 min
Discarded = 0.07 cfs @ 7.88 hrs, Volume= 5,066 cf
Primary = 3.54 cfs @ 12.14 hrs, Volume= 8,133 cf
Routed to Pond DMH3 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 145.42' @ 12.14 hrs Surf.Area= 1,271 sf Storage= 3,942 cf

Plug-Flow detention time= 101.8 min calculated for 13,194 cf (86% of inflow)
Center-of-Mass det. time= 40.5 min (797.4 - 756.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	140.50'	1,838 cf	**22.75'W x 55.89'L x 5.50'H Field A** 6,993 cf Overall - 2,398 cf Embedded = 4,595 cf x 40.0% Voids
#2A	141.25'	2,398 cf	**ADS_StormTech MC-3500 d +Cap** x 21 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 21 Chambers in 3 Rows Cap Storage= 14.9 cf x 2 x 3 rows = 89.4 cf
		4,236 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.50'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Device 3	145.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	139.50'	**12.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 139.50' / 139.10' S= 0.0400 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	143.25'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.07 cfs @ 7.88 hrs HW=140.56' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=3.53 cfs @ 12.14 hrs HW=145.42' TW=142.06' (Dynamic Tailwater)
└**3=Culvert** (Passes 3.53 cfs of 5.47 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.91 cfs @ 1.35 fps)
  └**4=Orifice/Grate** (Orifice Controls 2.62 cfs @ 6.67 fps)

Summary for Pond 13P: P.UIS3

Inflow Area = 22,985 sf, 76.88% Impervious, Inflow Depth > 7.43" for 100-Year event
Inflow = 4.21 cfs @ 12.08 hrs, Volume= 14,233 cf
Outflow = 1.65 cfs @ 12.30 hrs, Volume= 11,506 cf, Atten= 61%, Lag= 13.2 min
Discarded = 0.11 cfs @ 9.26 hrs, Volume= 6,865 cf
Primary = 1.54 cfs @ 12.30 hrs, Volume= 4,641 cf
Routed to Pond DMH3 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 144.37' @ 12.30 hrs Surf.Area= 1,924 sf Storage= 5,109 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 84.9 min (851.1 - 766.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	140.50'	2,746 cf	**22.75'W x 84.57'L x 5.50'H Field A**
			10,582 cf Overall - 3,718 cf Embedded = 6,864 cf x 40.0% Voids
#2A	141.25'	3,718 cf	**ADS_StormTech MC-3500 d +Cap** x 33 Inside #1
			Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
			Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
			33 Chambers in 3 Rows
			Cap Storage= 14.9 cf x 2 x 3 rows = 89.4 cf
		6,463 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Device 3	145.25'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	141.00'	**12.0" Round Culvert** L= 31.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 141.00' / 139.90' S= 0.0355 '/' Cc= 0.900
			n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Device 3	143.45'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.11 cfs @ 9.26 hrs HW=140.56' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=1.54 cfs @ 12.30 hrs HW=144.37' TW=140.74' (Dynamic Tailwater)
└**3=Culvert** (Passes 1.54 cfs of 5.05 cfs potential flow)
├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└**4=Orifice/Grate** (Orifice Controls 1.54 cfs @ 3.93 fps)

Summary for Pond 14P: P.UIS4

Inflow Area = 4,525 sf, 70.94% Impervious, Inflow Depth > 7.28" for 100-Year event
Inflow = 0.82 cfs @ 12.08 hrs, Volume= 2,747 cf
Outflow = 0.80 cfs @ 12.10 hrs, Volume= 2,746 cf, Atten= 3%, Lag= 1.2 min
Discarded = 0.07 cfs @ 11.39 hrs, Volume= 2,023 cf
Primary = 0.73 cfs @ 12.10 hrs, Volume= 724 cf
Routed to Reach 10R : Wetlands System - Peppermint Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 141.59' @ 12.10 hrs Surf.Area= 364 sf Storage= 367 cf

Plug-Flow detention time= 18.7 min calculated for 2,745 cf (100% of inflow)

Center-of-Mass det. time= 18.6 min (789.4 - 770.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	139.80'	269 cf	**14.83'W x 24.56'L x 2.33'H Field A** 850 cf Overall - 177 cf Embedded = 673 cf x 40.0% Voids
#2A	140.30'	177 cf	**ADS_StormTech SC-310 +Cap** x 12 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 4 Rows
		446 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	139.80'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	141.10'	**12.0" Round Culvert** L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 141.10' / 140.20' S= 0.0529 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.07 cfs @ 11.39 hrs HW=139.82' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.73 cfs @ 12.10 hrs HW=141.59' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 0.73 cfs @ 1.89 fps)

Summary for Pond CB1:

Inflow Area = 17,050 sf, 32.26% Impervious, Inflow Depth > 6.09" for 100-Year event
Inflow = 2.74 cfs @ 12.09 hrs, Volume= 8,647 cf
Outflow = 2.74 cfs @ 12.09 hrs, Volume= 8,647 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.74 cfs @ 12.09 hrs, Volume= 8,647 cf
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 148.19' @ 12.09 hrs
Flood Elev= 150.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.85'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 146.85' / 146.50' S= 0.0700 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.73 cfs @ 12.09 hrs HW=148.19' TW=146.68' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.73 cfs @ 3.48 fps)

Summary for Pond CB2:

Inflow Area = 5,760 sf, 69.18% Impervious, Inflow Depth > 7.28" for 100-Year event
Inflow = 1.05 cfs @ 12.08 hrs, Volume= 3,496 cf
Outflow = 1.05 cfs @ 12.08 hrs, Volume= 3,496 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.05 cfs @ 12.08 hrs, Volume= 3,496 cf
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 147.46' @ 12.08 hrs
Flood Elev= 150.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.85'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 146.85' / 146.50' S= 0.0700 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.04 cfs @ 12.08 hrs HW=147.46' TW=146.67' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.04 cfs @ 2.09 fps)

Summary for Pond CB3:

Inflow Area = 13,605 sf, 72.80% Impervious, Inflow Depth > 7.28" for 100-Year event
Inflow = 2.47 cfs @ 12.08 hrs, Volume= 8,258 cf
Outflow = 2.47 cfs @ 12.08 hrs, Volume= 8,258 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.47 cfs @ 12.08 hrs, Volume= 8,258 cf
Routed to Pond DMH4 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 144.93' @ 12.09 hrs
Flood Elev= 146.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	143.30'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 143.30' / 143.20' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.45 cfs @ 12.08 hrs HW=144.93' TW=144.25' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.45 cfs @ 3.13 fps)

Summary for Pond CB4:

Inflow Area = 9,380 sf, 82.78% Impervious, Inflow Depth > 7.64" for 100-Year event
Inflow = 1.74 cfs @ 12.08 hrs, Volume= 5,975 cf
Outflow = 1.74 cfs @ 12.08 hrs, Volume= 5,975 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.74 cfs @ 12.08 hrs, Volume= 5,975 cf
Routed to Pond DMH4 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 144.59' @ 12.09 hrs
Flood Elev= 146.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	143.30'	**12.0" Round Culvert** L= 6.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 143.30' / 143.20' S= 0.0167 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.72 cfs @ 12.08 hrs HW=144.58' TW=144.25' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.72 cfs @ 2.19 fps)

Summary for Pond CB5:

Inflow Area = 4,525 sf, 70.94% Impervious, Inflow Depth > 7.28" for 100-Year event
Inflow = 0.82 cfs @ 12.08 hrs, Volume= 2,747 cf
Outflow = 0.82 cfs @ 12.08 hrs, Volume= 2,747 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.82 cfs @ 12.08 hrs, Volume= 2,747 cf
Routed to Pond DMH5 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 141.73' @ 12.11 hrs
Flood Elev= 143.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	140.60'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 140.60' / 140.50' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.65 cfs @ 12.08 hrs HW=141.69' TW=141.64' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 0.65 cfs @ 0.83 fps)

Summary for Pond DCB1:

Inflow Area = 29,540 sf, 19.30% Impervious, Inflow Depth > 5.84" for 100-Year event
Inflow = 4.48 cfs @ 12.10 hrs, Volume= 14,387 cf
Outflow = 4.48 cfs @ 12.10 hrs, Volume= 14,387 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.48 cfs @ 12.10 hrs, Volume= 14,387 cf
Routed to Pond DMH10 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 172.75' @ 12.10 hrs
Flood Elev= 173.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	170.00'	**12.0" Round Culvert** L= 131.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 170.00' / 150.00' S= 0.1527 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=4.48 cfs @ 12.10 hrs HW=172.75' TW=149.15' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 4.48 cfs @ 5.70 fps)

Summary for Pond DCB2:

Inflow Area = 43,220 sf, 3.64% Impervious, Inflow Depth > 5.37" for 100-Year event
Inflow = 5.95 cfs @ 12.11 hrs, Volume= 19,325 cf
Outflow = 5.95 cfs @ 12.11 hrs, Volume= 19,325 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.95 cfs @ 12.11 hrs, Volume= 19,325 cf
Routed to Pond DMH9 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 165.47' @ 12.11 hrs
Flood Elev= 172.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	161.00'	**12.0" Round Culvert** L= 78.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.00' / 148.60' S= 0.1590 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=5.94 cfs @ 12.11 hrs HW=165.46' TW=152.96' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 5.94 cfs @ 7.56 fps)

Summary for Pond DMH1:

Inflow Area = 22,810 sf, 41.58% Impervious, Inflow Depth > 6.39" for 100-Year event
Inflow = 3.78 cfs @ 12.09 hrs, Volume= 12,144 cf
Outflow = 3.78 cfs @ 12.09 hrs, Volume= 12,144 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.78 cfs @ 12.09 hrs, Volume= 12,144 cf
Routed to Pond 11P : P.UIS1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 147.07' @ 12.19 hrs
Flood Elev= 150.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	145.50'	**24.0" Round Culvert** L= 4.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 145.50' / 145.11' S= 0.0975 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=2.94 cfs @ 12.09 hrs HW=146.67' TW=146.51' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.94 cfs @ 1.53 fps)

Summary for Pond DMH10:

Inflow Area = 29,540 sf, 19.30% Impervious, Inflow Depth > 5.84" for 100-Year event
Inflow = 4.48 cfs @ 12.10 hrs, Volume= 14,387 cf
Outflow = 4.48 cfs @ 12.10 hrs, Volume= 14,387 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.48 cfs @ 12.10 hrs, Volume= 14,387 cf
Routed to Pond DMH11 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 149.15' @ 12.10 hrs
Flood Elev= 154.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.40'	**12.0" Round Culvert** L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 146.40' / 145.80' S= 0.0140 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=4.48 cfs @ 12.10 hrs HW=149.15' TW=144.12' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 4.48 cfs @ 5.70 fps)

Summary for Pond DMH11:

Inflow Area = 52,350 sf, 29.01% Impervious, Inflow Depth > 3.97" for 100-Year event
Inflow = 5.62 cfs @ 12.14 hrs, Volume= 17,317 cf
Outflow = 5.62 cfs @ 12.14 hrs, Volume= 17,317 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.62 cfs @ 12.14 hrs, Volume= 17,317 cf
Routed to Reach 10R : Wetlands System - Peppermint Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 144.24' @ 12.14 hrs
Flood Elev= 152.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	142.80'	**18.0" Round Culvert** L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 142.80' / 141.50' S= 0.0433 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=5.61 cfs @ 12.14 hrs HW=144.24' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 5.61 cfs @ 3.22 fps)

Summary for Pond DMH2:

Inflow Area = 24,550 sf, 76.90% Impervious, Inflow Depth > 7.48" for 100-Year event
Inflow = 4.43 cfs @ 12.08 hrs, Volume= 15,302 cf
Outflow = 4.43 cfs @ 12.08 hrs, Volume= 15,302 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.43 cfs @ 12.08 hrs, Volume= 15,302 cf
Routed to Pond 12P : P.UIS2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 147.16' @ 12.11 hrs
Flood Elev= 150.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	141.35'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 141.35' / 141.25' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=4.28 cfs @ 12.08 hrs HW=147.00' TW=144.94' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 4.28 cfs @ 5.45 fps)

Summary for Pond DMH3:

Inflow Area = 90,755 sf, 42.01% Impervious, Inflow Depth > 4.24" for 100-Year event
Inflow = 10.23 cfs @ 12.14 hrs, Volume= 32,099 cf
Outflow = 10.23 cfs @ 12.14 hrs, Volume= 32,099 cf, Atten= 0%, Lag= 0.0 min
Primary = 10.23 cfs @ 12.14 hrs, Volume= 32,099 cf
Routed to Reach 10R : Wetlands System - Peppermint Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 142.07' @ 12.14 hrs
Flood Elev= 149.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	**18.0" Round Culvert** L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 139.00' / 138.50' S= 0.0152 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=10.22 cfs @ 12.14 hrs HW=142.06' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 10.22 cfs @ 5.78 fps)

Summary for Pond DMH4:

Inflow Area = 22,985 sf, 76.88% Impervious, Inflow Depth > 7.43" for 100-Year event
Inflow = 4.21 cfs @ 12.08 hrs, Volume= 14,233 cf
Outflow = 4.21 cfs @ 12.08 hrs, Volume= 14,233 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.21 cfs @ 12.08 hrs, Volume= 14,233 cf
Routed to Pond 13P : P.UIS3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 144.43' @ 12.29 hrs
Flood Elev= 146.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	143.10'	**18.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 143.10' / 141.25' S= 0.3700 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=4.20 cfs @ 12.08 hrs HW=144.25' TW=143.49' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 4.20 cfs @ 2.89 fps)

Summary for Pond DMH5:

Inflow Area = 4,525 sf, 70.94% Impervious, Inflow Depth > 7.28" for 100-Year event
Inflow = 0.82 cfs @ 12.08 hrs, Volume= 2,747 cf
Outflow = 0.82 cfs @ 12.08 hrs, Volume= 2,747 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.82 cfs @ 12.08 hrs, Volume= 2,747 cf
Routed to Pond 14P : P.UIS4

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 141.66' @ 12.11 hrs
Flood Elev= 143.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	140.40'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 140.40' / 140.30' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.72 cfs @ 12.08 hrs HW=141.64' TW=141.58' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 0.72 cfs @ 0.92 fps)

Summary for Pond DMH9:

Inflow Area = 43,220 sf, 3.64% Impervious, Inflow Depth > 5.37" for 100-Year event
Inflow = 5.95 cfs @ 12.11 hrs, Volume= 19,325 cf
Outflow = 5.95 cfs @ 12.11 hrs, Volume= 19,325 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.95 cfs @ 12.11 hrs, Volume= 19,325 cf
Routed to Pond DMH3 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 152.97' @ 12.11 hrs
Flood Elev= 154.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	148.50'	**12.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 148.50' / 139.90' S= 0.1564 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=5.94 cfs @ 12.11 hrs HW=152.96' TW=141.61' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 5.94 cfs @ 7.56 fps)

Appendix VII Hydrocad Output for Recharge Volume

Stage-Area-Storage for Pond 11P: P.UIS1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
144.25	**1,435**	0	147.20	1,435	2,921
144.30	1,435	29	147.25	1,435	2,973
144.35	1,435	57	147.30	1,435	3,023
144.40	1,435	86	147.35	1,435	3,074
144.45	1,435	115	147.40	1,435	3,124
144.50	1,435	143	147.45	1,435	3,173
144.55	1,435	172	147.50	1,435	3,222
144.60	1,435	201	147.55	1,435	3,271
144.65	1,435	230	147.60	1,435	3,319
144.70	1,435	258	147.65	1,435	3,367
144.75	1,435	287	147.70	1,435	3,414
144.80	1,435	316	147.75	1,435	3,461
144.85	1,435	344	147.80	1,435	3,507
144.90	1,435	373	147.85	1,435	3,553
144.95	1,435	402	147.90	1,435	3,598
145.00	1,435	430	147.95	1,435	3,642
145.05	1,435	490	148.00	1,435	3,686
145.10	1,435	550	148.05	1,435	3,729
145.15	1,435	610	148.10	1,435	3,771
145.20	1,435	670	148.15	1,435	3,813
145.25	1,435	729	148.20	1,435	3,853
145.30	1,435	789	148.25	1,435	3,892
145.35	1,435	848	148.30	1,435	3,930
145.40	1,435	907	148.35	1,435	3,967
145.45	1,435	966	148.40	1,435	4,002
145.50	1,435	1,025	148.45	1,435	4,035
145.55	1,435	1,084	148.50	1,435	4,068
145.60	1,435	1,143	148.55	1,435	4,099
145.65	1,435	1,201	148.60	1,435	4,130
145.70	1,435	1,260	148.65	1,435	4,161
145.75	1,435	1,318	148.70	1,435	4,190
145.80	1,435	1,376	148.75	1,435	4,219
145.85	1,435	1,434	148.80	1,435	4,248
145.90	1,435	1,492	148.85	1,435	4,277
145.95	1,435	1,550	148.90	1,435	4,305
146.00	1,435	1,607	148.95	1,435	4,334
146.05	1,435	1,665	149.00	1,435	4,363
146.10	1,435	1,722	149.05	1,435	4,391
146.15	1,435	1,779	149.10	1,435	4,420
146.20	1,435	1,835	149.15	1,435	4,449
146.25	1,435	1,892	149.20	1,435	4,477
146.30	1,435	1,949	149.25	1,435	4,506
146.35	1,435	2,005	149.30	1,435	4,535
146.40	1,435	2,061	149.35	1,435	4,564
146.45	1,435	2,116	149.40	1,435	4,592
146.50	1,435	2,172	149.45	1,435	4,621
146.55	1,435	2,227	149.50	1,435	4,650
146.60	1,435	2,282	149.55	1,435	4,678
146.65	1,435	2,337	149.60	1,435	4,707
146.70	1,435	2,392	149.65	1,435	4,736
146.75	1,435	2,446	149.70	1,435	4,764
146.80	1,435	2,500	149.75	1,435	**4,793**
146.85	1,435	2,554			
146.90	1,435	2,607			
146.95	1,435	2,660			
147.00	1,435	2,713			
147.05	1,435	2,766			
147.10	1,435	2,818			
147.15	1,435	2,870			

Stage-Area-Storage for Pond 12P: P.UIS2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
140.50	**1,271**	0	143.45	1,271	2,580
140.55	1,271	25	143.50	1,271	2,626
140.60	1,271	51	143.55	1,271	2,670
140.65	1,271	76	143.60	1,271	2,715
140.70	1,271	102	143.65	1,271	2,759
140.75	1,271	127	143.70	1,271	2,803
140.80	1,271	153	143.75	1,271	2,846
140.85	1,271	178	143.80	1,271	2,889
140.90	1,271	203	143.85	1,271	2,932
140.95	1,271	229	143.90	1,271	2,974
141.00	1,271	254	143.95	1,271	3,016
141.05	1,271	280	144.00	1,271	3,057
141.10	1,271	305	144.05	1,271	3,098
141.15	1,271	331	144.10	1,271	3,138
141.20	1,271	356	144.15	1,271	3,178
141.25	1,271	381	144.20	1,271	3,217
141.30	1,271	434	144.25	1,271	3,256
141.35	1,271	487	144.30	1,271	3,294
141.40	1,271	540	144.35	1,271	3,331
141.45	1,271	593	144.40	1,271	3,368
141.50	1,271	645	144.45	1,271	3,403
141.55	1,271	698	144.50	1,271	3,438
141.60	1,271	750	144.55	1,271	3,472
141.65	1,271	802	144.60	1,271	3,504
141.70	1,271	854	144.65	1,271	3,535
141.75	1,271	906	144.70	1,271	3,565
141.80	1,271	958	144.75	1,271	3,593
141.85	1,271	1,010	144.80	1,271	3,621
141.90	1,271	1,062	144.85	1,271	3,649
141.95	1,271	1,113	144.90	1,271	3,676
142.00	1,271	1,165	144.95	1,271	3,702
142.05	1,271	1,216	145.00	1,271	3,728
142.10	1,271	1,267	145.05	1,271	3,753
142.15	1,271	1,318	145.10	1,271	3,779
142.20	1,271	1,369	145.15	1,271	3,804
142.25	1,271	1,420	145.20	1,271	3,829
142.30	1,271	1,471	145.25	1,271	3,855
142.35	1,271	1,521	145.30	1,271	3,880
142.40	1,271	1,571	145.35	1,271	3,906
142.45	1,271	1,622	145.40	1,271	3,931
142.50	1,271	1,672	145.45	1,271	3,957
142.55	1,271	1,721	145.50	1,271	3,982
142.60	1,271	1,771	145.55	1,271	4,007
142.65	1,271	1,820	145.60	1,271	4,033
142.70	1,271	1,870	145.65	1,271	4,058
142.75	1,271	1,919	145.70	1,271	4,084
142.80	1,271	1,967	145.75	1,271	4,109
142.85	1,271	2,016	145.80	1,271	4,135
142.90	1,271	2,064	145.85	1,271	4,160
142.95	1,271	2,113	145.90	1,271	4,185
143.00	1,271	2,161	145.95	1,271	4,211
143.05	1,271	2,208	146.00	1,271	**4,236**
143.10	1,271	2,256			
143.15	1,271	2,303			
143.20	1,271	2,350			
143.25	1,271	2,397			
143.30	1,271	2,443			
143.35	1,271	2,489			
143.40	1,271	2,535			

Stage-Area-Storage for Pond 13P: P.UIS3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
140.50	**1,924**	0
140.55	1,924	38
140.60	1,924	77
140.65	1,924	115
140.70	1,924	154
140.75	1,924	192
140.80	1,924	231
140.85	1,924	269
140.90	1,924	308
140.95	1,924	346
141.00	1,924	385
141.05	1,924	423
141.10	1,924	462
141.15	1,924	500
141.20	1,924	539
141.25	1,924	577
141.30	1,924	658
141.35	1,924	739
141.40	1,924	820
141.45	1,924	901
141.50	1,924	981
141.55	1,924	1,062
141.60	1,924	1,142
141.65	1,924	1,222
141.70	1,924	1,302
141.75	1,924	1,382
141.80	1,924	1,461
141.85	1,924	1,540
141.90	1,924	1,620
141.95	1,924	1,699
142.00	1,924	1,778
142.05	1,924	1,856
142.10	1,924	1,935
142.15	1,924	2,013
142.20	1,924	2,091
142.25	1,924	2,168
142.30	1,924	2,246
142.35	1,924	2,323
142.40	1,924	2,400
142.45	1,924	2,477
142.50	1,924	2,554
142.55	1,924	2,630
142.60	1,924	2,706
142.65	1,924	2,781
142.70	1,924	2,857
142.75	1,924	2,932
142.80	1,924	3,007
142.85	1,924	3,081
142.90	1,924	3,155
142.95	1,924	3,229
143.00	1,924	3,302
143.05	1,924	3,375
143.10	1,924	3,448
143.15	1,924	3,520
143.20	1,924	3,592
143.25	1,924	3,663
143.30	1,924	3,734
143.35	1,924	3,805
143.40	1,924	3,875
143.45	1,924	3,944
143.50	1,924	4,014
143.55	1,924	4,082
143.60	1,924	4,150
143.65	1,924	4,218
143.70	1,924	4,285
143.75	1,924	4,351
143.80	1,924	4,417
143.85	1,924	4,482
143.90	1,924	4,546
143.95	1,924	4,610
144.00	1,924	4,673
144.05	1,924	4,736
144.10	1,924	4,797
144.15	1,924	4,858
144.20	1,924	4,918
144.25	1,924	4,976
144.30	1,924	5,034
144.35	1,924	5,091
144.40	1,924	5,147
144.45	1,924	5,201
144.50	1,924	5,255
144.55	1,924	5,306
144.60	1,924	5,355
144.65	1,924	5,402
144.70	1,924	5,447
144.75	1,924	5,490
144.80	1,924	5,533
144.85	1,924	5,574
144.90	1,924	5,615
144.95	1,924	5,655
145.00	1,924	5,694
145.05	1,924	5,732
145.10	1,924	5,771
145.15	1,924	5,809
145.20	1,924	5,848
145.25	1,924	5,886
145.30	1,924	5,925
145.35	1,924	5,963
145.40	1,924	6,002
145.45	1,924	6,040
145.50	1,924	6,079
145.55	1,924	6,117
145.60	1,924	6,156
145.65	1,924	6,194
145.70	1,924	6,233
145.75	1,924	6,271
145.80	1,924	6,309
145.85	1,924	6,348
145.90	1,924	6,386
145.95	1,924	6,425
146.00	1,924	**6,463**

Stage-Area-Storage for Pond 14P: P.UIS4

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
139.80	**364**	0	140.98	364	247
139.82	364	3	141.00	364	252
139.84	364	6	141.02	364	256
139.86	364	9	141.04	364	261
139.88	364	12	141.06	364	266
139.90	364	15	141.08	364	270
139.92	364	17	141.10	364	275
139.94	364	20	141.12	364	279
139.96	364	23	141.14	364	284
139.98	364	26	141.16	364	288
140.00	364	29	141.18	364	292
140.02	364	32	141.20	364	297
140.04	364	35	141.22	364	301
140.06	364	38	141.24	364	305
140.08	364	41	141.26	364	309
140.10	364	44	141.28	364	313
140.12	364	47	141.30	364	317
140.14	364	50	141.32	364	321
140.16	364	52	141.34	364	325
140.18	364	55	141.36	364	329
140.20	364	58	141.38	364	332
140.22	364	61	141.40	364	336
140.24	364	64	141.42	364	340
140.26	364	67	141.44	364	343
140.28	364	70	141.46	364	346
140.30	364	73	141.48	364	350
140.32	364	78	141.50	364	353
140.34	364	84	141.52	364	356
140.36	364	89	141.54	364	359
140.38	364	94	141.56	364	362
140.40	364	100	141.58	364	365
140.42	364	105	141.60	364	368
140.44	364	110	141.62	364	371
140.46	364	116	141.64	364	374
140.48	364	121	141.66	364	377
140.50	364	126	141.68	364	380
140.52	364	132	141.70	364	383
140.54	364	137	141.72	364	386
140.56	364	142	141.74	364	389
140.58	364	147	141.76	364	392
140.60	364	153	141.78	364	395
140.62	364	158	141.80	364	398
140.64	364	163	141.82	364	401
140.66	364	168	141.84	364	403
140.68	364	173	141.86	364	406
140.70	364	178	141.88	364	409
140.72	364	183	141.90	364	412
140.74	364	188	141.92	364	415
140.76	364	193	141.94	364	418
140.78	364	198	141.96	364	421
140.80	364	203	141.98	364	424
140.82	364	208	142.00	364	427
140.84	364	213	142.02	364	430
140.86	364	218	142.04	364	433
140.88	364	223	142.06	364	435
140.90	364	228	142.08	364	438
140.92	364	233	142.10	364	441
140.94	364	237	142.12	364	**444**
140.96	364	242			

Appendix VIII Water Quality Sizing Information

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

2041 BRIDGE STREET
DRACUT, MA

Area	**0.52 ac**	Unit Site Designation	**P.DMH1**
Weighted C	**0.9**	Rainfall Station #	**67**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.08	41.0%	41.0%	0.04	0.04	38.8
0.16	23.9%	64.9%	0.08	0.08	22.0
0.24	11.5%	76.5%	0.11	0.11	10.3
0.32	7.4%	83.9%	0.15	0.15	6.5
0.40	4.4%	88.3%	0.19	0.19	3.8
0.48	2.9%	91.2%	0.23	0.23	2.4
0.56	1.8%	93.0%	0.26	0.26	1.4
0.64	1.2%	94.2%	0.30	0.30	0.9
0.72	1.6%	95.8%	0.34	0.34	1.2
0.80	0.8%	96.6%	0.38	0.38	0.6
1.00	0.6%	97.1%	0.47	0.47	0.4
1.40	1.4%	98.6%	0.66	0.66	0.8
1.80	0.9%	99.5%	0.85	0.85	0.4
2.20	0.5%	100.0%	1.04	1.00	0.1
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					89.4
				Removal Efficiency Adjustment[2] =	0.0%
				Predicted % Annual Rainfall Treated =	100.0%
				Predicted Net Annual Load Removal Efficiency =	**89.4%**

1 - Based on 7 years of data from NCDC station #3276, Groveland, Essex County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

2041 BRIDGE STREET
DRACUT, MA

Area	**0.56 ac**	Unit Site Designation	**P.DMH2**
Weighted C	**0.9**	Rainfall Station #	**67**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.08	41.0%	41.0%	0.04	0.04	38.8
0.16	23.9%	64.9%	0.08	0.08	21.9
0.24	11.5%	76.5%	0.12	0.12	10.3
0.32	7.4%	83.9%	0.16	0.16	6.4
0.40	4.4%	88.3%	0.20	0.20	3.7
0.48	2.9%	91.2%	0.24	0.24	2.3
0.56	1.8%	93.0%	0.28	0.28	1.4
0.64	1.2%	94.2%	0.32	0.32	0.9
0.72	1.6%	95.8%	0.36	0.36	1.2
0.80	0.8%	96.6%	0.41	0.41	0.5
1.00	0.6%	97.1%	0.51	0.51	0.4
1.40	1.4%	98.6%	0.71	0.71	0.7
1.80	0.9%	99.5%	0.91	0.91	0.3
2.20	0.5%	100.0%	1.11	1.00	0.1
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					88.9
				Removal Efficiency Adjustment[2] =	0.0%
				Predicted % Annual Rainfall Treated =	99.9%
				Predicted Net Annual Load Removal Efficiency =	**88.9%**

1 - Based on 7 years of data from NCDC station #3276, Groveland, Essex County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

2041 BRIDGE STREET
DRACUT, MA

Area	**0.53 ac**	Unit Site Designation	**P.DMH4**
Weighted C	**0.9**	Rainfall Station #	**67**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.08	41.0%	41.0%	0.04	0.04	38.8
0.16	23.9%	64.9%	0.08	0.08	22.0
0.24	11.5%	76.5%	0.11	0.11	10.3
0.32	7.4%	83.9%	0.15	0.15	6.4
0.40	4.4%	88.3%	0.19	0.19	3.7
0.48	2.9%	91.2%	0.23	0.23	2.4
0.56	1.8%	93.0%	0.27	0.27	1.4
0.64	1.2%	94.2%	0.30	0.30	0.9
0.72	1.6%	95.8%	0.34	0.34	1.2
0.80	0.8%	96.6%	0.38	0.38	0.6
1.00	0.6%	97.1%	0.47	0.47	0.4
1.40	1.4%	98.6%	0.66	0.66	0.8
1.80	0.9%	99.5%	0.85	0.85	0.4
2.20	0.5%	100.0%	1.04	1.00	0.1
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					89.4
				Removal Efficiency Adjustment[2] =	0.0%
				Predicted % Annual Rainfall Treated =	100.0%
				Predicted Net Annual Load Removal Efficiency =	**89.4%**

1 - Based on 7 years of data from NCDC station #3276, Groveland, Essex County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

2041 BRIDGE STREET
DRACUT, MA

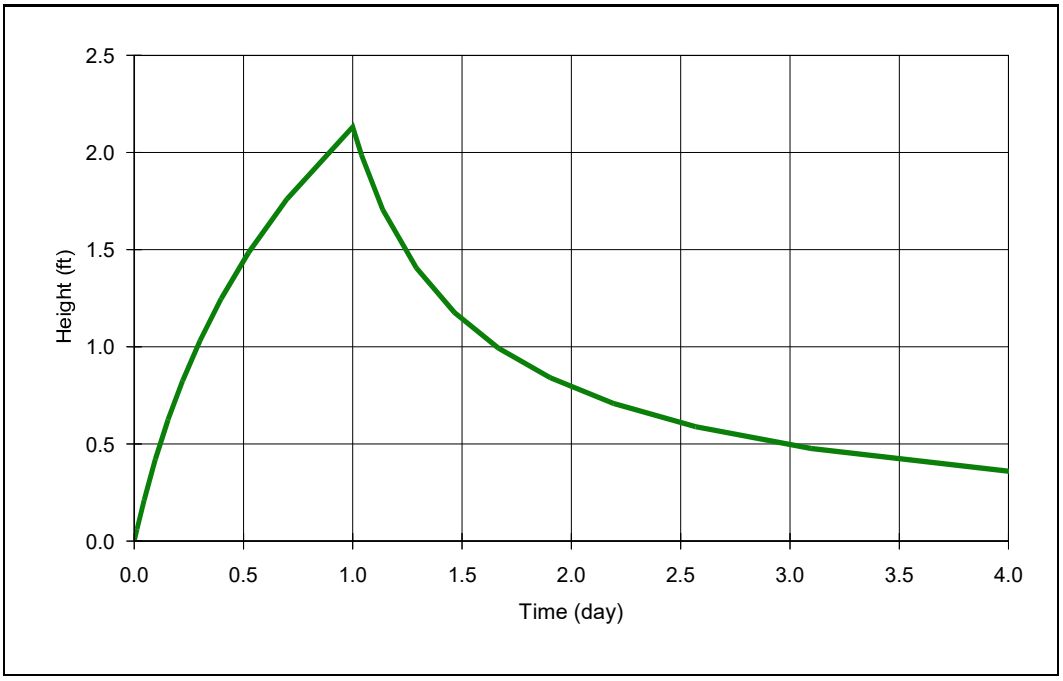
Area	**0.10 ac**	Unit Site Designation	**P.DMH5**
Weighted C	**0.9**	Rainfall Station #	**67**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.08	41.0%	41.0%	0.01	0.01	39.7
0.16	23.9%	64.9%	0.01	0.01	23.0
0.24	11.5%	76.5%	0.02	0.02	11.0
0.32	7.4%	83.9%	0.03	0.03	7.1
0.40	4.4%	88.3%	0.04	0.04	4.2
0.48	2.9%	91.2%	0.04	0.04	2.7
0.56	1.8%	93.0%	0.05	0.05	1.7
0.64	1.2%	94.2%	0.06	0.06	1.1
0.72	1.6%	95.8%	0.07	0.07	1.5
0.80	0.8%	96.6%	0.07	0.07	0.7
1.00	0.6%	97.1%	0.09	0.09	0.5
1.40	1.4%	98.6%	0.13	0.13	1.3
1.80	0.9%	99.5%	0.17	0.17	0.8
2.20	0.5%	100.0%	0.20	0.20	0.4
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					95.7
				Removal Efficiency Adjustment[2] =	0.0%
				Predicted % Annual Rainfall Treated =	100.0%
				Predicted Net Annual Load Removal Efficiency =	**95.7%**

1 - Based on 7 years of data from NCDC station #3276, Groveland, Essex County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Appendix XI Mounding Analysis

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Hancock Associates

PROJECT: 27164-P.UIS1

ANALYST: Morgan Seale

DATE: 9/12/2024 TIME: 11:23:01 AM

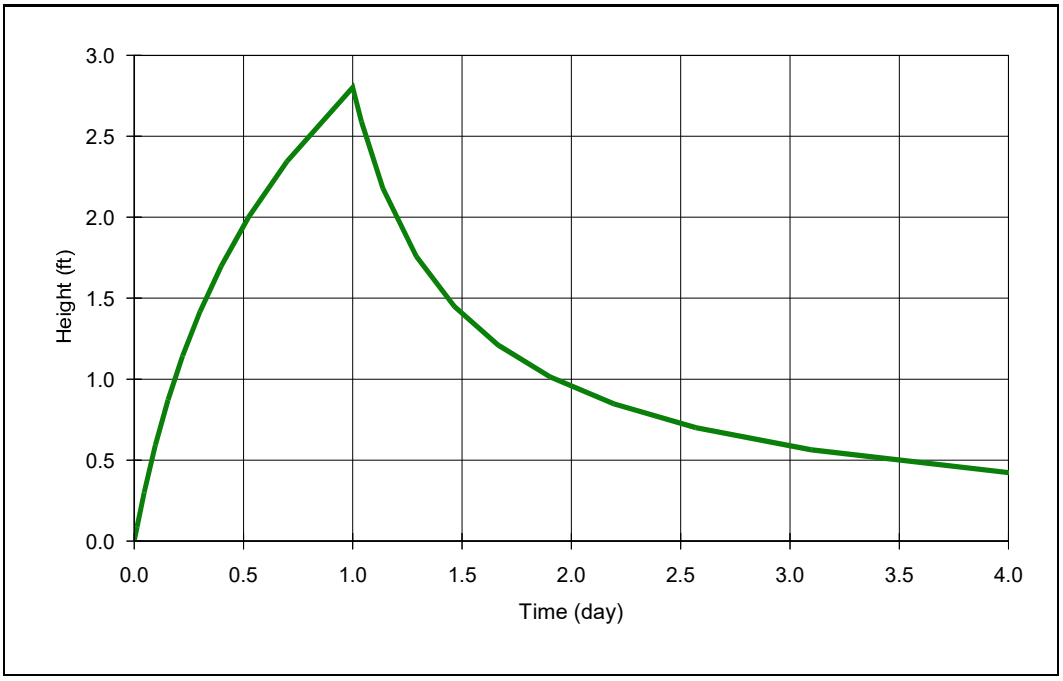
INPUT PARAMETERS

Application rate: 1.32 c.ft/day/sq. ft
Duration of application: 1 day
Total simulation time: 4 day
Fillable porosity: 0.28
Hydraulic conductivity: 20.48 ft/day
Initial saturated thickness: 5.5 ft
Length of application area: 63.06 ft
Width of application area: 22.75 ft
No constant head boundary used
Groundwater mounding @
X coordinate: 0 ft
Y coordinate: 0 ft
Total volume applied: 1893.692 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.06
0	0.21
0.1	0.42
0.2	0.62
0.2	0.82
0.3	1.03
0.4	1.25
0.5	1.48
0.7	1.76
1	2.13
1	1.99
1.1	1.7
1.3	1.41
1.5	1.18
1.7	0.99
1.9	0.84
2.2	0.71
2.6	0.59
3.1	0.48
4	0.36

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Hancock Associates

PROJECT: 27164-P.UIS2

ANALYST: Morgan Seale

DATE: 9/12/2024 TIME: 11:23:55 AM

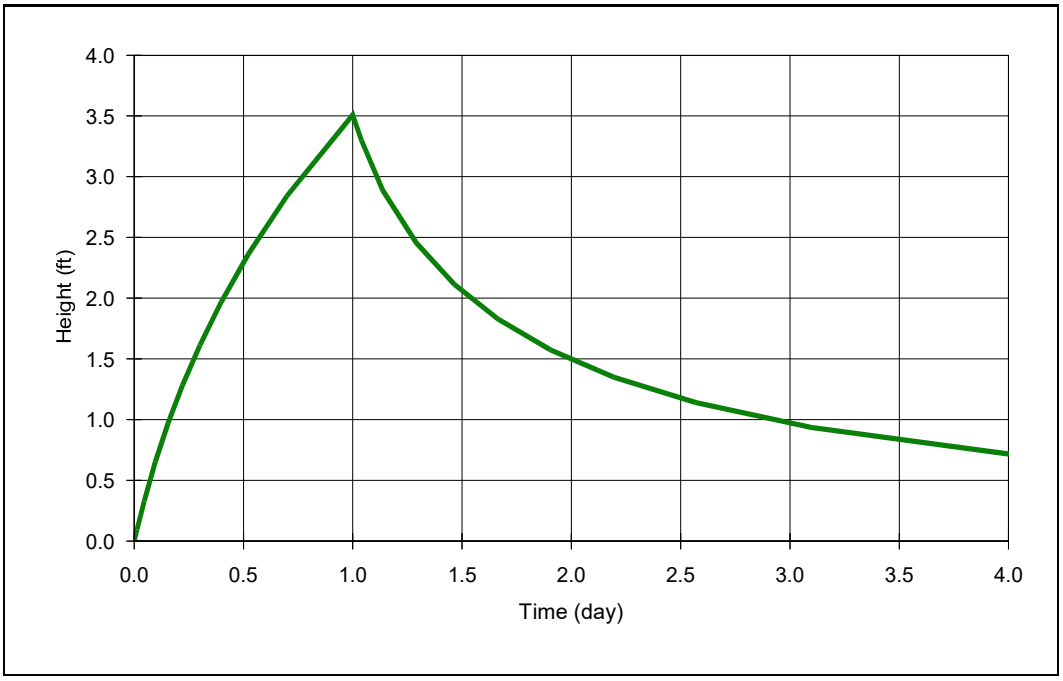
INPUT PARAMETERS

Application rate: 1.88 c.ft/day/sq. ft
Duration of application: 1 day
Total simulation time: 4 day
Fillable porosity: 0.28
Hydraulic conductivity: 20.48 ft/day
Initial saturated thickness: 6 ft
Length of application area: 55.89 ft
Width of application area: 22.75 ft
No constant head boundary used
Groundwater mounding @
X coordinate: 0 ft
Y coordinate: 0 ft
Total volume applied: 2390.415 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.09
0	0.3
0.1	0.59
0.2	0.87
0.2	1.14
0.3	1.42
0.4	1.7
0.5	2
0.7	2.34
1	2.8
1	2.59
1.1	2.18
1.3	1.76
1.5	1.45
1.7	1.21
1.9	1.01
2.2	0.85
2.6	0.7
3.1	0.56
4	0.42

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Hancock Associates

PROJECT: 27164-P.UIS3

ANALYST: Morgan Seale

DATE: 9/12/2024 TIME: 11:25:10 AM

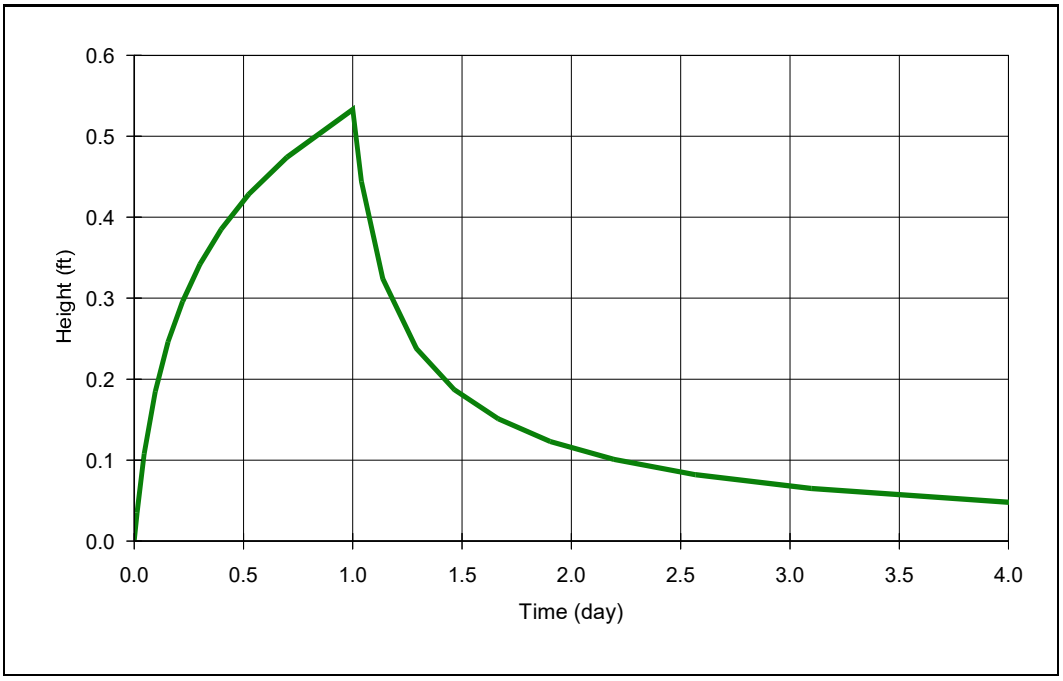
INPUT PARAMETERS

Application rate: 2.05 c.ft/day/sq. ft
Duration of application: 1 day
Total simulation time: 4 day
Fillable porosity: 0.28
Hydraulic conductivity: 20.48 ft/day
Initial saturated thickness: 5.5 ft
Length of application area: 84.57 ft
Width of application area: 22.75 ft
No constant head boundary used
Groundwater mounding @
X coordinate: 0 ft
Y coordinate: 0 ft
Total volume applied: 3944.133 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.1
0	0.33
0.1	0.65
0.2	0.97
0.2	1.29
0.3	1.61
0.4	1.97
0.5	2.36
0.7	2.84
1	3.51
1	3.3
1.1	2.89
1.3	2.46
1.5	2.11
1.7	1.83
1.9	1.58
2.2	1.35
2.6	1.14
3.1	0.94
4	0.72

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Hancock Associates

PROJECT: 27164-P.UIS4

ANALYST: Morgan Seale

DATE: 9/12/2024 TIME: 11:25:22 AM

INPUT PARAMETERS

Application rate: 0.75 c.ft/day/sq. ft
Duration of application: 1 day
Total simulation time: 4 day
Fillable porosity: 0.28
Hydraulic conductivity: 20.48 ft/day
Initial saturated thickness: 6.2 ft
Length of application area: 24.56 ft
Width of application area: 14.83 ft
No constant head boundary used
Groundwater mounding @
X coordinate: 0 ft
Y coordinate: 0 ft
Total volume applied: 273.1686 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.04
0	0.11
0.1	0.18
0.2	0.25
0.2	0.3
0.3	0.34
0.4	0.38
0.5	0.43
0.7	0.47
1	0.53
1	0.44
1.1	0.32
1.3	0.24
1.5	0.19
1.7	0.15
1.9	0.12
2.2	0.1
2.6	0.08
3.1	0.06
4	0.05

Appendix X Operations and Maintenance Log

2041 Bridge Street, Dracut, MA – Post Construction Maintenance

Operations and Maintenance Log
Inspections for Year:_____

Structural Best Management Practice (Frequency)	Action	Date Completed	Completed By	Comments
Deep Sump Hooded Catch Basin– Inspect/clean four times per year. Clean when sump is 50% full.	Inspect/ Clean			
	Inspect/ Clean			
	Inspect/ Clean			
	Inspect/ Clean			
Stormtech Chambers– Inspect four times per year. Clean per manufacturer's requirements.	Inspect/ Clean			
	Inspect/ Clean			
	Inspect/ Clean			
	Inspect/ Clean			
Roof Drain Leaders – Inspect/clean twice per year.	Inspect/Clean			
	Inspect/Clean			
Vegetated Areas Maintenance – Inspect twice per year. Maintain as required.	Inspect			
	Inspect			

(1) Refer to the Massachusetts Stormwater Management, Volume Two: Stormwater Technical Handbook (March 1997) for recommendations regarding frequency for inspection and maintenance of specific BMP's.

(2) Inspections to be conducted by qualified professional such as an environmental scientist or civil engineer.

Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.
Other notes: (Included deviations from: Con Comm. Order of Conditions, PB Approval, Construction Sequence and Approved Plan).

Stormwater Control Manager:_____

CONTECH®
ENGINEERED SOLUTIONS

CDS Guide
Operation, Design, Performance and Maintenance

CDS®

Using patented continuous deflective separation technology, the CDS system screens, separates and traps debris, sediment, and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material without blinding. Flow and screening controls physically separate captured solids, and minimize the re-suspension and release of previously trapped pollutants. Inline units can treat up to 6 cfs, and internally bypass flows in excess of 50 cfs (1416 L/s). Available precast or cast-in-place, offline units can treat flows from 1 to 300 cfs (28.3 to 8495 L/s). The pollutant removal capacity of the CDS system has been proven in lab and field testing.

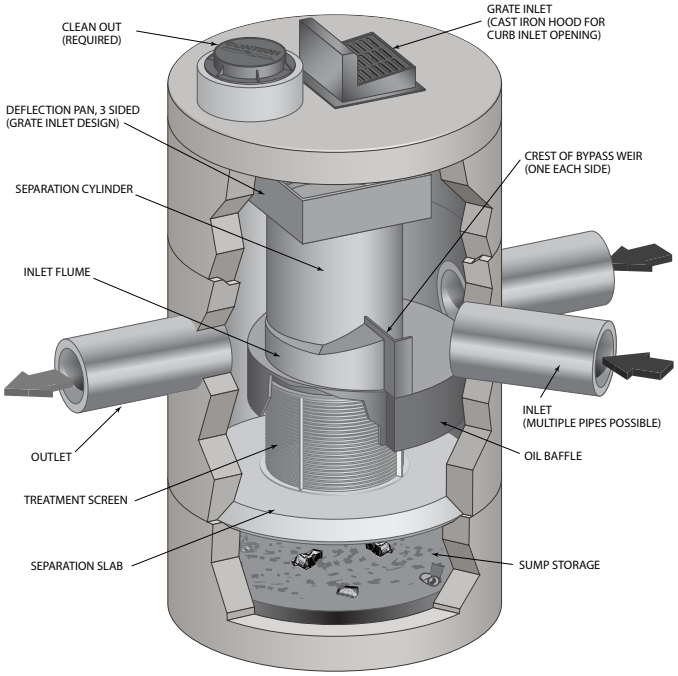
Operation Overview

Stormwater enters the diversion chamber where the diversion weir guides the flow into the unit's separation chamber and pollutants are removed from the flow. All flows up to the system's treatment design capacity enter the separation chamber and are treated.

Swirl concentration and screen deflection force floatables and solids to the center of the separation chamber where 100% of floatables and neutrally buoyant debris larger than the screen apertures are trapped.

Stormwater then moves through the separation screen, under the oil baffle and exits the system. The separation screen remains clog free due to continuous deflection.

During the flow events exceeding the treatment design capacity, the diversion weir bypasses excessive flows around the separation chamber, so captured pollutants are retained in the separation cylinder.



Design Basics

There are three primary methods of sizing a CDS system. The Water Quality Flow Rate Method determines which model size provides the desired removal efficiency at a given flow rate for a defined particle size. The Rational Rainfall Method™ or the and Probabilistic Method is used when a specific removal efficiency of the net annual sediment load is required.

Typically in the Unites States, CDS systems are designed to achieve an 80% annual solids load reduction based on lab generated performance curves for a gradation with an average particle size (d50) of 125 microns (μm). For some regulatory environments, CDS systems can also be designed to achieve an 80% annual solids load reduction based on an average particle size (d50) of 75 microns (μm) or 50 microns (μm).

Water Quality Flow Rate Method

In some cases, regulations require that a specific treatment rate, often referred to as the water quality design flow (WQQ), be treated. This WQQ represents the peak flow rate from either an event with a specific recurrence interval, e.g. the six-month storm, or a water quality depth, e.g. 1/2-inch (13 mm) of rainfall.

The CDS is designed to treat all flows up to the WQQ. At influent rates higher than the WQQ, the diversion weir will direct most flow exceeding the WQQ around the separation chamber. This allows removal efficiency to remain relatively constant in the separation chamber and eliminates the risk of washout during bypass flows regardless of influent flow rates.

Treatment flow rates are defined as the rate at which the CDS will remove a specific gradation of sediment at a specific removal efficiency. Therefore the treatment flow rate is variable, based on the gradation and removal efficiency specified by the design engineer.

Rational Rainfall Method™

Differences in local climate, topography and scale make every site hydraulically unique. It is important to take these factors into consideration when estimating the long-term performance of any stormwater treatment system. The Rational Rainfall Method combines site-specific information with laboratory generated performance data, and local historical precipitation records to estimate removal efficiencies as accurately as possible.

Short duration rain gauge records from across the United States and Canada were analyzed to determine the percent of the total annual rainfall that fell at a range of intensities. US stations' depths were totaled every 15 minutes, or hourly, and recorded in 0.01-inch increments. Depths were recorded hourly with 1-mm resolution at Canadian stations. One trend was consistent at all sites; the vast majority of precipitation fell at low intensities and high intensity storms contributed relatively little to the total annual depth.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Rainfall Method. Since most sites are relatively small and highly impervious, the Rational Rainfall Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS system are

determined. Performance efficiency curve determined from full scale laboratory tests on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

Probabilistic Rational Method

The Probabilistic Rational Method is a sizing program Contech developed to estimate a net annual sediment load reduction for a particular CDS model based on site size, site runoff coefficient, regional rainfall intensity distribution, and anticipated pollutant characteristics.

The Probabilistic Method is an extension of the Rational Method used to estimate peak discharge rates generated by storm events of varying statistical return frequencies (e.g. 2-year storm event). Under the Rational Method, an adjustment factor is used to adjust the runoff coefficient estimated for the 10-year event, correlating a known hydrologic parameter with the target storm event. The rainfall intensities vary depending on the return frequency of the storm event under consideration. In general, these two frequency dependent parameters (rainfall intensity and runoff coefficient) increase as the return frequency increases while the drainage area remains constant.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Method. Since most sites are relatively small and highly impervious, the Rational Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS are determined. Performance efficiency curve on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

Treatment Flow Rate

The inlet throat area is sized to ensure that the WQQ passes through the separation chamber at a water surface elevation equal to the crest of the diversion weir. The diversion weir bypasses excessive flows around the separation chamber, thus preventing re-suspension or re-entrainment of previously captured particles.

Hydraulic Capacity

The hydraulic capacity of a CDS system is determined by the length and height of the diversion weir and by the maximum allowable head in the system. Typical configurations allow hydraulic capacities of up to ten times the treatment flow rate. The crest of the diversion weir may be lowered and the inlet throat may be widened to increase the capacity of the system at a given water surface elevation. The unit is designed to meet project specific hydraulic requirements.

Performance

Full-Scale Laboratory Test Results

A full-scale CDS system (Model CDS2020-5B) was tested at the facility of University of Florida, Gainesville, FL. This CDS unit was evaluated under controlled laboratory conditions of influent flow rate and addition of sediment.

Two different gradations of silica sand material (UF Sediment & OK-110) were used in the CDS performance evaluation. The particle size distributions (PSDs) of the test materials were analyzed using standard method "Gradation ASTM D-422 "Standard Test Method for Particle-Size Analysis of Soils" by a certified laboratory.

UF Sediment is a mixture of three different products produced by the U.S. Silica Company: "Sil-Co-Sil 106", "#1 DRY" and "20/40 Oil Frac". Particle size distribution analysis shows that the UF Sediment has a very fine gradation (d50 = 20 to 30 μm) covering a wide size range (Coefficient of Uniformity, C averaged at 10.6). In comparison with the hypothetical TSS gradation specified in the NJDEP (New Jersey Department of Environmental Protection) and NJCAT (New Jersey Corporation for Advanced Technology) protocol for lab testing, the UF Sediment covers a similar range of particle size but with a finer d50 (d50 for NJDEP is approximately 50 μm) (NJDEP, 2003).

The OK-110 silica sand is a commercial product of U.S. Silica Sand. The particle size distribution analysis of this material, also included in Figure 1, shows that 99.9% of the OK-110 sand is finer than 250 microns, with a mean particle size (d50) of 106 microns. The PSDs for the test material are shown in Figure 1.

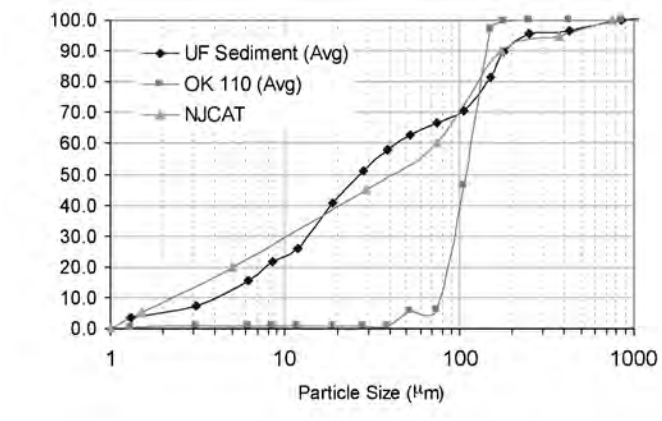


Figure 1. Particle size distributions

Tests were conducted to quantify the performance of a specific CDS unit (1.1 cfs (31.3-L/s) design capacity) at various flow rates, ranging from 1% up to 125% of the treatment design capacity of the unit, using the 2400 micron screen. All tests were conducted with controlled influent concentrations of approximately 200 mg/L. Effluent samples were taken at equal time intervals across the entire duration of each test run. These samples were then processed with a Dekaport Cone sample splitter to obtain representative sub-samples for Suspended Sediment Concentration (SSC) testing using ASTM D3977-97 "Standard Test Methods for Determining Sediment Concentration in Water Samples", and particle size distribution analysis.

Results and Modeling

Based on the data from the University of Florida, a performance model was developed for the CDS system. A regression analysis was used to develop a fitting curve representative of the scattered data points at various design flow rates. This model, which demonstrated good agreement with the laboratory data, can then be used to predict CDS system performance with respect

to SSC removal for any particle size gradation, assuming the particles are inorganic sandy-silt. Figure 2 shows CDS predictive performance for two typical particle size gradations (NJCAT gradation and OK-110 sand) as a function of operating rate.

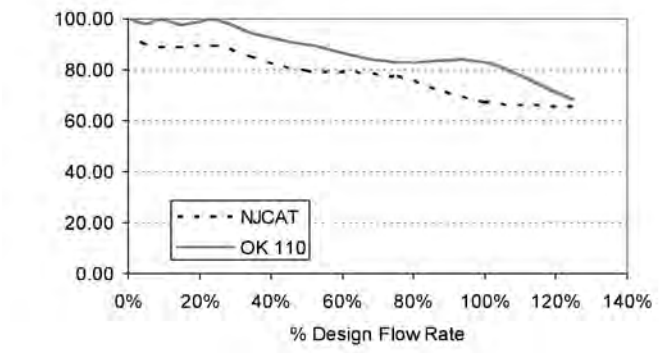


Figure 2. CDS stormwater treatment predictive performance for various particle gradations as a function of operating rate.

Many regulatory jurisdictions set a performance standard for hydrodynamic devices by stating that the devices shall be capable of achieving an 80% removal efficiency for particles having a mean particle size (d50) of 125 microns (e.g. Washington State Department of Ecology — WASDOE - 2008). The model can be used to calculate the expected performance of such a PSD (shown in Figure 3). The model indicates (Figure 4) that the CDS system with 2400 micron screen achieves approximately 80% removal at the design (100%) flow rate, for this particle size distribution (d50 = 125 μm).

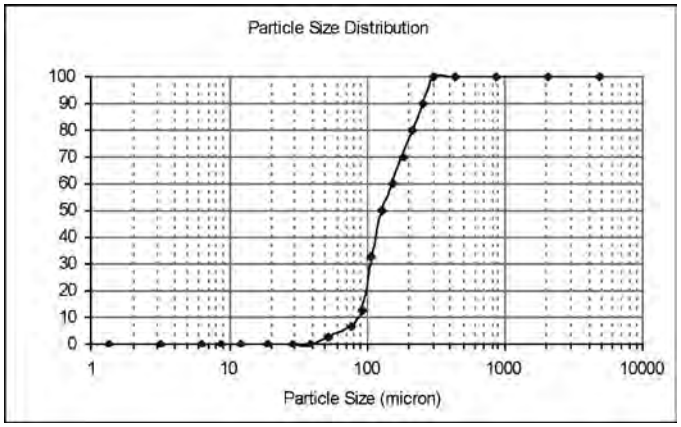


Figure 3. WASDOE PSD

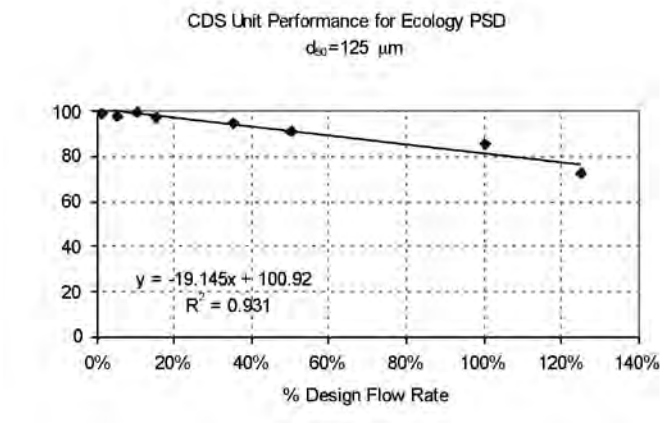


Figure 4. Modeled performance for WASDOE PSD.

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified

during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

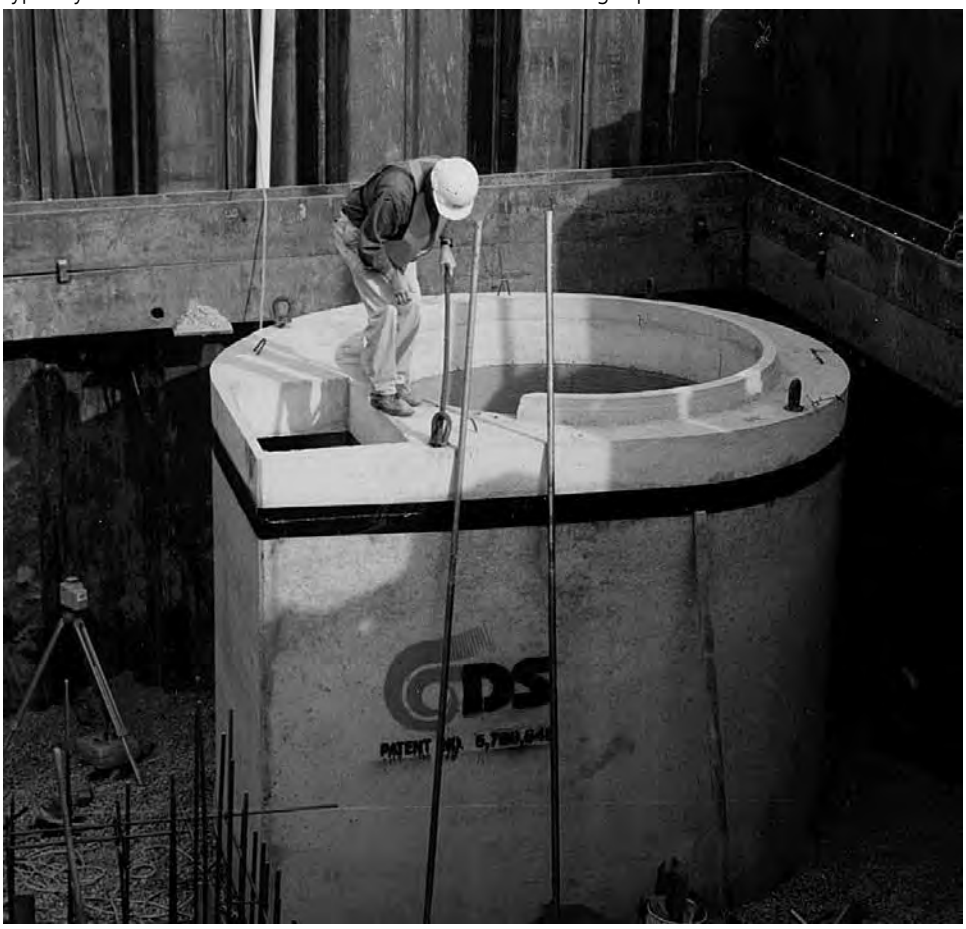
In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be cleaned to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Note: To avoid underestimating the volume of sediment in the chamber, carefully lower the measuring device to the top of the sediment pile. Finer silty particles at the top of the pile may be more difficult to feel with a measuring stick. These finer particles typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.



CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile**.

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

SUPPORT

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from our engineers.

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