Griffin Engineering Group, LLC

July 7, 2026

Topsfield Planning Board
Topsfield Town Hall
8 West Common Street
Topsfield, MA 01983

Via E-Mail

Subject: **Stormwater Management Permit - Revisions**
49 Asbury Street
(Assessor's Map 28, Lot 6)

Dear Ladies and Gentlemen:

On behalf of the Applicant, Landmark Utilities & Site Excavation Corp and in accordance with Section 6.0(I) of the Topsfield Stormwater and Erosion Control Regulations, we submit this updated site plan and request modification of the subject stormwater management permit. The permit was approved in July 2025.

Work is ongoing. The Applicant requests the following plan changes:

1. Combine the previously proposed stormwater infiltration fields into one, located at the barn. Combining the fields simplifies construction as well as long-term operation and maintenance.

The attached updated Site Plan and Stormwater Management Report detail the requested change. The site plan reflects conditions as of our May 2026 survey.

Thank you for your assistance. We are available to meet with the Board at its convenience to describe this plan further and respond to questions or comments.

Very truly yours,
Griffin Engineering Group, LLC

Robert H. Griffin, P.E.

Enclosures: Site Plan (C-1 & C-2, revised July 7, 2026);
Stormwater Management Report (revised July 7, 2026)

Cc: K. Clark

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495 Cabot Street | 2nd Floor | Beverly, MA 01915

Stormwater Management Report

under the
Town of Topsfield
Stormwater Management and Erosion Control Bylaw

Single-Family Residence Construction

Assessor's
Map 28, Lot 6

49 Asbury Street
Topsfield, MA

July 2, 2025
(Revised 7/31/25 & 7/7/26)

Applicant:

Landmark Utilities and Site Excavation Corporation

Submitted to:

Town of Topsfield
Planning Board

Prepared by:

Griffin Engineering Group, LLC
Beverly, MA

TABLE OF CONTENTS

STORMWATER MANAGEMENT CHECKLIST

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.

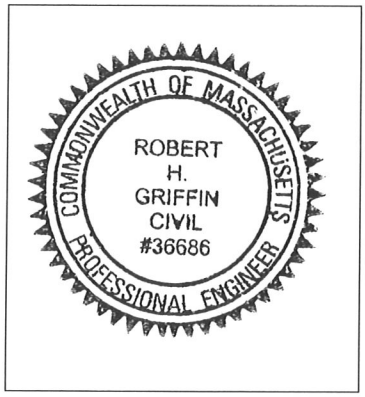
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

- ☒ 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
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☐ 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.

ATTACHMENT A

PROJECT
DESCRIPTION

1.0 INTRODUCTION

This stormwater management report was prepared in support of the proposed residential development at 49 Asbury Street (Assessors Map 28 Lot 6) in Topsfield, MA. The project consists of constructing a single-family residence with associated driveway, utilities, septic system, and landscaping.

According to the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management regulations, the proposed construction is exempt from MassDEP Stormwater Management requirements since the proposed development is a single-family residence. However, the regulations establish a framework for evaluating stormwater management systems that is used by the Town of Topsfield in evaluating new development projects. The narrative below compares the proposed construction to the MassDEP Stormwater Management requirements.

1.1 Existing Conditions

The project site is located at 49 Asbury Street, in Topsfield, Massachusetts. The 4.31-acre property is currently vacant consisting of woods and open field. The property is bounded to the north and south by residential properties. Asbury Street is to the east. The Ipswich River flows along the westerly property boundary. The site generally slopes west toward the Ipswich River and east toward Asbury Street.

1.2 Proposed Conditions

The project involves constructing a single-family residence with associated driveway, utilities, septic system, and landscaping. A site plan showing the proposed development and stormwater management features is separately provided.

The project is considered new development under the Stormwater Management regulations. When complete, the project will create a total of approximately 12,086 square feet of impervious surfaces at the site, consisting of building roofs and driveway.

2.0 STORMWATER MANAGEMENT STANDARDS

2.1 Standard 1: No New Untreated Discharges

No new untreated discharges to wetlands or waterways proposed.

2.2 Standard 2: Peak Rate Attenuation

Hydrologic modeling was conducted using the HydroCAD computer model. This model uses an approximation of Soil Conservation Service TR-20 methods to calculate runoff rates and volumes based on descriptions of land use, ground characteristics, and size.

The time of concentration (Tc) for each subcatchment was calculated in HydroCAD using a combination of sheet flow and shallow concentrated flow. Sheet flow uses roughness coefficients (Manning's *n*) and watercourse slope to calculate travel time of stormwater runoff for each subcatchment. The site was modeled using a maximum of 50-feet of sheet flow. The shallow concentrated flow method was used to determine the velocity factor along the flow path of the runoff and thereby derive a travel time. The time of concentration of each subcatchment is the combination of these travel times. A minimum time of concentration of 6 minutes was used for all subcatchments, for both existing and proposed conditions.

The enclosed drainage calculations indicate a decrease in the post-development peak runoff rates for the 2-, 10-, 25-, and 100-year, 24-hour storm events from the site (the HydroCAD drainage calculations for the aforementioned storm events are provided in Attachment F). Comparison of pre- and post-development stormwater runoff calculation results are summarized below in Tables 1 and 2.

Table 1: Comparison of Pre-Development and Post-Development Peak Runoff Rates [(1)] West toward the Ipswich River

Subcatchment	Storm Frequency			
	2-Year	10-Year	25-Year	100-Year
Pre-Development	0.52	2.87	5.33	11.28
Post-Development	0.50	2.41	4.47	11.10

1. Flow rates measured in cubic feet per second (cfs).

Table 2: Comparison of Pre-Development and Post-Development Peak Runoff Rates (1) East toward the Asbury Street

Subcatchment	Storm Frequency			
	2-Year	10-Year	25-Year	100-Year
Pre-Development	0.23	1.07	1.90	3.90
Post-Development	0.20	1.01	1.75	3.51

1. Flow rates measured in cubic feet per second (cfs).

The drainage calculations show that post-development runoff volumes for the 2-, 10-, 25-, and 100-year, 24-hour storm events are slightly less than pre-development conditions. Comparison of pre- and post-development stormwater runoff volume calculation results are summarized below in Table 3 and 4.

Table 3: Comparison of Pre-Development and Post-Development Runoff Volumes (1) West toward the Ipswich River

Subcatchment	Storm Frequency			
	2-Year	10-Year	25-Year	100-Year
Pre-Development	4,404	14,101	24,035	48,668
Post-Development	3,408	10,819	19,407	42,382

1. Volumes measured in cubic feet (cf).

Table 4: Comparison of Pre-Development and Post-Development Runoff Volumes (1) East toward the Asbury Street

Subcatchment	Storm Frequency			
	2-Year	10-Year	25-Year	100-Year
Pre-Development	1,268	3,923	6,609	13,218
Post-Development	1,185	3,648	6,126	12,182

1. Volumes measured in cubic feet (cf).

2.3 Standard 3: Recharge

Site soils are mapped by the United States Department of Agriculture – Soil Conservation Service (SCS) (Essex Co. Massachusetts Southern Part Soil Survey, 1984) as being primarily Charlton fine sandy loam. Soil testing performed at the site generally indicated a gravelly loamy sand and sandy loam. Results were generally

consistent with the SCS soil profiles. A 'B' Hydrologic Soil Group (HSG) was assigned to the soils for this analysis.

For B-type soils, the Stormwater Management guidelines require that a recharge device be provided with a capacity equal to 0.35-inches times the impervious area. The minimum design groundwater recharge volume is 510 cf. Calculations are enclosed (Attachment B).

2.4 Standard 4: Water Quality

The minimum required water quality treatment volume (WQV) for the proposed residential development is one-half-inch times the area of the impervious surfaces. Runoff from the proposed driveway will be directed into the proposed subsurface infiltration field. Roof runoff will be captured by gutters and conveyed to a separate subsurface infiltration field via downspouts and roof leaders to achieve 80% annual TSS removal. The reader is referred to Water Quality Volume Calculations provided in Attachment B.

As required by the Stormwater Management Standards, a Long-Term Pollution Prevention Plan has been prepared and can be found in Attachment C. In short, the plan identifies suitable practices for source control and pollution prevention measures.

2.5 Standard 5: Land Uses with Higher Potential Pollutant Loads

In accordance with the Stormwater Management Standards, the proposed residential use is not considered a Land Use with Higher Potential Pollutant Loads. Therefore, this standard does not apply to this project.

2.6 Standard 6: Critical Areas

The site does not discharge to any critical areas. Therefore, this standard does not apply to this project.

2.7 Standard 7: Redevelopment and Other Projects Subject to the Standards only to the Maximum Extent Practicable

This project is entirely new development so this standard does not apply.

2.8 Standard 8: Construction Period Pollution Prevention and Erosion and Sediment Control

The NPDES Construction General Permit requires that a Stormwater Pollution Prevention Plan (SWPPP) be prepared for any project disturbing over 1-acre of land. The proposed project will disturb approximately 1.8-acres of land. In accordance with the Massachusetts Stormwater Management Standards and the General Permit, a SWPPP has been prepared.

Construction shall proceed in the following sequence:

1. Install Erosion Controls downhill of work areas. Inspection and maintenance of Erosion Controls is required throughout the project as detailed below.

2. Clear & Grub lot. Stockpile topsoil.

3. Install construction entrance (rip rap) along street line for construction vehicles entering and exiting.

4. Excavate foundation hole. Install foundation and first floor deck.

5. Backfill around the foundation.

6. Install building utilities, and rough grade site. Construct residence.

7. Construct septic system.

8. Install driveway and landscaping.

The proposed project includes a comprehensive set of mitigation measures to protect the surrounding sites from impacts due to construction. Prior to work commencing on-site, there will be a preconstruction conference with the contractor. The purpose of this meeting will be to coordinate the best methods for erosion and sedimentation control and other construction-related issues. The implementation of a comprehensive soil and erosion control plan will occur prior to any construction activities within the project area. In general, the following sequence of events will occur:

- Erosion and sedimentation control devices will be installed along the edge of the down-gradient side of the project area prior to construction as depicted on the site plan. In addition to providing for sedimentation deposition and reducing runoff during storm events, this barrier will limit the work area.

- Erosion and sedimentation control devices will be inspected daily during periods of active construction and bi-weekly during the remainder of the construction period. Sediments will be removed from the barriers as soon as they reach a depth of 6-inches.

- Runoff from the site will be directed through sedimentation control barriers.

- During construction, disturbed areas will be kept to a minimum and vegetative stabilization of these areas will occur as soon as practicable.

- Temporary seeding, mulching, or other suitable stabilization measures will be used to protect exposed critical areas should unprotected soils remain exposed for prolonged periods.

Construction activities shall be monitored on-site by the construction supervisor to ensure that the soil erosion and sediment control features are installed properly,

maintained, and to evaluate the need for additional erosion control and/or stabilization measures. The inspector will perform the following tasks:

- Supervise the installation and maintenance of the soil erosion and sediment control features.
- Evaluate the need for additional soil erosion and sediment control features.
- Scheduled inspections of erosion control features, including construction entrance, haybales, and dust control.
- Supervise and monitor temporary and permanent stabilization activities.

2.9 Standard 9: Operation and Maintenance Plan

An Operations & Maintenance plan has been provided (Attachment D). The owner of the residence will be responsible for operation and maintenance of the proposed stormwater management devices.

2.10 Standard 10: Illicit Discharges

The submitted Long-Term Pollution Prevention Plan (Attachment C) specifies measures to prevent illicit discharges from entering the stormwater management system. Source control and response plans are also specified to prevent illicit discharges from being conveyed through the stormwater management system.

Consistent with the Massachusetts Stormwater Handbook, a signed Illicit Discharge Compliance Statement will be finalized prior to discharging stormwater to the post-construction stormwater BMP's. A draft copy of the Illicit Discharge Statement is provided (Attachment E).

3.0 SUMMARY

The proposed drainage system and site development plans for the single-family residence conform to the MassDEP Stormwater Management Regulations. The proposed drainage system will treat and remove TSS and other pollutants throughout the project area and minimize erosion. Proper construction and operation and maintenance of the proposed drainage system are critical to its long-term performance. To that end, an Operations and Maintenance Plan and Long-Term Pollution Prevention Plan have been prepared and will be instituted.

ATTACHMENT B

STORMWATER
COMPUTATIONS

- Recharge Volume Calculations
- Water Quality Volume Calculations
- TSS Removal Calculations
- Test Pit Logs
- NRCS Soil Map
- Mounding Calculation

Griffin Engineering Group, LLC
495 Cabot Street, 2nd Floor
Beverly, MA 01915

Phone: 978-927-5111; Fax: 978-927-5103

RECHARGE VOLUME & DESIGN CALCULATIONS

Job Name: 49 Asbury Street
Job No: 2289
Date 7/7/2026
Designer SSM
Checked By: RHG

IMPERVIOUS AREA:

		Total (sf)
Existing		0
Proposed		11,748

Target Depth Factor:
"B" Type Soils
0.35 inches of runoff

MINIMUM RECHARGE REQUIRED:

Volume = (11,748 sf) x (0.35 in) x (1'/12 in) = 343 cf
TOTAL = 343 cf

Infiltration Field 1

Tributary Impervious Area =	7,776 sf	
Minimum Volume Req'd =	227 cf	
Storage Volume Provided =	1,047 cf	**OK**
Impervious Area Tributary to Infiltration BMPs:	7,776 sf	
Percentage of Total Impervious Surfaces:	66.2%	**OK**
Ratio of Total Impervious Area to Tributary Area:	1.51	
Adjusted Min. Required Recharge Volume:	518 cf	
Total Storage Provided:	1,047 cf	**OK**

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WATER QUALITY VOLUME & DESIGN CALCULATIONS

Job Name: 49 Asbury Street
Job No: 2289
Date 7/7/2026
Designer SSM
Checked By: RHG

REQUIRED WATER QUALITY VOLUME (WQv): 0.5 inch

Subsurface Infiltration Field (INF1):

Tributary Impervious Area:	7,776	sf	(ref HydroCAD calculations)
BMP Required WQV:	324	cf	(7,776 sf * 0.5 in) / (12 in / ft)
Provided Storage Volume:	1,047	cf	(below lowest outlet, ref HydroCAD calculations)

Overall Site:

Impervious Area:	11,748	sf	(ref HydroCAD calculations)
Required WQV:	490	cf	(11,748 sf * 0.5 in) / (12 in / ft)
Provided Storage Volume:	1,047	cf	

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: P1a, P2a

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Subsurface Infiltration Structure	**0.80**	**0.75**	**0.60**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**

Total TSS Removal = **85%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 49 Asbury Street

Prepared By:

Date: 7/7/2026

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: P2b

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Infiltration Trench	**0.80**	**1.00**	**0.80**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**

Total TSS Removal = **80%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **49 Asbury Street**

Prepared By:

Date: **7/7/2026**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

Location Address 49 Asbury Street

On-site Review

Deep Hole Number: TP-1-25 **Date:** 6/17/2025 **Time:** 3:30 **Weather:** 65° Cloudy

Location: @ Loam Pile (southeast) **Ground Elevation at Surface of Hole:** 81.7'

Land Use: Pasture **Surface Stones:** None

Vegetation: Topsoil stripped (brush/woods **Landform:**

Slope(%): 5-10%

Distance from:

Open Water Body	feet	Drainage Way	feet
Possible Wet Area	feet	Property Line	100 feet
Drinking Water Well	feet	Other	

DEEP OBSERVATION HOLE LOG

Depth from Surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other Other (Structure, Kind & Grade, Consistency, % Gravel, Stones, Boulders …..)
Topsoil Stripped					
0 - 120"	C	L.S. - Gr. L.S.		--	Ma, Fr. Some cobbles; dry

Parent Material (geologic): **Depth of Bedrock:** >120"

Groundwater Observed: No If Yes: Depth of Weeping from Pit: --

Depth Standing Water in Hole: -- inches

Estimated Seasonal High Groundwater: >10 feet

Location Address 49 Asbury Street

On-site Review

Deep Hole Number: TP-2-25 **Date:** 6/17/2025 **Time:** 3:50 **Weather:** 65° Cloudy

Location: @ Loam Pile (north) **Ground Elevation at Surface of Hole:** 78.0'

Land Use: Pasture **Surface Stones:** None

Vegetation: Topsoil stripped (was grass) **Landform:**

Slope(%): 5-10%

Distance from:

Open Water Body	feet	Drainage Way	feet
Possible Wet Area	feet	Property Line	100 feet
Drinking Water Well	feet	Other	

DEEP OBSERVATION HOLE LOG

Depth from Surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other Other (Structure, Kind & Grade, Consistency, % Gravel, Stones, Boulders …..)
Topsoil Stripped					
0 - 120"	C	Gr. L.S.		--	MA, Fr. Some cobbles; dry; no roots
		w/ C. Sand			

Parent Material (geologic): **Depth of Bedrock:** >120"

Groundwater Observed: No If Yes: Depth of Weeping from Pit: --

Depth Standing Water in Hole: -- inches

Estimated Seasonal High Groundwater: >10 feet

Location Address 49 Asbury Street

On-site Review

Deep Hole Number: TP-3-25 **Date:** 6/17/2025 **Time:** 4:05 **Weather:** 65° Cloudy

Location: North of Boulders **Ground Elevation at Surface of Hole:** 70.7'

Land Use: Pasture **Surface Stones:** None

Vegetation: Topsoil stripped (was grass) **Landform:**

Slope(%): 5-10%

Distance from:

Open Water Body	feet	Drainage Way	feet
Possible Wet Area	feet	Property Line	30 feet
Drinking Water Well	feet	Other	

DEEP OBSERVATION HOLE LOG

Depth from Surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other Other (Structure, Kind & Grade, Consistency, % Gravel, Stones, Boulders …..)
Topsoil Stripped					
0 - 120"	C	Gr. L.S.		--	MA, Fr. Some cobbles; dry

Parent Material (geologic): **Depth of Bedrock:** >120"

Groundwater Observed: No If Yes: Depth of Weeping from Pit: --

Depth Standing Water in Hole: -- inches

Estimated Seasonal High Groundwater: >10 feet

Location Address 49 Asbury Street

On-site Review

Deep Hole Number: TP-4-25 **Date:** 6/17/2025 **Time:** 4:20 **Weather:** 65° Cloudy

Location: Top of hill @ tree (dwy) **Ground Elevation at Surface of Hole:** 87.7'

Land Use: Pasture **Surface Stones:** None

Vegetation: Grass, edge of site **Landform:**

Slope(%): 5-10%

Distance from:

Open Water Body	feet	Drainage Way	feet
Possible Wet Area	feet	Property Line	30 feet
Drinking Water Well	feet	Other	

DEEP OBSERVATION HOLE LOG

Depth from Surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other Other (Structure, Kind & Grade, Consistency, % Gravel, Stones, Boulders …..)
0 - 24"	Fill / A	S. L.		--	MA, Fr.
24 - 84"	C1	S. L.			MA, Fr.
84 - 120"	C2	L / SiL			Ma, Firm, Breaks up into Clods

Parent Material (geologic): **Depth of Bedrock:** >120"

Groundwater Observed: No If Yes: Depth of Weeping from Pit: --

Depth Standing Water in Hole: -- inches

Estimated Seasonal High Groundwater: -- feet

Location Address 49 Asbury Street

On-site Review

Deep Hole Number: TP-5-25 **Date:** 6/17/2025 **Time:** 4:35 **Weather:** 65° Cloudy

Location: @ Dwy fork **Ground Elevation at Surface of Hole:** 78.1'

Land Use: Pasture **Surface Stones:** None

Vegetation: Grass, edge of site **Landform:**

Slope(%): 5-10%

Distance from:

Open Water Body	feet	Drainage Way	feet
Possible Wet Area	feet	Property Line	25 feet
Drinking Water Well	feet	Other	

DEEP OBSERVATION HOLE LOG

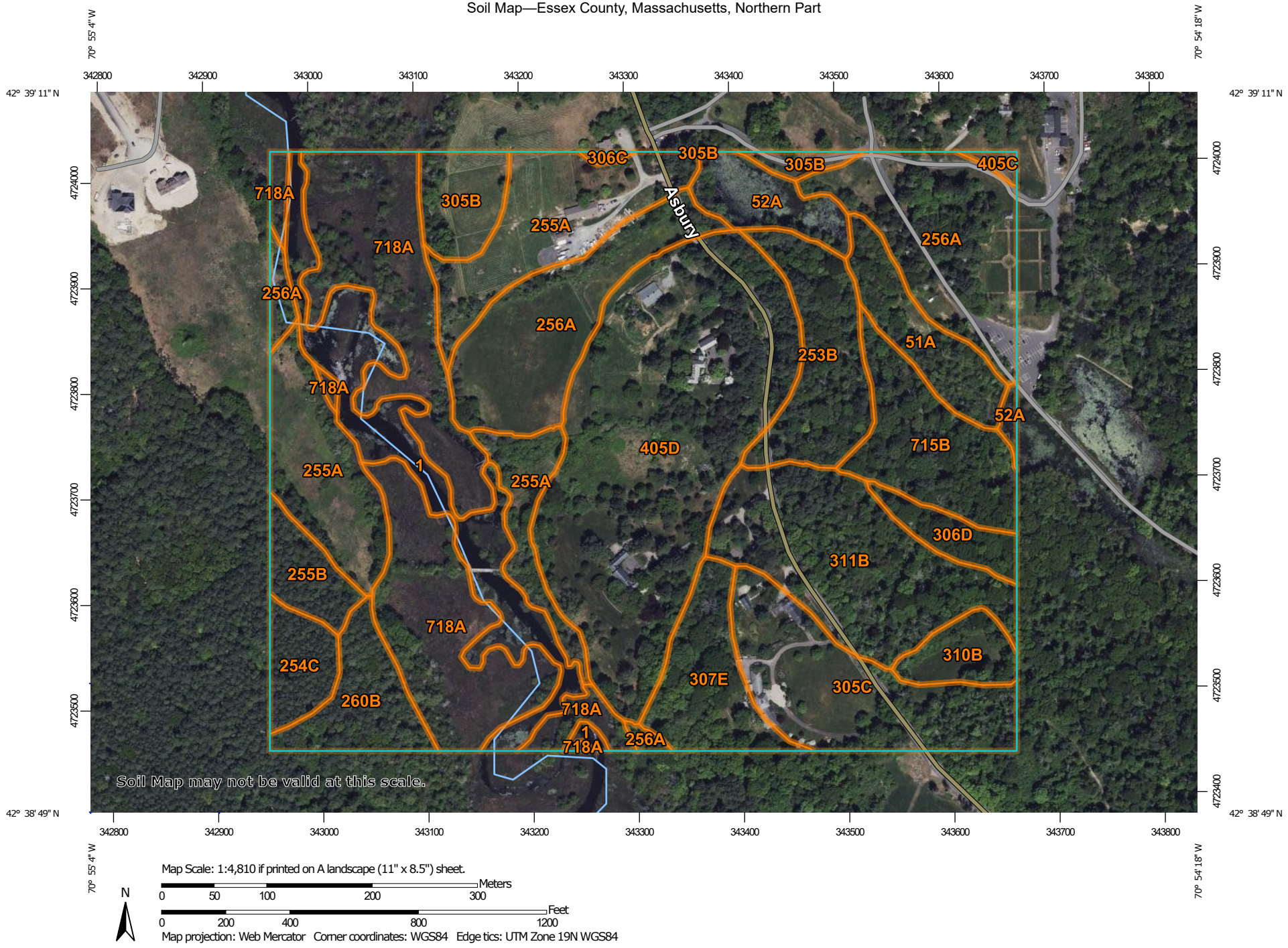
Depth from Surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other Other (Structure, Kind & Grade, Consistency, % Gravel, Stones, Boulders …..)
0 - 18"	Fill / A	L.S. - Gr. L.S.		--	Ma Fr.
18 - 38"	B/C	S. L.			Ma Fr. V. Cobbly
38 - 120"	C	L. / SiL		M @ 60"	MA, Firm, Damp @ 8'; No WTR

Parent Material (geologic): **Depth of Bedrock:** > 120"

Groundwater Observed: No If Yes: Depth of Weeping from Pit: --

Depth Standing Water in Hole: -- inches

Estimated Seasonal High Groundwater: 5 feet



Map Scale: 1:4,810 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

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 1:15,800.

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: Essex County, Massachusetts, Northern Part
Survey Area Data: Version 20, Aug 27, 2024

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	6.0	6.0%
51A	Swansea muck, 0 to 1 percent slopes	2.6	2.6%
52A	Freetown muck, 0 to 1 percent slopes	2.2	2.2%
253B	Hinckley loamy sand, 3 to 8 percent slopes	4.0	4.0%
254C	Merrimac fine sandy loam, 8 to 15 percent slopes	1.5	1.5%
255A	Windsor loamy sand, 0 to 3 percent slopes	10.7	10.7%
255B	Windsor loamy sand, 3 to 8 percent slopes	1.5	1.5%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	12.0	12.0%
260B	Sudbury fine sandy loam, 3 to 8 percent slopes	2.6	2.6%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	2.3	2.3%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	6.1	6.1%
306C	Paxton fine sandy loam, 8 to 15 percent slopes, very stony	0.1	0.1%
306D	Paxton fine sandy loam, 15 to 25 percent slopes, very stony	1.2	1.2%
307E	Paxton fine sandy loam, 25 to 35 percent slopes, extremely stony	3.3	3.3%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	1.4	1.4%
311B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	7.5	7.5%
405C	Charlton fine sandy loam, 8 to 15 percent slopes	0.2	0.2%
405D	Charlton fine sandy loam, 15 to 25 percent slopes	16.9	16.9%
715B	Ridgebury and Leicester fine sandy loams, 3 to 8 percent slopes, extremely stony	4.1	4.1%
718A	Saco variant silt loam, frequently ponded, 0 to 1 percent slopes, frequently flooded	13.6	13.6%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Totals for Area of Interest		**100.0**	**100.0%**

Calculator 9 - Groundwater Mounding Calculator

GROUNDWATER MOUND UNDER A RECTANGULAR RECHARGE AREA

Using the Hantush (1967)Derivation

Back to Calculators

The equation representing the groundwater mound beneath a rectangular recharge area is given by:

$$h_m^2 - h_i^2 = (2w/K)vtS^*((0.5L/(\sqrt{4vt})),(0.5W/(\sqrt{4vt})))$$

where:

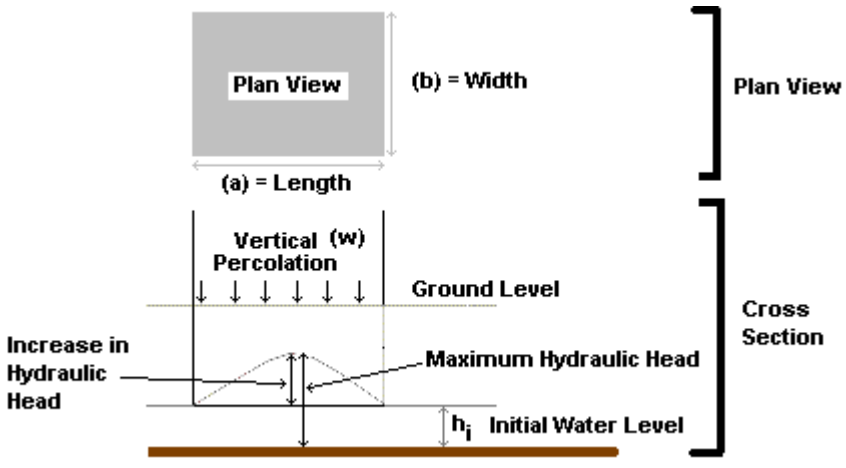
$$v = K\bar{b}/\varepsilon$$

$$\bar{b} = 0.5(h_i(0) + h(t))$$

where h_m is the maximum height of the mound; h_i is the initial height of the water table; w is the recharge or percolation rate; K is the hydraulic conductivity; t is the time of interest; L and W are the length and width of the rectangular recharge area, and ε is the specific yield of the aquifer. S* is an integral equation given by:

$$S^*(\alpha,\beta) = \int_0^1 erf(\frac{\alpha}{\sqrt{T}}) \bullet erf(\frac{\beta}{\sqrt{T}}) dT$$

This equation is estimated in the calculator by using a table of values given by Hantush (1967).



w (Percolation Rate): 2.04 **[L/T]*K (Hydraulic Conductivity)*:** 4 **[L/T]*S***

(Specific Yield): 22 **[-]*t*(Time):** 2 **[T]h_i**

(Initial Saturated Thickness): .1 **[L]*a (Length of Recharge Area)*:** 40 **[L]*b***
(Width of Recharge Area): 4 **[L]**

****KEEP UNITS CONSISTENT****

Calculate

GRIFFIN ENGINEERING INPUT NOTES:
SANDY LOAM RAWLS RATE = 1.02 IN/HR (2.04 FT/DAY)
SANDY LOAM K = 14.11 UM/S (4 FT/DAY)
TIME = 2 DAYS (ASSUMED STORM + DRAWDOWN TIME)
INITIAL SATURATION = 0.1 FT (NO OBSERVED GROUNDWATER)

Results

****Note that because of estimations of an integral function, this is an estimate****

Maximum hydraulic head: 0.28545451 **[L]Increase in hydraulic head:** 0.18545451 **[L]**

Hantush, M.S.(1967). *Growth and Decay of Groundwater-Mounds in Response to Uniform Percolation*, Water Resources Research vol. 3, no.1, pp 227-234.

Example:

Whatis the maximum mounding at the water table if 1000 liters/day of wateris discharged on an area 3 x 4 m after 2 days (all water infiltrates). Given a hydraulic conductivity of 1 x10^{-6} m/s, and specific yield of 0.01 and an initial saturated thickness of 2 m.

Your results should yield a maximum hydraulic head of approximately 3.3 m and an increase in hydraulic head of 1.3 m.

What might have gone wrong?

- converting from 1000 liters/day to m/day. Convert to m3/day using 1000 liters/m3, then divide by area to get the m/day of water infiltrating. This value should be approximately 0.08 m/day

-converting the hydraulic conductivity to units of m/day. This value should be approximately 0.086

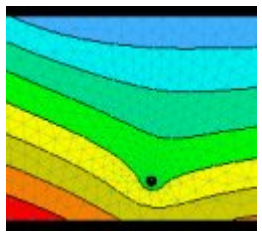
Summary
Inputs
w = 0.08 m/day, K = 0.086m/day, S=0.01, t = 2 days, hi = 2 m, a = 3m, b= 4 m

Results

Maximum hydraulic head = 3.3 m
Increase in hydraulic head = 1.3 m

You can also perform mounding calculations with graphical display using:

Hydrus
Saturated/Unsaturated Flow & Transport Model



GroundwaterSoftware.com

Home Calculator
Equipment Contact
Software

Address
520
Chicopee
Row Groton,
MA, 01450

Phone
(978) 502-6001

ATTACHMENT C

LONG-TERM
POLLUTION PREVENTION
PLAN

Long-Term Pollution Prevention Plan

Standard #4 of the MA DEP Stormwater Management Handbook requires that a Long-Term Pollution Prevention Plan (LTPPP) be prepared and incorporated into the long-term operation and maintenance plan of the projects stormwater management system. The purpose of the LTPPP is to identify potential sources of pollution that may affect the quality of stormwater discharges and to describe suggested practices to reduce pollutants in stormwater discharges.

Good housekeeping practices - The subject property owner is to keep the site in a neat and orderly condition so that pollutants are not conveyed to the stormwater drainage system. Materials swept, blown or washed into the system can decrease the system's effectiveness. Some examples of good housekeeping practices are pavement sweeping, litter control, contained outdoor waste and proper cigarette disposal, and protected material storage areas. The property owner should assign responsibilities to personnel to keep the property in a neat and orderly condition.

Provisions for storing materials and waste products inside or under cover – There are no exterior (uncovered) storage areas associated with the project site.

Requirements for routine inspections and maintenance of stormwater BMP's - Consistent with Standard 9 of the Massachusetts Stormwater Management Regulations, an Operation and Maintenance Plan has been provided in the Stormwater Management Report. The plan details routine inspection and maintenance of the stormwater BMP's along with associated record keeping forms.

Spill prevention and response plans – Sources of potential spill hazards include vehicle fluids and fuels, pesticides, paints, solvents, and liquid cleaning products. The majority of the spill hazards would likely occur within the building and would not enter the stormwater drainage system. However, there are spill hazards from vehicle fluids and fuels located outside of the buildings. These exterior spill hazards have the potential to enter the stormwater drainage system and are to be addressed as follows:

1) Spill hazards of pesticides, paints, and solvents shall be remediated using the Manufacturers' recommended spill cleanup protocol.
2) Vehicle fluid and fuel spills shall be remediated according to local and state regulations governing fuel spills.
3) The property owners shall have the following equipment and materials on hand to address a spill clean-up: brooms, dust-pans, mops, rags, gloves, trash bags, and trash containers.
4) Spills of toxic or hazardous materials shall be reported to the Massachusetts Department of Environmental Protection at 1-888-304-1133.

Provisions for maintenance of lawns, garden, and other landscaped areas - It should be a general goal of the subject property owner to achieve a high quality of well-groomed and stable landscape that evolves throughout the changing seasons and overall condition of the property. All landscaped areas are to be maintained with dense vegetative growth or a layer of mulch so as to minimize sediment transport. Litter and waste is to be removed weekly from these areas and disposed of properly.

Requirements for storage and use of fertilizer, herbicides, and pesticides - Fertilizers, herbicides, and pesticides are not to be stored on site or within the buildings. Should use of same become necessary, application should be performed by a state licensed contractor in accordance with the manufacturer's label instruction and when environmental conditions are conducive to product application. Chemical controls should be used as a last resort to organic and biological control methods.

Pet waste management provisions - All pet waste is to be scooped up, sealed in a plastic bag, and disposed of properly in the garbage. Never deposit pet waste in the stormwater management system for it contains high levels of bacteria.

Provisions for operation and management of septic systems – The on-site septic system should be inspected and maintained on a regular basis. Discharge or ponding of effluent at the ground surface may indicate system failure and should be resolved immediately.

Snow disposal and deicing chemicals – The property owner will be responsible for the clearing of their individual driveways and building entrances. The owner may be required to use a de-icing agent such as salt or calcium chloride to maintain a safe walking surface. The de-icing agent for the walkways and building entrances should be kept on site within a building (i.e. garage).

ATTACHMENT D

OPERATION
& MAINTENANCE
PLAN

OPERATION & MAINTENANCE PLAN

49 Asbury Street Residential Development

System Owner:

Landmark Utilities and Site Excavation Corp. (or Successor)

Party Responsible for O&M:

The homeowner will be responsible for the operation and maintenance of the on-site stormwater management features as outlined in this Operation and Maintenance (O&M) Plan. Should ownership of the property change, the succeeding owners shall have those responsibilities.

Note: The system inspectors should note that drainage pipes, manholes, and treatment devices are considered "confined spaces" subject to strict OSHA standards regarding safe entry. Confined spaces present inherent hazards to workers. Only appropriately trained staff with appropriate safety equipment and monitors may enter confined spaces, and then only with a specific entry permit. Also, this work may pose hazards to workers, such as soft ground, flowing or standing water, snakes and rodents. Again, only appropriately trained staff with the necessary safety equipment should undertake such work.

Post-Development Operation and Maintenance

The stormwater management system consists of a series of subsurface infiltration structures. Roof runoff is conveyed to an infiltration field via gutters, downspouts, and PVC roof leaders. Stormwater from the proposed driveway is directed into a deep-sump catchbasin and separate infiltration field.

Inspection of the drainage system components are to be performed by the System Owner or their designee during the first year of operation on a quarterly basis. The inspection frequency can be reduced after the first year to annual inspections provided that the quarterly inspections do not indicate the need for more frequent inspections. If more frequent inspections become appropriate at any time, they should be implemented. Inspections should be documented by taking necessary notes, measurements, photographs, and retaining service receipts. The following inspections are required of the system owner:

Subsurface Infiltration– The stormwater infiltration field and trench have been provided with inspection ports. Initially inspect after each major storm event (greater than 1-inch) to ensure proper function and stabilization. Record the water level over several hours to check performance. After the first year, inspect the infiltration field on a semi-annual basis. Inspect for apparent signs of silt buildup or clogging.

POST-CONSTRUCTION MAINTENANCE INSPECTION FORM

49 Asbury Street Residential Development

Inspections/reports must be completed quarterly for the first year of operation. Inspection frequency can be reduced after the first year to annual inspections provided that the quarterly inspections do not indicate the need for more frequent inspections.

Inspection Type:

- ☐ **Quarterly Inspection**
- ☐ **Annual Inspection**
- ☐ **Emergency Inspection**
  (i.e. Ponding, Flooding, and/or Severe Erosion)

Date: _____

Weather Conditions: _____

BMP Inspection Areas	Satisfactory	Unsatisfactory	Comments/Corrective Action Required
Catchbasins, Manholes & Piping			
Subsurface Infiltration Field			
Downspouts & Roof Leaders			
Infiltration Trench			
Other Necessary Controls			

Site Notes:

MAINTENANCE AGREEMENT

Inspections:

At approximately quarterly intervals for the first year and annually intervals thereafter, visually inspect the gutters, downspouts, and infiltration structures at 49 Asbury Street, as generally described in the Operation and Maintenance Plan prepared by Griffin Engineering Group. Document the inspections by using the Post-Construction Inspection Form.

_____

Signature Date

ATTACHMENT E

ILLICIT
DISCHARGE
STATEMENT

ILLICIT DISCHARGE COMPLIANCE STATEMENT

I verify that no illicit discharges exist from the 49 Asbury Street residential development. Through the implementation of Long-Term Pollution Prevention Plan and Operation and Maintenance Plan, measures are set forth to prevent illicit discharges from entering the stormwater management drainage system.

Signature	Print Name	Date
Title	Company	
Signature	Print Name	Date
Title	Company	

Note: This certification must be signed before stormwater is conveyed to the proposed stormwater drainage system in accordance with Standard 10 of the Massachusetts Stormwater Management Standards.

ATTACHMENT F

STORMWATER
ANALYSIS

- Subcatchment Plans, DR-1 & DR-2
  (Reduced Size, 11x17)
- HydroCAD Calculations
  (2-, 10-, 25-, & 100-Year Storm Events)

MAP 28 LOT 7
N/F
COKE
41 ASBURY STREET

Stone Bound
W/Drill Hole
(Fnd)

S82°27'06"W
143.29'

Iron Pipe
(Fnd)

R=800.00'
L=13.19'

Stone Bound
Center Back
(Fnd)

EXIST. CB
RIM=72.56'

ASBURY STREET
PUBLIC - VARIABLE WIDTH

N00°51'56"E
145.39'

Post & Rail Fence

30"

36"

RIVERFRONT AREA
(200' OUTER RIPARIAN)

S82°27'06"W
663.71'

MAP 28 LOT 6
49 ASBURY STREET
187,680 SQ.FT.
4.31 ACRES

E1

E2

WOODS

BOULDER
RETAINING
WALL
(TYP.)

SEPTIC
LEACH
FIELD

SEPTIC
TANK

PORCH

RETAINING
WALL
(TYP.)

APPROX.
POTABLE
WELL

Iron Rod
W/Cap
(Fnd)

6" DI CULVERT
I(IN)=75.5'±
I(OUT)=75.0'±

Iron Rod
W/Cap
(Set)

1

N72°08'57"E
225.41'

N89°10'55"E
314.49'

Iron Rod
W/Cap
(Fnd)

Bit. Drive

IPSWICH
RIVER

FEMA
100-YEAR
FLOOD ZONE
(BFE=35')

FEMA
500-YEAR
FLOOD ZONE

RIVERFRONT AREA
(100' INNER RIPARIAN)

S20°30'54"E
372.89'

FEMA
FLOODWAY

MAP 28 LOT 5
N/F
GRIEVE
51R ASBURY STREET

BORDERING
VEGETATED
WETLAND

MAP 28 LOT 4
N/F
GRIEVE
51 ASBURY STREET

N39°34'44"E
221.26'

FEMA
100-YEAR
FLOOD ZONE
(BFE=35')

100' BUFFER ZONE
TO BVW

N

W E

MA STATE PLANE

SITE PLAN

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

No.	Date	Description
1	7/31/25	REMOVE EXTRA LINEWORK.

Revisions

Griffin Engineering Group, LLC

495 Cabot Street, 2nd Floor
Beverly, MA 01915

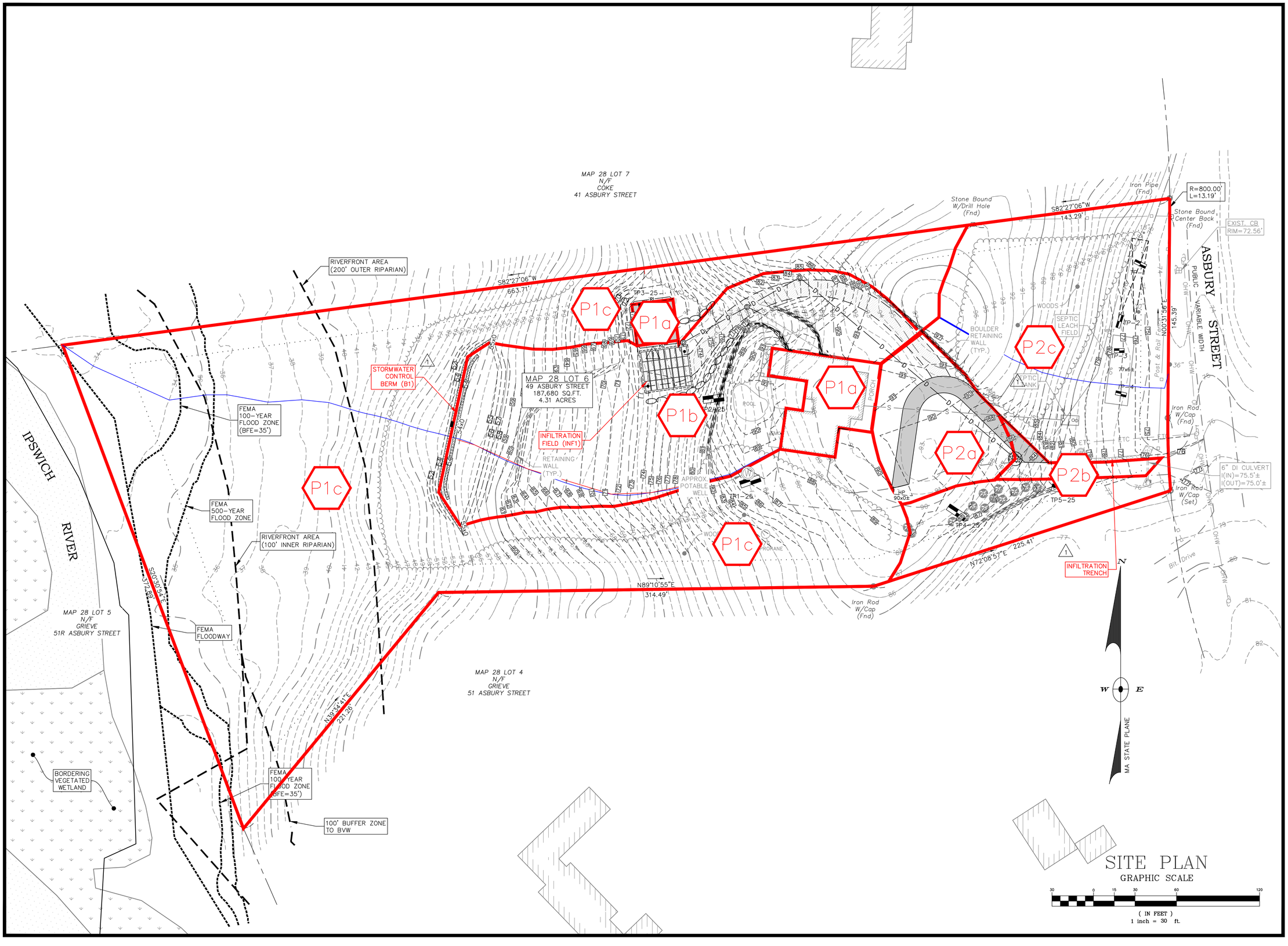
Tel: 978-927-5111
Fax: 978-927-5103

CLARK
49 ASBURY STREET
TOPSFIELD, MA

EXISTING
SUBCATCHMENT
PLAN

Scale: 1"=30'
Job No: 2289
Date: 7/2/25

DR-1



SITE PLAN

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

No.	Date	Description
2	7/7/26	RELOCATE INF. FIELDS
1	7/31/25	ADD BMP ANNONATIONS.

Revisions

Griffin Engineering Group, LLC

495 Cabot Street, 2nd Floor
Beverly, MA 01915

Tel: 978-927-5111
Fax: 978-927-5103

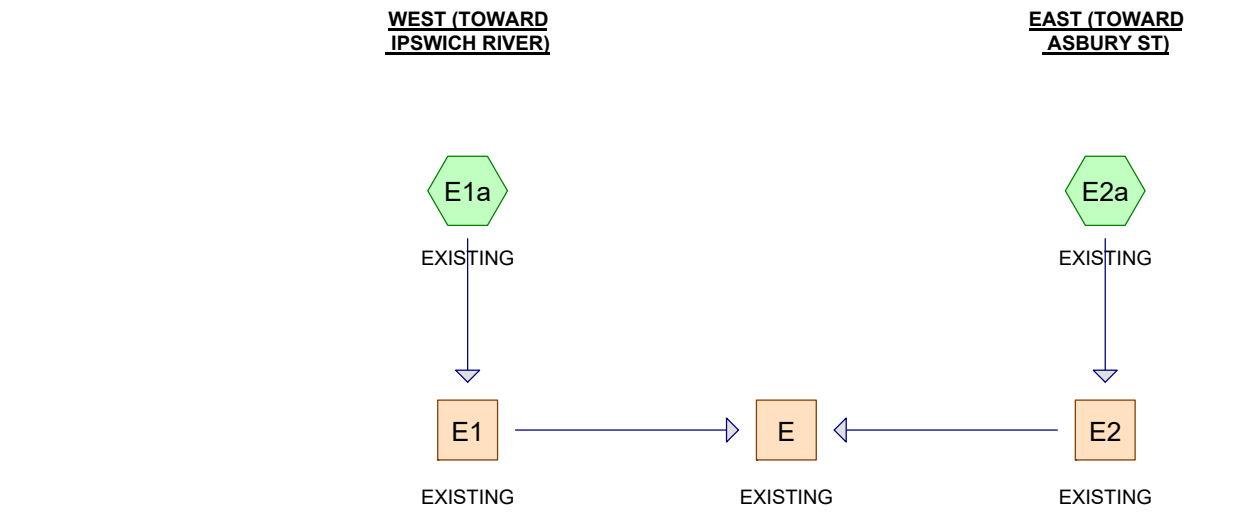
CLARK
49 ASBURY STREET
TOPSFIELD, MA

PROPOSED
SUBCATCHMENT
PLAN

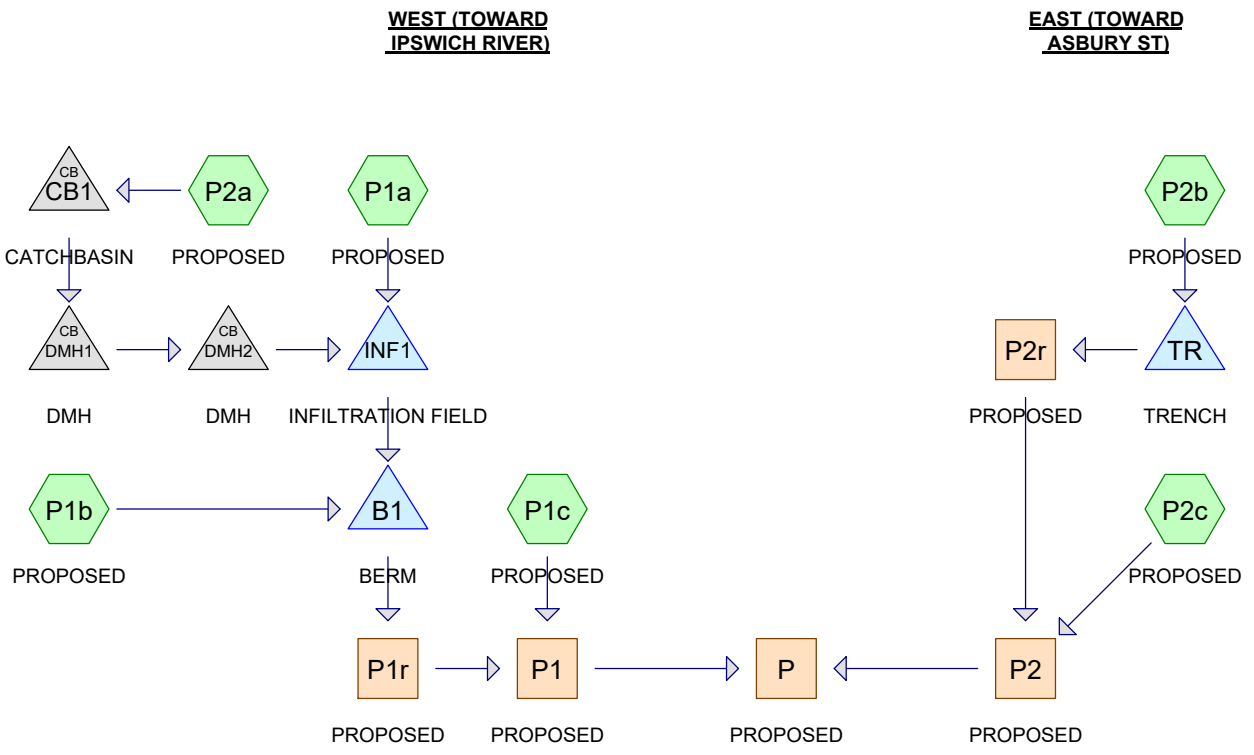
Scale: 1"=30'
Job No: 2289
Date: 7/2/25

DR-2

EXISTING



PROPOSED



Subcat Reach Pond Link

Routing Diagram for Clark-49AsburySt(Rev2)-2026
Prepared by Griffin Engineering, LLC, Printed 7/7/2026

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	NRCC 24-hr	D	Default	24.00	1	3.15	2
2	10-Year	NRCC 24-hr	D	Default	24.00	1	4.83	2
3	25-Year	NRCC 24-hr	D	Default	24.00	1	6.16	2
4	100-Year	NRCC 24-hr	D	Default	24.00	1	8.94	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
28,454	61	>75% Grass cover, Good, HSG B (P2a, P2c)
4,568	98	Driveway, Paved (P2a, P2b, P2c)
3,763	85	Gravel roads, HSG B (P1b, P2a)
152,969	61	Pasture/grassland/range, Good, HSG B (E1a, E2a, P1b, P1c)
2,169	98	Paved parking, HSG B (P1c)
900	98	Roof (Barn) (P1a)
4,106	98	Roof (Residence) (P1a)
178,419	58	Woods/grass comb., Good, HSG B (E1a, E2a, P1c, P2c)
375,348	**61**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
365,774	HSG B	E1a, E2a, P1b, P1c, P2a, P2c
0	HSG C	
0	HSG D	
9,574	Other	P1a, P2a, P2b, P2c
375,348		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
0	28,454	0	0	0	28,454	>75% Grass cover, Good
0	0	0	0	4,568	4,568	Driveway, Paved
0	3,763	0	0	0	3,763	Gravel roads
0	152,969	0	0	0	152,969	Pasture/grassland /range, Good
0	2,169	0	0	0	2,169	Paved parking
0	0	0	0	900	900	Roof (Barn)
0	0	0	0	4,106	4,106	Roof (Residence)
0	178,419	0	0	0	178,419	Woods/grass comb., Good
0	**365,774**	**0**	**0**	**9,574**	**375,348**	**TOTAL AREA**

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E1a: EXISTING Runoff Area=148,546 sf 0.00% Impervious Runoff Depth=0.36"
Flow Length=658' Tc=13.1 min CN=59 Runoff=0.52 cfs 4,404 cf

Subcatchment E2a: EXISTING Runoff Area=39,128 sf 0.00% Impervious Runoff Depth=0.39"
Flow Length=235' Tc=6.3 min CN=60 Runoff=0.23 cfs 1,268 cf

Subcatchment P1a: PROPOSED Runoff Area=5,006 sf 100.00% Impervious Runoff Depth=2.92"
Tc=6.0 min CN=98 Runoff=0.31 cfs 1,217 cf

Subcatchment P1b: PROPOSED Runoff Area=34,022 sf 0.00% Impervious Runoff Depth=0.50"
Flow Length=313' Tc=6.0 min CN=63 Runoff=0.32 cfs 1,410 cf

Subcatchment P1c: PROPOSED Runoff Area=105,108 sf 2.06% Impervious Runoff Depth=0.39"
Flow Length=613' Tc=10.4 min CN=60 Runoff=0.50 cfs 3,408 cf

Subcatchment P2a: PROPOSED Runoff Area=8,250 sf 33.58% Impervious Runoff Depth=1.06"
Tc=6.0 min CN=75 Runoff=0.21 cfs 729 cf

Subcatchment P2b: PROPOSED Runoff Area=1,665 sf 100.00% Impervious Runoff Depth=2.92"
Tc=6.0 min CN=98 Runoff=0.10 cfs 405 cf

Subcatchment P2c: PROPOSED Runoff Area=33,623 sf 0.40% Impervious Runoff Depth=0.39"
Flow Length=184' Tc=7.3 min CN=60 Runoff=0.19 cfs 1,090 cf

Reach E: EXISTING Inflow=0.66 cfs 5,672 cf
Outflow=0.66 cfs 5,672 cf

Reach E1: EXISTING Inflow=0.52 cfs 4,404 cf
Outflow=0.52 cfs 4,404 cf

Reach E2: EXISTING Inflow=0.23 cfs 1,268 cf
Outflow=0.23 cfs 1,268 cf

Reach P: PROPOSED Inflow=0.70 cfs 4,593 cf
Outflow=0.70 cfs 4,593 cf

Reach P1: PROPOSED Inflow=0.50 cfs 3,408 cf
Outflow=0.50 cfs 3,408 cf

Reach P1r: PROPOSED Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0 cf
n=0.080 L=300.0' S=0.0633 '/' Capacity=99.70 cfs Outflow=0.00 cfs 0 cf

Reach P2: PROPOSED Inflow=0.20 cfs 1,185 cf
Outflow=0.20 cfs 1,185 cf

Reach P2r: PROPOSED Avg. Flow Depth=0.02' Max Vel=0.19 fps Inflow=0.10 cfs 95 cf
n=0.080 L=100.0' S=0.0200 '/' Capacity=3.23 cfs Outflow=0.04 cfs 95 cf

Pond B1: BERM Peak Elev=54.09' Storage=195 cf Inflow=0.32 cfs 1,410 cf
Discarded=0.09 cfs 1,410 cf Primary=0.00 cfs 0 cf Outflow=0.09 cfs 1,410 cf

Pond CB1: CATCHBASIN Peak Elev=82.24' Inflow=0.21 cfs 729 cf
10.0" Round Culvert n=0.010 L=200.0' S=0.0200 '/' Outflow=0.21 cfs 729 cf

Pond DMH1: DMH Peak Elev=78.24' Inflow=0.21 cfs 729 cf
10.0" Round Culvert n=0.010 L=90.0' S=0.0667 '/' Outflow=0.21 cfs 729 cf

Pond DMH2: DMH Peak Elev=72.24' Inflow=0.21 cfs 729 cf
10.0" Round Culvert n=0.010 L=84.0' S=0.0833 '/' Outflow=0.21 cfs 729 cf

Pond INF1: INFILTRATION FIELD Peak Elev=65.19' Storage=447 cf Inflow=0.53 cfs 1,946 cf
Discarded=0.07 cfs 1,946 cf Primary=0.00 cfs 0 cf Outflow=0.07 cfs 1,946 cf

Pond TR: TRENCH Peak Elev=76.94' Storage=109 cf Inflow=0.10 cfs 405 cf
Discarded=0.00 cfs 310 cf Primary=0.10 cfs 95 cf Outflow=0.10 cfs 405 cf

Total Runoff Area = 375,348 sf Runoff Volume = 13,930 cf Average Runoff Depth = 0.45"
96.87% Pervious = 363,605 sf 3.13% Impervious = 11,743 sf

Summary for Subcatchment E1a: EXISTING

Runoff = 0.52 cfs @ 12.27 hrs, Volume= 4,404 cf, Depth= 0.36"
Routed to Reach E1 : EXISTING

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

Area (sf)	CN	Description
63,469	61	Pasture/grassland/range, Good, HSG B
85,077	58	Woods/grass comb., Good, HSG B
148,546	59	Weighted Average
148,546		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.15"
0.5	63	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.7	65	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.5	233	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.1	247	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.1	658	Total			

Summary for Subcatchment E2a: EXISTING

Runoff = 0.23 cfs @ 12.16 hrs, Volume= 1,268 cf, Depth= 0.39"
Routed to Reach E2 : EXISTING

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

Area (sf)	CN	Description
27,290	61	Pasture/grassland/range, Good, HSG B
11,838	58	Woods/grass comb., Good, HSG B
39,128	60	Weighted Average
39,128		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.0800	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.15"
1.6	185	0.0780	1.95		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.3	235	Total			

Summary for Subcatchment P1a: PROPOSED

Runoff = 0.31 cfs @ 12.13 hrs, Volume= 1,217 cf, Depth= 2.92"
Routed to Pond INF1 : INFILTRATION FIELD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

	Area (sf)	CN	Description
*	4,106	98	Roof (Residence)
*	900	98	Roof (Barn)
	5,006	98	Weighted Average
	5,006		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 (MIN.)**

Summary for Subcatchment P1b: PROPOSED

Runoff = 0.32 cfs @ 12.15 hrs, Volume= 1,410 cf, Depth= 0.50"
Routed to Pond B1 : BERM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

	Area (sf)	CN	Description
	3,355	85	Gravel roads, HSG B
*	30,667	61	Pasture/grassland/range, Good, HSG B
	34,022	63	Weighted Average
	34,022		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.15"
0.4	63	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	200	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.0	313	Total			

Summary for Subcatchment P1c: PROPOSED

Runoff = 0.50 cfs @ 12.22 hrs, Volume= 3,408 cf, Depth= 0.39"
Routed to Reach P1 : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

Area (sf)	CN	Description
71,396	58	Woods/grass comb., Good, HSG B
31,543	61	Pasture/grassland/range, Good, HSG B
2,169	98	Paved parking, HSG B
105,108	60	Weighted Average
102,939		97.94% Pervious Area
2,169		2.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.15"
0.4	63	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.6	253	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.1	247	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.4	613	Total			

Summary for Subcatchment P2a: PROPOSED

Runoff = 0.21 cfs @ 12.14 hrs, Volume= 729 cf, Depth= 1.06"
Routed to Pond CB1 : CATCHBASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

	Area (sf)	CN	Description
*	2,770	98	Driveway, Paved
	5,072	61	>75% Grass cover, Good, HSG B
	408	85	Gravel roads, HSG B
	8,250	75	Weighted Average
	5,480		66.42% Pervious Area
	2,770		33.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 (MIN.)**

Summary for Subcatchment P2b: PROPOSED

Runoff = 0.10 cfs @ 12.13 hrs, Volume= 405 cf, Depth= 2.92"
Routed to Pond TR : TRENCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

	Area (sf)	CN	Description
*	1,665	98	Driveway, Paved
	1,665		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 (MIN.)**

Summary for Subcatchment P2c: PROPOSED

Runoff = 0.19 cfs @ 12.17 hrs, Volume= 1,090 cf, Depth= 0.39"
Routed to Reach P2 : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

	Area (sf)	CN	Description
*	133	98	Driveway, Paved
	23,382	61	>75% Grass cover, Good, HSG B
	10,108	58	Woods/grass comb., Good, HSG B
	33,623	60	Weighted Average
	33,490		99.60% Pervious Area
	133		0.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.1100	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.15"
0.4	53	0.1900	2.18		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	81	0.0900	2.10		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.3	184	Total			

Summary for Reach E: EXISTING

Inflow Area = 187,674 sf, 0.00% Impervious, Inflow Depth = 0.36" for 2-Year event
Inflow = 0.66 cfs @ 12.25 hrs, Volume= 5,672 cf
Outflow = 0.66 cfs @ 12.25 hrs, Volume= 5,672 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach E1: EXISTING

Inflow Area = 148,546 sf, 0.00% Impervious, Inflow Depth = 0.36" for 2-Year event
Inflow = 0.52 cfs @ 12.27 hrs, Volume= 4,404 cf
Outflow = 0.52 cfs @ 12.27 hrs, Volume= 4,404 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach E : EXISTING

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach E2: EXISTING

Inflow Area = 39,128 sf, 0.00% Impervious, Inflow Depth = 0.39" for 2-Year event
Inflow = 0.23 cfs @ 12.16 hrs, Volume= 1,268 cf
Outflow = 0.23 cfs @ 12.16 hrs, Volume= 1,268 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach E : EXISTING

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach P: PROPOSED

Inflow Area = 187,674 sf, 6.26% Impervious, Inflow Depth = 0.29" for 2-Year event
Inflow = 0.70 cfs @ 12.21 hrs, Volume= 4,593 cf
Outflow = 0.70 cfs @ 12.21 hrs, Volume= 4,593 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach P1: PROPOSED

Inflow Area = 152,386 sf, 6.53% Impervious, Inflow Depth = 0.27" for 2-Year event
Inflow = 0.50 cfs @ 12.22 hrs, Volume= 3,408 cf
Outflow = 0.50 cfs @ 12.22 hrs, Volume= 3,408 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach P : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach P1r: PROPOSED

Inflow Area = 47,278 sf, 16.45% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach P1 : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 99.70 cfs

10.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 20.0 '/' Top Width= 50.00'
Length= 300.0' Slope= 0.0633 '/'
Inlet Invert= 53.00', Outlet Invert= 34.00'

‡

Summary for Reach P2: PROPOSED

Inflow Area = 35,288 sf, 5.10% Impervious, Inflow Depth = 0.40" for 2-Year event
Inflow = 0.20 cfs @ 12.19 hrs, Volume= 1,185 cf
Outflow = 0.20 cfs @ 12.19 hrs, Volume= 1,185 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach P : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach P2r: PROPOSED

Inflow Area = 1,665 sf,100.00% Impervious, Inflow Depth = 0.69" for 2-Year event
Inflow = 0.10 cfs @ 12.19 hrs, Volume= 95 cf
Outflow = 0.04 cfs @ 12.27 hrs, Volume= 95 cf, Atten= 58%, Lag= 4.5 min
Routed to Reach P2 : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.19 fps, Min. Travel Time= 8.8 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 24.4 min

Peak Storage= 21 cf @ 12.27 hrs
Average Depth at Peak Storage= 0.02' , Surface Width= 10.82'
Bank-Full Depth= 0.25' Flow Area= 3.8 sf, Capacity= 3.23 cfs

10.00' x 0.25' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 20.0 '/' Top Width= 20.00'
Length= 100.0' Slope= 0.0200 '/'
Inlet Invert= 76.00', Outlet Invert= 74.00'

‡

Summary for Pond B1: BERM

Inflow Area = 47,278 sf, 16.45% Impervious, Inflow Depth = 0.36" for 2-Year event
Inflow = 0.32 cfs @ 12.15 hrs, Volume= 1,410 cf
Outflow = 0.09 cfs @ 12.56 hrs, Volume= 1,410 cf, Atten= 72%, Lag= 24.9 min
Discarded = 0.09 cfs @ 12.56 hrs, Volume= 1,410 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Reach P1r : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 54.09' @ 12.56 hrs Surf.Area= 1,585 sf Storage= 195 cf
Flood Elev= 55.00' Surf.Area= 3,000 sf Storage= 2,105 cf

Plug-Flow detention time= 49.4 min calculated for 1,408 cf (100% of inflow)
Center-of-Mass det. time= 49.6 min (998.7 - 949.0)

Volume	Invert	Avail.Storage	Storage Description
#1	54.00'	2,025 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
#2	53.00'	80 cf	**2.00'W x 100.00'L x 1.00'H Prismatoid** 200 cf Overall x 40.0% Voids
		2,105 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
54.00	1,250	0	0
55.00	2,800	2,025	2,025

Device	Routing	Invert	Outlet Devices
#1	Primary	54.50'	**3.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	53.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.09 cfs @ 12.56 hrs HW=54.09' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=53.00' TW=53.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond CB1: CATCHBASIN

Inflow Area = 8,250 sf, 33.58% Impervious, Inflow Depth = 1.06" for 2-Year event
Inflow = 0.21 cfs @ 12.14 hrs, Volume= 729 cf
Outflow = 0.21 cfs @ 12.14 hrs, Volume= 729 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.21 cfs @ 12.14 hrs, Volume= 729 cf
Routed to Pond DMH1 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 82.24' @ 12.14 hrs
Flood Elev= 86.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	82.00'	**10.0" Round Culvert** L= 200.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 82.00' / 78.00' S= 0.0200 '/' Cc= 0.900 n= 0.010, Flow Area= 0.55 sf

Primary OutFlow Max=0.20 cfs @ 12.14 hrs HW=82.23' TW=78.23' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.20 cfs @ 1.64 fps)

Summary for Pond DMH1: DMH

Inflow Area = 8,250 sf, 33.58% Impervious, Inflow Depth = 1.06" for 2-Year event
Inflow = 0.21 cfs @ 12.14 hrs, Volume= 729 cf
Outflow = 0.21 cfs @ 12.14 hrs, Volume= 729 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.21 cfs @ 12.14 hrs, Volume= 729 cf
Routed to Pond DMH2 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 78.24' @ 12.14 hrs
Flood Elev= 89.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	78.00'	**10.0" Round Culvert** L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 78.00' / 72.00' S= 0.0667 '/' Cc= 0.900 n= 0.010, Flow Area= 0.55 sf

Primary OutFlow Max=0.20 cfs @ 12.14 hrs HW=78.23' TW=72.23' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.20 cfs @ 1.64 fps)

Summary for Pond DMH2: DMH

Inflow Area = 8,250 sf, 33.58% Impervious, Inflow Depth = 1.06" for 2-Year event
Inflow = 0.21 cfs @ 12.14 hrs, Volume= 729 cf
Outflow = 0.21 cfs @ 12.14 hrs, Volume= 729 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.21 cfs @ 12.14 hrs, Volume= 729 cf
Routed to Pond INF1 : INFILTRATION FIELD

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 72.24' @ 12.14 hrs
Flood Elev= 75.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	72.00'	**10.0" Round Culvert** L= 84.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 72.00' / 65.00' S= 0.0833 '/' Cc= 0.900 n= 0.010, Flow Area= 0.55 sf

Primary OutFlow Max=0.20 cfs @ 12.14 hrs HW=72.23' TW=64.96' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.20 cfs @ 1.64 fps)

Summary for Pond INF1: INFILTRATION FIELD

Inflow Area = 13,256 sf, 58.66% Impervious, Inflow Depth = 1.76" for 2-Year event
Inflow = 0.53 cfs @ 12.13 hrs, Volume= 1,946 cf
Outflow = 0.07 cfs @ 11.90 hrs, Volume= 1,946 cf, Atten= 87%, Lag= 0.0 min
Discarded = 0.07 cfs @ 11.90 hrs, Volume= 1,946 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond B1 : BERM

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 65.19' @ 12.81 hrs Surf.Area= 1,268 sf Storage= 447 cf

Plug-Flow detention time= 37.1 min calculated for 1,943 cf (100% of inflow)
Center-of-Mass det. time= 37.1 min (847.0 - 810.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	64.50'	1,187 cf	**39.50'W x 32.10'L x 3.50'H Field A** 4,437 cf Overall - 1,470 cf Embedded = 2,967 cf x 40.0% Voids
#2A	65.00'	1,470 cf	**ADS_StormTech SC-740 +Cap** x 32 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 32 Chambers in 8 Rows
#3	67.00'	1 cf	**0.67'D x 2.50'H Vertical Cone/Cylinder**-Impervious
		2,658 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	64.50'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	69.00'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.07 cfs @ 11.90 hrs HW=64.56' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=64.50' TW=53.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond TR: TRENCH

Inflow Area = 1,665 sf,100.00% Impervious, Inflow Depth = 2.92" for 2-Year event
Inflow = 0.10 cfs @ 12.13 hrs, Volume= 405 cf
Outflow = 0.10 cfs @ 12.19 hrs, Volume= 405 cf, Atten= 4%, Lag= 3.9 min
Discarded = 0.00 cfs @ 9.35 hrs, Volume= 310 cf
Primary = 0.10 cfs @ 12.19 hrs, Volume= 95 cf
Routed to Reach P2r : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 76.94' @ 12.19 hrs Surf.Area= 140 sf Storage= 109 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 222.2 min (983.0 - 760.8)

Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	112 cf	**2.00'W x 70.00'L x 2.00'H Prismatoid** 280 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	76.90'	**5.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	75.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 9.35 hrs HW=75.02' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.09 cfs @ 12.19 hrs HW=76.94' TW=76.01' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.09 cfs @ 0.49 fps)

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E1a: EXISTING Runoff Area=148,546 sf 0.00% Impervious Runoff Depth=1.14"
Flow Length=658' Tc=13.1 min CN=59 Runoff=2.87 cfs 14,101 cf

Subcatchment E2a: EXISTING Runoff Area=39,128 sf 0.00% Impervious Runoff Depth=1.20"
Flow Length=235' Tc=6.3 min CN=60 Runoff=1.07 cfs 3,923 cf

Subcatchment P1a: PROPOSED Runoff Area=5,006 sf 100.00% Impervious Runoff Depth=4.59"
Tc=6.0 min CN=98 Runoff=0.49 cfs 1,916 cf

Subcatchment P1b: PROPOSED Runoff Area=34,022 sf 0.00% Impervious Runoff Depth=1.40"
Flow Length=313' Tc=6.0 min CN=63 Runoff=1.13 cfs 3,976 cf

Subcatchment P1c: PROPOSED Runoff Area=105,108 sf 2.06% Impervious Runoff Depth=1.20"
Flow Length=613' Tc=10.4 min CN=60 Runoff=2.41 cfs 10,537 cf

Subcatchment P2a: PROPOSED Runoff Area=8,250 sf 33.58% Impervious Runoff Depth=2.31"
Tc=6.0 min CN=75 Runoff=0.47 cfs 1,590 cf

Subcatchment P2b: PROPOSED Runoff Area=1,665 sf 100.00% Impervious Runoff Depth=4.59"
Tc=6.0 min CN=98 Runoff=0.16 cfs 637 cf

Subcatchment P2c: PROPOSED Runoff Area=33,623 sf 0.40% Impervious Runoff Depth=1.20"
Flow Length=184' Tc=7.3 min CN=60 Runoff=0.88 cfs 3,371 cf

Reach E: EXISTING Inflow=3.61 cfs 18,024 cf
Outflow=3.61 cfs 18,024 cf

Reach E1: EXISTING Inflow=2.87 cfs 14,101 cf
Outflow=2.87 cfs 14,101 cf

Reach E2: EXISTING Inflow=1.07 cfs 3,923 cf
Outflow=1.07 cfs 3,923 cf

Reach P: PROPOSED Inflow=3.33 cfs 14,468 cf
Outflow=3.33 cfs 14,468 cf

Reach P1: PROPOSED Inflow=2.41 cfs 10,819 cf
Outflow=2.41 cfs 10,819 cf

Reach P1r: PROPOSED Avg. Flow Depth=0.02' Max Vel=0.37 fps Inflow=0.11 cfs 282 cf
n=0.080 L=300.0' S=0.0633 '/' Capacity=99.70 cfs Outflow=0.09 cfs 282 cf

Reach P2: PROPOSED Inflow=1.01 cfs 3,648 cf
Outflow=1.01 cfs 3,648 cf

Reach P2r: PROPOSED Avg. Flow Depth=0.04' Max Vel=0.30 fps Inflow=0.16 cfs 278 cf
n=0.080 L=100.0' S=0.0200 '/' Capacity=3.23 cfs Outflow=0.13 cfs 278 cf

Pond B1: BERM Peak Elev=54.56' Storage=1,019 cf Inflow=1.13 cfs 3,976 cf
Discarded=0.13 cfs 3,694 cf Primary=0.11 cfs 282 cf Outflow=0.24 cfs 3,976 cf

Pond CB1: CATCHBASIN Peak Elev=82.37' Inflow=0.47 cfs 1,590 cf
10.0" Round Culvert n=0.010 L=200.0' S=0.0200 '/' Outflow=0.47 cfs 1,590 cf

Pond DMH1: DMH Peak Elev=78.37' Inflow=0.47 cfs 1,590 cf
10.0" Round Culvert n=0.010 L=90.0' S=0.0667 '/' Outflow=0.47 cfs 1,590 cf

Pond DMH2: DMH Peak Elev=72.37' Inflow=0.47 cfs 1,590 cf
10.0" Round Culvert n=0.010 L=84.0' S=0.0833 '/' Outflow=0.47 cfs 1,590 cf

Pond INF1: INFILTRATION FIELD Peak Elev=65.93' Storage=1,171 cf Inflow=0.96 cfs 3,506 cf
Discarded=0.07 cfs 3,506 cf Primary=0.00 cfs 0 cf Outflow=0.07 cfs 3,506 cf

Pond TR: TRENCH Peak Elev=76.95' Storage=109 cf Inflow=0.16 cfs 637 cf
Discarded=0.00 cfs 360 cf Primary=0.16 cfs 278 cf Outflow=0.16 cfs 638 cf

Total Runoff Area = 375,348 sf Runoff Volume = 40,051 cf Average Runoff Depth = 1.28"
96.87% Pervious = 363,605 sf 3.13% Impervious = 11,743 sf

Summary for Subcatchment E1a: EXISTING

Runoff = 2.87 cfs @ 12.23 hrs, Volume= 14,101 cf, Depth= 1.14"
Routed to Reach E1 : EXISTING

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

Area (sf)	CN	Description
63,469	61	Pasture/grassland/range, Good, HSG B
85,077	58	Woods/grass comb., Good, HSG B
148,546	59	Weighted Average
148,546		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.15"
0.5	63	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.7	65	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.5	233	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.1	247	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.1	658	Total			

Summary for Subcatchment E2a: EXISTING

Runoff = 1.07 cfs @ 12.14 hrs, Volume= 3,923 cf, Depth= 1.20"
Routed to Reach E2 : EXISTING

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

Area (sf)	CN	Description
27,290	61	Pasture/grassland/range, Good, HSG B
11,838	58	Woods/grass comb., Good, HSG B
39,128	60	Weighted Average
39,128		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.0800	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.15"
1.6	185	0.0780	1.95		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.3	235	Total			

Summary for Subcatchment P1a: PROPOSED

Runoff = 0.49 cfs @ 12.13 hrs, Volume= 1,916 cf, Depth= 4.59"
Routed to Pond INF1 : INFILTRATION FIELD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

	Area (sf)	CN	Description
*	4,106	98	Roof (Residence)
*	900	98	Roof (Barn)
	5,006	98	Weighted Average
	5,006		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 (MIN.)**

Summary for Subcatchment P1b: PROPOSED

Runoff = 1.13 cfs @ 12.14 hrs, Volume= 3,976 cf, Depth= 1.40"
Routed to Pond B1 : BERM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

	Area (sf)	CN	Description
	3,355	85	Gravel roads, HSG B
*	30,667	61	Pasture/grassland/range, Good, HSG B
	34,022	63	Weighted Average
	34,022		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.15"
0.4	63	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	200	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.0	313	Total			

Summary for Subcatchment P1c: PROPOSED

Runoff = 2.41 cfs @ 12.19 hrs, Volume= 10,537 cf, Depth= 1.20"
Routed to Reach P1 : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

Area (sf)	CN	Description
71,396	58	Woods/grass comb., Good, HSG B
31,543	61	Pasture/grassland/range, Good, HSG B
2,169	98	Paved parking, HSG B
105,108	60	Weighted Average
102,939		97.94% Pervious Area
2,169		2.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.15"
0.4	63	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.6	253	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.1	247	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.4	613	Total			

Summary for Subcatchment P2a: PROPOSED

Runoff = 0.47 cfs @ 12.13 hrs, Volume= 1,590 cf, Depth= 2.31"
Routed to Pond CB1 : CATCHBASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

	Area (sf)	CN	Description
*	2,770	98	Driveway, Paved
	5,072	61	>75% Grass cover, Good, HSG B
	408	85	Gravel roads, HSG B
	8,250	75	Weighted Average
	5,480		66.42% Pervious Area
	2,770		33.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 (MIN.)**

Summary for Subcatchment P2b: PROPOSED

Runoff = 0.16 cfs @ 12.13 hrs, Volume= 637 cf, Depth= 4.59"
Routed to Pond TR : TRENCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

	Area (sf)	CN	Description
*	1,665	98	Driveway, Paved
	1,665		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 (MIN.)**

Summary for Subcatchment P2c: PROPOSED

Runoff = 0.88 cfs @ 12.15 hrs, Volume= 3,371 cf, Depth= 1.20"
Routed to Reach P2 : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

	Area (sf)	CN	Description
*	133	98	Driveway, Paved
	23,382	61	>75% Grass cover, Good, HSG B
	10,108	58	Woods/grass comb., Good, HSG B
	33,623	60	Weighted Average
	33,490		99.60% Pervious Area
	133		0.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.1100	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.15"
0.4	53	0.1900	2.18		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	81	0.0900	2.10		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.3	184	Total			

Summary for Reach E: EXISTING

Inflow Area = 187,674 sf, 0.00% Impervious, Inflow Depth = 1.15" for 10-Year event
Inflow = 3.61 cfs @ 12.20 hrs, Volume= 18,024 cf
Outflow = 3.61 cfs @ 12.20 hrs, Volume= 18,024 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach E1: EXISTING

Inflow Area = 148,546 sf, 0.00% Impervious, Inflow Depth = 1.14" for 10-Year event
Inflow = 2.87 cfs @ 12.23 hrs, Volume= 14,101 cf
Outflow = 2.87 cfs @ 12.23 hrs, Volume= 14,101 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach E : EXISTING

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach E2: EXISTING

Inflow Area = 39,128 sf, 0.00% Impervious, Inflow Depth = 1.20" for 10-Year event
Inflow = 1.07 cfs @ 12.14 hrs, Volume= 3,923 cf
Outflow = 1.07 cfs @ 12.14 hrs, Volume= 3,923 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach E : EXISTING

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach P: PROPOSED

Inflow Area = 187,674 sf, 6.26% Impervious, Inflow Depth = 0.93" for 10-Year event
Inflow = 3.33 cfs @ 12.18 hrs, Volume= 14,468 cf
Outflow = 3.33 cfs @ 12.18 hrs, Volume= 14,468 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach P1: PROPOSED

Inflow Area = 152,386 sf, 6.53% Impervious, Inflow Depth = 0.85" for 10-Year event
Inflow = 2.41 cfs @ 12.19 hrs, Volume= 10,819 cf
Outflow = 2.41 cfs @ 12.19 hrs, Volume= 10,819 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach P : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach P1r: PROPOSED

Inflow Area = 47,278 sf, 16.45% Impervious, Inflow Depth = 0.07" for 10-Year event
Inflow = 0.11 cfs @ 12.58 hrs, Volume= 282 cf
Outflow = 0.09 cfs @ 12.79 hrs, Volume= 282 cf, Atten= 19%, Lag= 12.4 min
Routed to Reach P1 : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.37 fps, Min. Travel Time= 13.6 min
Avg. Velocity = 0.24 fps, Avg. Travel Time= 20.6 min

Peak Storage= 70 cf @ 12.79 hrs
Average Depth at Peak Storage= 0.02' , Surface Width= 10.90'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 99.70 cfs

10.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 20.0 '/' Top Width= 50.00'
Length= 300.0' Slope= 0.0633 '/'
Inlet Invert= 53.00', Outlet Invert= 34.00'

‡

Summary for Reach P2: PROPOSED

Inflow Area = 35,288 sf, 5.10% Impervious, Inflow Depth = 1.24" for 10-Year event
Inflow = 1.01 cfs @ 12.15 hrs, Volume= 3,648 cf
Outflow = 1.01 cfs @ 12.15 hrs, Volume= 3,648 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach P : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach P2r: PROPOSED

Inflow Area = 1,665 sf,100.00% Impervious, Inflow Depth = 2.00" for 10-Year event
Inflow = 0.16 cfs @ 12.13 hrs, Volume= 278 cf
Outflow = 0.13 cfs @ 12.18 hrs, Volume= 278 cf, Atten= 17%, Lag= 2.6 min
Routed to Reach P2 : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.30 fps, Min. Travel Time= 5.6 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 21.8 min

Peak Storage= 45 cf @ 12.18 hrs
Average Depth at Peak Storage= 0.04' , Surface Width= 11.65'
Bank-Full Depth= 0.25' Flow Area= 3.8 sf, Capacity= 3.23 cfs

10.00' x 0.25' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 20.0 '/' Top Width= 20.00'
Length= 100.0' Slope= 0.0200 '/'
Inlet Invert= 76.00', Outlet Invert= 74.00'

‡

Summary for Pond B1: BERM

Inflow Area = 47,278 sf, 16.45% Impervious, Inflow Depth = 1.01" for 10-Year event
Inflow = 1.13 cfs @ 12.14 hrs, Volume= 3,976 cf
Outflow = 0.24 cfs @ 12.58 hrs, Volume= 3,976 cf, Atten= 79%, Lag= 26.6 min
Discarded = 0.13 cfs @ 12.58 hrs, Volume= 3,694 cf
Primary = 0.11 cfs @ 12.58 hrs, Volume= 282 cf
Routed to Reach P1r : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 54.56' @ 12.58 hrs Surf.Area= 2,315 sf Storage= 1,019 cf
Flood Elev= 55.00' Surf.Area= 3,000 sf Storage= 2,105 cf

Plug-Flow detention time= 72.7 min calculated for 3,970 cf (100% of inflow)
Center-of-Mass det. time= 72.8 min (976.0 - 903.2)

Volume	Invert	Avail.Storage	Storage Description
#1	54.00'	2,025 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
#2	53.00'	80 cf	**2.00'W x 100.00'L x 1.00'H Prismatoid** 200 cf Overall x 40.0% Voids
		2,105 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
54.00	1,250	0	0
55.00	2,800	2,025	2,025

Device	Routing	Invert	Outlet Devices
#1	Primary	54.50'	**3.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	53.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.13 cfs @ 12.58 hrs HW=54.56' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=0.11 cfs @ 12.58 hrs HW=54.56' TW=53.02' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.11 cfs @ 0.61 fps)

Summary for Pond CB1: CATCHBASIN

Inflow Area = 8,250 sf, 33.58% Impervious, Inflow Depth = 2.31" for 10-Year event
Inflow = 0.47 cfs @ 12.13 hrs, Volume= 1,590 cf
Outflow = 0.47 cfs @ 12.13 hrs, Volume= 1,590 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.47 cfs @ 12.13 hrs, Volume= 1,590 cf
Routed to Pond DMH1 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 82.37' @ 12.13 hrs
Flood Elev= 86.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	82.00'	**10.0" Round Culvert** L= 200.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 82.00' / 78.00' S= 0.0200 '/' Cc= 0.900 n= 0.010, Flow Area= 0.55 sf

Primary OutFlow Max=0.45 cfs @ 12.13 hrs HW=82.36' TW=78.36' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.45 cfs @ 2.03 fps)

Summary for Pond DMH1: DMH

Inflow Area = 8,250 sf, 33.58% Impervious, Inflow Depth = 2.31" for 10-Year event
Inflow = 0.47 cfs @ 12.13 hrs, Volume= 1,590 cf
Outflow = 0.47 cfs @ 12.13 hrs, Volume= 1,590 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.47 cfs @ 12.13 hrs, Volume= 1,590 cf
Routed to Pond DMH2 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 78.37' @ 12.13 hrs
Flood Elev= 89.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	78.00'	**10.0" Round Culvert** L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 78.00' / 72.00' S= 0.0667 '/' Cc= 0.900 n= 0.010, Flow Area= 0.55 sf

Primary OutFlow Max=0.45 cfs @ 12.13 hrs HW=78.36' TW=72.36' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.45 cfs @ 2.03 fps)

Summary for Pond DMH2: DMH

Inflow Area = 8,250 sf, 33.58% Impervious, Inflow Depth = 2.31" for 10-Year event
Inflow = 0.47 cfs @ 12.13 hrs, Volume= 1,590 cf
Outflow = 0.47 cfs @ 12.13 hrs, Volume= 1,590 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.47 cfs @ 12.13 hrs, Volume= 1,590 cf
Routed to Pond INF1 : INFILTRATION FIELD

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 72.37' @ 12.13 hrs
Flood Elev= 75.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	72.00'	**10.0" Round Culvert** L= 84.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 72.00' / 65.00' S= 0.0833 '/' Cc= 0.900 n= 0.010, Flow Area= 0.55 sf

Primary OutFlow Max=0.45 cfs @ 12.13 hrs HW=72.36' TW=65.33' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.45 cfs @ 2.03 fps)

Summary for Pond INF1: INFILTRATION FIELD

Inflow Area = 13,256 sf, 58.66% Impervious, Inflow Depth = 3.17" for 10-Year event
Inflow = 0.96 cfs @ 12.13 hrs, Volume= 3,506 cf
Outflow = 0.07 cfs @ 11.50 hrs, Volume= 3,506 cf, Atten= 93%, Lag= 0.0 min
Discarded = 0.07 cfs @ 11.50 hrs, Volume= 3,506 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond B1 : BERM

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 65.93' @ 13.56 hrs Surf.Area= 1,268 sf Storage= 1,171 cf

Plug-Flow detention time= 128.2 min calculated for 3,501 cf (100% of inflow)
Center-of-Mass det. time= 128.1 min (929.8 - 801.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	64.50'	1,187 cf	**39.50'W x 32.10'L x 3.50'H Field A** 4,437 cf Overall - 1,470 cf Embedded = 2,967 cf x 40.0% Voids
#2A	65.00'	1,470 cf	**ADS_StormTech SC-740 +Cap** x 32 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 32 Chambers in 8 Rows
#3	67.00'	1 cf	**0.67'D x 2.50'H Vertical Cone/Cylinder**-Impervious
		2,658 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	64.50'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	69.00'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.07 cfs @ 11.50 hrs HW=64.55' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=64.50' TW=53.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond TR: TRENCH

Inflow Area = 1,665 sf,100.00% Impervious, Inflow Depth = 4.59" for 10-Year event
Inflow = 0.16 cfs @ 12.13 hrs, Volume= 637 cf
Outflow = 0.16 cfs @ 12.13 hrs, Volume= 638 cf, Atten= 0%, Lag= 0.4 min
Discarded = 0.00 cfs @ 6.80 hrs, Volume= 360 cf
Primary = 0.16 cfs @ 12.13 hrs, Volume= 278 cf
Routed to Reach P2r : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 76.95' @ 12.13 hrs Surf.Area= 140 sf Storage= 109 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 177.0 min (928.1 - 751.2)

Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	112 cf	**2.00'W x 70.00'L x 2.00'H Prismatoid** 280 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	76.90'	**5.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	75.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 6.80 hrs HW=75.02' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.15 cfs @ 12.13 hrs HW=76.95' TW=76.04' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.15 cfs @ 0.58 fps)

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E1a: EXISTING Runoff Area=148,546 sf 0.00% Impervious Runoff Depth=1.94"
Flow Length=658' Tc=13.1 min CN=59 Runoff=5.33 cfs 24,035 cf

Subcatchment E2a: EXISTING Runoff Area=39,128 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=235' Tc=6.3 min CN=60 Runoff=1.90 cfs 6,609 cf

Subcatchment P1a: PROPOSED Runoff Area=5,006 sf 100.00% Impervious Runoff Depth=5.92"
Tc=6.0 min CN=98 Runoff=0.62 cfs 2,470 cf

Subcatchment P1b: PROPOSED Runoff Area=34,022 sf 0.00% Impervious Runoff Depth=2.29"
Flow Length=313' Tc=6.0 min CN=63 Runoff=1.90 cfs 6,490 cf

Subcatchment P1c: PROPOSED Runoff Area=105,108 sf 2.06% Impervious Runoff Depth=2.03"
Flow Length=613' Tc=10.4 min CN=60 Runoff=4.33 cfs 17,754 cf

Subcatchment P2a: PROPOSED Runoff Area=8,250 sf 33.58% Impervious Runoff Depth=3.42"
Tc=6.0 min CN=75 Runoff=0.70 cfs 2,350 cf

Subcatchment P2b: PROPOSED Runoff Area=1,665 sf 100.00% Impervious Runoff Depth=5.92"
Tc=6.0 min CN=98 Runoff=0.21 cfs 822 cf

Subcatchment P2c: PROPOSED Runoff Area=33,623 sf 0.40% Impervious Runoff Depth=2.03"
Flow Length=184' Tc=7.3 min CN=60 Runoff=1.58 cfs 5,679 cf

Reach E: EXISTING Inflow=6.62 cfs 30,644 cf
Outflow=6.62 cfs 30,644 cf

Reach E1: EXISTING Inflow=5.33 cfs 24,035 cf
Outflow=5.33 cfs 24,035 cf

Reach E2: EXISTING Inflow=1.90 cfs 6,609 cf
Outflow=1.90 cfs 6,609 cf

Reach P: PROPOSED Inflow=6.00 cfs 25,533 cf
Outflow=6.00 cfs 25,533 cf

Reach P1: PROPOSED Inflow=4.47 cfs 19,407 cf
Outflow=4.47 cfs 19,407 cf

Reach P1r: PROPOSED Avg. Flow Depth=0.07' Max Vel=0.76 fps Inflow=0.78 cfs 1,653 cf
n=0.080 L=300.0' S=0.0633 '/' Capacity=99.70 cfs Outflow=0.64 cfs 1,653 cf

Reach P2: PROPOSED Inflow=1.75 cfs 6,126 cf
Outflow=1.75 cfs 6,126 cf

Reach P2r: PROPOSED Avg. Flow Depth=0.05' Max Vel=0.33 fps Inflow=0.20 cfs 447 cf
n=0.080 L=100.0' S=0.0200 '/' Capacity=3.23 cfs Outflow=0.18 cfs 447 cf

Pond B1: BERM Peak Elev=54.72' Storage=1,380 cf Inflow=1.90 cfs 6,490 cf
Discarded=0.14 cfs 4,837 cf Primary=0.78 cfs 1,653 cf Outflow=0.93 cfs 6,490 cf

Pond CB1: CATCHBASIN Peak Elev=82.45' Inflow=0.70 cfs 2,350 cf
10.0" Round Culvert n=0.010 L=200.0' S=0.0200 '/' Outflow=0.70 cfs 2,350 cf

Pond DMH1: DMH Peak Elev=78.45' Inflow=0.70 cfs 2,350 cf
10.0" Round Culvert n=0.010 L=90.0' S=0.0667 '/' Outflow=0.70 cfs 2,350 cf

Pond DMH2: DMH Peak Elev=72.45' Inflow=0.70 cfs 2,350 cf
10.0" Round Culvert n=0.010 L=84.0' S=0.0833 '/' Outflow=0.70 cfs 2,350 cf

Pond INF1: INFILTRATION FIELD Peak Elev=66.75' Storage=1,902 cf Inflow=1.32 cfs 4,821 cf
Discarded=0.07 cfs 4,821 cf Primary=0.00 cfs 0 cf Outflow=0.07 cfs 4,821 cf

Pond TR: TRENCH Peak Elev=76.96' Storage=110 cf Inflow=0.21 cfs 822 cf
Discarded=0.00 cfs 375 cf Primary=0.20 cfs 447 cf Outflow=0.21 cfs 822 cf

Total Runoff Area = 375,348 sf Runoff Volume = 66,210 cf Average Runoff Depth = 2.12"
96.87% Pervious = 363,605 sf 3.13% Impervious = 11,743 sf

Summary for Subcatchment E1a: EXISTING

Runoff = 5.33 cfs @ 12.22 hrs, Volume= 24,035 cf, Depth= 1.94"
Routed to Reach E1 : EXISTING

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.16"

Area (sf)	CN	Description
63,469	61	Pasture/grassland/range, Good, HSG B
85,077	58	Woods/grass comb., Good, HSG B
148,546	59	Weighted Average
148,546		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.15"
0.5	63	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.7	65	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.5	233	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.1	247	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.1	658	Total			

Summary for Subcatchment E2a: EXISTING

Runoff = 1.90 cfs @ 12.14 hrs, Volume= 6,609 cf, Depth= 2.03"
Routed to Reach E2 : EXISTING

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.16"

Area (sf)	CN	Description
27,290	61	Pasture/grassland/range, Good, HSG B
11,838	58	Woods/grass comb., Good, HSG B
39,128	60	Weighted Average
39,128		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.0800	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.15"
1.6	185	0.0780	1.95		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.3	235	Total			

Summary for Subcatchment P1a: PROPOSED

Runoff = 0.62 cfs @ 12.13 hrs, Volume= 2,470 cf, Depth= 5.92"
Routed to Pond INF1 : INFILTRATION FIELD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.16"

	Area (sf)	CN	Description
*	4,106	98	Roof (Residence)
*	900	98	Roof (Barn)
	5,006	98	Weighted Average
	5,006		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 (MIN.)**

Summary for Subcatchment P1b: PROPOSED

Runoff = 1.90 cfs @ 12.13 hrs, Volume= 6,490 cf, Depth= 2.29"
Routed to Pond B1 : BERM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.16"

	Area (sf)	CN	Description
	3,355	85	Gravel roads, HSG B
*	30,667	61	Pasture/grassland/range, Good, HSG B
	34,022	63	Weighted Average
	34,022		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.15"
0.4	63	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	200	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.0	313	Total			

Summary for Subcatchment P1c: PROPOSED

Runoff = 4.33 cfs @ 12.19 hrs, Volume= 17,754 cf, Depth= 2.03"
Routed to Reach P1 : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.16"

Area (sf)	CN	Description
71,396	58	Woods/grass comb., Good, HSG B
31,543	61	Pasture/grassland/range, Good, HSG B
2,169	98	Paved parking, HSG B
105,108	60	Weighted Average
102,939		97.94% Pervious Area
2,169		2.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.15"
0.4	63	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.6	253	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.1	247	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.4	613	Total			

Summary for Subcatchment P2a: PROPOSED

Runoff = 0.70 cfs @ 12.13 hrs, Volume= 2,350 cf, Depth= 3.42"
Routed to Pond CB1 : CATCHBASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.16"

	Area (sf)	CN	Description
*	2,770	98	Driveway, Paved
	5,072	61	>75% Grass cover, Good, HSG B
	408	85	Gravel roads, HSG B
	8,250	75	Weighted Average
	5,480		66.42% Pervious Area
	2,770		33.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 (MIN.)**

Summary for Subcatchment P2b: PROPOSED

Runoff = 0.21 cfs @ 12.13 hrs, Volume= 822 cf, Depth= 5.92"
Routed to Pond TR : TRENCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.16"

	Area (sf)	CN	Description
*	1,665	98	Driveway, Paved
	1,665		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 (MIN.)**

Summary for Subcatchment P2c: PROPOSED

Runoff = 1.58 cfs @ 12.15 hrs, Volume= 5,679 cf, Depth= 2.03"
Routed to Reach P2 : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.16"

	Area (sf)	CN	Description
*	133	98	Driveway, Paved
	23,382	61	>75% Grass cover, Good, HSG B
	10,108	58	Woods/grass comb., Good, HSG B
	33,623	60	Weighted Average
	33,490		99.60% Pervious Area
	133		0.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.1100	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.15"
0.4	53	0.1900	2.18		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	81	0.0900	2.10		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.3	184	Total			

Summary for Reach E: EXISTING

Inflow Area = 187,674 sf, 0.00% Impervious, Inflow Depth = 1.96" for 25-Year event
Inflow = 6.62 cfs @ 12.19 hrs, Volume= 30,644 cf
Outflow = 6.62 cfs @ 12.19 hrs, Volume= 30,644 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach E1: EXISTING

Inflow Area = 148,546 sf, 0.00% Impervious, Inflow Depth = 1.94" for 25-Year event
Inflow = 5.33 cfs @ 12.22 hrs, Volume= 24,035 cf
Outflow = 5.33 cfs @ 12.22 hrs, Volume= 24,035 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach E : EXISTING

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach E2: EXISTING

Inflow Area = 39,128 sf, 0.00% Impervious, Inflow Depth = 2.03" for 25-Year event
Inflow = 1.90 cfs @ 12.14 hrs, Volume= 6,609 cf
Outflow = 1.90 cfs @ 12.14 hrs, Volume= 6,609 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach E : EXISTING

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach P: PROPOSED

Inflow Area = 187,674 sf, 6.26% Impervious, Inflow Depth = 1.63" for 25-Year event
Inflow = 6.00 cfs @ 12.18 hrs, Volume= 25,533 cf
Outflow = 6.00 cfs @ 12.18 hrs, Volume= 25,533 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach P1: PROPOSED

Inflow Area = 152,386 sf, 6.53% Impervious, Inflow Depth = 1.53" for 25-Year event
Inflow = 4.47 cfs @ 12.20 hrs, Volume= 19,407 cf
Outflow = 4.47 cfs @ 12.20 hrs, Volume= 19,407 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach P : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

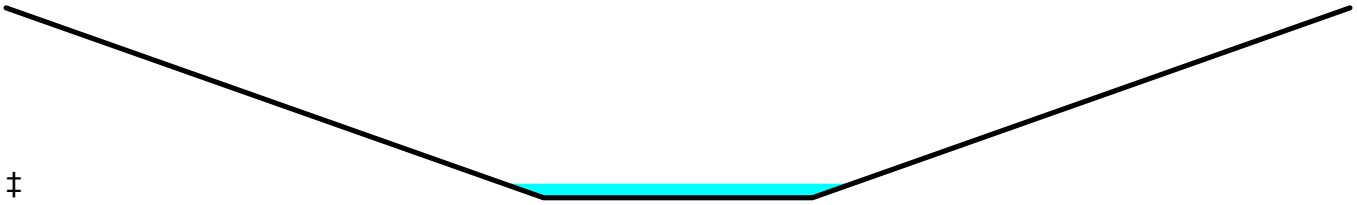
Summary for Reach P1r: PROPOSED

Inflow Area = 47,278 sf, 16.45% Impervious, Inflow Depth = 0.42" for 25-Year event
Inflow = 0.78 cfs @ 12.26 hrs, Volume= 1,653 cf
Outflow = 0.64 cfs @ 12.37 hrs, Volume= 1,653 cf, Atten= 18%, Lag= 6.5 min
Routed to Reach P1 : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.76 fps, Min. Travel Time= 6.6 min
Avg. Velocity = 0.31 fps, Avg. Travel Time= 15.9 min

Peak Storage= 254 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.07' , Surface Width= 12.95'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 99.70 cfs

10.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 20.0 '/' Top Width= 50.00'
Length= 300.0' Slope= 0.0633 '/'
Inlet Invert= 53.00', Outlet Invert= 34.00'



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Summary for Reach P2: PROPOSED

Inflow Area = 35,288 sf, 5.10% Impervious, Inflow Depth = 2.08" for 25-Year event
Inflow = 1.75 cfs @ 12.15 hrs, Volume= 6,126 cf
Outflow = 1.75 cfs @ 12.15 hrs, Volume= 6,126 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach P : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach P2r: PROPOSED

Inflow Area = 1,665 sf,100.00% Impervious, Inflow Depth = 3.22" for 25-Year event
Inflow = 0.20 cfs @ 12.13 hrs, Volume= 447 cf
Outflow = 0.18 cfs @ 12.17 hrs, Volume= 447 cf, Atten= 14%, Lag= 2.3 min
Routed to Reach P2 : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.33 fps, Min. Travel Time= 5.1 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 21.1 min

Peak Storage= 53 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.05' , Surface Width= 11.94'
Bank-Full Depth= 0.25' Flow Area= 3.8 sf, Capacity= 3.23 cfs

10.00' x 0.25' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 20.0 '/' Top Width= 20.00'
Length= 100.0' Slope= 0.0200 '/'
Inlet Invert= 76.00', Outlet Invert= 74.00'

‡

Summary for Pond B1: BERM

Inflow Area = 47,278 sf, 16.45% Impervious, Inflow Depth = 1.65" for 25-Year event
Inflow = 1.90 cfs @ 12.13 hrs, Volume= 6,490 cf
Outflow = 0.93 cfs @ 12.26 hrs, Volume= 6,490 cf, Atten= 51%, Lag= 7.5 min
Discarded = 0.14 cfs @ 12.26 hrs, Volume= 4,837 cf
Primary = 0.78 cfs @ 12.26 hrs, Volume= 1,653 cf
Routed to Reach P1r : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 54.72' @ 12.26 hrs Surf.Area= 2,565 sf Storage= 1,380 cf
Flood Elev= 55.00' Surf.Area= 3,000 sf Storage= 2,105 cf

Plug-Flow detention time= 64.3 min calculated for 6,481 cf (100% of inflow)
Center-of-Mass det. time= 64.4 min (948.6 - 884.2)

Volume	Invert	Avail.Storage	Storage Description
#1	54.00'	2,025 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
#2	53.00'	80 cf	**2.00'W x 100.00'L x 1.00'H Prismatoid** 200 cf Overall x 40.0% Voids
		2,105 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
54.00	1,250	0	0
55.00	2,800	2,025	2,025

Device	Routing	Invert	Outlet Devices
#1	Primary	54.50'	**3.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	53.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.14 cfs @ 12.26 hrs HW=54.72' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.77 cfs @ 12.26 hrs HW=54.72' TW=53.06' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.77 cfs @ 1.19 fps)

Summary for Pond CB1: CATCHBASIN

Inflow Area = 8,250 sf, 33.58% Impervious, Inflow Depth = 3.42" for 25-Year event
Inflow = 0.70 cfs @ 12.13 hrs, Volume= 2,350 cf
Outflow = 0.70 cfs @ 12.13 hrs, Volume= 2,350 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.70 cfs @ 12.13 hrs, Volume= 2,350 cf
Routed to Pond DMH1 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 82.45' @ 12.13 hrs
Flood Elev= 86.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	82.00'	**10.0" Round Culvert** L= 200.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 82.00' / 78.00' S= 0.0200 '/' Cc= 0.900 n= 0.010, Flow Area= 0.55 sf

Primary OutFlow Max=0.67 cfs @ 12.13 hrs HW=82.44' TW=78.44' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.67 cfs @ 2.27 fps)

Summary for Pond DMH1: DMH

Inflow Area = 8,250 sf, 33.58% Impervious, Inflow Depth = 3.42" for 25-Year event
Inflow = 0.70 cfs @ 12.13 hrs, Volume= 2,350 cf
Outflow = 0.70 cfs @ 12.13 hrs, Volume= 2,350 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.70 cfs @ 12.13 hrs, Volume= 2,350 cf
Routed to Pond DMH2 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 78.45' @ 12.13 hrs
Flood Elev= 89.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	78.00'	**10.0" Round Culvert** L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 78.00' / 72.00' S= 0.0667 '/' Cc= 0.900 n= 0.010, Flow Area= 0.55 sf

Primary OutFlow Max=0.67 cfs @ 12.13 hrs HW=78.44' TW=72.44' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.67 cfs @ 2.27 fps)

Summary for Pond DMH2: DMH

Inflow Area = 8,250 sf, 33.58% Impervious, Inflow Depth = 3.42" for 25-Year event
Inflow = 0.70 cfs @ 12.13 hrs, Volume= 2,350 cf
Outflow = 0.70 cfs @ 12.13 hrs, Volume= 2,350 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.70 cfs @ 12.13 hrs, Volume= 2,350 cf
Routed to Pond INF1 : INFILTRATION FIELD

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 72.45' @ 12.13 hrs
Flood Elev= 75.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	72.00'	**10.0" Round Culvert** L= 84.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 72.00' / 65.00' S= 0.0833 '/' Cc= 0.900 n= 0.010, Flow Area= 0.55 sf

Primary OutFlow Max=0.67 cfs @ 12.13 hrs HW=72.44' TW=65.68' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.67 cfs @ 2.27 fps)

Summary for Pond INF1: INFILTRATION FIELD

Inflow Area = 13,256 sf, 58.66% Impervious, Inflow Depth = 4.36" for 25-Year event
Inflow = 1.32 cfs @ 12.13 hrs, Volume= 4,821 cf
Outflow = 0.07 cfs @ 11.15 hrs, Volume= 4,821 cf, Atten= 95%, Lag= 0.0 min
Discarded = 0.07 cfs @ 11.15 hrs, Volume= 4,821 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond B1 : BERM

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 66.75' @ 14.45 hrs Surf.Area= 1,268 sf Storage= 1,902 cf

Plug-Flow detention time= 235.3 min calculated for 4,815 cf (100% of inflow)
Center-of-Mass det. time= 235.4 min (1,031.5 - 796.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	64.50'	1,187 cf	**39.50'W x 32.10'L x 3.50'H Field A** 4,437 cf Overall - 1,470 cf Embedded = 2,967 cf x 40.0% Voids
#2A	65.00'	1,470 cf	**ADS_StormTech SC-740 +Cap** x 32 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 32 Chambers in 8 Rows
#3	67.00'	1 cf	**0.67'D x 2.50'H Vertical Cone/Cylinder**-Impervious
		2,658 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	64.50'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	69.00'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.07 cfs @ 11.15 hrs HW=64.56' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=64.50' TW=53.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond TR: TRENCH

Inflow Area = 1,665 sf,100.00% Impervious, Inflow Depth = 5.92" for 25-Year event
Inflow = 0.21 cfs @ 12.13 hrs, Volume= 822 cf
Outflow = 0.21 cfs @ 12.13 hrs, Volume= 822 cf, Atten= 0%, Lag= 0.3 min
Discarded = 0.00 cfs @ 4.30 hrs, Volume= 375 cf
Primary = 0.20 cfs @ 12.13 hrs, Volume= 447 cf
Routed to Reach P2r : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 76.96' @ 12.13 hrs Surf.Area= 140 sf Storage= 110 cf

Plug-Flow detention time= 149.3 min calculated for 821 cf (100% of inflow)
Center-of-Mass det. time= 150.0 min (896.8 - 746.7)

Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	112 cf	**2.00'W x 70.00'L x 2.00'H Prismatoid** 280 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	76.90'	**5.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	75.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 4.30 hrs HW=75.02' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.20 cfs @ 12.13 hrs HW=76.96' TW=76.05' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.20 cfs @ 0.63 fps)

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E1a: EXISTING Runoff Area=148,546 sf 0.00% Impervious Runoff Depth=3.93"
Flow Length=658' Tc=13.1 min CN=59 Runoff=11.28 cfs 48,668 cf

Subcatchment E2a: EXISTING Runoff Area=39,128 sf 0.00% Impervious Runoff Depth=4.05"
Flow Length=235' Tc=6.3 min CN=60 Runoff=3.90 cfs 13,218 cf

Subcatchment P1a: PROPOSED Runoff Area=5,006 sf 100.00% Impervious Runoff Depth=8.70"
Tc=6.0 min CN=98 Runoff=0.90 cfs 3,629 cf

Subcatchment P1b: PROPOSED Runoff Area=34,022 sf 0.00% Impervious Runoff Depth=4.42"
Flow Length=313' Tc=6.0 min CN=63 Runoff=3.72 cfs 12,536 cf

Subcatchment P1c: PROPOSED Runoff Area=105,108 sf 2.06% Impervious Runoff Depth=4.05"
Flow Length=613' Tc=10.4 min CN=60 Runoff=8.95 cfs 35,507 cf

Subcatchment P2a: PROPOSED Runoff Area=8,250 sf 33.58% Impervious Runoff Depth=5.90"
Tc=6.0 min CN=75 Runoff=1.18 cfs 4,054 cf

Subcatchment P2b: PROPOSED Runoff Area=1,665 sf 100.00% Impervious Runoff Depth=8.70"
Tc=6.0 min CN=98 Runoff=0.30 cfs 1,207 cf

Subcatchment P2c: PROPOSED Runoff Area=33,623 sf 0.40% Impervious Runoff Depth=4.05"
Flow Length=184' Tc=7.3 min CN=60 Runoff=3.25 cfs 11,358 cf

Reach E: EXISTING Inflow=13.98 cfs 61,886 cf
Outflow=13.98 cfs 61,886 cf

Reach E1: EXISTING Inflow=11.28 cfs 48,668 cf
Outflow=11.28 cfs 48,668 cf

Reach E2: EXISTING Inflow=3.90 cfs 13,218 cf
Outflow=3.90 cfs 13,218 cf

Reach P: PROPOSED Inflow=14.14 cfs 54,564 cf
Outflow=14.14 cfs 54,564 cf

Reach P1: PROPOSED Inflow=11.10 cfs 42,382 cf
Outflow=11.10 cfs 42,382 cf

Reach P1r: PROPOSED Avg. Flow Depth=0.16' Max Vel=1.18 fps Inflow=2.63 cfs 6,875 cf
n=0.080 L=300.0' S=0.0633 '/' Capacity=99.70 cfs Outflow=2.41 cfs 6,875 cf

Reach P2: PROPOSED Inflow=3.51 cfs 12,182 cf
Outflow=3.51 cfs 12,182 cf

Reach P2r: PROPOSED Avg. Flow Depth=0.06' Max Vel=0.38 fps Inflow=0.30 cfs 823 cf
n=0.080 L=100.0' S=0.0200 '/' Capacity=3.23 cfs Outflow=0.26 cfs 823 cf

Pond B1: BERM Peak Elev=54.98' Storage=2,058 cf Inflow=3.72 cfs 13,635 cf
Discarded=0.17 cfs 6,760 cf Primary=2.63 cfs 6,875 cf Outflow=2.80 cfs 13,635 cf

Pond CB1: CATCHBASIN Peak Elev=82.62' Inflow=1.18 cfs 4,054 cf
10.0" Round Culvert n=0.010 L=200.0' S=0.0200 '/' Outflow=1.18 cfs 4,054 cf

Pond DMH1: DMH Peak Elev=78.62' Inflow=1.18 cfs 4,054 cf
10.0" Round Culvert n=0.010 L=90.0' S=0.0667 '/' Outflow=1.18 cfs 4,054 cf

Pond DMH2: DMH Peak Elev=72.62' Inflow=1.18 cfs 4,054 cf
10.0" Round Culvert n=0.010 L=84.0' S=0.0833 '/' Outflow=1.18 cfs 4,054 cf

Pond INF1: INFILTRATION FIELD Peak Elev=69.23' Storage=2,658 cf Inflow=2.08 cfs 7,684 cf
Discarded=0.07 cfs 6,584 cf Primary=0.73 cfs 1,100 cf Outflow=0.81 cfs 7,684 cf

Pond TR: TRENCH Peak Elev=76.98' Storage=111 cf Inflow=0.30 cfs 1,207 cf
Discarded=0.00 cfs 384 cf Primary=0.30 cfs 823 cf Outflow=0.30 cfs 1,207 cf

Total Runoff Area = 375,348 sf Runoff Volume = 130,178 cf Average Runoff Depth = 4.16"
96.87% Pervious = 363,605 sf 3.13% Impervious = 11,743 sf

Summary for Subcatchment E1a: EXISTING

Runoff = 11.28 cfs @ 12.21 hrs, Volume= 48,668 cf, Depth= 3.93"
Routed to Reach E1 : EXISTING

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

Area (sf)	CN	Description
63,469	61	Pasture/grassland/range, Good, HSG B
85,077	58	Woods/grass comb., Good, HSG B
148,546	59	Weighted Average
148,546		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.15"
0.5	63	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.7	65	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.5	233	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.1	247	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.1	658	Total			

Summary for Subcatchment E2a: EXISTING

Runoff = 3.90 cfs @ 12.14 hrs, Volume= 13,218 cf, Depth= 4.05"
Routed to Reach E2 : EXISTING

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

Area (sf)	CN	Description
27,290	61	Pasture/grassland/range, Good, HSG B
11,838	58	Woods/grass comb., Good, HSG B
39,128	60	Weighted Average
39,128		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.0800	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.15"
1.6	185	0.0780	1.95		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.3	235	Total			

Summary for Subcatchment P1a: PROPOSED

Runoff = 0.90 cfs @ 12.13 hrs, Volume= 3,629 cf, Depth= 8.70"
Routed to Pond INF1 : INFILTRATION FIELD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

	Area (sf)	CN	Description
*	4,106	98	Roof (Residence)
*	900	98	Roof (Barn)
	5,006	98	Weighted Average
	5,006		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 (MIN.)**

Summary for Subcatchment P1b: PROPOSED

Runoff = 3.72 cfs @ 12.13 hrs, Volume= 12,536 cf, Depth= 4.42"
Routed to Pond B1 : BERM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

	Area (sf)	CN	Description
	3,355	85	Gravel roads, HSG B
*	30,667	61	Pasture/grassland/range, Good, HSG B
	34,022	63	Weighted Average
	34,022		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.15"
0.4	63	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	200	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.0	313	Total			

Summary for Subcatchment P1c: PROPOSED

Runoff = 8.95 cfs @ 12.18 hrs, Volume= 35,507 cf, Depth= 4.05"
Routed to Reach P1 : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

Area (sf)	CN	Description
71,396	58	Woods/grass comb., Good, HSG B
31,543	61	Pasture/grassland/range, Good, HSG B
2,169	98	Paved parking, HSG B
105,108	60	Weighted Average
102,939		97.94% Pervious Area
2,169		2.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.15"
0.4	63	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.6	253	0.1400	2.62		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.1	247	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.4	613	Total			

Summary for Subcatchment P2a: PROPOSED

Runoff = 1.18 cfs @ 12.13 hrs, Volume= 4,054 cf, Depth= 5.90"
Routed to Pond CB1 : CATCHBASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

	Area (sf)	CN	Description
*	2,770	98	Driveway, Paved
	5,072	61	>75% Grass cover, Good, HSG B
	408	85	Gravel roads, HSG B
	8,250	75	Weighted Average
	5,480		66.42% Pervious Area
	2,770		33.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 (MIN.)**

Summary for Subcatchment P2b: PROPOSED

Runoff = 0.30 cfs @ 12.13 hrs, Volume= 1,207 cf, Depth= 8.70"
Routed to Pond TR : TRENCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

	Area (sf)	CN	Description
*	1,665	98	Driveway, Paved
	1,665		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 (MIN.)**

Summary for Subcatchment P2c: PROPOSED

Runoff = 3.25 cfs @ 12.15 hrs, Volume= 11,358 cf, Depth= 4.05"
Routed to Reach P2 : PROPOSED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

	Area (sf)	CN	Description
*	133	98	Driveway, Paved
	23,382	61	>75% Grass cover, Good, HSG B
	10,108	58	Woods/grass comb., Good, HSG B
	33,623	60	Weighted Average
	33,490		99.60% Pervious Area
	133		0.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.1100	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.15"
0.4	53	0.1900	2.18		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	81	0.0900	2.10		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.3	184	Total			

Summary for Reach E: EXISTING

Inflow Area = 187,674 sf, 0.00% Impervious, Inflow Depth = 3.96" for 100-Year event
Inflow = 13.98 cfs @ 12.19 hrs, Volume= 61,886 cf
Outflow = 13.98 cfs @ 12.19 hrs, Volume= 61,886 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach E1: EXISTING

Inflow Area = 148,546 sf, 0.00% Impervious, Inflow Depth = 3.93" for 100-Year event
Inflow = 11.28 cfs @ 12.21 hrs, Volume= 48,668 cf
Outflow = 11.28 cfs @ 12.21 hrs, Volume= 48,668 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach E : EXISTING

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach E2: EXISTING

Inflow Area = 39,128 sf, 0.00% Impervious, Inflow Depth = 4.05" for 100-Year event
Inflow = 3.90 cfs @ 12.14 hrs, Volume= 13,218 cf
Outflow = 3.90 cfs @ 12.14 hrs, Volume= 13,218 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach E : EXISTING

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach P: PROPOSED

Inflow Area = 187,674 sf, 6.26% Impervious, Inflow Depth = 3.49" for 100-Year event
Inflow = 14.14 cfs @ 12.18 hrs, Volume= 54,564 cf
Outflow = 14.14 cfs @ 12.18 hrs, Volume= 54,564 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach P1: PROPOSED

Inflow Area = 152,386 sf, 6.53% Impervious, Inflow Depth = 3.34" for 100-Year event
Inflow = 11.10 cfs @ 12.19 hrs, Volume= 42,382 cf
Outflow = 11.10 cfs @ 12.19 hrs, Volume= 42,382 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach P : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach P1r: PROPOSED

Inflow Area = 47,278 sf, 16.45% Impervious, Inflow Depth = 1.75" for 100-Year event
Inflow = 2.63 cfs @ 12.19 hrs, Volume= 6,875 cf
Outflow = 2.41 cfs @ 12.25 hrs, Volume= 6,875 cf, Atten= 9%, Lag= 3.2 min
Routed to Reach P1 : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 1.18 fps, Min. Travel Time= 4.3 min
Avg. Velocity = 0.40 fps, Avg. Travel Time= 12.6 min

Peak Storage= 614 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.16' , Surface Width= 16.24'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 99.70 cfs

10.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 20.0 '/' Top Width= 50.00'
Length= 300.0' Slope= 0.0633 '/'
Inlet Invert= 53.00', Outlet Invert= 34.00'

‡

Summary for Reach P2: PROPOSED

Inflow Area = 35,288 sf, 5.10% Impervious, Inflow Depth = 4.14" for 100-Year event
Inflow = 3.51 cfs @ 12.15 hrs, Volume= 12,182 cf
Outflow = 3.51 cfs @ 12.15 hrs, Volume= 12,182 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach P : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach P2r: PROPOSED

Inflow Area = 1,665 sf,100.00% Impervious, Inflow Depth = 5.93" for 100-Year event
Inflow = 0.30 cfs @ 12.13 hrs, Volume= 823 cf
Outflow = 0.26 cfs @ 12.17 hrs, Volume= 823 cf, Atten= 12%, Lag= 2.0 min
Routed to Reach P2 : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.38 fps, Min. Travel Time= 4.4 min
Avg. Velocity = 0.10 fps, Avg. Travel Time= 17.2 min

Peak Storage= 69 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 12.46'
Bank-Full Depth= 0.25' Flow Area= 3.8 sf, Capacity= 3.23 cfs

10.00' x 0.25' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 20.0 '/' Top Width= 20.00'
Length= 100.0' Slope= 0.0200 '/'
Inlet Invert= 76.00', Outlet Invert= 74.00'

‡

Summary for Pond B1: BERM

Inflow Area = 47,278 sf, 16.45% Impervious, Inflow Depth = 3.46" for 100-Year event
Inflow = 3.72 cfs @ 12.13 hrs, Volume= 13,635 cf
Outflow = 2.80 cfs @ 12.19 hrs, Volume= 13,635 cf, Atten= 25%, Lag= 3.8 min
Discarded = 0.17 cfs @ 12.19 hrs, Volume= 6,760 cf
Primary = 2.63 cfs @ 12.19 hrs, Volume= 6,875 cf
Routed to Reach P1r : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 54.98' @ 12.19 hrs Surf.Area= 2,974 sf Storage= 2,058 cf
Flood Elev= 55.00' Surf.Area= 3,000 sf Storage= 2,105 cf

Plug-Flow detention time= 53.4 min calculated for 13,616 cf (100% of inflow)
Center-of-Mass det. time= 53.6 min (907.5 - 853.9)

Volume	Invert	Avail.Storage	Storage Description
#1	54.00'	2,025 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
#2	53.00'	80 cf	**2.00'W x 100.00'L x 1.00'H Prismatoid** 200 cf Overall x 40.0% Voids
		2,105 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
54.00	1,250	0	0
55.00	2,800	2,025	2,025

Device	Routing	Invert	Outlet Devices
#1	Primary	54.50'	**3.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	53.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.17 cfs @ 12.19 hrs HW=54.98' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=2.61 cfs @ 12.19 hrs HW=54.98' TW=53.15' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 2.61 cfs @ 1.81 fps)

Summary for Pond CB1: CATCHBASIN

Inflow Area = 8,250 sf, 33.58% Impervious, Inflow Depth = 5.90" for 100-Year event
Inflow = 1.18 cfs @ 12.13 hrs, Volume= 4,054 cf
Outflow = 1.18 cfs @ 12.13 hrs, Volume= 4,054 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.18 cfs @ 12.13 hrs, Volume= 4,054 cf
Routed to Pond DMH1 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 82.62' @ 12.13 hrs
Flood Elev= 86.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	82.00'	**10.0" Round Culvert** L= 200.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 82.00' / 78.00' S= 0.0200 '/' Cc= 0.900 n= 0.010, Flow Area= 0.55 sf

Primary OutFlow Max=1.13 cfs @ 12.13 hrs HW=82.61' TW=78.61' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.13 cfs @ 2.65 fps)

Summary for Pond DMH1: DMH

Inflow Area = 8,250 sf, 33.58% Impervious, Inflow Depth = 5.90" for 100-Year event
Inflow = 1.18 cfs @ 12.13 hrs, Volume= 4,054 cf
Outflow = 1.18 cfs @ 12.13 hrs, Volume= 4,054 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.18 cfs @ 12.13 hrs, Volume= 4,054 cf
Routed to Pond DMH2 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 78.62' @ 12.13 hrs
Flood Elev= 89.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	78.00'	**10.0" Round Culvert** L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 78.00' / 72.00' S= 0.0667 '/' Cc= 0.900 n= 0.010, Flow Area= 0.55 sf

Primary OutFlow Max=1.13 cfs @ 12.13 hrs HW=78.61' TW=72.61' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.13 cfs @ 2.65 fps)

Summary for Pond DMH2: DMH

Inflow Area = 8,250 sf, 33.58% Impervious, Inflow Depth = 5.90" for 100-Year event
Inflow = 1.18 cfs @ 12.13 hrs, Volume= 4,054 cf
Outflow = 1.18 cfs @ 12.13 hrs, Volume= 4,054 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.18 cfs @ 12.13 hrs, Volume= 4,054 cf
Routed to Pond INF1 : INFILTRATION FIELD

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 72.62' @ 12.13 hrs
Flood Elev= 75.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	72.00'	**10.0" Round Culvert** L= 84.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 72.00' / 65.00' S= 0.0833 '/' Cc= 0.900 n= 0.010, Flow Area= 0.55 sf

Primary OutFlow Max=1.13 cfs @ 12.13 hrs HW=72.61' TW=66.65' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.13 cfs @ 2.65 fps)

Summary for Pond INF1: INFILTRATION FIELD

Inflow Area = 13,256 sf, 58.66% Impervious, Inflow Depth = 6.96" for 100-Year event
Inflow = 2.08 cfs @ 12.13 hrs, Volume= 7,684 cf
Outflow = 0.81 cfs @ 12.40 hrs, Volume= 7,684 cf, Atten= 61%, Lag= 16.1 min
Discarded = 0.07 cfs @ 10.15 hrs, Volume= 6,584 cf
Primary = 0.73 cfs @ 12.40 hrs, Volume= 1,100 cf
Routed to Pond B1 : BERM

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 69.23' @ 12.40 hrs Surf.Area= 1,268 sf Storage= 2,658 cf

Plug-Flow detention time= 302.1 min calculated for 7,673 cf (100% of inflow)
Center-of-Mass det. time= 302.4 min (1,089.3 - 786.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	64.50'	1,187 cf	**39.50'W x 32.10'L x 3.50'H Field A** 4,437 cf Overall - 1,470 cf Embedded = 2,967 cf x 40.0% Voids
#2A	65.00'	1,470 cf	**ADS_StormTech SC-740 +Cap** x 32 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 32 Chambers in 8 Rows
#3	67.00'	1 cf	**0.67'D x 2.50'H Vertical Cone/Cylinder**-Impervious
		2,658 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	64.50'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	69.00'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.07 cfs @ 10.15 hrs HW=64.55' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.69 cfs @ 12.40 hrs HW=69.22' TW=54.83' (Dynamic Tailwater)
↑**2=Orifice/Grate** (Weir Controls 0.69 cfs @ 1.52 fps)

Summary for Pond TR: TRENCH

Inflow Area = 1,665 sf,100.00% Impervious, Inflow Depth = 8.70" for 100-Year event
Inflow = 0.30 cfs @ 12.13 hrs, Volume= 1,207 cf
Outflow = 0.30 cfs @ 12.13 hrs, Volume= 1,207 cf, Atten= 0%, Lag= 0.3 min
Discarded = 0.00 cfs @ 2.05 hrs, Volume= 384 cf
Primary = 0.30 cfs @ 12.13 hrs, Volume= 823 cf
Routed to Reach P2r : PROPOSED

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 76.98' @ 12.13 hrs Surf.Area= 140 sf Storage= 111 cf

Plug-Flow detention time= 115.5 min calculated for 1,206 cf (100% of inflow)
Center-of-Mass det. time= 116.2 min (857.4 - 741.2)

Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	112 cf	**2.00'W x 70.00'L x 2.00'H Prismatoid** 280 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	76.90'	**5.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	75.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 2.05 hrs HW=75.02' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.29 cfs @ 12.13 hrs HW=76.98' TW=76.06' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.29 cfs @ 0.72 fps)