



ENGINEERING,
INC.

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STORMWATER REPORT

For

“Settler’s Glen”

Red Brook Road
E. Wareham, MA 02576

Prepared for

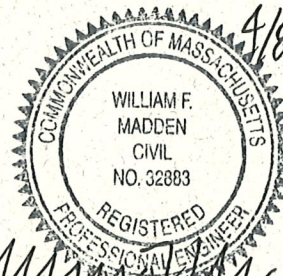
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Revised April 8, 2021

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DRAINAGE NARRATIVE

General Description

This project consists of the construction of ten two-family dwelling units on a 3.6 acre parcel of land. Access to the homes will be from a twenty foot wide paved roadway with a length of seven hundred twenty five feet from Red Brook Road into the property and around the cul-de-sac.

The property is located within a Zone II recharge area and local Groundwater Protection Overlay District. There is a requirement for projects located within these areas to limit total impervious surfaces to 2,500 square feet or 15% of the land area, whichever is greater. Projects which exceed this threshold may be approved if there is a system for artificial recharge and there will not be degradation of groundwater quality. The project has been designed to infiltrate/recharge stormwater and will meet or exceed the requirements of the Massachusetts Stormwater Handbook as well as those listed in the Town of Wareham Rules and Regulations Governing the Subdivision of Land.

The drainage system has been designed to maximize pretreatment and infiltration of runoff and reduce stormwater runoff rates and volumes to the adjacent properties and Red Brook Road. A system of deep sump hooded catch basins, drain manholes including a proprietary water quality manhole, roof runoff leaching galleys, and an underground leaching galley system for the roadway runoff has been designed to provide maximum pretreatment, infiltration, and water quality volume treatment.

This report includes provisions for both "Construction Phase Erosion and Sedimentation Controls" and a "Long Term Operation and Maintenance Plan".

There are no wetland resources in the vicinity of this site. Compliance with the regulations provides a presumption that groundwater supplies and adjacent properties are protected from potential negative impacts.

The project proponents will work cooperatively with the Town of Wareham and their engineering consultant to ensure that development of this project is in full compliance with the regulations.

Existing Conditions

The property is rectangular in shape, approximately two hundred forty seven feet wide and six hundred eighty feet deep. The lot is entirely wooded.

The property slopes from a high point with elevation forty eight in the center of the lot adjacent to Red Brook Road to several circular depressions in the middle of the lot bottom elevations of forty three and forty one. Due to the existing ground cover and pervious soils these depressions were assumed to retain any stormwater with no overflow. The southern end of the land includes small watersheds which slope toward adjacent properties. Existing conditions runoff analysis has been set up as follows.

Sub-catchment 1S is the portion of the property which slopes toward Red Brook Road.

Sub-catchment 2S is the portion of the property with discharge to the adjacent lot 1008D along the east property line.

Sub-catchment 3S is at the north end of the lot with discharge to the westerly abutter.

Sub-catchment 4S is a small depression and the surrounding area above the bottom. This area does not generate any outflow.

Similar to above sub-catchment 5S is a depression in the middle of the lot on the east side with no outflow.

Sub-catchment 6S is a depression in the southwest corner of the lot with no outflow.

Sub-catchment 7S is at the far southwest corner of the property with discharge to adjacent lot 1007B.

Sub-catchment 8S is on the east side of the property opposite 7S with discharge to the east and Roger Lane.

A Link 1L was created to analyze the total flow to the easterly abutter.

Soils on the property as mapped by the USDA Natural Resources Conservation Service are classified as Carver loamy coarse sand (259B), 3-8 percent slopes, with a Hydrologic Soil Group rating A.

The rainfall volumes used in the program were taken from the information available online using NOAA Atlas 14, Volume 10, Version 3.

Proposed Conditions

The access road for the project, "Halyard Road", is centrally located on the property which provides for six buildings on the east side and five buildings on the west side. The proposed grades on both sides of the road are designed to direct the runoff toward the street and the drainage conveyance system. The grading also serves to minimize any runoff onto the adjacent properties.

Drywells consisting of 4'x 4' precast concrete galleys are proposed to store and infiltrate roof runoff from the dwellings in order to promote uniform distribution of a portion of the total storm volume and reduce the amount of runoff to the street system.

The roadway drainage system is comprised of four deep sump hooded catch basins, two drain manholes, and an underground storage and infiltration system comprised of precast concrete galleys similar to the roof infiltration units.

The drain manhole immediately upgradient from the galley system has been specified as a proprietary water quality structure in order to provide total suspended solids removal in excess of the minimum required 44% for highly pervious soils.

Sub-catchment 1S is a portion of the lawn area to the side and rear of unit 20 which contributes runoff to Red Brook Road. This area is compared with pre-development area 1S.

Sub-catchment 2S is a long narrow strip of landscaped or lawn area along the east property line. Area 2S is compared with the flow from pre-development Link 1L.

Sub-catchment 3S is the area of the project which is collected in the catch basins and conveyed to the water quality manhole and underground leaching galley system.

Subcatchments 4S and 5S are roof areas for a single and double unit for confirmation of the number of leaching galleys needed to store and infiltrate the 100 year frequency storm event. Ponds 1P and 3P are the galley systems for roof areas.

Pond 2P is the large galley system that receives runoff from the roadway collection system.

All of the galleys have one foot of crushed stone beneath them, two feet around the outside, and six inches on top.

The infiltration rate utilized in HydroCAD is the Rawls rate for highly pervious Hydrologic Soil Group A soils, 8.27 inches per hour for the wetted perimeter.

The summary table which follows lists the comparison of peak flow rates and volumes resulting from the construction of the stormwater management system for each design point.

In our opinion the successful development of this project in compliance with the design will not result in any adverse impacts to the environment or adjacent properties with respect to stormwater, and provides compliance with the Massachusetts Stormwater Handbook.

Drainage Summary

Table 1 – Pre-Development vs. Post-Development to East (1L/2S)

Storm Event	Pre		Post		Pre vs. Post changes	
	Peak Discharge (cfs)	Volume (ac-ft.)	Peak Discharge (cfs)	Volume (ac-ft.)	Peak Discharge (cfs)	Volume (ac-ft.)
2 yr	0	0	0	0	0	0
10 yr	0	0	0	.002	0	.002
25 yr	.01	.006	.02	.005	.01	-.001
100 yr	.05	.026	.08	.010	.03	-.016

Table 2 – Pre-Development vs. Post-Development to West (3S/Grade Away)

Storm Event	Pre		Post		Pre vs. Post changes	
	Peak Discharge (cfs)	Volume (ac-ft.)	Peak Discharge (cfs)	Volume (ac-ft.)	Peak Discharge (cfs)	Volume (ac-ft.)
2 yr	0	0	0	0	0	0
10 yr	0	0	0	0	0	0
25 yr	.01	.005	0	0	-.01	-.005
100 yr	.05	.020	0	0	-.05	-.020

Table 3 – Pre-Development vs. Post-Development to Red Brook Road (1S/1S)

Storm Event	Pre		Post		Pre vs. Post changes	
	Peak Discharge (cfs)	Volume (ac-ft.)	Peak Discharge (cfs)	Volume (ac-ft.)	Peak Discharge (cfs)	Volume (ac-ft.)
2 yr	0	0	0	0	0	0
10 yr	0	0	0	0	0	0
25 yr	0	.001	0	.001	0	0
100 yr	.01	.002	0.02	.002	.01	0



Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.¹ This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8²
- Operation and Maintenance Plan required by Standard 9

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

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

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

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

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



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.

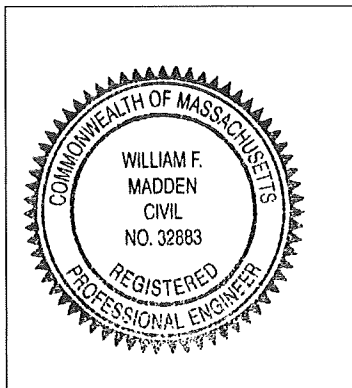
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



William F. Madden 9/8/21
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 Field¹
- 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 proprietary 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) *N/A*

- 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 *N/A*

- 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 N/A

- 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.

COMPLIANCE WITH THE STORMWATER MANAGEMENT STANDARDS

The Stormwater Management Standards

1. No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.
 - *This project does not include any drainage outfalls. The underground infiltration systems have been sized to store and infiltrate all storm events up to and including the 100 year storm.*
2. Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.
 - *The drainage calculations confirm that the proposed project matches or reduces the rate of runoff for all design storms.*
3. Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.
 - *Recharge is provided within the galley systems. Volume calculations are included in the report and confirm that this standard is met.*
4. Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:
 - a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;
 - b. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and
 - c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

- *This project includes deep sump hooded catch basins and a proprietary manhole structure to provide pretreatment prior to infiltration. The system exceeds the minimum 80% annual TSS removal.*
5. For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.
- *This project is not considered a land use with higher potential pollutant loads.*
6. Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A “storm water discharge” as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.
- *This project is not located within a Zone II of a public water supply, however it is within the Town’s Groundwater Protection Overlay District.*
7. A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A

redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

- *This project is considered new development. Full compliance with the standards is provided by the stormwater management system design.*
8. A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.
- *Construction period erosion and sedimentation control measures are included on the design plans and in this report.*
9. A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.
- *A long-term operation and maintenance plan has been listed on the design plans and is included in this report.*
10. All illicit discharges to the stormwater management system are prohibited.
- *An illicit discharge compliance statement is included in the drainage report.*

Long Term Operation and Maintenance Plan

Responsible Party: Settler's Glen Homeowners Association
Halyard Road
East Wareham, MA 02538

The property owner is responsible for the inspection, operation, and maintenance of the Stormwater Management System. The homeowner's association will be provided with copies of the approved site design and as-built plans to make them aware of the locations of system components. A copy of this Operation and Maintenance (O & M) Plan should also be provided.

System Description: The drainage system consists of a number of Best Management Practices, BMPs, which collect, treat, and infiltrate stormwater runoff from all storm events up to and including the 100 year storm event. Roof drainage from the housing units is directed to underground leaching galleys for storage and infiltration. This reduces the amount of runoff going to the street. The street drainage system consists of four deep sump hooded catch basins which discharge to drain manholes connected to a field of galleys installed underground off the end of the cul-de-sac. The manhole immediately upstream from the galleys is a proprietary treatment manhole which provides enhanced removal of total suspended solids in order to comply with regulatory requirements and increase the longevity and performance of the leaching galley system.

Street Sweeping: Street sweeping is an effective non-structural source control that will remove sediment from paved surfaces. Street sweeping should be done with a high efficiency vacuum sweeper or regenerative air sweeper. Street sweeping should be done twice per year. Once removed from paved surfaces, the sweepings must be handled and disposed of properly in one of the ways approved by MassDEP. (See Policy #BAW-18-001: Reuse and Disposal of Street Sweepings)

Deep Sump Catch Basins: Deep sump catch basins are underground retention systems designed to remove trash, debris, and coarse sediment from stormwater runoff and serve as temporary spill containment devices for floatables such as oils and grease. Inspect catch basins monthly and clean out at least two times per year at the end of the foliage and snow removal seasons. Sediment must also be removed whenever the depth of the deposits is greater than or equal to one-half the distance from the bottom of the structure to the outlet invert. Sediment shall be removed through the use of a vacuum truck. Sediment must be handled and disposed of properly in one of the ways approved by MassDEP. Refer to their policy on the management of catch basin cleanings. If there is evidence that they have been contaminated by a spill or other means, the cleanings must be evaluated in accordance with the MassDEP hazardous waste regulations, 310 CMR 30.00 and handled as hazardous waste.

Proprietary Manholes: Proprietary drainage structures (CDS2015-4-C) are underground retention systems designed to remove trash, debris, and coarse sediment from stormwater runoff and serve as temporary spill containment devices for floatables such as oils and grease. Inspect the units monthly, clean at least two times a year at the end of the foliage and snow removal seasons. Sediments must also be removed when sediment has reached the depth recommended for cleanout by the manufacturer's specifications. Sediment must be handled and disposed of in the same manner as listed above for deep sump catch basins.

Leaching Pits and Galleys: Leaching pits and galleys shall be inspected after every major storm event for the first few months after installation to ensure proper stabilization and function. Thereafter inspection shall occur annually. Water depth in the pits and galleys should be observed after major storms to determine proper function. Exfiltration rates are determined by the drop in water level over the time it takes for the unit to empty. A comparison of exfiltration rate measurements taken over a period of years can provide helpful information in the event that clogging problems occur.

Public Safety Features: The catch basin grates and manhole covers are bicycle and pedestrian safe. The precast concrete galleys are underground and therefore inaccessible to children.

Operation and Maintenance Budget: The estimated annual cost for inspection and sediment removal associated with the maintenance of the Stormwater Management System is \$2,500.

Reference: For full details on drainage system Construction, Operation and Maintenance refer to the current edition of the Massachusetts Stormwater Handbook.

Construction Period Pollution Prevention and Erosion & Sedimentation Control Plan

Narrative: This project consists of construction of a 725' dead end residential subdivision road which provides access to ten two-family homes. The roadway construction includes the installation of municipal water, sewer, underground electric, gas, a closed drainage system, and underground leaching galley systems.

Responsible Parties: The site contractor and the developer.

Construction Period Operation / Maintenance Plan:

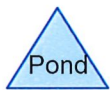
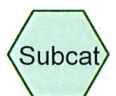
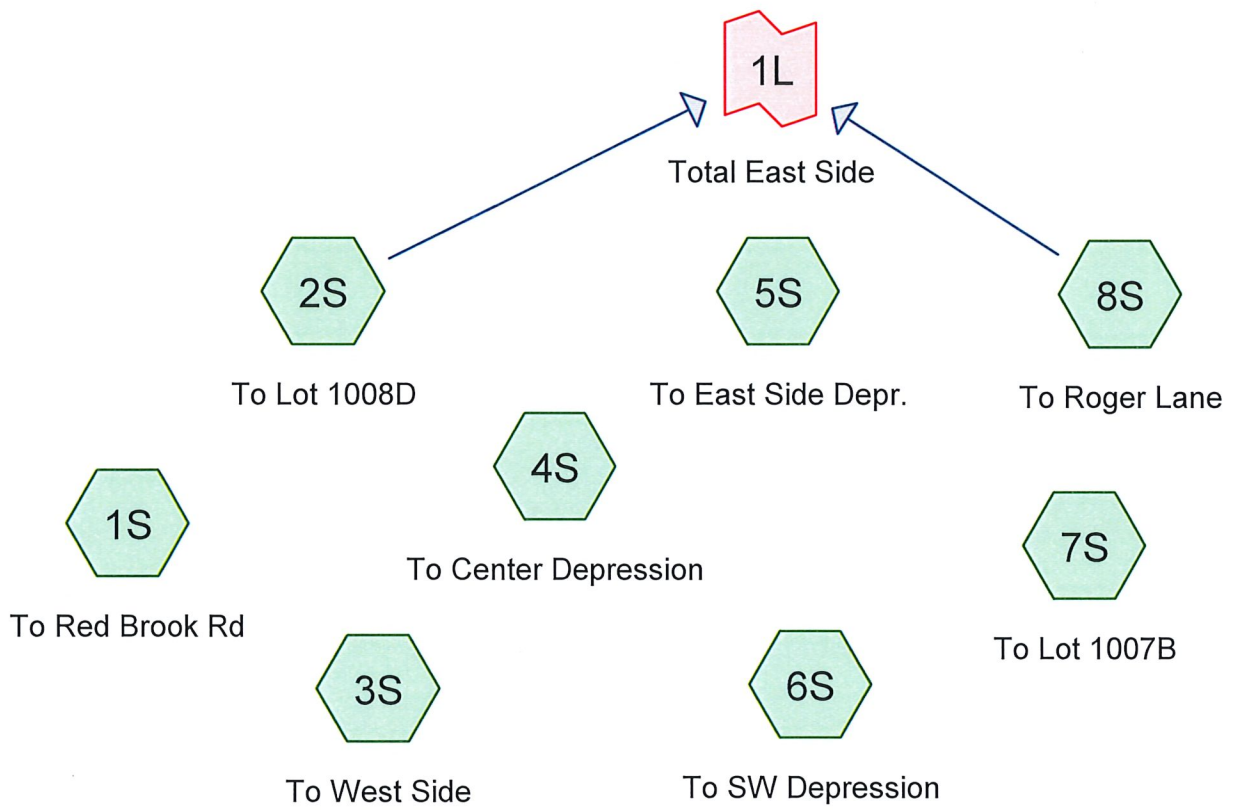
- Provide sufficient refuse containers and empty as needed.
- Inspect erosion controls daily. Repair or replace as needed.
- Police the area for safety hazards and trash on a daily basis.
- Store materials away from drainage and resource areas.
- Provide or receive only the materials which can be installed promptly.
- Inspect vehicles for leaks and repair or replace when necessary.
- Provide dust control with watering.
- Maintain truck runoff pads.
- Provide a contact person for complaints and to receive notification of problems.
- Direct dewatering to adequately sized containment areas.

Construction Sequence:

- Install erosion controls per the plans.
- Install silt sacks in existing catch basins.
- Clear the land, remove stumps, and rough grade.
- Install the underground utilities.
- Install drainage structures and piping.
- Install roadway base material.
- Install base course pavement.
- Install foundations. Extend utilities to homes.
- Construct sidewalk.
- Install landscaping and lighting.
- Loam and seed disturbed areas.
- Install top course pavement.
- Remove erosion controls.

Maintenance Schedule:

- Erosion controls are to be inspected daily and repaired or replaced as needed.
- Trash is to be picked up daily.
- Water shall be used for dust control as needed.
- Silt sacks shall be emptied or replaced when full.
- Vehicles shall be inspected daily for any leaks and repaired or replaced as needed.



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Project Notes

Rainfall events imported from "9247 Trial.hcp"

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2 Year Storm	Type III 24-hr		Default	24.00	1	3.44	2
2	10 Year Storm	Type III 24-hr		Default	24.00	1	5.03	2
3	25 Year Storm	Type III 24-hr		Default	24.00	1	6.02	2
4	100 Year Storm	Type III 24-hr		Default	24.00	1	7.55	2

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.598	30	Woods, Good, HSG A (1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S)
3.598	30	TOTAL AREA

9247 Pre

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
3.598	HSG A	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
3.598		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
3.598	0.000	0.000	0.000	0.000	3.598	Woods, Good	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S
3.598	0.000	0.000	0.000	0.000	3.598	TOTAL AREA	

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Type III 24-hr 2 Year Storm Rainfall=3.44"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Red Brook Rd	Runoff Area=3,600 sf 0.00% Impervious Runoff Depth=0.00" Tc=6.0 min CN=30 Runoff=0.00 cfs 0.000 af
Subcatchment 2S: To Lot 1008D	Runoff Area=28,485 sf 0.00% Impervious Runoff Depth=0.00" Flow Length=198' Tc=9.6 min CN=30 Runoff=0.00 cfs 0.000 af
Subcatchment 3S: To West Side	Runoff Area=33,615 sf 0.00% Impervious Runoff Depth=0.00" Flow Length=195' Tc=11.1 min CN=30 Runoff=0.00 cfs 0.000 af
Subcatchment 4S: To Center Depression	Runoff Area=12,150 sf 0.00% Impervious Runoff Depth=0.00" Flow Length=114' Tc=11.8 min CN=30 Runoff=0.00 cfs 0.000 af
Subcatchment 5S: To East Side Depr.	Runoff Area=25,740 sf 0.00% Impervious Runoff Depth=0.00" Flow Length=140' Tc=20.0 min CN=30 Runoff=0.00 cfs 0.000 af
Subcatchment 6S: To SW Depression	Runoff Area=32,000 sf 0.00% Impervious Runoff Depth=0.00" Flow Length=115' Tc=15.1 min CN=30 Runoff=0.00 cfs 0.000 af
Subcatchment 7S: To Lot 1007B	Runoff Area=7,528 sf 0.00% Impervious Runoff Depth=0.00" Flow Length=92' Tc=17.6 min CN=30 Runoff=0.00 cfs 0.000 af
Subcatchment 8S: To Roger Lane	Runoff Area=13,590 sf 0.00% Impervious Runoff Depth=0.00" Flow Length=100' Tc=19.7 min CN=30 Runoff=0.00 cfs 0.000 af
Link 1L: Total East Side	Inflow=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af
Total Runoff Area = 3.598 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.00"	
100.00% Pervious = 3.598 ac 0.00% Impervious = 0.000 ac	

Summary for Subcatchment 1S: To Red Brook Rd

[45] Hint: Runoff=Zero

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
3,600	30	Woods, Good, HSG A
3,600		100.00% Pervious Area

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

Summary for Subcatchment 2S: To Lot 1008D

[45] Hint: Runoff=Zero

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
28,485	30	Woods, Good, HSG A
28,485		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0460	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
1.1	148	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
9.6	198	Total			

Summary for Subcatchment 3S: To West Side

[45] Hint: Runoff=Zero

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
33,615	30	Woods, Good, HSG A
33,615		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	50	0.0280	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.7	145	0.0470	3.49		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.1	195	Total			

Summary for Subcatchment 4S: To Center Depression

[45] Hint: Runoff=Zero

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
12,150	30	Woods, Good, HSG A
12,150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.0220	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.3	64	0.0480	3.53		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.8	114	Total			

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Type III 24-hr 2 Year Storm Rainfall=3.44"

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Summary for Subcatchment 5S: To East Side Depr.

[45] Hint: Runoff=Zero

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
25,740	30	Woods, Good, HSG A
25,740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	50	0.0060	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.7	90	0.0160	2.04		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
20.0	140	Total			

Summary for Subcatchment 6S: To SW Depression

[45] Hint: Runoff=Zero

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
32,000	30	Woods, Good, HSG A
32,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	50	0.0120	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.5	65	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
15.1	115	Total			

Summary for Subcatchment 7S: To Lot 1007B

[45] Hint: Runoff=Zero

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
7,528	30	Woods, Good, HSG A
7,528		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	50	0.0080	0.05		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.4	42	0.0120	1.76		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.6	92	Total			

Summary for Subcatchment 8S: To Roger Lane

[45] Hint: Runoff=Zero

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
13,590	30	Woods, Good, HSG A
13,590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	50	0.0060	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.4	50	0.0180	2.16		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
19.7	100	Total			

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Type III 24-hr 2 Year Storm Rainfall=3.44"

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Summary for Link 1L: Total East Side

Inflow Area = 0.966 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2 Year Storm event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Red Brook Rd Runoff Area=3,600 sf 0.00% Impervious Runoff Depth=0.01"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 2S: To Lot 1008D Runoff Area=28,485 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=198' Tc=9.6 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 3S: To West Side Runoff Area=33,615 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=195' Tc=11.1 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 4S: To Center Depression Runoff Area=12,150 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=114' Tc=11.8 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 5S: To East Side Depr. Runoff Area=25,740 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=140' Tc=20.0 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 6S: To SW Depression Runoff Area=32,000 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=115' Tc=15.1 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 7S: To Lot 1007B Runoff Area=7,528 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=92' Tc=17.6 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 8S: To Roger Lane Runoff Area=13,590 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=100' Tc=19.7 min CN=30 Runoff=0.00 cfs 0.000 af

Link 1L: Total East Side Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 3.598 ac Runoff Volume = 0.002 af Average Runoff Depth = 0.01"
100.00% Pervious = 3.598 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: To Red Brook Rd

Runoff = 0.00 cfs @ 23.74 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
3,600	30	Woods, Good, HSG A
3,600		100.00% Pervious Area

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

Summary for Subcatchment 2S: To Lot 1008D

Runoff = 0.00 cfs @ 23.82 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
28,485	30	Woods, Good, HSG A
28,485		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0460	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
1.1	148	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
9.6	198	Total			

Summary for Subcatchment 3S: To West Side

Runoff = 0.00 cfs @ 23.79 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
33,615	30	Woods, Good, HSG A
33,615		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	50	0.0280	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.7	145	0.0470	3.49		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.1	195	Total			

Summary for Subcatchment 4S: To Center Depression

Runoff = 0.00 cfs @ 23.85 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
12,150	30	Woods, Good, HSG A
12,150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.0220	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.3	64	0.0480	3.53		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.8	114	Total			

Summary for Subcatchment 5S: To East Side Depr.

Runoff = 0.00 cfs @ 23.98 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
25,740	30	Woods, Good, HSG A
25,740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	50	0.0060	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.7	90	0.0160	2.04		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
20.0	140	Total			

Summary for Subcatchment 6S: To SW Depression

Runoff = 0.00 cfs @ 23.84 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
32,000	30	Woods, Good, HSG A
32,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	50	0.0120	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.5	65	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
15.1	115	Total			

Summary for Subcatchment 7S: To Lot 1007B

Runoff = 0.00 cfs @ 23.88 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
7,528	30	Woods, Good, HSG A
7,528		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	50	0.0080	0.05		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.4	42	0.0120	1.76		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.6	92	Total			

Summary for Subcatchment 8S: To Roger Lane

Runoff = 0.00 cfs @ 23.97 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
13,590	30	Woods, Good, HSG A
13,590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	50	0.0060	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.4	50	0.0180	2.16		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
19.7	100	Total			

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Type III 24-hr 10 Year Storm Rainfall=5.03"

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Summary for Link 1L: Total East Side

Inflow Area = 0.966 ac, 0.00% Impervious, Inflow Depth = 0.01" for 10 Year Storm event
Inflow = 0.00 cfs @ 23.84 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 23.84 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Red Brook Rd Runoff Area=3,600 sf 0.00% Impervious Runoff Depth=0.07"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0.001 af

Subcatchment 2S: To Lot 1008D Runoff Area=28,485 sf 0.00% Impervious Runoff Depth=0.07"
Flow Length=198' Tc=9.6 min CN=30 Runoff=0.01 cfs 0.004 af

Subcatchment 3S: To West Side Runoff Area=33,615 sf 0.00% Impervious Runoff Depth=0.07"
Flow Length=195' Tc=11.1 min CN=30 Runoff=0.01 cfs 0.005 af

Subcatchment 4S: To Center Depression Runoff Area=12,150 sf 0.00% Impervious Runoff Depth=0.07"
Flow Length=114' Tc=11.8 min CN=30 Runoff=0.00 cfs 0.002 af

Subcatchment 5S: To East Side Depr. Runoff Area=25,740 sf 0.00% Impervious Runoff Depth=0.07"
Flow Length=140' Tc=20.0 min CN=30 Runoff=0.01 cfs 0.004 af

Subcatchment 6S: To SW Depression Runoff Area=32,000 sf 0.00% Impervious Runoff Depth=0.07"
Flow Length=115' Tc=15.1 min CN=30 Runoff=0.01 cfs 0.005 af

Subcatchment 7S: To Lot 1007B Runoff Area=7,528 sf 0.00% Impervious Runoff Depth=0.07"
Flow Length=92' Tc=17.6 min CN=30 Runoff=0.00 cfs 0.001 af

Subcatchment 8S: To Roger Lane Runoff Area=13,590 sf 0.00% Impervious Runoff Depth=0.07"
Flow Length=100' Tc=19.7 min CN=30 Runoff=0.00 cfs 0.002 af

Link 1L: Total East Side Inflow=0.01 cfs 0.006 af
Primary=0.01 cfs 0.006 af

Total Runoff Area = 3.598 ac Runoff Volume = 0.022 af Average Runoff Depth = 0.07"
100.00% Pervious = 3.598 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: To Red Brook Rd

Runoff = 0.00 cfs @ 15.46 hrs, Volume= 0.001 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
3,600	30	Woods, Good, HSG A
3,600		100.00% Pervious Area

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

Summary for Subcatchment 2S: To Lot 1008D

Runoff = 0.01 cfs @ 15.52 hrs, Volume= 0.004 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
28,485	30	Woods, Good, HSG A
28,485		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0460	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
1.1	148	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
9.6	198	Total			

Summary for Subcatchment 3S: To West Side

Runoff = 0.01 cfs @ 15.55 hrs, Volume= 0.005 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
33,615	30	Woods, Good, HSG A
33,615		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	50	0.0280	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.7	145	0.0470	3.49		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.1	195	Total			

Summary for Subcatchment 4S: To Center Depression

Runoff = 0.00 cfs @ 15.56 hrs, Volume= 0.002 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
12,150	30	Woods, Good, HSG A
12,150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.0220	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.3	64	0.0480	3.53		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.8	114	Total			

Summary for Subcatchment 5S: To East Side Depr.

Runoff = 0.01 cfs @ 15.71 hrs, Volume= 0.004 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
25,740	30	Woods, Good, HSG A
25,740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	50	0.0060	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.7	90	0.0160	2.04		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
20.0	140	Total			

Summary for Subcatchment 6S: To SW Depression

Runoff = 0.01 cfs @ 15.62 hrs, Volume= 0.005 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
32,000	30	Woods, Good, HSG A
32,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	50	0.0120	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.5	65	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
15.1	115	Total			

Summary for Subcatchment 7S: To Lot 1007B

Runoff = 0.00 cfs @ 15.66 hrs, Volume= 0.001 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
7,528	30	Woods, Good, HSG A
7,528		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	50	0.0080	0.05		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.4	42	0.0120	1.76		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.6	92	Total			

Summary for Subcatchment 8S: To Roger Lane

Runoff = 0.00 cfs @ 15.69 hrs, Volume= 0.002 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
13,590	30	Woods, Good, HSG A
13,590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	50	0.0060	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.4	50	0.0180	2.16		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
19.7	100	Total			

Summary for Link 1L: Total East Side

Inflow Area = 0.966 ac, 0.00% Impervious, Inflow Depth = 0.07" for 25 Year Storm event
Inflow = 0.01 cfs @ 15.56 hrs, Volume= 0.006 af
Primary = 0.01 cfs @ 15.56 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Red Brook Rd Runoff Area=3,600 sf 0.00% Impervious Runoff Depth=0.32"
Tc=6.0 min CN=30 Runoff=0.01 cfs 0.002 af

Subcatchment 2S: To Lot 1008D Runoff Area=28,485 sf 0.00% Impervious Runoff Depth=0.32"
Flow Length=198' Tc=9.6 min CN=30 Runoff=0.04 cfs 0.017 af

Subcatchment 3S: To West Side Runoff Area=33,615 sf 0.00% Impervious Runoff Depth=0.32"
Flow Length=195' Tc=11.1 min CN=30 Runoff=0.05 cfs 0.020 af

Subcatchment 4S: To Center Depression Runoff Area=12,150 sf 0.00% Impervious Runoff Depth=0.32"
Flow Length=114' Tc=11.8 min CN=30 Runoff=0.02 cfs 0.007 af

Subcatchment 5S: To East Side Depr. Runoff Area=25,740 sf 0.00% Impervious Runoff Depth=0.32"
Flow Length=140' Tc=20.0 min CN=30 Runoff=0.03 cfs 0.016 af

Subcatchment 6S: To SW Depression Runoff Area=32,000 sf 0.00% Impervious Runoff Depth=0.32"
Flow Length=115' Tc=15.1 min CN=30 Runoff=0.04 cfs 0.019 af

Subcatchment 7S: To Lot 1007B Runoff Area=7,528 sf 0.00% Impervious Runoff Depth=0.32"
Flow Length=92' Tc=17.6 min CN=30 Runoff=0.01 cfs 0.005 af

Subcatchment 8S: To Roger Lane Runoff Area=13,590 sf 0.00% Impervious Runoff Depth=0.32"
Flow Length=100' Tc=19.7 min CN=30 Runoff=0.02 cfs 0.008 af

Link 1L: Total East Side Inflow=0.05 cfs 0.026 af
Primary=0.05 cfs 0.026 af

Total Runoff Area = 3.598 ac Runoff Volume = 0.095 af Average Runoff Depth = 0.32"
100.00% Pervious = 3.598 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: To Red Brook Rd

Runoff = 0.01 cfs @ 12.46 hrs, Volume= 0.002 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
3,600	30	Woods, Good, HSG A
3,600		100.00% Pervious Area

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

Summary for Subcatchment 2S: To Lot 1008D

Runoff = 0.04 cfs @ 12.52 hrs, Volume= 0.017 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
28,485	30	Woods, Good, HSG A
28,485		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0460	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
1.1	148	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
9.6	198	Total			

Summary for Subcatchment 3S: To West Side

Runoff = 0.05 cfs @ 12.54 hrs, Volume= 0.020 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
33,615	30	Woods, Good, HSG A
33,615		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	50	0.0280	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.7	145	0.0470	3.49		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.1	195	Total			

Summary for Subcatchment 4S: To Center Depression

Runoff = 0.02 cfs @ 12.55 hrs, Volume= 0.007 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
12,150	30	Woods, Good, HSG A
12,150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.0220	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.3	64	0.0480	3.53		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.8	114	Total			

Summary for Subcatchment 5S: To East Side Depr.

Runoff = 0.03 cfs @ 12.73 hrs, Volume= 0.016 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
25,740	30	Woods, Good, HSG A
25,740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	50	0.0060	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.7	90	0.0160	2.04		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
20.0	140	Total			

Summary for Subcatchment 6S: To SW Depression

Runoff = 0.04 cfs @ 12.61 hrs, Volume= 0.019 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
32,000	30	Woods, Good, HSG A
32,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	50	0.0120	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.5	65	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
15.1	115	Total			

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Type III 24-hr 100 Year Storm Rainfall=7.55"

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Summary for Subcatchment 7S: To Lot 1007B

Runoff = 0.01 cfs @ 12.66 hrs, Volume= 0.005 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
7,528	30	Woods, Good, HSG A
7,528		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	50	0.0080	0.05		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44"
0.4	42	0.0120	1.76		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.6	92	Total			

Summary for Subcatchment 8S: To Roger Lane

Runoff = 0.02 cfs @ 12.72 hrs, Volume= 0.008 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=7.55"

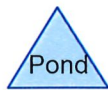
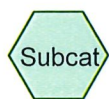
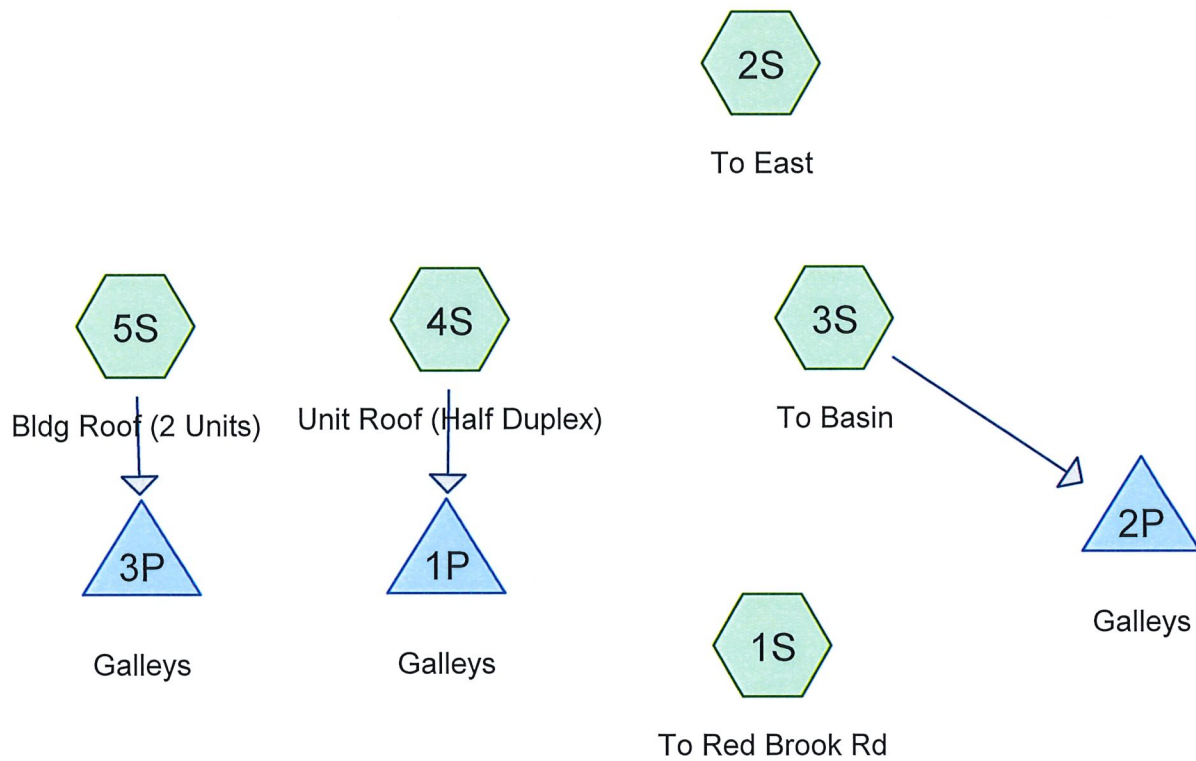
Area (sf)	CN	Description
13,590	30	Woods, Good, HSG A
13,590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	50	0.0060	0.04		Sheet Flow,
					Woods: Light underbrush n= 0.400 P2= 3.44"
0.4	50	0.0180	2.16		Shallow Concentrated Flow,
					Unpaved Kv= 16.1 fps
19.7	100	Total			

Summary for Link 1L: Total East Side

Inflow Area = 0.966 ac, 0.00% Impervious, Inflow Depth = 0.32" for 100 Year Storm event
Inflow = 0.05 cfs @ 12.56 hrs, Volume= 0.026 af
Primary = 0.05 cfs @ 12.56 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs



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Project Notes

Rainfall events imported from "9247 Pre.hcp"

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2 Year Storm	Type III 24-hr		Default	24.00	1	3.44	2
2	10 Year Storm	Type III 24-hr		Default	24.00	1	5.03	2
3	25 Year Storm	Type III 24-hr		Default	24.00	1	6.02	2
4	100 Year Storm	Type III 24-hr		Default	24.00	1	7.55	2

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.035	39	>75% Grass cover, Good, HSG A (1S, 2S, 3S)
0.698	98	Paved Road, driveways, sidewalks (3S)
0.090	98	Roof Area of 2 units (5S)
0.045	98	Unit Roof (4S)
2.868	56	TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.035	HSG A	1S, 2S, 3S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.833	Other	3S, 4S, 5S
2.868		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatch Numbers
2.035	0.000	0.000	0.000	0.000	2.035	>75% Grass cover, Good	
0.000	0.000	0.000	0.000	0.698	0.698	Paved Road, driveways, sidewalks	
0.000	0.000	0.000	0.000	0.090	0.090	Roof Area of 2 units	
0.000	0.000	0.000	0.000	0.045	0.045	Unit Roof	
2.035	0.000	0.000	0.000	0.833	2.868	TOTAL AREA	

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	3S	0.00	0.00	355.0	0.0050	0.012	0.0	12.0	0.0

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Type III 24-hr 2 Year Storm Rainfall=3.44"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Red Brook Rd Runoff Area=1,140 sf 0.00% Impervious Runoff Depth=0.01"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment 2S: To East Runoff Area=5,391 sf 0.00% Impervious Runoff Depth=0.01"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment 3S: To Basin Runoff Area=112,517 sf 27.02% Impervious Runoff Depth=0.33"
Flow Length=539' Tc=11.7 min CN=55 Runoff=0.38 cfs 0.070 af

Subcatchment 4S: Unit Roof (Half Duplex) Runoff Area=1,960 sf 100.00% Impervious Runoff Depth=3.21"
Tc=6.0 min CN=98 Runoff=0.15 cfs 0.012 af

Subcatchment 5S: Bldg Roof (2 Units) Runoff Area=3,920 sf 100.00% Impervious Runoff Depth=3.21"
Tc=6.0 min CN=98 Runoff=0.30 cfs 0.024 af

Pond 1P: Galleys Peak Elev=37.84' Storage=111 cf Inflow=0.15 cfs 0.012 af
Outflow=0.04 cfs 0.012 af

Pond 2P: Galleys Peak Elev=35.54' Storage=43 cf Inflow=0.38 cfs 0.070 af
Outflow=0.37 cfs 0.070 af

Pond 3P: Galleys Peak Elev=37.86' Storage=229 cf Inflow=0.30 cfs 0.024 af
Outflow=0.08 cfs 0.024 af

Total Runoff Area = 2.868 ac Runoff Volume = 0.106 af Average Runoff Depth = 0.44"
70.96% Pervious = 2.035 ac 29.04% Impervious = 0.833 ac

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Type III 24-hr 2 Year Storm Rainfall=3.44"

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Summary for Subcatchment 1S: To Red Brook Rd

Runoff = 0.00 cfs @ 23.06 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
1,140	39	>75% Grass cover, Good, HSG A
1,140		100.00% Pervious Area

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

Summary for Subcatchment 2S: To East

Runoff = 0.00 cfs @ 23.06 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
5,391	39	>75% Grass cover, Good, HSG A
5,391		100.00% Pervious Area

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

Summary for Subcatchment 3S: To Basin

Runoff = 0.38 cfs @ 12.38 hrs, Volume= 0.070 af, Depth= 0.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
* 30,400	98	Paved Road, driveways, sidewalks
82,117	39	>75% Grass cover, Good, HSG A
112,517	55	Weighted Average
82,117		72.98% Pervious Area
30,400		27.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	50	0.0060	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
0.3	40	0.0150	1.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.9	94	0.0075	1.76		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.7	355	0.0050	3.47	2.73	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
11.7	539	Total			

Summary for Subcatchment 4S: Unit Roof (Half Duplex)

Runoff = 0.15 cfs @ 12.08 hrs, Volume= 0.012 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
* 1,960	98	Unit Roof
1,960		100.00% Impervious Area

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

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Type III 24-hr 2 Year Storm Rainfall=3.44"

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Summary for Subcatchment 5S: Bldg Roof (2 Units)

Runoff = 0.30 cfs @ 12.08 hrs, Volume= 0.024 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.44"

	Area (sf)	CN	Description
*	3,920	98	Roof Area of 2 units
	3,920		100.00% Impervious Area

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

Summary for Pond 1P: Galleys

Inflow Area = 0.045 ac, 100.00% Impervious, Inflow Depth = 3.21" for 2 Year Storm event
 Inflow = 0.15 cfs @ 12.08 hrs, Volume= 0.012 af
 Outflow = 0.04 cfs @ 12.42 hrs, Volume= 0.012 af, Atten= 72%, Lag= 20.5 min
 Discarded = 0.04 cfs @ 12.42 hrs, Volume= 0.012 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 37.84' @ 12.42 hrs Surf.Area= 128 sf Storage= 111 cf

Plug-Flow detention time= 15.5 min calculated for 0.012 af (100% of inflow)
 Center-of-Mass det. time= 15.5 min (770.4 - 754.9)

Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	211 cf	8.00'W x 16.00'L x 5.50'H Excavation/Crushed Stone 704 cf Overall - 177 cf Embedded = 527 cf x 40.0% Voids
#2	37.00'	133 cf	Concrete Galley 4x4x4 x 3 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
		344 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	36.00'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.04 cfs @ 12.42 hrs HW=37.84' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.04 cfs)

Summary for Pond 2P: Galleys

Inflow Area = 2.583 ac, 27.02% Impervious, Inflow Depth = 0.33" for 2 Year Storm event
 Inflow = 0.38 cfs @ 12.38 hrs, Volume= 0.070 af
 Outflow = 0.37 cfs @ 12.41 hrs, Volume= 0.070 af, Atten= 1%, Lag= 1.8 min
 Discarded = 0.37 cfs @ 12.41 hrs, Volume= 0.070 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 35.54' @ 12.41 hrs Surf.Area= 2,640 sf Storage= 43 cf

Plug-Flow detention time= 1.9 min calculated for 0.070 af (100% of inflow)
 Center-of-Mass det. time= 1.9 min (948.5 - 946.6)

Volume	Invert	Avail.Storage	Storage Description
#1	35.50'	2,511 cf	44.00'W x 60.00'L x 5.50'H Excavation/Crushed Stone 14,520 cf Overall - 8,243 cf Embedded = 6,277 cf x 40.0% Voids
#2	36.50'	6,208 cf	Concrete Galley 4x4x4 x 140 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf 140 Chambers in 10 Rows
		8,719 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	35.50'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.51 cfs @ 12.41 hrs HW=35.54' (Free Discharge)
 ↖1=Exfiltration (Exfiltration Controls 0.51 cfs)

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Type III 24-hr 2 Year Storm Rainfall=3.44"

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Summary for Pond 3P: Galleys

Inflow Area = 0.090 ac, 100.00% Impervious, Inflow Depth = 3.21" for 2 Year Storm event
 Inflow = 0.30 cfs @ 12.08 hrs, Volume= 0.024 af
 Outflow = 0.08 cfs @ 12.44 hrs, Volume= 0.024 af, Atten= 74%, Lag= 21.6 min
 Discarded = 0.08 cfs @ 12.44 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 37.86' @ 12.44 hrs Surf.Area= 256 sf Storage= 229 cf

Plug-Flow detention time= 17.0 min calculated for 0.024 af (100% of inflow)
 Center-of-Mass det. time= 17.0 min (771.9 - 754.9)

Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	398 cf	8.00'W x 32.00'L x 5.50'H Excavation/Crushed Stone 1,408 cf Overall - 412 cf Embedded = 996 cf x 40.0% Voids
#2	37.00'	310 cf	Concrete Galley 4x4x4 x 7 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
		709 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	36.00'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.08 cfs @ 12.44 hrs HW=37.86' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

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Type III 24-hr 10 Year Storm Rainfall=5.03"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Red Brook Rd	Runoff Area=1,140 sf 0.00% Impervious Runoff Depth=0.21" Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af
Subcatchment 2S: To East	Runoff Area=5,391 sf 0.00% Impervious Runoff Depth=0.21" Tc=6.0 min CN=39 Runoff=0.00 cfs 0.002 af
Subcatchment 3S: To Basin	Runoff Area=112,517 sf 27.02% Impervious Runoff Depth=0.99" Flow Length=539' Tc=11.7 min CN=55 Runoff=1.98 cfs 0.214 af
Subcatchment 4S: Unit Roof (Half Duplex)	Runoff Area=1,960 sf 100.00% Impervious Runoff Depth=4.79" Tc=6.0 min CN=98 Runoff=0.22 cfs 0.018 af
Subcatchment 5S: Bldg Roof (2 Units)	Runoff Area=3,920 sf 100.00% Impervious Runoff Depth=4.79" Tc=6.0 min CN=98 Runoff=0.44 cfs 0.036 af
Pond 1P: Galleys	Peak Elev=39.00' Storage=193 cf Inflow=0.22 cfs 0.018 af Outflow=0.05 cfs 0.018 af
Pond 2P: Galleys	Peak Elev=36.94' Storage=1,914 cf Inflow=1.98 cfs 0.214 af Outflow=0.56 cfs 0.214 af
Pond 3P: Galleys	Peak Elev=39.01' Storage=401 cf Inflow=0.44 cfs 0.036 af Outflow=0.10 cfs 0.036 af

Total Runoff Area = 2.868 ac Runoff Volume = 0.271 af Average Runoff Depth = 1.13"
70.96% Pervious = 2.035 ac 29.04% Impervious = 0.833 ac

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Type III 24-hr 10 Year Storm Rainfall=5.03"

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Summary for Subcatchment 1S: To Red Brook Rd

Runoff = 0.00 cfs @ 12.47 hrs, Volume= 0.000 af, Depth= 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
1,140	39	>75% Grass cover, Good, HSG A
1,140		100.00% Pervious Area

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

Summary for Subcatchment 2S: To East

Runoff = 0.00 cfs @ 12.47 hrs, Volume= 0.002 af, Depth= 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
5,391	39	>75% Grass cover, Good, HSG A
5,391		100.00% Pervious Area

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

Summary for Subcatchment 3S: To Basin

Runoff = 1.98 cfs @ 12.19 hrs, Volume= 0.214 af, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
30,400	98	Paved Road, driveways, sidewalks
82,117	39	>75% Grass cover, Good, HSG A
112,517	55	Weighted Average
82,117		72.98% Pervious Area
30,400		27.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	50	0.0060	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
0.3	40	0.0150	1.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.9	94	0.0075	1.76		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.7	355	0.0050	3.47	2.73	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
11.7	539	Total			

Summary for Subcatchment 4S: Unit Roof (Half Duplex)

Runoff = 0.22 cfs @ 12.08 hrs, Volume= 0.018 af, Depth= 4.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=5.03"

	Area (sf)	CN	Description
*	1,960	98	Unit Roof
	1,960		100.00% Impervious Area

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

Summary for Subcatchment 5S: Bldg Roof (2 Units)

Runoff = 0.44 cfs @ 12.08 hrs, Volume= 0.036 af, Depth= 4.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=5.03"

	Area (sf)	CN	Description
*	3,920	98	Roof Area of 2 units
	3,920		100.00% Impervious Area

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

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Type III 24-hr 10 Year Storm Rainfall=5.03"

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Summary for Pond 1P: Galleys

Inflow Area = 0.045 ac, 100.00% Impervious, Inflow Depth = 4.79" for 10 Year Storm event
 Inflow = 0.22 cfs @ 12.08 hrs, Volume= 0.018 af
 Outflow = 0.05 cfs @ 12.47 hrs, Volume= 0.018 af, Atten= 76%, Lag= 23.1 min
 Discarded = 0.05 cfs @ 12.47 hrs, Volume= 0.018 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 39.00' @ 12.47 hrs Surf.Area= 128 sf Storage= 193 cf

Plug-Flow detention time= 23.7 min calculated for 0.018 af (100% of inflow)
 Center-of-Mass det. time= 23.6 min (771.6 - 747.9)

Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	211 cf	8.00'W x 16.00'L x 5.50'H Excavation/Crushed Stone 704 cf Overall - 177 cf Embedded = 527 cf x 40.0% Voids
#2	37.00'	133 cf	Concrete Galley 4x4x4 x 3 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
		344 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	36.00'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.05 cfs @ 12.47 hrs HW=39.00' (Free Discharge)
 ↑-1=Exfiltration (Exfiltration Controls 0.05 cfs)

Summary for Pond 2P: Galleys

Inflow Area = 2.583 ac, 27.02% Impervious, Inflow Depth = 0.99" for 10 Year Storm event
 Inflow = 1.98 cfs @ 12.19 hrs, Volume= 0.214 af
 Outflow = 0.56 cfs @ 12.74 hrs, Volume= 0.214 af, Atten= 72%, Lag= 32.9 min
 Discarded = 0.56 cfs @ 12.74 hrs, Volume= 0.214 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 36.94' @ 12.74 hrs Surf.Area= 2,640 sf Storage= 1,914 cf

Plug-Flow detention time= 22.5 min calculated for 0.214 af (100% of inflow)
 Center-of-Mass det. time= 22.5 min (919.8 - 897.4)

Volume	Invert	Avail.Storage	Storage Description
#1	35.50'	2,511 cf	44.00'W x 60.00'L x 5.50'H Excavation/Crushed Stone 14,520 cf Overall - 8,243 cf Embedded = 6,277 cf x 40.0% Voids
#2	36.50'	6,208 cf	Concrete Galley 4x4x4 x 140 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf 140 Chambers in 10 Rows
		8,719 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	35.50'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.56 cfs @ 12.74 hrs HW=36.94' (Free Discharge)
 ↑-1=Exfiltration (Exfiltration Controls 0.56 cfs)

Summary for Pond 3P: Galleys

Inflow Area = 0.090 ac, 100.00% Impervious, Inflow Depth = 4.79" for 10 Year Storm event
 Inflow = 0.44 cfs @ 12.08 hrs, Volume= 0.036 af
 Outflow = 0.10 cfs @ 12.49 hrs, Volume= 0.036 af, Atten= 79%, Lag= 24.4 min
 Discarded = 0.10 cfs @ 12.49 hrs, Volume= 0.036 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 39.01' @ 12.49 hrs Surf.Area= 256 sf Storage= 401 cf

Plug-Flow detention time= 26.7 min calculated for 0.036 af (100% of inflow)
 Center-of-Mass det. time= 26.7 min (774.6 - 747.9)

Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	398 cf	8.00'W x 32.00'L x 5.50'H Excavation/Crushed Stone 1,408 cf Overall - 412 cf Embedded = 996 cf x 40.0% Voids
#2	37.00'	310 cf	Concrete Galley 4x4x4 x 7 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
		709 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	36.00'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.10 cfs @ 12.49 hrs HW=39.01' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

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Type III 24-hr 25 Year Storm Rainfall=6.02"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Red Brook Rd	Runoff Area=1,140 sf 0.00% Impervious Runoff Depth=0.45" Tc=6.0 min CN=39 Runoff=0.00 cfs 0.001 af
Subcatchment 2S: To East	Runoff Area=5,391 sf 0.00% Impervious Runoff Depth=0.45" Tc=6.0 min CN=39 Runoff=0.02 cfs 0.005 af
Subcatchment 3S: To Basin	Runoff Area=112,517 sf 27.02% Impervious Runoff Depth=1.53" Flow Length=539' Tc=11.7 min CN=55 Runoff=3.38 cfs 0.329 af
Subcatchment 4S: Unit Roof (Half Duplex)	Runoff Area=1,960 sf 100.00% Impervious Runoff Depth=5.78" Tc=6.0 min CN=98 Runoff=0.27 cfs 0.022 af
Subcatchment 5S: Bldg Roof (2 Units)	Runoff Area=3,920 sf 100.00% Impervious Runoff Depth=5.78" Tc=6.0 min CN=98 Runoff=0.53 cfs 0.043 af
Pond 1P: Galleys	Peak Elev=39.75' Storage=246 cf Inflow=0.27 cfs 0.022 af Outflow=0.06 cfs 0.022 af
Pond 2P: Galleys	Peak Elev=38.08' Storage=4,171 cf Inflow=3.38 cfs 0.329 af Outflow=0.61 cfs 0.329 af
Pond 3P: Galleys	Peak Elev=39.77' Storage=513 cf Inflow=0.53 cfs 0.043 af Outflow=0.11 cfs 0.043 af

Total Runoff Area = 2.868 ac Runoff Volume = 0.400 af Average Runoff Depth = 1.67"
70.96% Pervious = 2.035 ac 29.04% Impervious = 0.833 ac

Summary for Subcatchment 1S: To Red Brook Rd

Runoff = 0.00 cfs @ 12.34 hrs, Volume= 0.001 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
1,140	39	>75% Grass cover, Good, HSG A
1,140		100.00% Pervious Area

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

Summary for Subcatchment 2S: To East

Runoff = 0.02 cfs @ 12.34 hrs, Volume= 0.005 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
5,391	39	>75% Grass cover, Good, HSG A
5,391		100.00% Pervious Area

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

Summary for Subcatchment 3S: To Basin

[47] Hint: Peak is 124% of capacity of segment #4

Runoff = 3.38 cfs @ 12.18 hrs, Volume= 0.329 af, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
30,400	98	Paved Road, driveways, sidewalks
82,117	39	>75% Grass cover, Good, HSG A
112,517	55	Weighted Average
82,117		72.98% Pervious Area
30,400		27.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	50	0.0060	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
0.3	40	0.0150	1.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.9	94	0.0075	1.76		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.7	355	0.0050	3.47	2.73	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
11.7	539	Total			

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Type III 24-hr 25 Year Storm Rainfall=6.02"

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Summary for Subcatchment 4S: Unit Roof (Half Duplex)

Runoff = 0.27 cfs @ 12.08 hrs, Volume= 0.022 af, Depth= 5.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.02"

	Area (sf)	CN	Description
*	1,960	98	Unit Roof
	1,960		100.00% Impervious Area

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

Summary for Subcatchment 5S: Bldg Roof (2 Units)

Runoff = 0.53 cfs @ 12.08 hrs, Volume= 0.043 af, Depth= 5.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 Year Storm Rainfall=6.02"

	Area (sf)	CN	Description
*	3,920	98	Roof Area of 2 units
	3,920		100.00% Impervious Area

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

Summary for Pond 1P: Galleys

Inflow Area = 0.045 ac, 100.00% Impervious, Inflow Depth = 5.78" for 25 Year Storm event
 Inflow = 0.27 cfs @ 12.08 hrs, Volume= 0.022 af
 Outflow = 0.06 cfs @ 12.48 hrs, Volume= 0.022 af, Atten= 78%, Lag= 23.9 min
 Discarded = 0.06 cfs @ 12.48 hrs, Volume= 0.022 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 39.75' @ 12.48 hrs Surf.Area= 128 sf Storage= 246 cf

Plug-Flow detention time= 28.2 min calculated for 0.022 af (100% of inflow)
 Center-of-Mass det. time= 28.2 min (773.3 - 745.1)

Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	211 cf	8.00'W x 16.00'L x 5.50'H Excavation/Crushed Stone 704 cf Overall - 177 cf Embedded = 527 cf x 40.0% Voids
#2	37.00'	133 cf	Concrete Galley 4x4x4 x 3 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
		344 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	36.00'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.06 cfs @ 12.48 hrs HW=39.75' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.06 cfs)

Summary for Pond 2P: Galleys

Inflow Area = 2.583 ac, 27.02% Impervious, Inflow Depth = 1.53" for 25 Year Storm event
 Inflow = 3.38 cfs @ 12.18 hrs, Volume= 0.329 af
 Outflow = 0.61 cfs @ 13.03 hrs, Volume= 0.329 af, Atten= 82%, Lag= 50.8 min
 Discarded = 0.61 cfs @ 13.03 hrs, Volume= 0.329 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 38.08' @ 13.03 hrs Surf.Area= 2,640 sf Storage= 4,171 cf

Plug-Flow detention time= 58.9 min calculated for 0.329 af (100% of inflow)
 Center-of-Mass det. time= 58.8 min (941.0 - 882.1)

Volume	Invert	Avail.Storage	Storage Description
#1	35.50'	2,511 cf	44.00'W x 60.00'L x 5.50'H Excavation/Crushed Stone 14,520 cf Overall - 8,243 cf Embedded = 6,277 cf x 40.0% Voids
#2	36.50'	6,208 cf	Concrete Galley 4x4x4 x 140 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf 140 Chambers in 10 Rows
		8,719 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	35.50'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.61 cfs @ 13.03 hrs HW=38.08' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.61 cfs)

9247 PostRev1

Type III 24-hr 25 Year Storm Rainfall=6.02"

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Summary for Pond 3P: Galleys

Inflow Area = 0.090 ac, 100.00% Impervious, Inflow Depth = 5.78" for 25 Year Storm event
 Inflow = 0.53 cfs @ 12.08 hrs, Volume= 0.043 af
 Outflow = 0.11 cfs @ 12.51 hrs, Volume= 0.043 af, Atten= 80%, Lag= 25.3 min
 Discarded = 0.11 cfs @ 12.51 hrs, Volume= 0.043 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 39.77' @ 12.51 hrs Surf.Area= 256 sf Storage= 513 cf

Plug-Flow detention time= 32.3 min calculated for 0.043 af (100% of inflow)
 Center-of-Mass det. time= 32.3 min (777.4 - 745.1)

Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	398 cf	8.00'W x 32.00'L x 5.50'H Excavation/Crushed Stone 1,408 cf Overall - 412 cf Embedded = 996 cf x 40.0% Voids
#2	37.00'	310 cf	Concrete Galley 4x4x4 x 7 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
		709 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	36.00'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.11 cfs @ 12.51 hrs HW=39.77' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

9247 PostRev1

Type III 24-hr 100 Year Storm Rainfall=7.55"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Red Brook Rd Runoff Area=1,140 sf 0.00% Impervious Runoff Depth=0.97"
Tc=6.0 min CN=39 Runoff=0.02 cfs 0.002 af

Subcatchment 2S: To East Runoff Area=5,391 sf 0.00% Impervious Runoff Depth=0.97"
Tc=6.0 min CN=39 Runoff=0.08 cfs 0.010 af

Subcatchment 3S: To Basin Runoff Area=112,517 sf 27.02% Impervious Runoff Depth=2.48"
Flow Length=539' Tc=11.7 min CN=55 Runoff=5.88 cfs 0.534 af

Subcatchment 4S: Unit Roof (Half Duplex) Runoff Area=1,960 sf 100.00% Impervious Runoff Depth=7.31"
Tc=6.0 min CN=98 Runoff=0.33 cfs 0.027 af

Subcatchment 5S: Bldg Roof (2 Units) Runoff Area=3,920 sf 100.00% Impervious Runoff Depth=7.31"
Tc=6.0 min CN=98 Runoff=0.67 cfs 0.055 af

Pond 1P: Galleys Peak Elev=41.23' Storage=330 cf Inflow=0.33 cfs 0.027 af
Outflow=0.07 cfs 0.027 af

Pond 2P: Galleys Peak Elev=41.00' Storage=8,718 cf Inflow=5.88 cfs 0.534 af
Outflow=0.72 cfs 0.534 af

Pond 3P: Galleys Peak Elev=41.30' Storage=688 cf Inflow=0.67 cfs 0.055 af
Outflow=0.13 cfs 0.055 af

Total Runoff Area = 2.868 ac Runoff Volume = 0.628 af Average Runoff Depth = 2.63"
70.96% Pervious = 2.035 ac 29.04% Impervious = 0.833 ac

Summary for Subcatchment 1S: To Red Brook Rd

Runoff = 0.02 cfs @ 12.13 hrs, Volume= 0.002 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
1,140	39	>75% Grass cover, Good, HSG A
1,140		100.00% Pervious Area

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

Summary for Subcatchment 2S: To East

Runoff = 0.08 cfs @ 12.13 hrs, Volume= 0.010 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
5,391	39	>75% Grass cover, Good, HSG A
5,391		100.00% Pervious Area

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

Summary for Subcatchment 3S: To Basin

[47] Hint: Peak is 215% of capacity of segment #4

Runoff = 5.88 cfs @ 12.17 hrs, Volume= 0.534 af, Depth= 2.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=7.55"

	Area (sf)	CN	Description
*	30,400	98	Paved Road, driveways, sidewalks
	82,117	39	>75% Grass cover, Good, HSG A
	112,517	55	Weighted Average
	82,117		72.98% Pervious Area
	30,400		27.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	50	0.0060	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
0.3	40	0.0150	1.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.9	94	0.0075	1.76		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.7	355	0.0050	3.47	2.73	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
11.7	539	Total			

Summary for Subcatchment 4S: Unit Roof (Half Duplex)

Runoff = 0.33 cfs @ 12.08 hrs, Volume= 0.027 af, Depth= 7.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=7.55"

	Area (sf)	CN	Description
*	1,960	98	Unit Roof
	1,960		100.00% Impervious Area

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

Summary for Subcatchment 5S: Bldg Roof (2 Units)

Runoff = 0.67 cfs @ 12.08 hrs, Volume= 0.055 af, Depth= 7.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=7.55"

	Area (sf)	CN	Description
*	3,920	98	Roof Area of 2 units
	3,920		100.00% Impervious Area

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

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Type III 24-hr 100 Year Storm Rainfall=7.55"

Prepared by G.A.F. Engineering, Inc.

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Summary for Pond 1P: Galleys

Inflow Area = 0.045 ac, 100.00% Impervious, Inflow Depth = 7.31" for 100 Year Storm event
 Inflow = 0.33 cfs @ 12.08 hrs, Volume= 0.027 af
 Outflow = 0.07 cfs @ 12.49 hrs, Volume= 0.027 af, Atten= 78%, Lag= 24.2 min
 Discarded = 0.07 cfs @ 12.49 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 41.23' @ 12.49 hrs Surf.Area= 128 sf Storage= 330 cf

Plug-Flow detention time= 34.1 min calculated for 0.027 af (100% of inflow)
 Center-of-Mass det. time= 34.1 min (776.1 - 741.9)

Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	211 cf	8.00'W x 16.00'L x 5.50'H Excavation/Crushed Stone 704 cf Overall - 177 cf Embedded = 527 cf x 40.0% Voids
#2	37.00'	133 cf	Concrete Galley 4x4x4 x 3 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
		344 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	36.00'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.07 cfs @ 12.49 hrs HW=41.23' (Free Discharge)

↳1=Exfiltration (Exfiltration Controls 0.07 cfs)

Summary for Pond 2P: Galleys

Inflow Area = 2.583 ac, 27.02% Impervious, Inflow Depth = 2.48" for 100 Year Storm event
 Inflow = 5.88 cfs @ 12.17 hrs, Volume= 0.534 af
 Outflow = 0.72 cfs @ 13.49 hrs, Volume= 0.534 af, Atten= 88%, Lag= 79.2 min
 Discarded = 0.72 cfs @ 13.49 hrs, Volume= 0.534 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 41.00' @ 13.49 hrs Surf.Area= 2,640 sf Storage= 8,718 cf

Plug-Flow detention time= 125.8 min calculated for 0.534 af (100% of inflow)
 Center-of-Mass det. time= 125.8 min (992.3 - 866.5)

Volume	Invert	Avail.Storage	Storage Description
#1	35.50'	2,511 cf	44.00'W x 60.00'L x 5.50'H Excavation/Crushed Stone 14,520 cf Overall - 8,243 cf Embedded = 6,277 cf x 40.0% Voids
#2	36.50'	6,208 cf	Concrete Galley 4x4x4 x 140 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf 140 Chambers in 10 Rows
		8,719 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	35.50'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.72 cfs @ 13.49 hrs HW=41.00' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.72 cfs)

Summary for Pond 3P: Galleys

Inflow Area = 0.090 ac, 100.00% Impervious, Inflow Depth = 7.31" for 100 Year Storm event
 Inflow = 0.67 cfs @ 12.08 hrs, Volume= 0.055 af
 Outflow = 0.13 cfs @ 12.51 hrs, Volume= 0.055 af, Atten= 80%, Lag= 25.7 min
 Discarded = 0.13 cfs @ 12.51 hrs, Volume= 0.055 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 41.30' @ 12.51 hrs Surf.Area= 256 sf Storage= 688 cf

Plug-Flow detention time= 39.7 min calculated for 0.055 af (100% of inflow)
 Center-of-Mass det. time= 39.7 min (781.6 - 741.9)

Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	398 cf	8.00'W x 32.00'L x 5.50'H Excavation/Crushed Stone 1,408 cf Overall - 412 cf Embedded = 996 cf x 40.0% Voids
#2	37.00'	310 cf	Concrete Galley 4x4x4 x 7 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
		709 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	36.00'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.13 cfs @ 12.51 hrs HW=41.30' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.13 cfs)

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Settler's Glen - Red Brook Road, WTHM

A	B	C	D	E
BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (B*C)	Remaining Load (C-D)
Deep Sump Hooded Catch Basin	25%	1.00	0.25	0.75
Proprietary Manhole CDS2015-4-C	90%	0.75	0.675	0.075
Underground Leaching Galleries	80%	0.075	0.060	0.015

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

Total TSS Removal = 98.5%

Project: JN 18-9247
 Prepared By: RJR-GAF Eng.
 Date: April 8, 2021

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

**CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD**

**SETTLERS GLEN
WAREHAM, MA**

Area **0.70 ac**
 Weighted C **0.9**
 t_c **6 min**
 CDS Model **2015-4**

Unit Site Designation **WQS - 1**
 Rainfall Station # **68**
 CDS Treatment Capacity **1.4 cfs**

<u>Rainfall Intensity¹</u> (in/hr)	<u>Percent Rainfall Volume¹</u>	<u>Cumulative Rainfall Volume</u>	<u>Total Flowrate (cfs)</u>	<u>Treated Flowrate (cfs)</u>	<u>Incremental Removal (%)</u>
0.02	9.3%	9.3%	0.01	0.01	9.3
0.04	9.5%	18.8%	0.03	0.03	9.5
0.06	8.7%	27.5%	0.04	0.04	8.7
0.08	10.1%	37.6%	0.05	0.05	10.0
0.10	7.2%	44.8%	0.06	0.06	7.1
0.12	6.0%	50.8%	0.08	0.08	5.9
0.14	6.3%	57.1%	0.09	0.09	6.2
0.16	5.6%	62.7%	0.10	0.10	5.5
0.18	4.7%	67.4%	0.11	0.11	4.6
0.20	3.6%	71.0%	0.13	0.13	3.5
0.25	8.2%	79.1%	0.16	0.16	7.8
0.50	14.9%	94.0%	0.32	0.32	13.5
0.75	3.2%	97.3%	0.47	0.47	2.8
1.00	1.2%	98.5%	0.63	0.63	1.0
1.50	0.7%	99.2%	0.95	0.95	0.5
2.00	0.8%	100.0%	1.26	1.26	0.5
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					96.4
Removal Efficiency Adjustment ² =					6.5%
Predicted % Annual Rainfall Treated =					93.5%
Predicted Net Annual Load Removal Efficiency =					90.0%

1 - Based on 10 years of rainfall data from NCDL station 736, Blue Hill, Norfolk County, MA
 2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Water Quality Volume Calculation

Required Water Quality Depth = 1.00 inch volume from impervious surfaces.

Impervious Area to Galley System 2P = 30,400 sf

Water Quality Volume = $30,400 \text{ sf} \times 1.00/12 = 2,533.3 \text{ cf}$

Total Storage: Galleys Pond 2P = 8,719 cf

8,719 cf > 2,533.3 cf OK

Recharge Volume Calculation

Required Recharge Depth = 0.60 inch volume from impervious surfaces (HSG A Soil)

The 1.00 inch water quality volume calculations confirm that the capacity of the leaching galleys exceeds that required volume therefore they also exceed the 0.60 inch required recharge volume.

The system drawdown calculations are as follows. The storage volume input is based on the 100 year volume listed in the HydroCAD calculations.

Recharge System Drawdown time (72 hrs. max.)

$$\text{Time} = \frac{\text{Storage Volume}}{(\text{Rawls Rate}) (\text{Bottom Area})}$$

Leaching Galleys - Pond 1P:

$$\text{Time} = \frac{330 \text{ cf}}{(8.27 \text{ inches/hour})(1 \text{ ft}/12 \text{ inches})(128 \text{ sf})}$$

3.7 hours \leq 72 hours – OK

Leaching Galleys - Pond 2P:

$$\text{Time} = \frac{8,718 \text{ cf}}{(8.27 \text{ inches/hour})(1 \text{ ft}/12 \text{ inches})(2,640 \text{ sf})}$$

4.8 hours \leq 72 hours – OK

Leaching Galleys - Pond 3P:

$$\text{Time} = \frac{688 \text{ cf}}{(8.27 \text{ inches/hour})(1 \text{ ft}/12 \text{ inches})(256 \text{ sf})}$$

3.9 hours \leq 72 hours – OK

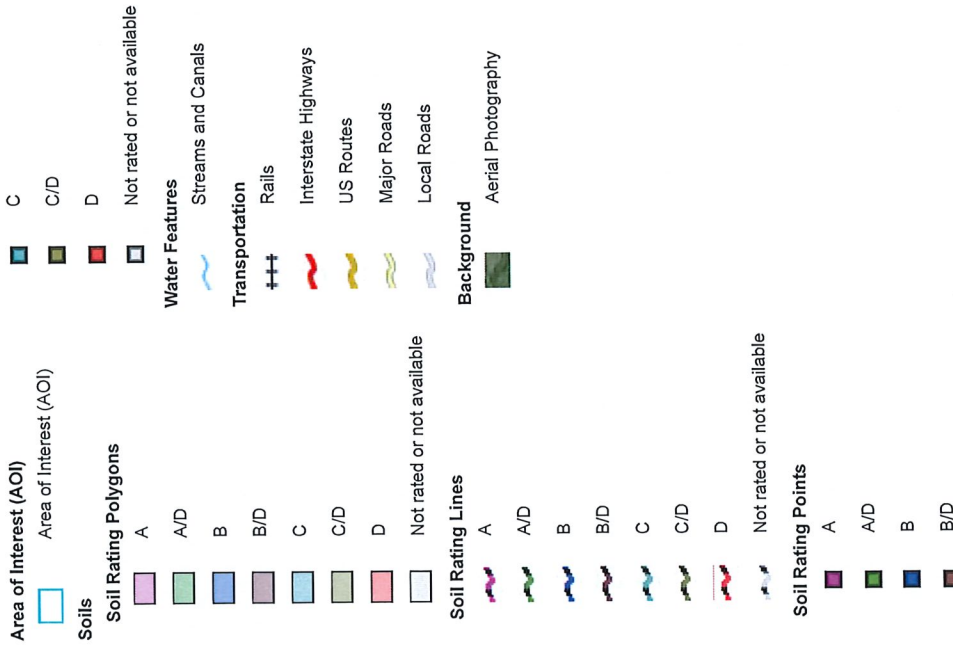
Hydrologic Soil Group—Plymouth County, Massachusetts
(TGC/Emnaca, LLC)



Map Scale: 1:7,360 if printed on A landscape (11" x 8.5") sheet.

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

MAP LEGEND



MAP INFORMATION

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

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: Plymouth County, Massachusetts
 Survey Area Data: Version 12, Sep 12, 2019

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

Date(s) aerial images were photographed: Jul 10, 2018—Nov 17, 2018

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		1.1	0.4%
7A	Rainberry coarse sand, 0 to 3 percent slopes, sanded surface	A/D	2.3	1.0%
55A	Freetown coarse sand, 0 to 3 percent slopes, sanded surface	B/D	1.0	0.4%
252E	Carver coarse sand, 15 to 35 percent slopes	A	1.4	0.6%
259A	Carver loamy coarse sand, 0 to 3 percent slopes	A	11.5	4.9%
259B	Carver loamy coarse sand, 3 to 8 percent slopes	A	70.0	29.5%
259C	Carver loamy coarse sand, 8 to 15 percent slopes	A	5.0	2.1%
435C	Plymouth loamy coarse sand, 8 to 15 percent slopes	A	4.4	1.9%
438E	Plymouth loamy coarse sand, 15 to 35 percent slopes, extremely bouldery	A	3.1	1.3%
480C	Plymouth - Carver complex, 8 to 15 percent slopes	A	11.2	4.7%
637B	Carver - Urban land complex, 0 to 8 percent slopes	A	106.3	44.9%
665B	Udipsamments, 0 to 8 percent slopes	A	4.3	1.8%
702C	Udipsamments, 8 to 15 percent slopes	A	15.3	6.5%
Totals for Area of Interest			236.8	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

