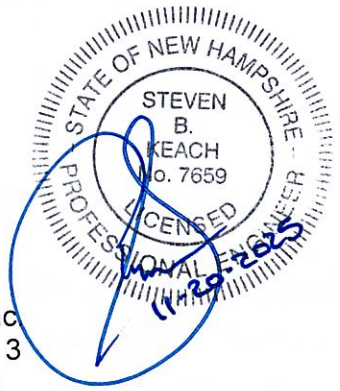
Alteration of Terrain Application & Stormwater Drainage Analysis

Jennesstown Manor

Map 7, Lots 39
Route 103
Warner, New Hampshire

February 20, 2025
REVISED: NOVEMBER 18, 2025

KNA Project No. 24-0307-1



Prepared For: Peacock Hill Road, LLC
145 Old Town Road
Weare, NH 03281

Prepared By: Keach-Nordstrom Associates, Inc
10 Commerce Park North, Suite 3
Bedford, New Hampshire 03110
(603) 627-2881
(603) 627-2915 (fax)

KNA KEACH-NORDSTROM ASSOCIATES, INC.

Table of Contents

1. **SIGNED APPLICANT AFFADAVIT**

Owner Affidavit

I, Gary Fitzgerald, Member of Peacock Hill Road, LLC and owner of the property referenced on Tax Map 7 as Lot 39, located on Route 103 Warner, New Hampshire, hereby verify that I have authorized Keach-Nordstrom Associates, Inc. to submit on my behalf, any and all applicable State and local permit applications as they pertain to improvements on said property.

Additionally, I authorize Keach-Nordstrom Associates, Inc. to aid in the representation of these applications throughout the approval process.

Signature of Owner: _____

Printed Name of Owner: Gary Fitzgerald, Member

Address of Owner: 145 Old Town Road

Weare, NH 03281

Date: 12/10/24

2. AOT APPLICATION

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

ALTERATION OF TERRAIN PERMIT APPLICATION

Water Division / Land Resources Management

Check the status of your application

RSA / Rule: RSA 485-A:17, Env-Wq 1500

Administrative Use Only	Administrative Use Only	Administrative Use Only	File Number:
			Check No.
			Amount:
			Initials:

1. APPLICANT INFORMATION (INTENDED PERMIT HOLDER)		
Applicant Name: Peacock Hill Road, LLC	Contact Name: Gary Fitzgerald	
Email: hotrodda57@hotmail.com	Daytime Telephone: 603-325-3112	
Mailing Address: 145 Old Town Road		
Town/City: Weare	State: NH	ZIP Code: 03281
2. APPLICANT'S AGENT INFORMATION If none, check here: ☐		
Agent's Name:	Contact Name:	
Email:	Daytime Telephone:	
Address:		
Town/City:	State:	ZIP Code:
3. PROPERTY OWNER INFORMATION (IF DIFFERENT FROM APPLICANT) Check here if more than one property owner, and attach additional sheets as necessary: ☐		
Owner's Name:	Contact Name:	
Email:	Daytime Telephone:	
Mailing Address:		
Town/City:	State:	ZIP Code:
4. PROPERTY OWNER'S AGENT INFORMATION If none, check here: ☐		
Business Name:	Contact Name:	
Email:	Daytime Telephone:	
Address:		
Town/City:	State:	ZIP Code:
5. CONSULTANT INFORMATION If none, check here: ☐		
Engineering Firm: Keach-Nordstrom Associates, Inc.	Contact Name: Jason Lopez	
Email: jlopez@keachnordstrom.com	Daytime Telephone: 603-627-2881	
Address: 10 Commerce Park N Suite 3B		
Town/City: Bedford	State: NH	ZIP Code: 03110

6. PROJECT TYPE

☐ Excavation Only ■ Residential ☐ Commercial ☐ Golf Course ☐ School ☐ Municipal
☐ Agricultural ☐ Land Conversion ☐ Other:

7. PROJECT LOCATION INFORMATION

Project Name: Jennesstown Manor

Street/Road Address: Route 103

Town/City: Warner	County: Merrimack		
Tax Map: 7	Block:	Lot Number: 39 & 39-1	Unit:

Post-development, will the proposed project withdraw from or directly discharge to any of the following? If yes, identify the purpose.

1. Stream or Wetland Purpose:	☐ Yes ■ No	☐ Withdrawal	☐ Discharge
2. Artificial pond created by impounding a stream or wetland Purpose:	☐ Yes ■ No	☐ Withdrawal	☐ Discharge
3. Unlined pond dug into the water table Purpose: Pocket Pond	■ Yes ■ No	☐ Withdrawal	☐ Discharge

Post-development, will the proposed project discharge to:
- Within one-quarter mile of a surface water impaired for phosphorus and/or nitrogen? ■ No ☐ **Yes**
- Within one-quarter mile of a Class A surface water or within the watershed area of an Outstanding Resource Water? ■ No ☐ **Yes**
- Within one-quarter mile of a lake or pond not covered previously? ■ No ☐ **Yes**

Is the project a High Load area? ☐ Yes ■ No
If yes, specify the type of high load land use or activity:

Is the project within a Water Supply Intake Protection Area (WSIPA)? ☐ Yes ■ No
Is the project within a Groundwater Protection Area (GPA)? ☐ Yes ■ No
Will the well setbacks identified in Env-Wq 1508.02 be met? ☐ Yes ■ No
For more details on the restrictions in these areas, read Chapter 3.1 in Volume 2 of the NH Stormwater Manual.

Is any part of the property within the 100-year floodplain? ☐ Yes ■ No
If yes: Cut volume: cubic feet within the 100-year floodplain.
Fill volume: cubic feet within the 100-year floodplain.

■ Project *is* within **¼ mile of a designated river** Name of River: Warner River
☐ Project *is not* within ¼ mile of a designated river.

☐ Project *is* within a Coastal/Great Bay Region community.
■ Project *is not* within a Coastal/Great Bay Region community.

8. BRIEF PROJECT DESCRIPTION (PLEASE DO NOT REPLY "SEE ATTACHED")

Two four unit buildings each with shared driveway and a parking area to take place on Map 7 Lots 39 & 39-1.

9. IF APPLICABLE, DESCRIBE ANY WORK STARTED PRIOR TO RECEIVING PERMIT.

Tree clearing per intent to cut filed with Town.

10. ADDITIONAL REQUIRED INFORMATION

A. Date a copy of the application was sent to the municipality, as required by Env-Wq 1503.05(e) (Env-Wq 1503.05(c)(6), requires proof that a completed application form, checklist, plans and specifications, and all other supporting materials have been sent or delivered to the governing body of each municipality in which the project is proposed):

(Attach proof of delivery)

B. Date a copy of the application was sent to the local river advisory committee, if required by Env-Wq 1503.05(e) (Env-Wq 1503.05(c)(6), requires proof that a completed application form, checklist, plans and specifications, and all other supporting materials have been sent or delivered to the Local River Advisory Committee, if the project is within ¼ mile of a designated river): N/A

(Attach proof of delivery)

C. Type of plan required: ☐ Land Conversion ■ Detailed Development ☐ Excavation, Grading and Reclamation ☐ Steep Slope

D. Additional plans required: ■ Stormwater Drainage and Hydrologic Soil Groups ☐ Source Control ☐ Chloride Management

E. Total area of disturbance, in square feet 275,000

F. Additional impervious cover as a result of the project, in square feet (use "-"to indicate a net reduction in impervious coverage).

Total final impervious cover, in square feet Total Cover: 37,244 SF Additional Cover: 25,352 SF

G. Total undisturbed cover, in square feet 1,317,247

H. Number of lots proposed: 2

I. Total length of roadway, in linear feet: 0

J. Name(s) of receiving water(s): Warner River

K. Identify all other NHDES permits required for the project. For each, indicate whether an application has been filed and is pending. If the required approval has been issued, provide the permit number, registration date, or approval letter number, as applicable.

Type of Approval	Application Filed?	Pending?	If Issued
1. Water Supply Approval	☐ Yes ☐ No ■ N/A	☐	Permit number:
2. Wetlands Permit	☐ Yes ☐ No ■ N/A	☐	Permit number:
3. Shoreland Permit	☐ Yes ☐ No ■ N/A	☐	Registration date:
4. UIC Registration	☐ Yes ☐ No ■ N/A	☐	Approval letter date:
5. Large/Small Community Well Approval	☐ Yes ☐ No ■ N/A	☐	Permit number:
6. Large Groundwater Withdrawal Permit	☐ Yes ☐ No ■ N/A	☐	Permit number:
7. Other:	☐ Yes ☐ No		

L. List all species identified by the Natural Heritage Bureau as threatened or endangered or of concern:

Wood Turtle

M. Using the NHDES OneStop Data Mapper with the Surface Water Impairment layer turned on, list the impairments identified for each receiving water. If no pollutants are listed, enter "N/A."

N/A

N. Did the applicant or applicant's agent have a pre-application meeting with Alteration of Terrain Bureau staff?

☐ Yes ■ No If yes, name of staff member:

O. Will blasting of bedrock be required? ☐ Yes ■ No If yes, estimated quantity of blast rock in cubic yards:
If yes, standard blasting Best Management Practices notes must be placed on the plans.

NOTE: If greater than 5,000 cubic yards of blast rock will be generated, a groundwater monitoring program must be developed and submitted to NHDES. Contact Alteration of Terrain Bureau staff for additional detail.

11. CHECK ALL APPLICATION ATTACHMENTS THAT APPLY (SUBMIT WITH APPLICATION IN THE ORDER LISTED BELOW)

LOOSE:

- ■ Signed application form, with attached proof(s) of delivery.
- ■ Check for the application fee, calculated using the fee schedule available on the NHDES Land Development page.
- ■ Color copy of a USGS map with the property boundaries outlined (1" = 2,000' scale).
- ☐ If the applicant is not the property owner, proof that the applicant will have a legal right to undertake the project on the property if a permit is issued to the applicant.

BOUND, IN A REPORT, IN THE FOLLOWING ORDER:

- ■ Copy of the signed application form and application checklist.
- ■ Copy of the check.
- ■ Copy of the USGS map with the property boundaries outlined (1" = 2,000' scale).
- ■ Narrative of the project with a summary table of the peak discharge rate for the off-site discharge points.
- ■ Printout of NHDES OneStop Mapper with "Surface Water Impairments" layer turned on.
- ■ Printout of NHDES OneStop Mapper with Alteration of Terrain screening layers turned on.
- ■ Printout of Natural Heritage Bureau DataCheck Tool letter and any relevant correspondence with New Hampshire Fish and Game.
- ■ USDA Web Soil Survey Map with project's watershed outlined.
- ■ Aerial photograph (1" = 2,000' scale with the site boundaries outlined).
- ■ Photographs representative of the site.
- ■ Groundwater recharge volume calculations (include one Best Management Practices worksheet per permit application).
- ■ Drainage analysis, stamped by a professional engineer (see "Application Checklist" at the end of this document).
- ■ Riprap apron or other energy dissipation or stability calculations.
- ■ Site Specific Soil Survey report, stamped and with a certification note prepared by the soil scientist that the survey was done in accordance with the Site Specific Soil Mapping standards of the Society of Soil Scientists of Northern New England.
- ■ Infiltration Feasibility Report (example online) [Env-Wq 1503.08(f)(3)].
- ☐ Registration and Notification Form for Stormwater Infiltration to Groundwater (UIC Registration-for underground systems only, including drywells and trenches).
- ■ Inspection and maintenance manual with, if applicable, long term maintenance agreements [Env-Wq 1503.08(g)].
- ☐ Source control plan.

PLANS:

- ■ One set of design plans on 34 - 36" by 22 - 24" white paper (see Application Checklist for details).
- ■ Pre- and post-development color-coded soil plans on 11" x 17" (see Application Checklist for details).
- ■ Pre- and post-construction drainage area plans on 34 - 36" by 22 - 24" white paper (see Application Checklist for details).

100-YEAR FLOODPLAIN REPORT:

- ☐ All information required in Env-Wq 1503.09, submitted as a separate report.

ADDITIONAL INFORMATION RE: NUTRIENTS, CLIMATE

- ■ See Application Checklist (Attachment A) for details.

■ **REVIEW APPLICATION FOR COMPLETENESS. CONFIRM INFORMATION LISTED ON THE APPLICATION IS INCLUDED WITH SUBMITTAL.**

12. REQUIRED SIGNATURES

By signing below, I certify that:

- The information contained in or otherwise submitted with this application is true, complete, and not misleading to the best of my knowledge and belief;
- I understand that the submission of false, incomplete, or misleading information constitutes grounds for the department to deny the application, revoke any permit that is granted based on the information, and/or refer the matter to the board of professional engineers established by RSA 310-A:3 if I am a professional engineer; and
- I understand that I am subject to the penalties specified in New Hampshire law for falsification in official matters, currently RSA 641:3.

☒ **APPLICANT** ☐ **APPLICANT'S AGENT:**

Signature: _____ Date: 3/13/25

Name (print or type): GARY Fitzgerald Title: manager

☒ **PROPERTY OWNER** ☐ **PROPERTY OWNER'S AGENT:**

Signature: _____ Date: 3/13/25

Name (print or type): GARY Fitzgerald Title:

3. AOT APPLICATION CHECKLIST

ALTERATION OF TERRAIN PERMIT ATTACHMENT A: APPLICATION CHECKLIST

Check each box to indicate the item has been provided, or indicate why it does not apply.

DESIGN PLANS

- [x] Plans printed on 34 - 36" by 22 - 24" white paper.
- [x] Professional Engineer stamp.
- [x] Wetland delineation.
- [x] Temporary erosion control measures.
- [x] Treatment for all stormwater runoff from impervious surfaces such as roadways (including gravel roadways), parking areas, and nonresidential roof runoff. Guidance on treatment BMPs can be found in Volume 2, Chapter 4 of the New Hampshire Stormwater Management Manual.
- [x] Pre-existing 2-foot contours.
- [x] Proposed 2-foot contours.
- [x] Drainage easements protecting the drainage/treatment structures.
- [x] Compliance with state statute governing fill and dredge in wetlands, RSA 482- A. Note that artificial detention in wetlands is prohibited.
- [ ] Compliance with the New Hampshire Shoreland Protection Act, RSA 483-B. Site not in Shoreland Zone.
- [x] Benching – needed if you have more than 20 feet change in elevation on a 2:1 slope, 30 feet change in elevation on a 3:1 slope, 40 feet change in elevation on a 4:1 slope.
- [ ] Check to see if any proposed ponds require state dam permits. No state dam permits required.

DETAILS

- [x] Typical roadway cross-section.
- [x] Detention basin with inverts noted on the outlet structure.
- [x] Stone berm level spreader.
- [x] Outlet protection – riprap aprons.
- [x] A general installation detail for an erosion control blanket.
- [x] Silt fences or mulch berm.
- [x] Storm drain inlet protection. Note that since hay bales must be embedded 4 inches into the ground, they are not to be used on hard surfaces such as pavement.
- [ ] Hay bale barriers. No hale bale barriers proposed.
- [ ] Stone check dams. No stone check dams proposed.
- [x] Gravel construction exit.
- [x] Temporary sediment trap.
- [x] The treatment BMPs proposed.
- [ ] Any innovative BMPs proposed. No innovative BMPs proposed.

CONSTRUCTION SEQUENCE / EROSION CONTROL

■ Note that the project must be managed to meet the requirements and intent of RSA 430:53 and Agr 3800 relative to invasive species.

■ Note that perimeter controls shall be installed prior to earth moving operations.

■ Note that temporary water diversion (swales, basins, etc.) must be used as necessary until areas are stabilized.

■ Note that ponds and swales shall be installed early on in the construction sequence (before rough grading the site).

■ Note that all ditches and swales shall be stabilized prior to directing runoff to them.

■ Note that all roadways and parking lots shall be stabilized within 72 hours of achieving finished grade.

■ Note that all cut and fill slopes shall be seeded or loamed within 72 hours of achieving finished grade

■ Note that all erosion controls shall be inspected weekly AND after every half-inch of rainfall.

■ Note the limits on the open area allowed, see Env-Wq 1505.02 for detailed information.

Example note: The smallest practical area shall be disturbed during construction, but in no case shall exceed 5 acres at any one time before disturbed areas are stabilized.

■ Note the definition of the word "stable."

Example note: An area shall be considered stable if one of the following has occurred:

- Base course gravels have been installed in areas to be paved.
- A minimum of 85 percent vegetated growth has been established.
- A minimum of 3 inches of non-erosive material such stone or riprap has been installed.
- Or, erosion control blankets have been properly installed.

■ Note the limit of time an area may be exposed.

Example note: All areas shall be stabilized within 45 days of initial disturbance.

■ Provide temporary and permanent seeding specifications. Note that although reed canary grass is listed in the Green Book; it is a problematic species according to the Wetlands Bureau and therefore should not be specified.

■ Provide winter construction notes that meet or exceed our standards.

Standard Winter Notes:

- All proposed vegetated areas that do not exhibit a minimum of 85 percent vegetative growth by October 15, or which are disturbed after October 15, shall be stabilized by seeding and installing erosion control blankets on slopes greater than 3:1, and seeding and placing 3 to 4 tons of mulch per acre, secured with anchored netting, elsewhere. The installation of erosion control blankets or mulch and netting shall not occur over accumulated snow or on frozen ground and shall be completed in advance of thaw or spring melt events.
- All ditches or swales which do not exhibit a minimum of 85 percent vegetative growth by October 15, or which are disturbed after October 15, shall be stabilized temporarily with stone or erosion control blankets appropriate for the design flow conditions.
- After October 15, incomplete road or parking surfaces where work has stopped for the winter season shall be protected with a minimum of 3 inches of crushed gravel per NHDOT item 304.3.

■ Note at the end of the construction sequence that "Lot disturbance, other than that shown on the approved plans, shall not commence until after the roadway has the base course to design elevation and the associated drainage is complete and stable." – This note is applicable to single/duplex family subdivisions, when lot development is not part of the permit.

DRAINAGE ANALYSES

Please provide double-side 8 ½" × 11" sheets where possible but, **do not** reduce the text such that more than one page fits on one side.

■ Professional Engineer stamp.

■ Rainfall amount obtained from the Northeast Regional Climate Center. Include extreme precipitation table as obtained from this source.

■ Drainage analyses, in the following order:

- Pre-development analysis: Drainage diagram.
- Pre-development analysis: Area Listing and Soil Listing.
- Pre-development analysis: Node listing 1-year (if applicable), 2-year, 10-year and 50-year.
- Pre-development analysis: Full summary of the 10-year storm.
- Post-development analysis: Drainage diagram.
- Post-development analysis: Area Listing and Soil Listing.
- Post-development analysis: Node listing for the 2-year, 10-year and 50-year.
- Post-development analysis: Full summary of the 10-year storm.

■ Review the Area Listing and Soil Listing reports

- Hydrologic Soil Groups (HSG) match the HSGs on the soil maps provided.
- There is the same or less HSG A soil area after development (check for each HSG).
- There is the same or less "woods" cover in the post-development.
- Undeveloped land was assumed to be in "good" condition.
- The amount of impervious cover in the analyses is correct.

Note: A good check is to subtract the total impervious area used in the pre-analysis from the total impervious area used in the post-analysis. For residential projects without demolition occurring, a good check is to take this change in impervious area, subtract out the roadway and divide the remaining by the number of houses or units proposed. Do these numbers make sense?

■ Check the storage input used to model the ponds.

■ Check to see if the artificial berms pass the 50-year storm, i.e., make sure the constructed berms on ponds are not overtopped.

■ Check the outlet structure proposed and make sure it matches that modeled.

■ Check to see if the total areas in the pre and post analyses are same.

■ Confirm the correct NRCS storm type was modeled (Coos, Carroll and Grafton counties are Type II, all others Type III).

PRE- AND POST-CONSTRUCTION DRAINAGE AREA PLANS

■ Plans printed on 34 - 36" by 22 - 24" on white paper.

■ Submit these plans separate from the soil plans.

■ A north arrow.

■ A scale.

■ Labeled subcatchments, reaches and ponds.

- [x] Tc lines.
- [x] A clear delineation of the subcatchment boundaries.
- [x] Roadway station numbers.
- [x] Culverts and other conveyance structures.

PRE- AND POST-CONSTRUCTION COLOR-CODED SOIL PLANS

- [x] 11" × 17" sheets suitable, as long as it is readable.
- [x] Submit these plans separate from the drainage area plans.
- [x] A north arrow.
- [x] A scale.
- [x] Name of the soil scientist who performed the survey and date the soil survey took place.
- [x] 2-foot contours (5-foot contours if application is for a gravel pit) as well as other surveyed features.
- [x] Delineation of the soil boundaries and wetland boundaries.
- [x] Delineation of the subcatchment boundaries.
- [x] Soil series symbols (e.g., 26).
- [x] A key or legend identifying each soil series symbol and its associated soil series name (for example: 26 = Windsor).
- [x] The hydrologic soil group color coding (A = Green, B = yellow, C= orange, D=red, Water=blue, and Impervious = gray).

Please note that excavation projects (including gravel pits) have similar requirements to those above, with the following common exceptions or additions:

- [ ] Drainage report is not needed if site does not have off-site flow.
- [ ] 5-foot contours are allowed rather than 2-foot.
- [ ] No Professional Engineer stamp is needed on the plans.
- [ ] Add a note to the plans that the applicant must provide NHDES a written update of the project and revised plans documenting the project status every five years from the date of the Alteration of Terrain permit.
- [ ] Add reclamation notes.
- [ ] A description of the subsurface conditions to the planned depth of excavation, including the elevation of the location of the Seasonal High Water Table (SHWT), as observed and described by a certified soil scientist, or an individual holding a valid permit as a permitted designer as issued by the department's Subsurface Systems Bureau.

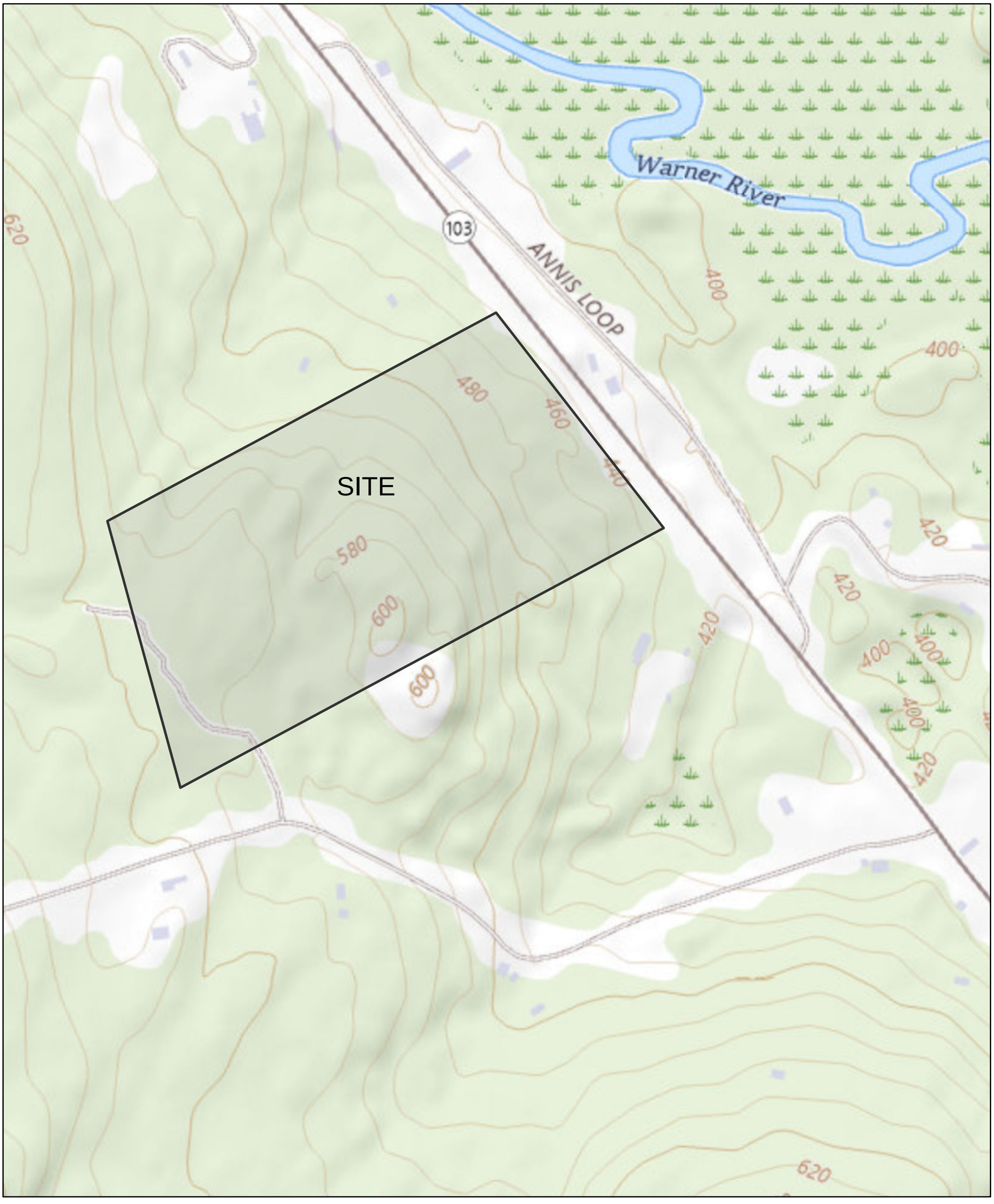
For more resources, refer to the Natural Resources Conservation Service's Vegetating New Hampshire Sand and Gravel Pits publication.

4. COPY OF AOT APPLICATION CHECK

5. MUNICIPAL SUBMISSION: WARNER

6. USGS LOCATION MAP

USGS Map by NH DES OneStop Data Mapper



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City/Town

Layers

Red: Band_1

Green: Band_2

Blue: Band_3

1:5,000

0 0.04 0.08 0.16 mi

0 0.05 0.1 0.2 km

USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S.

7. PROJECT NARRATIVE

1. INTRODUCTION

A. Project Description

The project proposes the development of Warner Tax Map 7, Lots 39 and 39-1, on the west side of Route 103. The proposal seeks to develop two buildings for multi-family residence. Each building will have four units. The project will include associated parking and utilities.

The buildings will be served by on-site septic systems and wells. Access will be provided by connection to a proposed driveway off of Route 103. The buildings will share access to the driveway. The drainage system will have two pocket ponds and an infiltration basin. After treatment and mitigation of peak runoff, the water flows to the existing catch basins on Route 103 in front of the subject parcel.

B. Existing Site Conditions

The subject lot is 34.60 acres and is currently undeveloped in Warner's Residential 2 (R-2) and Residential 3 (R-3) Zoning Districts; however, the area of proposed work is entirely within the R-2 District. The abutting properties are residential or undeveloped uses. Previously, the subject lot was partially cleared. There are wetland pockets and many ledge outcroppings on site.

According to the Site-Specific Soil Survey soil mapping, the parcel consists of soils as shown below:

SSSM SYM.	SSS MAP NAME	HISS SYM.	HYDROLOGIC SOIL GRP.
55	Hermon Very Stony	121	B
442	Chichester	221	B
58	Waumbek	321	A
829	Waumbek-Hermon Association	321	B
414	Moosilauke Poorly Drained	521	C
399	Ledge Outcrop	228	D

II. STORM DRAINAGE ANALYSIS & DESIGN

A. Methodology

In accordance with the provisions of the Town of Warner, NHDES, and generally accepted engineering practice, the 2-year, 10-year, 25-year and 50-year frequency storms have each been used in the various aspects of analysis and design of stormwater management considerations for the subject residential development project. All proposed stormwater measures have been designed for the 10-year return frequency storms, in accordance with the State regulations and for the 25-year return frequency storms, in accordance with the Town regulations.

KNA utilizes HydroCAD version 10.2 to analyze both pre and post-development watershed characteristics. This computer software system is based largely on hydrology techniques (TR-20) developed by the Soil Conservation Service (now the Natural Resources Conservation Service). In addition, the software derives Time of Concentration values using the methodology contained within USDA-S.C.S. publication Urban Hydrology for Small Watersheds Technical Release No. 55 (TR 55).

Rainfall data utilized in the analysis is obtained from the "Extreme Precipitation in a Changing Climate for New York and the New England States", version 1.12, published by the USDA, NRCS and Cornell University's Northeast Regional Climate Center and can be found in Section 9.

All design and analysis calculations performed using the referenced methodologies are attached to this report. The minimum time of concentrations used for the analysis is 6 minutes. These calculations document each catchment area, a breakdown of surface type, time of concentration, rainfall intensity, peak discharge volume, Manning's "n" value, peak velocity, and other descriptive design data for each watershed and pipe segment evaluated. In addition, the "Pre/Post Development Drainage Area Plans" graphically define and illustrate the extent of each watershed or catchment area investigated.

B. Pre-Development Drainage Conditions

In the pre-development scenario, 6 points of analysis (POA) were identified as the appropriate points to compare pre vs. post development rates of stormwater discharge. These points of analysis reflect the main discharge points of the site and were analyzed to show the impact of the proposed improvements.

The pre-development drainage model's POA is further described as follows:

10P Flow to Existing CB

20P Flow to Existing CB

30P Flow to Existing CB

40P Flow to Existing CB

50L Flow to Abutters Map 7 Lots 36 & 36-1

An additional point of analysis has been added to monitor the flow and volume to the Map 7 Lot 36-1 due to increased area (~1 acre) directed towards this parcel in post-development design versus pre-development:

60L Flow to Abutter Map 7 Lot 36-1

In general, the site slopes in an easterly direction to the catch basins along Route 103.

For a more visual description of the information presented in this section, please refer to the attached "Pre-Development Drainage Areas Plan" attached in the appendix of this report. The pre-development drainage model recognizes five points of analysis to compare pre vs. post-development peak rates of stormwater discharge.

C. Post-Development DrainageConditions:

The same POA's that were identified in the pre-development scenario have been analyzed in the post-development scenario.

The proposed stormwater management system utilizes closed and open drainage that incorporates various best management practices for the collection, storage, and treatment of runoff. Stormwater runoff generated from the proposed development will be collected in a series of closed structures (catch basins and drain manholes) and conveyed towards the pocket ponds and the infiltration basin. The proposed ponds discharge through outlet control structures to overland flow prior to entering the closed drainage system in the Route 103 Right-Of-Way. The areas flowing towards each point of analysis are equal to or less than in comparison to the pre-development conditions. The proposal has also been designed to convey runoff in a manner consistent with the pre-development conditions. The drainage system was properly sized to control runoff for the full build-out of the project.

The proposed pocket ponds are designed to intercept groundwater and maintain a permanent pool. The ponds have been designed to mitigate the increased runoff from the proposed parking areas and common driveway.

The proposed infiltration basin is designed to infiltrate the runoff from the proposed development.

The peak stormwater runoff rate for the specific storm frequencies is presented and analyzed in the subsequent summary section of this report (Table 1). For a more visual description of the information presented in this section, please refer to the attached "Post-Development Drainage Areas Plan" attached in the appendix of this report.

D. Summary:

Through the use of the stormwater management techniques described above, we were able to implement the proposed development goals while maintaining appropriate peak rates of runoff, providing volume control, and providing treatment of stormwater generated from the proposed development. As shown in the Tables below, through the use of the aforementioned stormwater management techniques, the peak rates of stormwater discharge and volume to the point of analysis was controlled within an acceptable limit.

Table 1: Peak Flow Discharge Rate

Site Pre-Development vs. Post-Development (cfs)								
Description	2-Year		10-Year		25-Year		50-Year	
24-hr Rainfall	2.78 in/hr		4.04 in/hr		5.01 in/hr		5.89 in/hr	
	Pre	Post	**Pre**	Post	**Pre**	Post	**Pre**	Post
10P (Lot 3-1)	**0.85**	0.84	**1.93**	1.93	**3.00**	2.99	**4.07**	4.05
20P (Lot 7-38)	**2.01**	1.84	**4.94**	4.20	**8.10**	8.07	**11.29**	11.10
30P (Lot 7-38)	**0.63**	0.49	**1.36**	0.87	**2.08**	1.19	**2.80**	1.48
40P (Lot 7-38)	**1.06**	0.66	**2.46**	1.31	**4.08**	2.10	**5.77**	3.69
50L (Lots 7-36 & 7-36-1)	**0.04**	0.04	**0.13**	0.13	**0.25**	0.25	**0.39**	0.39
Site Pre-Development vs. Post-Development Monitoring of Flow to Abutter Map 7 Lot 36-1 (cfs)								
60L (Lot 7-36-1)	**0.19**	0.18	**0.79**	0.63	**1.55**	1.29	**2.37**	2.26

Table 2: Channel Protection Requirements

Site Pre-Development vs. Post-Development Flow Volume (af)			
Description	2-Year		Comments
24- hr Rainfall	2.78 in/hr		
	Pre	Post	
10P	0.104	0.103	NHDES 1507.05,(b),(1), a
20P	0.255	0.247	NHDES 1507.05,(b),(1), a
30P	0.083	0.053	NHDES 1507.05,(b),(1), a
40P	0.150	0.133	NHDES 1507.05,(b),(1), a
50L	0.006	0.006	NHDES 1507.05,(b),(1), a
Site Pre-Development vs. Post-Development Monitoring of Flow to Abutter Map 7 Lot 36-1 (cfs)			
60L	0.041	0.032	

III. EROSION & SEDIMENTATION CONTROL PROVISIONS

A. Temporary Erosion Control Measures

As an integral part of the engineering design of this site, an erosion and sedimentation control plan has been developed with the intent of limiting the potential for soil loss and associated receiving water quality degradation, both during and after the construction period. As the project plans indicate, traditional temporary erosion and sedimentation control devices and practices, such as siltation fencing, block and gravel sediment filters, and seeding have been specified for use during the construction period. In preparation of these provisions, reference was made to the New Hampshire Stormwater Manual; Volume 3: Erosion and Sediment Temporary Controls During Construction. Construction details for each temporary erosion control measure and practice specified have been added to the project plans. These plans also contain a number of erosion control notes, which are offered to the selected contractor in order to supplement the specified measures and practices to the extent practical.

B. Construction Sequence

A site-specific construction sequence sensitive to limiting soil loss due to erosion and associated water quality degradation was prepared specifically for this project and is shown on the project plans. As pointed out in the erosion control notes, it is important for the contractor to recognize that proper judgment in the implementation of work will be essential if erosion is to be limited and protection of completed work is to be realized. Moreover, any specific changes in sequence and/or field conditions affecting the ability of specific erosion control measures to adequately serve their intended purpose should be reported to this office by the contractor. Furthermore, the contractor is encouraged to supplement specified erosion control measures during the construction period where and when in his/ her best judgment, additional protection is warranted.

C. Permanent Erosion Control Measures

In the design of this site, consideration was given to limiting the potential for long-term erosion of completed improvements. As a result, several permanent erosion control measures were incorporated into the site design. These provisions include:

1) Specification of a turf establishment schedule and seed mixture, utilizing materials and workmanship recognized as appropriate for the site conditions at hand;

2) The design has provided catch basins to capture runoff and reduce the overland flow, thereby reducing erosion.

8. SURFACE WATER IMPAIRMENTS

Surface Water Impairments

Legend

- Surface Waters with Impairn with Quarter Mile Buffer
- Parcels
- Additional Lines

Map Scale

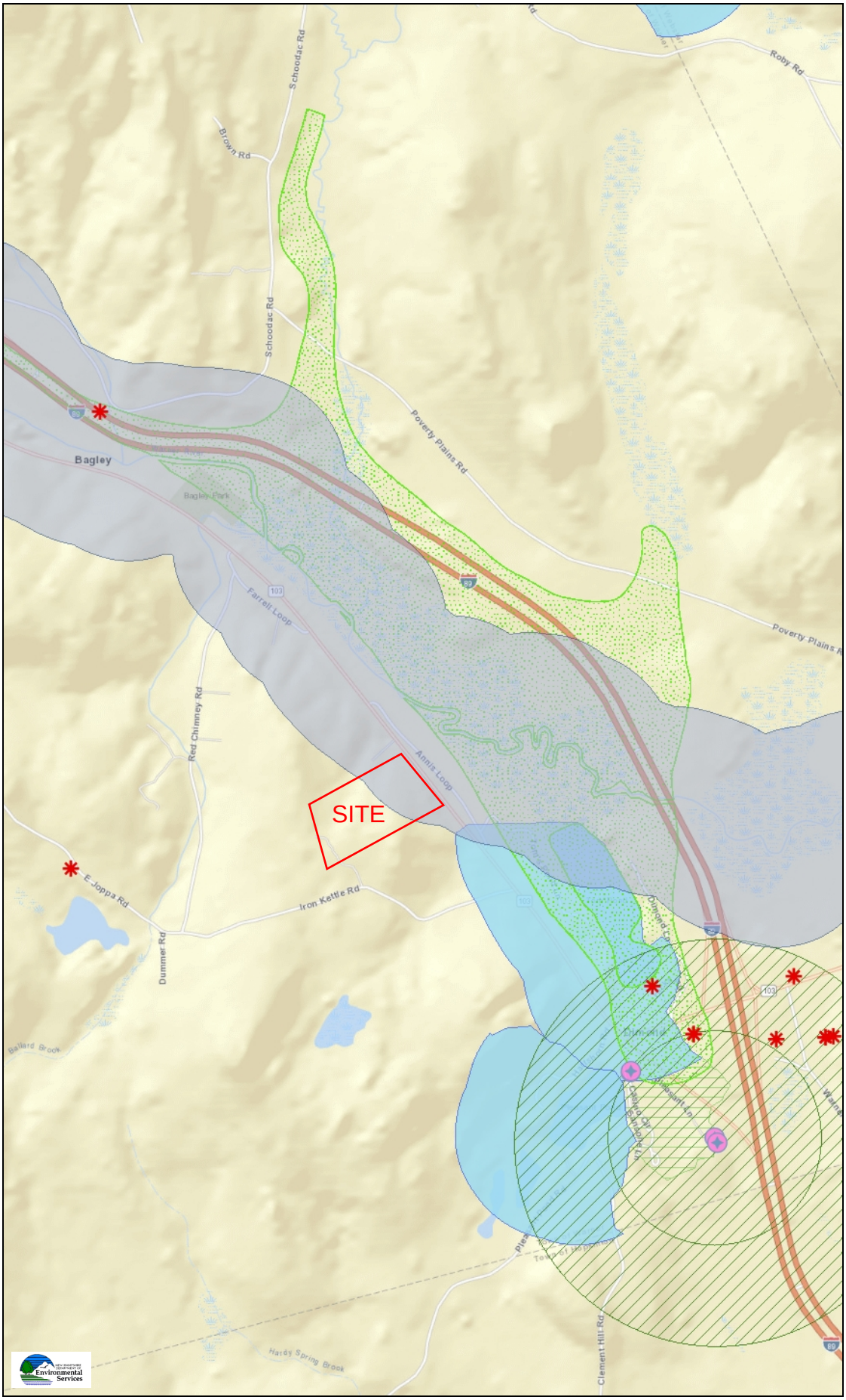
1: 24,000

Map Generated: 11/27/2024

Notes

9. WEB GIS FIGURES

Web GIS Figure



Legend

- Remediation Sites
- Coastal and Great Bay Regi Communities
- Designated Rivers Quarterm Buffer
- Public Water Supply Wells
- Groundwater Classification / GA1
- Groundwater Classification / GA2
- Water Supply Intake Protect Areas
- Wellhead Protection Areas
- Class A Lakes with a Quarte Buffer
- Class A - All Features
- All Lakes, with a Quarter Mil Buffer
- Outstanding Resource Wate Watersheds
- Surface Waters with Impairn with Quarter Mile Buffer
- Watersheds with Chloride Impairments

Map Scale

1: 24,000

Map Generated: 12/2/2024

Notes

10. WARNER GROUNDWATER PROTECTION OVERLAY DISTRICT

Groundwater Protection Overlay District

TOWN OF WARNER, NH

Legend

- Proposed Groundwater Protection Overlay District
- Town Boundary
- Village Water District
- Aquifer Full Extent

Water Resources

- Lakes and Ponds
- Rivers and Streams
- Intermittent Streams

Roads

- Interstates
- Class I and II State Highways
- Class V Town Maintained Roads
- Class VI Unmaintained Roads
- Other Roads/Private

Zoning District

- B-1 Business District
- C-1 Commercial District
- R-1 Village Residential District
- R-2 MediumDensity Residential District
- R-3 Low Density Residential District
- OC-1 Open Conservation District
- OR-1 Open Recreation District
- Intervale Overlay District

N W E S

0 0.5 1 1.5 Miles

March 14, 2023

This map was produced by the Central NH Regional Planning Commission for the Town of Warner. It is intended for planning purposes only.

Data Sources: NH GRANIT, NH Dept. of Environmental Services, NH Dept. of Transportation, FEMA, CNHRPC, Town of Warner, US Geologic Survey, Hazard Mitigation Subcommittee input. Corrections should be provided to the Town of Warner and to CNHRPC.

Central New Hampshire Regional Planning Commission

28 Commercial Street, Suite 3
Concord, NH 03301

603.226.6020
www.cnhrpc.org

11. NEW HAMPSHIRE NATURAL HERITAFE INVENTORY DATABASE CHECK

NHB DataCheck Results Letter
NH Natural Heritage Bureau
Please note: maps and NHB record pages are **confidential** and shall be redacted from public documents.

To: Jason Lopez, Keach-Nordstrom Associates, Inc.
10 Commerce Park North Suite 3B
Bedford, NH 03110
jlopez@keachnordstrom.com

From: NHB Review
NH Natural Heritage Bureau
Main Contact: Ashley Litwinenko - nhbreview@dncr.nh.gov

cc: NHFG Review

Date: 06/13/2024 (valid until 06/13/2025)
Re: DataCheck Review by NH Natural Heritage Bureau and NH Fish & Game
Permits: MUNICIPAL POR - Warner, NHDES - Alteration of Terrain Permit, USEPA - Stormwater Pollution Prevention

NHB ID: NHB24-0767

Town: Warner
Location: NH Route 103

Project Description: Four lot subdivision with each lot containing a 4 unit building. All lots served by a common driveway.

Next Steps for Applicant:

NHB's database has been searched for records of rare species and exemplary natural communities. Please carefully read the comments and consultation requirements below.

NHB Comments: No comments at this time.

NHFG Comments: Please refer to NHFG consultation requirements below.

NHB Consultation

If this NHB DataCheck letter includes records of rare plants and/or natural communities/systems, please contact NHB and provide any requested supplementary materials by emailing nhbreview@dncr.nh.gov.

If this NHB DataCheck letter DOES NOT include any records of rare plants and/or natural communities/systems, no further consultation with NHB is required.

NH Fish and Game Department Consultation

If this NHB DataCheck letter DOES NOT include ANY wildlife species records, then, based on the information submitted, no further consultation with the NH Fish and Game Department pursuant to Fis 1004 is required.

If this NHB DataCheck letter includes a record for a threatened (T) or endangered (E) wildlife species, consultation with the New Hampshire Fish and Game Department under Fis 1004 may be required. To review the Fis 1000 rules (effective February 3, 2022), please go to https://www.wildlife.nh.gov/wildlife-and-habitat/nongame-and-endangered-species/environmental-review. All requests for consultation and submittals should be sent via email to NHFGreview@wildlife.nh.gov or can be sent by mail, and **must include the NHB DataCheck results letter number and "Fis 1004 consultation request" in the subject line**.

If the NHB DataCheck response letter does not include a threatened or endangered wildlife species but includes other wildlife species (e.g., Species of Special Concern), consultation under Fis 1004 is not required; however, some species are protected under other state laws or rules, so coordination with NH Fish & Game is highly recommended or may be required for certain permits. While some permitting processes are exempt from required consultation under Fis 1004 (e.g., *statutory permit by notification, permit by rule, permit by notification, routine roadway registration, docking structure registration, or conditional authorization by rule*), coordination with NH Fish & Game may still be required under the rules governing those specific permitting processes, and it is recommended you contact the applicable permitting agency. For projects not requiring consultation under Fis 1004, but where additional coordination with NH Fish and Game is requested, please email NHFGreview@wildlife.nh.gov, and include the NHB DataCheck results letter number and "review request" in the email subject line.
Contact NH Fish & Game at (603) 271-0467 with questions.

NHB Database Records:
The following record(s) have been documented in the vicinity of the proposed project.
Please see the map and detailed information about the record(s) on the following pages.

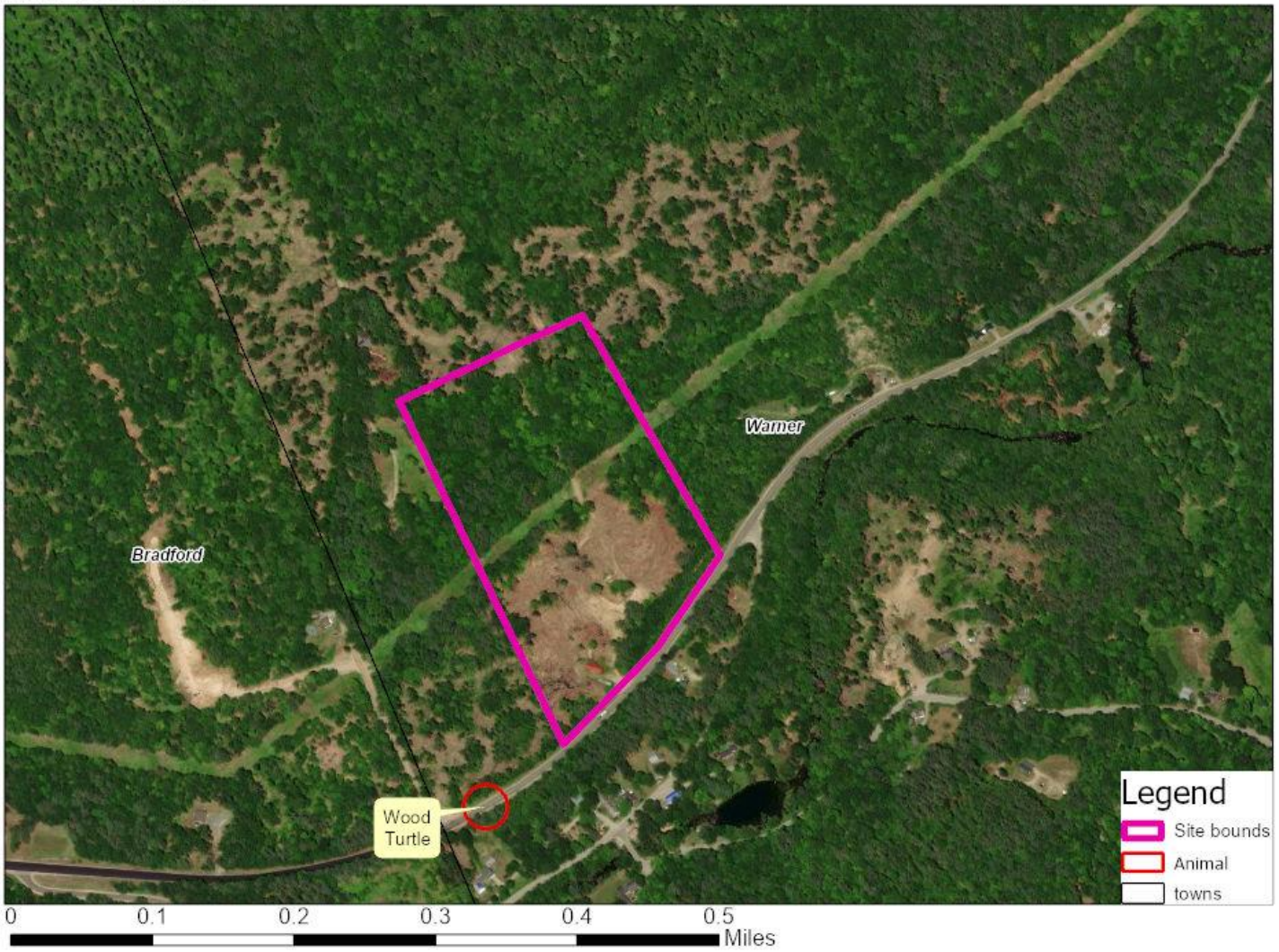
Vertebrate species	State[1]	Federal	Notes
Wood Turtle (*Glyptemys insculpta*)	SC	--	Contact the NH Fish & Game Dept (see below).

[1]Codes: "E" = Endangered, "T" = Threatened, "SC" = Special Concern, "--" = an exemplary natural community, or a rare species tracked by NH Natural Heritage that has not yet been added to the official state list.
An asterisk (*) indicates that the most recent report for that occurrence was 20 or more years ago.

For all animal reviews, refer to 'IMPORTANT: NHFG Consultation' section above.

Disclaimer: NHB's database can only tell you of known occurrences that have been reported to NHFG/NHB. Known occurrences are based on information gathered by qualified biologists or members of the public, reported to our offices, and verified by NHB/NHFG.
However, many areas have never been surveyed, or have only been surveyed for certain species.
NHB recommends surveys to determine what species/natural communities are present onsite.

NHB24-0767


Warner
Bradford
Wood Turtle
Legend
Site bounds
Animal
towns
0
0.1
0.2
0.3
0.4
0.5
Miles

NHB24-0767 EOCODE: ARAAD02020*161*NH

New Hampshire Natural Heritage Bureau - Animal Record

Wood Turtle (*Glyptemys insculpta*)

Legal Status	Conservation Status
Federal: Not listed	Global: Imperiled due to rarity or vulnerability
State: Special Concern	State: Rare or uncommon

Description at this Location

Conservation Rank: Fair quality, condition and/or landscape context ('C' on a scale of A-D).
Comments on Rank: --

Detailed Description: 2022: Area 15062: 1 adult observed, sex unknown. 2011: Area 12918: 1 adult observed, dead on road. 2007: Area 12247: 1 observed. 2005: Area 12133: 1 observed.
General Area: 2022: Area 15062: Fallow field with clover, cinquefoil, dandelion, and other grasses and forbs. 2011: Area 12918: Roadside. 2007: Area 12247: This area contains a relatively large, open floodplain forest of white pine, maple, American hophornbeam, and various grasses and other herbaceous plants. 2005: Area 12133: Residential yard.
General Comments: --
Management Comments: --

Location

Survey Site Name: West Branch of Hoyt River
Managed By: Bradford Pines Natural Area

County: Merrimack
Town(s): Bradford
Size: 40.9 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2022: Area 15062: Field next to Hoyt Brook on east side of Center Road in Bradford, just south of NH Route 103 and Warner River. 2011: Area 12918: On Warner Road (Rte. 103) near Bradford town line. 2007: Area 12247: In the West Branch Warner River, about 500 feet downstream from the large white pines of the Bradford Natural Pines area. 2005: Area 12133: 56 Fairgrounds Road, Bradford.

Dates documented

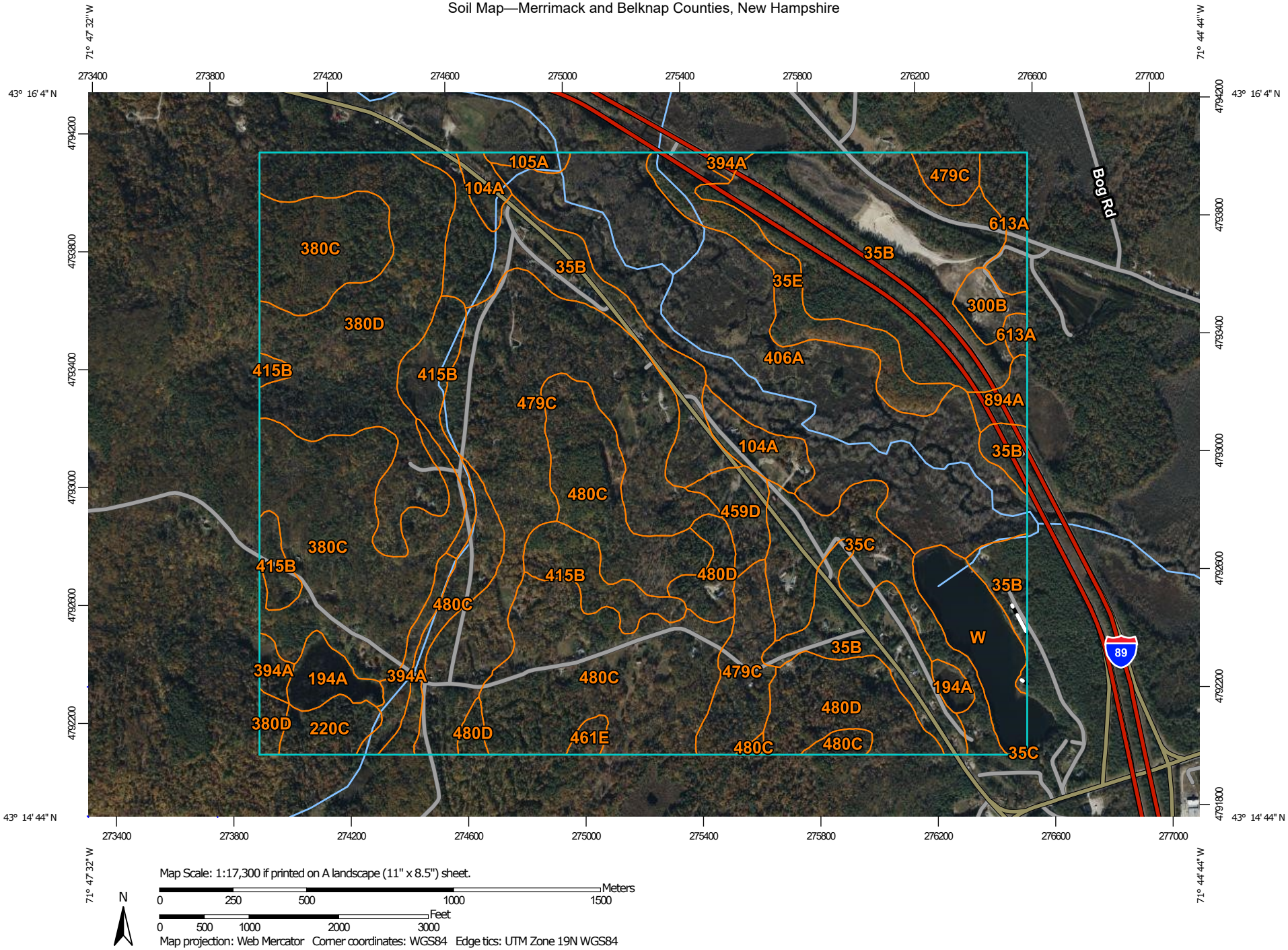
First reported: 2005-06-11 Last reported: 2022-05-21

NHB24-0767 EOCODE: ARAAD02020*161*NH

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

12. WEB SOIL SURVEY

Soil Map—Merrimack and Belknap Counties, New Hampshire



Map Scale: 1:17,300 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 250 500 1000 1500

Feet: 0 500 1000 2000 3000

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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: Merrimack and Belknap Counties, New Hampshire
Survey Area Data: Version 29, Aug 22, 2023

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

Date(s) aerial images were photographed: Oct 6, 2022—Oct 22, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
35B	Champlain loamy fine sand, 3 to 8 percent slopes	224.3	16.9%
35C	Champlain loamy fine sand, 8 to 15 percent slopes	50.2	3.8%
35E	Champlain loamy fine sand, 15 to 60 percent slopes	36.2	2.7%
104A	Podunk fine sandy loam, 0 to 3 percent slopes, frequently flooded	21.1	1.6%
105A	Rumney fine sandy loam, 0 to 3 percent slopes, frequently flooded	3.7	0.3%
194A	Catden mucky peat, 0 to 1 percent slopes, ponded	16.2	1.2%
220C	Boscawen fine sandy loam, 8 to 15 percent slopes	13.0	1.0%
300B	Udipsamments, 0 to 6 percent slopes	9.0	0.7%
380C	Tunbridge-Lyman-Becket complex, 8 to 15 percent slopes, very stony	132.3	10.0%
380D	Tunbridge-Lyman-Becket complex, 15 to 25 percent slopes, very stony	116.7	8.8%
394A	Chocorua mucky peat, 0 to 1 percent slopes	16.8	1.3%
406A	Medomak mucky silt loam, 0 to 2 percent slopes, frequently flooded	183.8	13.9%
415B	Moosilauke fine sandy loam, 3 to 8 percent slopes, very stony	48.2	3.6%
459D	Metacomet fine sandy loam, 15 to 25 percent slopes, very stony	13.4	1.0%
461E	Woodstock-Millsite-Rock outcrop complex, 35 to 60 percent slopes	3.2	0.2%
479C	Gilmanton fine sandy loam, 8 to 15 percent slopes, very stony	172.7	13.0%
480C	Millsite-Woodstock-Henniker complex, 8 to 15 percent slopes, very stony	158.9	12.0%
480D	Millsite-Woodstock-Henniker complex, 15 to 25 percent slopes, very stony	50.9	3.8%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
613A	Croghan loamy fine sand, 0 to 8 percent slopes, wooded	16.9	1.3%
894A	Meadowsedge peat, 0 to 1 percent slopes	7.3	0.5%
W	Water	31.0	2.3%
Totals for Area of Interest		**1,325.7**	**100.0%**

13. AERIAL PHOTOGRAPH

Aerial Map

Legend

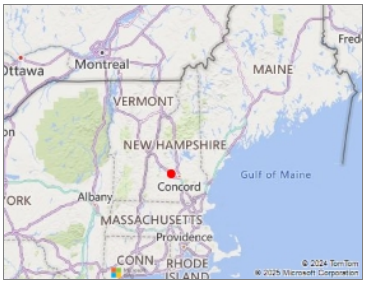
- Parcels
- State
- County
- City/Town

Map Scale

1: 5,000

Map Generated: 2/25/2025

Notes



14. SITE PHOTOGRAPHS

Photo No. 1: Looking west on Map 7 Lot 39 (taken: 2/3/25)

Photo No. 2: Looking east on Map 7 Lot 39 (taken: 2/3/25)

Photo No. 3: Looking north to Route 103 from Map 7 Lot 39 (taken: 2/3/25)

Photo No. 4: Looking south on Map 7 Lot 39 (taken: 2/3/25)

15. GRV CALCULATIONS

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

GROUNDWATER RECHARGE VOLULME (GRV) CALCULATION (Env-Wq 1507.04)

0.44	ac	Area of HSG A soil that was replaced by impervious cover	0.40"
0.42	ac	Area of HSG B soil that was replaced by impervious cover	0.25"
	ac	Area of HSG C soil that was replaced by impervious cover	0.10"
-	ac	Area of HSG D soil or impervious cover that was replaced by impervious cover	0.0"
0.33	inches	Rd = Weighted groundwater recharge depth	
0.281	ac-in	GRV = AI * Rd	
1,020	cf	GRV conversion (ac-in x 43,560 sf/ac x 1ft/12")	

Provide calculations below showing that the project meets the groundwater recharge requirements (Env-Wq 1507.04):

16. BMP WORKSHEETS

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

INFILTRATION PRACTICE CRITERIA (Env-Wq 1508.06)

Type/Node Name: **Infiltration Practice 21P**

Enter the type of infiltration practice (e.g., basin, trench) and the node name in the drainage analysis, if applicable.

Yes		Have you reviewed Env-Wq 1508.06(a) to ensure that infiltration is allowed?	← yes
2.46	ac	A = Area draining to the practice	
0.64	ac	A_I = Impervious area draining to the practice	
0.26	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.28	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.70	ac-in	WQV= 1" x Rv x A	
2,537	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
634	cf	25% x WQV (check calc for sediment forebay volume)	
NA		Method of pretreatment? (not required for clean or roof runoff)	
-	cf	V_{SED} = Sediment forebay volume, if used for pretreatment	≥ 25%WQV
3,199	cf	V = Volume[1] (attach a stage-storage table)	≥ WQV
238	sf	A_{SA} = Surface area of the bottom of the pond	
3.00	iph	$Ksat_{DESIGN}$ = Design infiltration rate[2]	
42.6	hours	T_{DRAIN} = Drain time = V / (A_{SA} * I_{DESIGN})	≤ 72-hrs
466.00	feet	E_{BTM} = Elevation of the bottom of the basin	
464.22	feet	E_{SHWT} = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
456.89	feet	E_{ROCK} = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
1.78	feet	D_{SHWT} = Separation from SHWT	≥ *[3]
9.1	feet	D_{ROCK} = Separation from bedrock	≥ *[3]
	ft	D_{amend} = Depth of amended soil, if applicable due high infiltation rate	≥ 24"
	ft	D_T = Depth of trench, if trench proposed	4 - 10 ft
	Yes/No	If a trench or underground system is proposed, has observation well been provided?	←yes
		If a trench is proposed, does materialmeet Env-Wq 1508.06(k)(2) requirements.[4]	← yes
Yes	Yes/No	If a basin is proposed, Is the perimeter curvilinear, and basin floor flat?	← yes
3.0	:1	If a basin is proposed, pond side slopes.	≥3:1
469.75	ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
469.82	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
470.00	ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES		10 peak elevation ≤ Elevation of the top of the trench?[5]	← yes
YES		If a basin is proposed, 50-year peak elevation ≤ Elevation of berm?	← yes

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. $Ksat_{DESIGN}$ includes a factor of safety. See Env-Wq 1504.14 for requirements for determining the infiltr. rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.
4. Clean, washed well graded diameter of 1.5 to 3 inches above the in-situ soil.
5. If 50-year peak elevation exceeds top of trench, the overflow must be routed in HydroCAD as secondary discharge.

Designer's Notes:

Summary for Pond 21P: Infiltration Basin

Inflow Area = 2.455 ac, 25.89% Impervious, Inflow Depth > 1.68" for 10 yr event
Inflow = 1.43 cfs @ 12.30 hrs, Volume= 0.343 af
Outflow = 1.36 cfs @ 12.51 hrs, Volume= 0.281 af, Atten= 5%, Lag= 12.9 min
Discarded = 0.13 cfs @ 12.51 hrs, Volume= 0.140 af
Primary = 1.23 cfs @ 12.51 hrs, Volume= 0.141 af
Routed to Reach 20R : Overland Flow to 20P
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 20R : Overland Flow to 20P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 469.75' @ 12.51 hrs Surf.Area= 1,822 sf Storage= 3,377 cf
Flood Elev= 470.00' Surf.Area= 1,983 sf Storage= 3,854 cf

Plug-Flow detention time= 141.0 min calculated for 0.281 af (82% of inflow)
Center-of-Mass det. time= 62.2 min (898.9 - 836.7)

Volume	Invert	Avail.Storage	Storage Description
#1	466.00'	3,854 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
466.00	238	61.0	0	0	238
468.00	887	160.0	1,056	1,056	1,993
470.00	1,983	201.0	2,797	3,854	3,225

Device	Routing	Invert	Outlet Devices
#1	Discarded	466.00'	**3.000 in/hr Exfiltration over Surface area**
#2	Primary	465.00'	**18.0" Round HDPE Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 465.00' / 464.75' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	469.65'	**2.0" x 2.0" Horiz. Grate X 10.00 columns** X 10 rows C= 0.600 in 36.0" x 36.0" Grate (31% open area) Limited to weir flow at low heads
#4	Secondary	469.75'	**4.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.13 cfs @ 12.51 hrs HW=469.75' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=1.23 cfs @ 12.51 hrs HW=469.75' TW=453.59' (Dynamic Tailwater)
↑—**2=HDPE Culvert** (Passes 1.23 cfs of 17.02 cfs potential flow)
↑—**3=Grate** (Weir Controls 1.23 cfs @ 1.03 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=466.00' TW=453.50' (Dynamic Tailwater)
↑—**4=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Stage-Area-Storage for Pond 21P: Infiltration Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
466.00	238	0
466.05	249	12
466.10	261	25
466.15	272	38
466.20	284	52
466.25	297	67
466.30	309	82
466.35	322	98
466.40	335	114
466.45	348	131
466.50	362	149
466.55	375	167
466.60	389	186
466.65	404	206
466.70	418	227
466.75	433	248
466.80	448	270
466.85	463	293
466.90	479	316
466.95	495	341
467.00	511	366
467.05	527	392
467.10	544	419
467.15	561	446
467.20	578	475
467.25	595	504
467.30	613	534
467.35	631	565
467.40	649	597
467.45	667	630
467.50	686	664
467.55	705	699
467.60	724	735
467.65	744	771
467.70	763	809
467.75	783	848
467.80	804	887
467.85	824	928
467.90	845	970
467.95	866	1,012
468.00	887	1,056
468.05	909	1,101
468.10	931	1,147
468.15	954	1,194
468.20	977	1,243
468.25	1,000	1,292
468.30	1,024	1,343
468.35	1,047	1,394
468.40	1,071	1,447
468.45	1,096	1,502
468.50	1,120	1,557
468.55	1,145	1,614
468.60	1,170	1,671
468.65	1,195	1,731
468.70	1,221	1,791
468.75	1,247	1,853
468.80	1,273	1,916
468.85	1,300	1,980
468.90	1,326	2,046
468.95	1,353	2,113
469.00	1,381	2,181
469.05	1,408	2,251
469.10	1,436	2,322
469.15	1,464	2,394
469.20	1,492	2,468
469.25	1,521	2,544
469.30	1,550	2,620
469.35	1,579	2,699
469.40	1,609	2,778
469.45	1,638	2,859
469.50	1,668	2,942
469.55	1,698	3,026
469.60	1,729	3,112
469.65	1,760	3,199
469.70	1,791	3,288
469.75	1,822	3,378
469.80	1,854	3,470
469.85	1,886	3,564
469.90	1,918	3,659
469.95	1,950	3,755
470.00	**1,983**	**3,854**

Summary for Pond 21P: Infiltration Basin

Inflow Area = 2.455 ac, 25.89% Impervious, Inflow Depth > 2.90" for 50 yr event
Inflow = 3.06 cfs @ 12.38 hrs, Volume= 0.593 af
Outflow = 3.05 cfs @ 12.40 hrs, Volume= 0.521 af, Atten= 0%, Lag= 1.2 min
Discarded = 0.13 cfs @ 12.40 hrs, Volume= 0.154 af
Primary = 2.75 cfs @ 12.40 hrs, Volume= 0.359 af
Routed to Reach 20R : Overland Flow to 20P
Secondary = 0.18 cfs @ 12.40 hrs, Volume= 0.008 af
Routed to Reach 20R : Overland Flow to 20P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 469.82' @ 12.40 hrs Surf.Area= 1,867 sf Storage= 3,507 cf
Flood Elev= 470.00' Surf.Area= 1,983 sf Storage= 3,854 cf

Plug-Flow detention time= 88.8 min calculated for 0.521 af (88% of inflow)
Center-of-Mass det. time= 32.6 min (857.3 - 824.7)

Volume	Invert	Avail.Storage	Storage Description
#1	466.00'	3,854 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
466.00	238	61.0	0	0	238
468.00	887	160.0	1,056	1,056	1,993
470.00	1,983	201.0	2,797	3,854	3,225

Device	Routing	Invert	Outlet Devices
#1	Discarded	466.00'	**3.000 in/hr Exfiltration over Surface area**
#2	Primary	465.00'	**18.0" Round HDPE Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 465.00' / 464.75' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	469.65'	**2.0" x 2.0" Horiz. Grate X 10.00 columns** X 10 rows C= 0.600 in 36.0" x 36.0" Grate (31% open area) Limited to weir flow at low heads
#4	Secondary	469.75'	**4.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.13 cfs @ 12.40 hrs HW=469.82' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=2.75 cfs @ 12.40 hrs HW=469.82' TW=453.63' (Dynamic Tailwater)
↑—**2=HDPE Culvert** (Passes 2.75 cfs of 17.17 cfs potential flow)
↑—**3=Grate** (Weir Controls 2.75 cfs @ 1.35 fps)

Secondary OutFlow Max=0.18 cfs @ 12.40 hrs HW=469.82' TW=453.63' (Dynamic Tailwater)
↑—**4=Broad-Crested Rectangular Weir** (Weir Controls 0.18 cfs @ 0.63 fps)

Stage-Area-Storage for Pond 21P: Infiltration Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
466.00	238	0
466.05	249	12
466.10	261	25
466.15	272	38
466.20	284	52
466.25	297	67
466.30	309	82
466.35	322	98
466.40	335	114
466.45	348	131
466.50	362	149
466.55	375	167
466.60	389	186
466.65	404	206
466.70	418	227
466.75	433	248
466.80	448	270
466.85	463	293
466.90	479	316
466.95	495	341
467.00	511	366
467.05	527	392
467.10	544	419
467.15	561	446
467.20	578	475
467.25	595	504
467.30	613	534
467.35	631	565
467.40	649	597
467.45	667	630
467.50	686	664
467.55	705	699
467.60	724	735
467.65	744	771
467.70	763	809
467.75	783	848
467.80	804	887
467.85	824	928
467.90	845	970
467.95	866	1,012
468.00	887	1,056
468.05	909	1,101
468.10	931	1,147
468.15	954	1,194
468.20	977	1,243
468.25	1,000	1,292
468.30	1,024	1,343
468.35	1,047	1,394
468.40	1,071	1,447
468.45	1,096	1,502
468.50	1,120	1,557
468.55	1,145	1,614
468.60	1,170	1,671
468.65	1,195	1,731
468.70	1,221	1,791
468.75	1,247	1,853
468.80	1,273	1,916
468.85	1,300	1,980
468.90	1,326	2,046
468.95	1,353	2,113
469.00	1,381	2,181
469.05	1,408	2,251
469.10	1,436	2,322
469.15	1,464	2,394
469.20	1,492	2,468
469.25	1,521	2,544
469.30	1,550	2,620
469.35	1,579	2,699
469.40	1,609	2,778
469.45	1,638	2,859
469.50	1,668	2,942
469.55	1,698	3,026
469.60	1,729	3,112
469.65	1,760	3,199
469.70	1,791	3,288
469.75	1,822	3,378
469.80	1,854	3,470
469.85	1,886	3,564
469.90	1,918	3,659
469.95	1,950	3,755
470.00	**1,983**	**3,854**

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

STORMWATER POND DESIGN CRITERIA

Env-Wq 1508.03

Type/Node Name: **Pocket Pond 22P**

Enter the type of stormwater pond (e.g., Wet Pond) and the node name in the drainage analysis, if applicable.

2.46	ac	A = Area draining to the practice	
0.64	ac	A_I = Impervious area draining to the practice	
0.26	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.28	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.70	ac-in	WQV= 1" x Rv x A	
2,537	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
254	cf	10% x WQV (check calc for sediment forebay and micropool volume)	
1,269	cf	50% x WQV (check calc for extended detention volume)	
292	cf	V_{SED} = Sediment forebay volume	**≥ 10%WQV**
3,827	cf	V_{PP} = Permanent pool volume (volume below the lowest invert of the outlet structure) Attach stage-storage table.	
no	cf	Extended Detention?[1]	**≤ 50% WQV**
-		V_{ED} = Volume of extended detention (if "yes" is given in box above)	
		E_{ED} = Elevation of WQV if "yes" is given in box above[2]	
-	cfs	$2Q_{avg}$ = 2* V_{ED} / 24 hrs * (1hr / 3600 sec) (used to check against Q_{EDmax} below)	
	cfs	Q_{EDmax} = Discharge at the E_{ED} (attach stage-discharge table)	**< $2Q_{avg}$**
-	hours	T_{ED} = Drawdown time of extended detention = $2V_{ED}/Q_{EDmax}$	**≥ 24-hrs**
3.00	:1	Pond side slopes	**≥3:1**
468.63	ft	Elevation of seasonal high water table	
469.35	ft	Elevation of lowest pond outlet	
463.63	ft	Max floor = Maximum elevation of pond bottom (ft)	
460.63	ft	Minimum floor (to maintain depth at less than 8')	**≤ 8 ft**
466.00	ft	Elevation of pond floor[3]	**≤ Max floor and > Min floor**
80.00	ft	Length of the flow path between the inlet and outlet at mid-depth	
30.00	ft	Average width ([average of the top width + average bottom width]/2)	
2.67	:1	Length to average width ratio	**≥ 3:1**
No	Yes/No	Is the perimeter curvilinear.	**← Yes**
Yes	Yes/No	Are the inlet and outlet located as far apart as possible.	**← Yes**
No	Yes/No	Is there a manually-controlled drain to dewater the pond over a 24hr period?	
If no state why:		grades	
		What mechanism is proposed to prevent the outlet structure from clogging (applicable for orifices/weirs with a dimension of <6")?	
471.54	ft	Peak elevation of the 50-year storm event	
472.00	ft	Berm elevation of the pond	
YES		50 peak elevation ≤ the berm elevation?	**←yes**

1. If the entire WQV is stored in the perm. pool, there is no extended det., and the following five lines do not apply.

2. This is the elevation of WQV **if** the hydrologic analysis is set up to include the permanent pool storage in the node description.

3. If the pond floor elevation is above the max floor elev., a hydrologic budget must be submitted to demonstrate that a minimum depth of 3 feet can be maintained. (First check whether a revised "lowest pond outlet" elev. will resolve the issue.)

Designer's Notes:

Summary for Pond 22P: Pocket Pond 22P

Inflow Area = 2.455 ac, 25.89% Impervious, Inflow Depth > 2.96" for 50 yr event
Inflow = 6.85 cfs @ 12.11 hrs, Volume= 0.606 af
Outflow = 3.06 cfs @ 12.38 hrs, Volume= 0.593 af, Atten= 55%, Lag= 15.9 min
Primary = 3.06 cfs @ 12.38 hrs, Volume= 0.593 af
Routed to Pond 21P : Infiltration Basin
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 21P : Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3
Starting Elev= 469.35' Surf.Area= 1,930 sf Storage= 3,827 cf
Peak Elev= 471.54' @ 12.38 hrs Surf.Area= 4,538 sf Storage= 9,814 cf (5,988 cf above start)
Flood Elev= 472.00' Surf.Area= 5,229 sf Storage= 12,066 cf (8,239 cf above start)

Plug-Flow detention time= 144.9 min calculated for 0.505 af (83% of inflow)
Center-of-Mass det. time= 28.1 min (824.7 - 796.6)

Volume	Invert	Avail.Storage	Storage Description
#1	466.00'	12,066 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
466.00	492	103.6	0	0	492
468.00	1,258	151.6	1,691	1,691	1,500
470.00	2,304	194.4	3,510	5,201	2,728
471.00	2,916	213.3	2,604	7,805	3,374
471.50	4,482	493.2	1,836	9,640	19,111
472.00	5,229	502.6	2,425	12,066	19,897

Device	Routing	Invert	Outlet Devices
#1	Primary	469.00'	**12.0" Round HDPE Culvert** L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 469.00' / 468.00' S= 0.0476 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	469.35'	**5.0" Vert. 5" Orifices X 2.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	470.80'	**5.0" Vert. 5" Orifices X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 1	471.25'	**Weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.40 Width (feet) 0.75 0.75
#5	Device 1	471.65'	**2.0" x 2.0" Horiz. Grate X 10.00 columns** X 10 rows C= 0.600 in 36.0" x 36.0" Grate (31% open area) Limited to weir flow at low heads
#6	Secondary	471.75'	**4.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=3.06 cfs @ 12.38 hrs HW=471.54' TW=469.82' (Dynamic Tailwater)
└─**1=HDPE Culvert** (Passes 3.06 cfs of 4.96 cfs potential flow)
  ├─**2=5" Orifices** (Orifice Controls 1.72 cfs @ 6.31 fps)
  ├─**3=5" Orifices** (Orifice Controls 0.96 cfs @ 3.50 fps)
  ├─**4=Weir** (Weir Controls 0.38 cfs @ 1.76 fps)
  └─**5=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=469.35' TW=466.00' (Dynamic Tailwater)
└─**6=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Stage-Area-Storage for Pond 22P: Pocket Pond 22P

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
466.00	492	0
466.10	522	51
466.20	553	104
466.30	584	161
466.40	617	221
466.50	650	285
466.60	685	351
466.70	720	422
466.80	756	495
466.90	793	573
467.00	831	654
467.10	870	739
467.20	909	828
467.30	950	921
467.40	991	1,018
467.50	1,033	1,119
467.60	1,077	1,225
467.70	1,121	1,335
467.80	1,166	1,449
467.90	1,211	1,568
468.00	1,258	1,691
468.10	1,303	1,819
468.20	1,348	1,952
468.30	1,395	2,089
468.40	1,442	2,231
468.50	1,490	2,377
468.60	1,539	2,529
468.70	1,588	2,685
468.80	1,639	2,846
468.90	1,690	3,013
469.00	1,742	3,184
469.10	1,794	3,361
469.20	1,848	3,543
469.30	1,902	3,731
469.40	1,957	3,924
469.50	2,013	4,122
469.60	2,070	4,326
469.70	2,127	4,536
469.80	2,185	4,752
469.90	2,244	4,973
470.00	2,304	5,201
470.10	2,362	5,434
470.20	2,421	5,673
470.30	2,480	5,918
470.40	2,540	6,169
470.50	2,601	6,426
470.60	2,663	6,689
470.70	2,725	6,959
470.80	2,788	7,234
470.90	2,852	7,516
471.00	2,916	7,805
471.10	3,202	8,111
471.20	3,502	8,446
471.30	3,815	8,811
471.40	4,142	9,209
471.50	4,482	9,640
471.60	4,627	10,096
471.70	4,774	10,566
471.80	4,923	11,051
471.90	5,075	11,551
472.00	**5,229**	**12,066**

Summary for Pond 23P: Sediment Forebay 23P

Inflow Area = 2.455 ac, 25.89% Impervious, Inflow Depth > 2.96" for 50 yr event
Inflow = 6.85 cfs @ 12.11 hrs, Volume= 0.606 af
Outflow = 6.85 cfs @ 12.11 hrs, Volume= 0.606 af, Atten= 0%, Lag= 0.0 min
Primary = 6.85 cfs @ 12.11 hrs, Volume= 0.606 af
Routed to Pond 22P : Pocket Pond 22P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 471.75' @ 12.13 hrs Surf.Area= 570 sf Storage= 0 cf
Flood Elev= 472.00' Surf.Area= 650 sf Storage= 0 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	469.00'	0 cf	**Custom Stage Data (Irregular)** Listed below (Recalc) 792 cf Overall x 0.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
469.00	3	16.6	0	0	3
470.00	135	65.6	53	53	326
471.00	363	86.1	240	292	585
472.00	650	105.0	500	792	888

Device	Routing	Invert	Outlet Devices
#1	Primary	471.00'	**4.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=6.84 cfs @ 12.11 hrs HW=471.74' TW=471.02' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 6.84 cfs @ 2.31 fps)

Stage-Area-Storage for Pond 23P: Sediment Forebay 23P

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
469.00	3	**0**
469.05	5	0
469.10	7	0
469.15	10	0
469.20	14	0
469.25	18	0
469.30	22	0
469.35	27	0
469.40	32	0
469.45	38	0
469.50	45	0
469.55	51	0
469.60	59	0
469.65	67	0
469.70	75	0
469.75	84	0
469.80	93	0
469.85	103	0
469.90	113	0
469.95	124	0
470.00	135	0
470.05	144	0
470.10	153	0
470.15	162	0
470.20	172	0
470.25	182	0
470.30	192	0
470.35	202	0
470.40	213	0
470.45	224	0
470.50	235	0
470.55	247	0
470.60	259	0
470.65	271	0
470.70	283	0
470.75	296	0
470.80	309	0
470.85	322	0
470.90	335	0
470.95	349	0
471.00	363	0
471.05	375	0
471.10	388	0
471.15	401	0
471.20	414	0
471.25	427	0
471.30	440	0
471.35	454	0
471.40	468	0
471.45	482	0
471.50	496	0
471.55	511	0
471.60	525	0
471.65	540	0
471.70	555	0
471.75	570	0
471.80	586	0
471.85	602	0
471.90	618	0
471.95	634	0
472.00	**650**	0

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

STORMWATER POND DESIGN CRITERIA

Env-Wq 1508.03

Type/Node Name: **Pocket Pond 41P**

Enter the type of stormwater pond (e.g., Wet Pond) and the node name in the drainage analysis, if applicable.

1.68	ac	A = Area draining to the practice	
0.14	ac	A_I = Impervious area draining to the practice	
0.09	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.13	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.21	ac-in	WQV= 1" x Rv x A	
775	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
77	cf	10% x WQV (check calc for sediment forebay and micropool volume)	
387	cf	50% x WQV (check calc for extended detention volume)	
245	cf	V_{SED} = Sediment forebay volume	**≥ 10%WQV**
5,532	cf	V_{PP} = Permanent pool volume (volume below the lowest invert of the outlet structure) Attach stage-storage table.	
no	cf	Extended Detention?[1]	**≤ 50% WQV**
-		V_{ED} = Volume of extended detention (if "yes" is given in box above)	
		E_{ED} = Elevation of WQV if "yes" is given in box above[2]	
-	cfs	$2Q_{avg}$ = 2* V_{ED} / 24 hrs * (1hr / 3600 sec) (used to check against Q_{EDmax} below)	
	cfs	Q_{EDmax} = Discharge at the E_{ED} (attach stage-discharge table)	**< $2Q_{avg}$**
-	hours	T_{ED} = Drawdown time of extended detention = $2V_{ED}/Q_{EDmax}$	**≥ 24-hrs**
3.00	:1	Pond side slopes	**≥3:1**
437.00	ft	Elevation of seasonal high water table	
440.10	ft	Elevation of lowest pond outlet	
432.00	ft	Max floor = Maximum elevation of pond bottom (ft)	
429.00	ft	Minimum floor (to maintain depth at less than 8')	**≤ 8 ft**
434.00	ft	Elevation of pond floor[3]	**≤ Max floor and > Min floor**
51.00	ft	Length of the flow path between the inlet and outlet at mid-depth	
67.00	ft	Average width ([average of the top width + average bottom width]/2)	
0.76	:1	Length to average width ratio	**≥ 3:1**
Yes	Yes/No	Is the perimeter curvilinear.	**← Yes**
Yes	Yes/No	Are the inlet and outlet located as far apart as possible.	**← Yes**
No	Yes/No	Is there a manually-controlled drain to dewater the pond over a 24hr period?	
If no state why:		grades	
		What mechanism is proposed to prevent the outlet structure from clogging (applicable for orifices/weirs with a dimension of <6")?	
441.67	ft	Peak elevation of the 50-year storm event	
442.00	ft	Berm elevation of the pond	
YES		50 peak elevation ≤ the berm elevation?	**←yes**

1. If the entire WQV is stored in the perm. pool, there is no extended det., and the following five lines do not apply.

2. This is the elevation of WQV **if** the hydrologic analysis is set up to include the permanent pool storage in the node description.

3. If the pond floor elevation is above the max floor elev., a hydrologic budget must be submitted to demonstrate that a minimum depth of 3 feet can be maintained. (First check whether a revised "lowest pond outlet" elev. will resolve the issue.)

Designer's Notes:

Summary for Pond 41P: Pocket Pond 41P

Inflow Area = 1.631 ac, 10.12% Impervious, Inflow Depth > 1.96" for 50 yr event
Inflow = 2.91 cfs @ 12.11 hrs, Volume= 0.266 af
Outflow = 1.08 cfs @ 12.48 hrs, Volume= 0.251 af, Atten= 63%, Lag= 22.2 min
Primary = 1.08 cfs @ 12.48 hrs, Volume= 0.251 af
Routed to Pond 40P : Existing CB

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3
Starting Elev= 440.10' Surf.Area= 2,197 sf Storage= 5,532 cf
Peak Elev= 441.67' @ 12.48 hrs Surf.Area= 3,100 sf Storage= 9,719 cf (4,188 cf above start)
Flood Elev= 442.00' Surf.Area= 3,207 sf Storage= 10,747 cf (5,215 cf above start)

Plug-Flow detention time= 462.0 min calculated for 0.124 af (47% of inflow)
Center-of-Mass det. time= 139.1 min (966.3 - 827.3)

Volume	Invert	Avail.Storage	Storage Description
#1	434.00'	10,747 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
434.00	64	44.5	0	0	64
436.00	472	91.7	473	473	593
438.00	1,164	139.2	1,585	2,058	1,496
440.00	2,142	186.2	3,257	5,315	2,756
441.50	3,044	214.5	3,870	9,184	3,707
442.00	3,207	219.2	1,563	10,747	3,902

Device	Routing	Invert	Outlet Devices
#1	Primary	437.00'	**18.0" Round HDPE Culvert** L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 437.00' / 435.00' S= 0.0833 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	440.10'	**3.0" Vert. 3" Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	441.60'	**2.0" x 2.0" Horiz. Grate X 10.00 columns** X 10 rows C= 0.600 in 36.0" x 36.0" Grate (31% open area) Limited to weir flow at low heads

Primary OutFlow Max=1.07 cfs @ 12.48 hrs HW=441.67' TW=0.00' (Dynamic Tailwater)
↑—**1=HDPE Culvert** (Passes 1.07 cfs of 16.85 cfs potential flow)
↑—**2=3" Orifice** (Orifice Controls 0.28 cfs @ 5.80 fps)
└—**3=Grate** (Weir Controls 0.79 cfs @ 0.89 fps)

Stage-Area-Storage for Pond 41P: Pocket Pond 41P

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
434.00	64	0
434.10	75	7
434.20	88	15
434.30	101	25
434.40	115	35
434.50	131	48
434.60	147	62
434.70	164	77
434.80	182	94
434.90	201	114
435.00	221	135
435.10	242	158
435.20	264	183
435.30	286	210
435.40	310	240
435.50	335	273
435.60	360	307
435.70	387	345
435.80	414	385
435.90	443	427
436.00	472	473
436.10	499	522
436.20	527	573
436.30	556	627
436.40	586	684
436.50	616	744
436.60	647	808
436.70	679	874
436.80	712	944
436.90	745	1,016
437.00	780	1,093
437.10	815	1,172
437.20	850	1,256
437.30	887	1,342
437.40	924	1,433
437.50	962	1,527
437.60	1,001	1,625
437.70	1,041	1,727
437.80	1,081	1,834
437.90	1,122	1,944
438.00	1,164	2,058
438.10	1,206	2,177
438.20	1,248	2,299
438.30	1,292	2,426
438.40	1,336	2,558
438.50	1,381	2,693
438.60	1,426	2,834
438.70	1,473	2,979
438.80	1,520	3,128
438.90	1,567	3,283
439.00	1,616	3,442
439.10	1,665	3,606
439.20	1,715	3,775
439.30	1,766	3,949
439.40	1,818	4,128
439.50	1,870	4,313
439.60	1,923	4,502
439.70	1,976	4,697
439.80	2,031	4,897
439.90	2,086	5,103
440.00	2,142	5,315
440.10	2,197	5,532
440.20	2,253	5,754
440.30	2,310	5,982
440.40	2,367	6,216
440.50	2,425	6,456
440.60	2,484	6,701
440.70	2,543	6,953
440.80	2,603	7,210
440.90	2,664	7,473
441.00	2,726	7,743
441.10	2,788	8,018
441.20	2,851	8,300
441.30	2,915	8,589
441.40	2,979	8,883
441.50	3,044	9,184
441.60	3,076	9,490
441.70	3,109	9,800
441.80	3,141	10,112
441.90	3,174	10,428
442.00	**3,207**	**10,747**

Summary for Pond 415P: Sediment Forebay 415P

Inflow Area = 0.974 ac, 15.98% Impervious, Inflow Depth > 2.29" for 50 yr event
Inflow = 2.01 cfs @ 12.11 hrs, Volume= 0.186 af
Outflow = 2.01 cfs @ 12.11 hrs, Volume= 0.186 af, Atten= 0%, Lag= 0.0 min
Primary = 2.01 cfs @ 12.11 hrs, Volume= 0.186 af
Routed to Pond 41P : Pocket Pond 41P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 441.84' @ 12.11 hrs Surf.Area= 407 sf Storage= 0 cf
Flood Elev= 442.00' Surf.Area= 454 sf Storage= 0 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	439.50'	0 cf	**Custom Stage Data (Irregular)** Listed below (Recalc) 435 cf Overall x 0.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
439.50	7	13.1	0	0	7
441.50	313	89.1	245	245	633
442.00	454	98.5	191	435	781

Device	Routing	Invert	Outlet Devices
#1	Primary	441.50'	**4.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=2.00 cfs @ 12.11 hrs HW=441.84' TW=441.07' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 2.00 cfs @ 1.46 fps)

Stage-Area-Storage for Pond 415P: Sediment Forebay 415P

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
439.50	7	**0**
439.55	9	0
439.60	12	0
439.65	14	0
439.70	17	0
439.75	20	0
439.80	24	0
439.85	28	0
439.90	32	0
439.95	36	0
440.00	41	0
440.05	46	0
440.10	51	0
440.15	57	0
440.20	63	0
440.25	69	0
440.30	75	0
440.35	82	0
440.40	89	0
440.45	96	0
440.50	103	0
440.55	111	0
440.60	119	0
440.65	128	0
440.70	136	0
440.75	145	0
440.80	154	0
440.85	164	0
440.90	174	0
440.95	184	0
441.00	194	0
441.05	205	0
441.10	216	0
441.15	227	0
441.20	238	0
441.25	250	0
441.30	262	0
441.35	274	0
441.40	287	0
441.45	300	0
441.50	313	0
441.55	326	0
441.60	339	0
441.65	353	0
441.70	366	0
441.75	380	0
441.80	394	0
441.85	409	0
441.90	424	0
441.95	439	0
442.00	**454**	0

17. EXTREME PRECIPITATION TABLES

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Metadata for Point	
Smoothing	Yes
State	New Hampshire
Location	New Hampshire, United States
Latitude	43.255 degrees North
Longitude	71.765 degrees West
Elevation	140 feet
Date/Time	Wed Jun 05 2024 12:33:03 GMT-0400 (Eastern Daylight Time)

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.26	0.40	0.50	0.65	0.81	1.02	**1yr**	0.70	0.97	1.18	1.48	1.87	2.35	2.55	**1yr**	2.08	2.45	2.90	3.60	4.12	**1yr**
2yr	0.31	0.48	0.60	0.79	0.99	1.25	**2yr**	0.86	1.14	1.44	1.80	2.23	2.78	3.11	**2yr**	2.46	2.99	3.48	4.16	4.75	**2yr**
5yr	0.37	0.58	0.72	0.97	1.24	1.57	**5yr**	1.07	1.44	1.81	2.26	2.79	3.44	3.93	**5yr**	3.04	3.78	4.38	5.15	5.84	**5yr**
10yr	0.42	0.66	0.83	1.13	1.47	1.87	**10yr**	1.27	1.72	2.17	2.69	3.31	4.04	4.70	**10yr**	3.58	4.52	5.21	6.05	6.83	**10yr**
25yr	0.49	0.79	1.00	1.38	1.83	2.35	**25yr**	1.58	2.16	2.73	3.38	4.14	5.01	5.94	**25yr**	4.43	5.71	6.56	7.50	8.40	**25yr**
50yr	0.56	0.90	1.15	1.61	2.17	2.80	**50yr**	1.87	2.58	3.25	4.03	4.90	5.89	7.11	**50yr**	5.22	6.83	7.81	8.82	9.82	**50yr**
100yr	0.64	1.03	1.33	1.89	2.58	3.34	**100yr**	2.22	3.07	3.89	4.80	5.81	6.94	8.50	**100yr**	6.14	8.17	9.31	10.38	11.49	**100yr**
200yr	0.73	1.20	1.55	2.22	3.06	3.98	**200yr**	2.64	3.67	4.63	5.70	6.88	8.17	10.17	**200yr**	7.23	9.78	11.09	12.22	13.45	**200yr**
500yr	0.88	1.45	1.88	2.73	3.83	5.01	**500yr**	3.30	4.64	5.84	7.17	8.61	10.16	12.90	**500yr**	8.99	12.41	14.00	15.18	16.57	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.24	0.37	0.45	0.61	0.75	0.88	**1yr**	0.64	0.86	0.95	1.28	1.57	1.90	2.28	**1yr**	1.68	2.19	2.58	3.07	3.62	**1yr**
2yr	0.30	0.46	0.57	0.77	0.95	1.13	**2yr**	0.82	1.10	1.29	1.71	2.21	2.69	3.00	**2yr**	2.38	2.88	3.35	4.02	4.60	**2yr**
5yr	0.34	0.52	0.65	0.89	1.13	1.33	**5yr**	0.97	1.30	1.50	1.96	2.54	3.17	3.59	**5yr**	2.81	3.45	3.98	4.74	5.42	**5yr**
10yr	0.38	0.58	0.72	1.01	1.30	1.52	**10yr**	1.12	1.48	1.68	2.17	2.82	3.60	4.10	**10yr**	3.19	3.95	4.52	5.36	6.09	**10yr**
25yr	0.43	0.65	0.81	1.16	1.53	1.78	**25yr**	1.32	1.74	1.96	2.48	3.23	4.25	4.89	**25yr**	3.76	4.70	5.35	6.33	7.11	**25yr**
50yr	0.47	0.72	0.89	1.29	1.73	1.99	**50yr**	1.49	1.95	2.18	2.76	3.57	4.83	5.57	**50yr**	4.28	5.36	6.07	7.19	8.03	**50yr**
100yr	0.52	0.79	0.99	1.42	1.95	2.24	**100yr**	1.68	2.19	2.43	3.07	3.96	5.50	6.37	**100yr**	4.87	6.12	6.89	8.18	9.07	**100yr**
200yr	0.57	0.86	1.09	1.57	2.20	2.52	**200yr**	1.90	2.46	2.71	3.42	4.39	6.28	7.27	**200yr**	5.55	6.99	7.83	9.33	10.24	**200yr**
500yr	0.65	0.97	1.25	1.81	2.58	2.92	**500yr**	2.23	2.85	3.13	3.95	5.03	7.48	8.67	**500yr**	6.62	8.34	9.25	11.12	12.05	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.29	0.45	0.55	0.73	0.90	1.11	**1yr**	0.78	1.09	1.21	1.59	1.96	2.61	2.80	**1yr**	2.31	2.69	3.21	3.94	4.48	**1yr**
2yr	0.33	0.51	0.63	0.85	1.05	1.24	**2yr**	0.91	1.21	1.41	1.85	2.37	2.89	3.25	**2yr**	2.56	3.12	3.64	4.31	4.99	**2yr**
5yr	0.41	0.63	0.78	1.07	1.36	1.63	**5yr**	1.18	1.59	1.85	2.36	3.00	3.73	4.32	**5yr**	3.30	4.16	4.81	5.55	6.30	**5yr**
10yr	0.49	0.76	0.94	1.31	1.69	2.02	**10yr**	1.46	1.98	2.27	2.86	3.60	4.53	5.38	**10yr**	4.01	5.18	5.97	6.70	7.57	**10yr**
25yr	0.63	0.96	1.19	1.70	2.24	2.69	**25yr**	1.93	2.63	3.01	3.66	4.58	5.85	7.18	**25yr**	5.18	6.90	7.94	8.61	9.69	**25yr**
50yr	0.76	1.15	1.43	2.06	2.77	3.36	**50yr**	2.39	3.28	3.70	4.43	5.51	7.09	8.95	**50yr**	6.28	8.61	9.86	10.42	11.67	**50yr**
100yr	0.92	1.39	1.74	2.51	3.44	4.19	**100yr**	2.97	4.10	4.57	5.34	6.63	8.62	11.17	**100yr**	7.63	10.74	12.25	12.60	14.06	**100yr**
200yr	1.11	1.67	2.11	3.06	4.27	5.23	**200yr**	3.68	5.12	5.66	6.46	7.96	10.44	13.93	**200yr**	9.24	13.39	15.23	15.22	16.93	**200yr**
500yr	1.44	2.14	2.75	4.00	5.68	7.03	**500yr**	4.90	6.87	7.50	8.30	10.19	13.50	18.67	**500yr**	11.95	17.96	20.33	19.55	21.65	**500yr**

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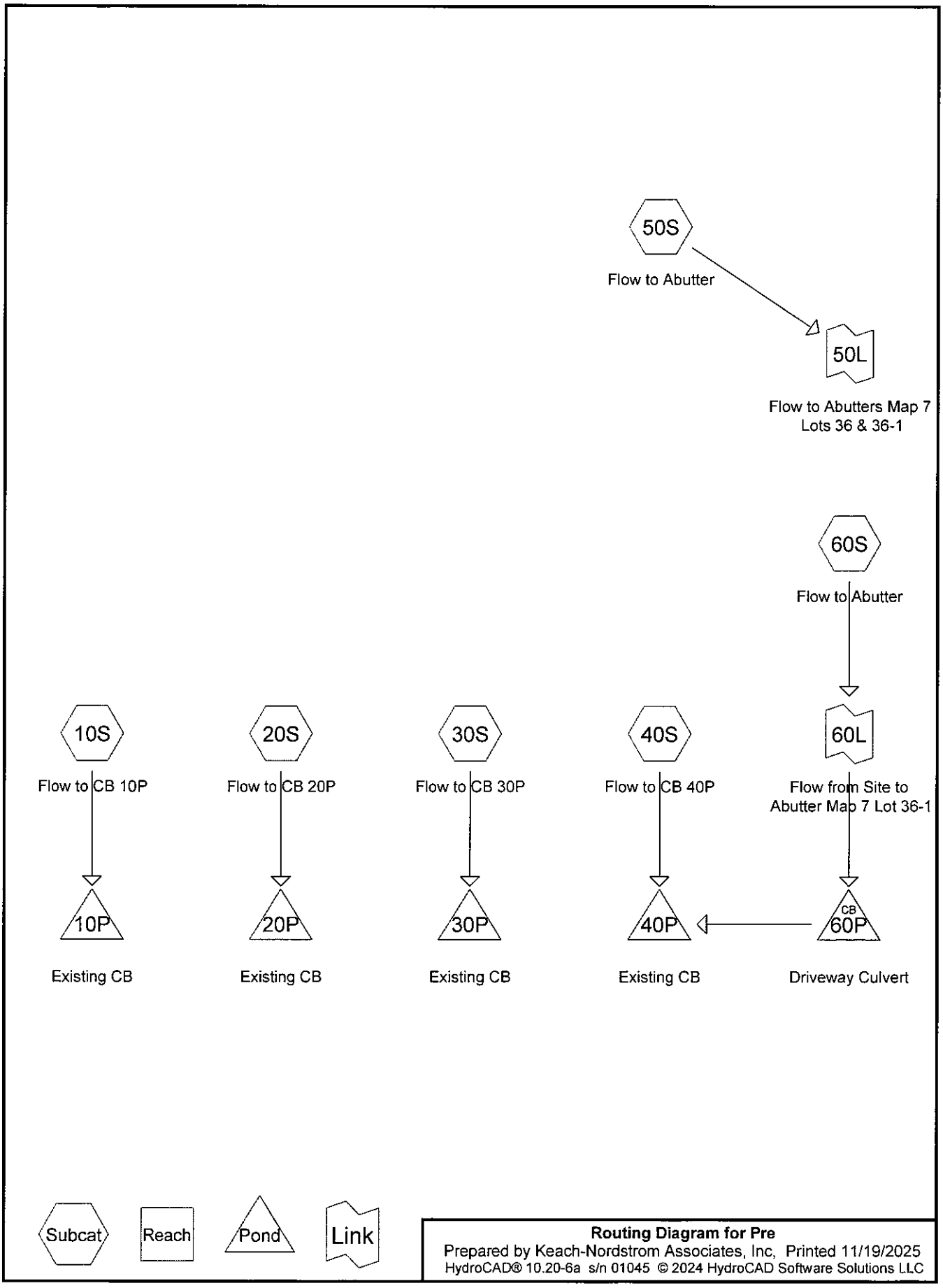
18. HYDROCAD DRAINAGE ANALAYSIS



Routing Diagram for Pre

Prepared by Keach-Nordstrom Associates, Inc, Printed 11/19/2025

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
3.712	HSG A	10S, 20S, 30S, 40S, 60S
9.582	HSG B	10S, 20S, 30S, 40S, 50S, 60S
0.183	HSG C	10S, 20S
3.666	HSG D	10S, 20S, 30S, 40S, 50S, 60S
0.000	Other	

Time span=0.00-24.00 hrs, dt=0.03 hrs, 801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10S: Flow to CB 10P Runoff Area=138,949 sf 3.22% Impervious Runoff Depth>0.39"
Flow Length=1,135' Tc=17.9 min CN=WQ Runoff=0.85 cfs 0.104 af

Subcatchment20S: Flow to CB 20P Runoff Area=314,828 sf 3.69% Impervious Runoff Depth>0.42"
Flow Length=1,000' Tc=16.1 min CN=WQ Runoff=2.01 cfs 0.255 af

Subcatchment30S: Flow to CB 30P Runoff Area=85,116 sf 6.62% Impervious Runoff Depth>0.51"
Flow Length=905' Tc=21.0 min CN=WQ Runoff=0.63 cfs 0.083 af

Subcatchment40S: Flow to CB 40P Runoff Area=87,968 sf 5.34% Impervious Runoff Depth>0.63"
Flow Length=1,073' Tc=17.4 min CN=WQ Runoff=0.86 cfs 0.106 af

Subcatchment50S: Flow to Abutter Runoff Area=11,007 sf 0.00% Impervious Runoff Depth>0.27"
Flow Length=213' Tc=10.6 min CN=WQ Runoff=0.04 cfs 0.006 af

Subcatchment60S: Flow to Abutter Runoff Area=108,896 sf 2.23% Impervious Runoff Depth>0.20"
Flow Length=1,171' Tc=18.2 min CN=WQ Runoff=0.19 cfs 0.041 af

Pond 10P: Existing CB Inflow=0.85 cfs 0.104 af
Primary=0.85 cfs 0.104 af

Pond 20P: Existing CB Inflow=2.01 cfs 0.255 af
Primary=2.01 cfs 0.255 af

Pond 30P: Existing CB Inflow=0.63 cfs 0.083 af
Primary=0.63 cfs 0.083 af

Pond 40P: Existing CB Inflow=1.06 cfs 0.148 af
Primary=1.06 cfs 0.148 af

Pond 60P: Driveway Culvert Peak Elev=431.57' Inflow=0.19 cfs 0.041 af
12.0" Round Culvert n=0.013 L=39.0' S=0.0169 '/' Outflow=0.19 cfs 0.041 af

Link 50L: Flow to Abutters Map 7 Lots 36 & 36-1 Inflow=0.04 cfs 0.006 af
Primary=0.04 cfs 0.006 af

Link 60L: Flow from Site to Abutter Map 7 Lot 36-1 Inflow=0.19 cfs 0.041 af
Primary=0.19 cfs 0.041 af

Time span=0.00-24.00 hrs, dt=0.03 hrs, 801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10S: Flow to CB 10P Runoff Area=138,949 sf 3.22% Impervious Runoff Depth>1.64"
Flow Length=1,135' Tc=17.9 min CN=WQ Runoff=4.07 cfs 0.437 af

Subcatchment20S: Flow to CB 20P Runoff Area=314,828 sf 3.69% Impervious Runoff Depth>1.95"
Flow Length=1,000' Tc=16.1 min CN=WQ Runoff=11.29 cfs 1.177 af

Subcatchment30S: Flow to CB 30P Runoff Area=85,116 sf 6.62% Impervious Runoff Depth>2.01"
Flow Length=905' Tc=21.0 min CN=WQ Runoff=2.80 cfs 0.328 af

Subcatchment40S: Flow to CB 40P Runoff Area=87,968 sf 5.34% Impervious Runoff Depth>2.32"
Flow Length=1,073' Tc=17.4 min CN=WQ Runoff=3.48 cfs 0.390 af

Subcatchment50S: Flow to Abutter Runoff Area=11,007 sf 0.00% Impervious Runoff Depth>1.72"
Flow Length=213' Tc=10.6 min CN=WQ Runoff=0.39 cfs 0.036 af

Subcatchment60S: Flow to Abutter Runoff Area=108,896 sf 2.23% Impervious Runoff Depth>1.32"
Flow Length=1,171' Tc=18.2 min CN=WQ Runoff=2.37 cfs 0.276 af

Pond 10P: Existing CB Inflow=4.07 cfs 0.437 af
Primary=4.07 cfs 0.437 af

Pond 20P: Existing CB Inflow=11.29 cfs 1.177 af
Primary=11.29 cfs 1.177 af

Pond 30P: Existing CB Inflow=2.80 cfs 0.328 af
Primary=2.80 cfs 0.328 af

Pond 40P: Existing CB Inflow=5.82 cfs 0.666 af
Primary=5.82 cfs 0.666 af

Pond 60P: Driveway Culvert Peak Elev=432.25' Inflow=2.37 cfs 0.276 af
12.0" Round Culvert n=0.013 L=39.0' S=0.0169 '/' Outflow=2.37 cfs 0.276 af

Link 50L: Flow to Abutters Map 7 Lots 36 & 36-1 Inflow=0.39 cfs 0.036 af
Primary=0.39 cfs 0.036 af

Link 60L: Flow from Site to Abutter Map 7 Lot 36-1 Inflow=2.37 cfs 0.276 af
Primary=2.37 cfs 0.276 af

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	10 yr	Type III 24-hr		Default	24.00	1	4.04	2

Summary for Subcatchment 10S: Flow to CB 10P

Runoff = 1.93 cfs @ 12.26 hrs, Volume= 0.220 af, Depth> 0.83"
Routed to Pond 10P : Existing CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 yr Rainfall=4.04"

Area (sf)	CN	Description
3,674	98	Paved parking, HSG B
6,224	61	>75% Grass cover, Good, HSG B
801	98	Water Surface, HSG C
49,768	30	Woods, Good, HSG A
39,726	55	Woods, Good, HSG B
38,756	77	Woods, Good, HSG D
138,949		Weighted Average
134,474		96.78% Pervious Area
4,475		3.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.2100	0.19		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.78"
8.9	1,035	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.9	1,135	Total			

Summary for Subcatchment 20S: Flow to CB 20P

Runoff = 4.94 cfs @ 12.24 hrs, Volume= 0.571 af, Depth> 0.95"
Routed to Pond 20P : Existing CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 yr Rainfall=4.04"

Area (sf)	CN	Description
4,461	98	Paved parking, HSG B
5,323	80	>75% Grass cover, Good, HSG D
7,166	98	Water Surface, HSG C
39,209	30	Woods, Good, HSG A
179,013	55	Woods, Good, HSG B
79,656	77	Woods, Good, HSG D
314,828		Weighted Average
303,201		96.31% Pervious Area
11,627		3.69% Impervious Area

Area (sf)	CN	Description
2,433	98	Paved parking, HSG A
474	98	Paved parking, HSG D
1,792	98	Paved parking, HSG B
9,352	39	>75% Grass cover, Good, HSG A
6,161	61	>75% Grass cover, Good, HSG B
2,588	80	>75% Grass cover, Good, HSG D
47,279	55	Woods, Good, HSG B
2,326	96	Gravel surface, HSG B
9,098	96	Gravel surface, HSG A
6,465	77	Woods, Good, HSG D
87,968		Weighted Average
83,269		94.66% Pervious Area
4,699		5.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.2100	0.19		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.78"
8.4	973	0.1500	1.94		**Shallow Concentrated Flow, Shallow** Woodland Kv= 5.0 fps
17.4	1,073	Total			

Summary for Subcatchment 50S: Flow to Abutter

Runoff = 0.13 cfs @ 12.18 hrs, Volume= 0.016 af, Depth> 0.74"
Routed to Link 50L : Flow to Abutters Map 7 Lots 36 & 36-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 yr Rainfall=4.04"

Area (sf)	CN	Description
506	96	Gravel surface, HSG B
485	77	Woods, Good, HSG D
10,016	55	Woods, Good, HSG B
11,007		Weighted Average
11,007		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.1800	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.78"
1.0	113	0.1400	1.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.6	213	Total			

Summary for Pond 30P: Existing CB

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.954 ac, 6.62% Impervious, Inflow Depth > 1.03" for 10 yr event
Inflow = 1.36 cfs @ 12.31 hrs, Volume= 0.168 af
Primary = 1.36 cfs @ 12.31 hrs, Volume= 0.168 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 1L

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3

Summary for Pond 40P: Existing CB

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.519 ac, 3.62% Impervious, Inflow Depth > 0.85" for 10 yr event
Inflow = 2.46 cfs @ 12.27 hrs, Volume= 0.320 af
Primary = 2.46 cfs @ 12.27 hrs, Volume= 0.320 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 1L

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3

Summary for Pond 60P: Driveway Culvert

[57] Hint: Peaked at 431.81' (Flood elevation advised)

Inflow Area = 2.500 ac, 2.23% Impervious, Inflow Depth > 0.55" for 10 yr event
Inflow = 0.79 cfs @ 12.32 hrs, Volume= 0.115 af
Outflow = 0.79 cfs @ 12.32 hrs, Volume= 0.115 af, Atten= 0%, Lag= 0.0 min
Primary = 0.79 cfs @ 12.32 hrs, Volume= 0.115 af
Routed to Pond 40P : Existing CB

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 431.81' @ 12.32 hrs

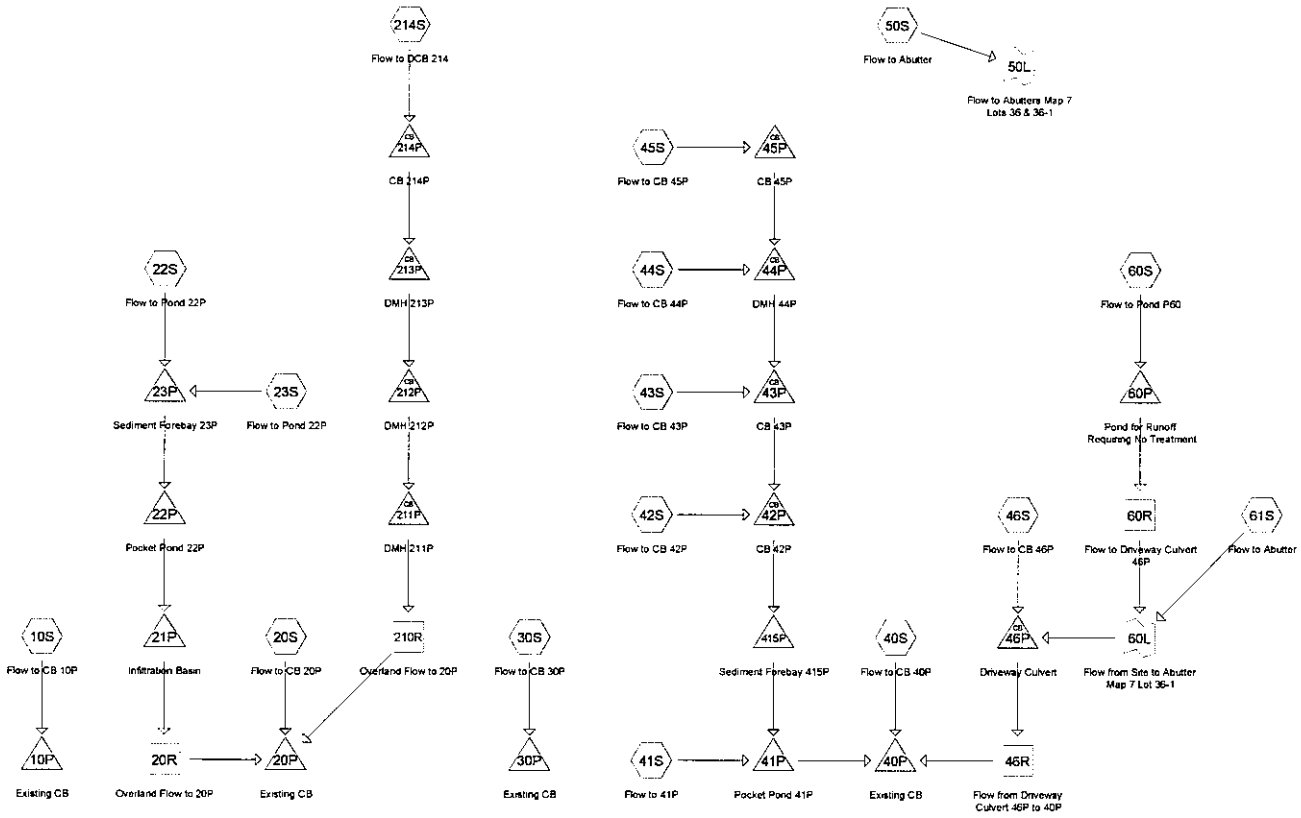
Device	Routing	Invert	Outlet Devices
#1	Primary	431.36'	**12.0" Round Culvert** L= 39.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 431.36' / 430.70' S= 0.0169 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.79 cfs @ 12.32 hrs HW=431.81' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.79 cfs @ 2.29 fps)

Summary for Link 50L: Flow to Abutters Map 7 Lots 36 & 36-1

Inflow Area = 0.253 ac, 0.00% Impervious, Inflow Depth > 0.74" for 10 yr event
Inflow = 0.13 cfs @ 12.18 hrs, Volume= 0.016 af
Primary = 0.13 cfs @ 12.18 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs



Subcat Reach Pond Link

Routing Diagram for Post

Prepared by Keach-Nordstrom Associates, Inc, Printed 11/19/2025

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
3.712	HSG A	10S, 20S, 22S, 23S, 30S, 40S, 41S, 42S, 43S, 44S, 46S, 61S
9.582	HSG B	10S, 20S, 22S, 23S, 30S, 41S, 42S, 43S, 44S, 45S, 46S, 50S, 60S, 61S, 214S
0.183	HSG C	10S, 20S
3.666	HSG D	10S, 20S, 22S, 30S, 40S, 41S, 42S, 43S, 45S, 46S, 50S, 60S, 61S, 214S
0.000	Other	

Time span=0.00-24.00 hrs, dt=0.03 hrs, 801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10S: Flow to CB 10P Runoff Area=138,730 sf 3.23% Impervious Runoff Depth>0.39"
Flow Length=1,135' Tc=17.9 min CN=WQ Runoff=0.84 cfs 0.103 af

Subcatchment20S: Flow to CB 20P Runoff Area=102,298 sf 14.98% Impervious Runoff Depth>0.78"
Flow Length=578' Tc=16.9 min CN=WQ Runoff=1.30 cfs 0.153 af

Subcatchment22S: Flow to Pond 22P Runoff Area=75,133 sf 6.41% Impervious Runoff Depth>0.60"
Flow Length=363' Tc=9.5 min CN=WQ Runoff=0.86 cfs 0.086 af

Subcatchment23S: Flow to Pond 22P Runoff Area=31,796 sf 71.93% Impervious Runoff Depth>1.85"
Flow Length=412' Tc=6.0 min CN=WQ Runoff=1.41 cfs 0.113 af

Subcatchment30S: Flow to CB 30P Runoff Area=21,407 sf 23.53% Impervious Runoff Depth>1.29"
Flow Length=310' Slope=0.0100 '/' Tc=17.8 min CN=WQ Runoff=0.49 cfs 0.053 af

Subcatchment40S: Flow to CB 40P Runoff Area=6,946 sf 32.42% Impervious Runoff Depth>1.44"
Flow Length=126' Tc=6.3 min CN=WQ Runoff=0.25 cfs 0.019 af

Subcatchment41S: Flow to 41P Runoff Area=28,634 sf 1.45% Impervious Runoff Depth>0.30"
Flow Length=142' Tc=6.0 min CN=WQ Runoff=0.19 cfs 0.017 af

Subcatchment42S: Flow to CB 42P Runoff Area=6,835 sf 27.53% Impervious Runoff Depth>0.80"
Flow Length=128' Tc=8.1 min CN=WQ Runoff=0.12 cfs 0.010 af

Subcatchment43S: Flow to CB 43P Runoff Area=18,609 sf 12.79% Impervious Runoff Depth>0.52"
Flow Length=358' Tc=11.6 min CN=WQ Runoff=0.16 cfs 0.018 af

Subcatchment44S: Flow to CB 44P Runoff Area=2,206 sf 60.20% Impervious Runoff Depth>1.62"
Flow Length=54' Slope=0.1400 '/' Tc=6.0 min CN=WQ Runoff=0.08 cfs 0.007 af

Subcatchment45S: Flow to CB 45P Runoff Area=14,764 sf 8.05% Impervious Runoff Depth>0.51"
Flow Length=134' Tc=6.0 min CN=WQ Runoff=0.13 cfs 0.014 af

Subcatchment46S: Flow to CB 46P Runoff Area=12,239 sf 23.60% Impervious Runoff Depth>0.83"
Flow Length=258' Tc=10.0 min CN=WQ Runoff=0.22 cfs 0.019 af

Subcatchment50S: Flow to Abutter Runoff Area=11,007 sf 0.00% Impervious Runoff Depth>0.27"
Flow Length=213' Tc=10.6 min CN=WQ Runoff=0.04 cfs 0.006 af

Subcatchment60S: Flow to Pond P60 Runoff Area=110,256 sf 0.00% Impervious Runoff Depth>0.21"
Flow Length=684' Tc=14.6 min CN=WQ Runoff=0.18 cfs 0.045 af

Subcatchment61S: Flow to Abutter Runoff Area=81,036 sf 3.10% Impervious Runoff Depth>0.21"
Flow Length=734' Tc=14.5 min CN=WQ Runoff=0.18 cfs 0.032 af

Subcatchment214S: Flow to DCB 214 Runoff Area=84,870 sf 0.00% Impervious Runoff Depth>0.43"
Flow Length=816' Tc=15.2 min CN=WQ Runoff=0.55 cfs 0.069 af

Pond 60P: Pond for Runoff Requiring No Peak Elev=502.05' Storage=1,922 cf Inflow=0.18 cfs 0.045 af
Primary=0.01 cfs 0.001 af Secondary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.001 af

Pond 211P: DMH 211P Peak Elev=473.56' Inflow=0.55 cfs 0.069 af
18.0" Round Culvert n=0.013 L=128.0' S=0.0078 '/' Outflow=0.55 cfs 0.069 af

Pond 212P: DMH 212P Peak Elev=479.57' Inflow=0.55 cfs 0.069 af
18.0" Round Culvert n=0.013 L=43.0' S=0.0988 '/' Outflow=0.55 cfs 0.069 af

Pond 213P: DMH 213P Peak Elev=488.37' Inflow=0.55 cfs 0.069 af
18.0" Round Culvert n=0.013 L=38.0' S=0.1066 '/' Outflow=0.55 cfs 0.069 af

Pond 214P: CB 214P Peak Elev=497.82' Inflow=0.55 cfs 0.069 af
18.0" Round Culvert n=0.013 L=45.0' S=0.0989 '/' Outflow=0.55 cfs 0.069 af

Pond 415P: Sediment Forebay 415P Peak Elev=441.64' Storage=0 cf Inflow=0.47 cfs 0.050 af
Outflow=0.47 cfs 0.050 af

Link 50L: Flow to Abutters Map 7 Lots 36 & 36-1 Inflow=0.04 cfs 0.006 af
Primary=0.04 cfs 0.006 af

Link 60L: Flow from Site to Abutter Map 7 Lot 36-1 Inflow=0.18 cfs 0.032 af
Primary=0.18 cfs 0.032 af

Reach 20R: Overland Flow to 20P Avg. Flow Depth=0.11' Max Vel=6.10 fps Inflow=2.09 cfs 0.252 af
n=0.013 L=244.0' S=0.0922 '/' Capacity=1,102.26 cfs Outflow=2.09 cfs 0.252 af

Reach 46R: Flow from Driveway Culvert Avg. Flow Depth=0.85' Max Vel=0.52 fps Inflow=1.58 cfs 0.373 af
n=0.150 L=50.0' S=0.0074 '/' Capacity=12.13 cfs Outflow=1.57 cfs 0.373 af

Reach 60R: Flow to Driveway Culvert Avg. Flow Depth=0.08' Max Vel=2.32 fps Inflow=0.69 cfs 0.194 af
n=0.035 L=467.0' S=0.1499 '/' Capacity=166.52 cfs Outflow=0.69 cfs 0.193 af

Reach 210R: Overland Flow to 20P Avg. Flow Depth=0.12' Max Vel=6.29 fps Inflow=2.52 cfs 0.258 af
n=0.013 L=486.0' S=0.0874 '/' Capacity=1,073.41 cfs Outflow=2.48 cfs 0.258 af

Pond 10P: Existing CB Inflow=2.99 cfs 0.325 af
Primary=2.99 cfs 0.325 af

Pond 20P: Existing CB Inflow=8.07 cfs 0.924 af
Primary=8.07 cfs 0.924 af

Pond 21P: Infiltration Basin Peak Elev=469.79' Storage=3,449 cf Inflow=2.22 cfs 0.469 af
Discarded=0.13 cfs 0.148 af Primary=2.02 cfs 0.250 af Secondary=0.07 cfs 0.002 af Outflow=2.22 cfs 0.400 af

Pond 22P: Pocket Pond 22P Peak Elev=471.24' Storage=8,604 cf Inflow=5.40 cfs 0.479 af
Primary=2.22 cfs 0.469 af Secondary=0.00 cfs 0.000 af Outflow=2.22 cfs 0.469 af

Pond 23P: Sediment Forebay 23P Peak Elev=471.63' Storage=0 cf Inflow=5.40 cfs 0.479 af
Outflow=5.40 cfs 0.479 af

Pond 30P: Existing CB Inflow=1.19 cfs 0.125 af
Primary=1.19 cfs 0.125 af

Pond 40P: Existing CB Inflow=2.10 cfs 0.605 af
Primary=2.10 cfs 0.605 af

Pond 41P: Pocket Pond 41P Peak Elev=441.46' Storage=9,061 cf Inflow=2.17 cfs 0.199 af
Outflow=0.26 cfs 0.189 af

Pond 42P: CB 42P Peak Elev=443.88' Inflow=1.50 cfs 0.141 af
18.0" Round Culvert n=0.013 L=17.0' S=0.0782 '/' Outflow=1.50 cfs 0.141 af

Pond 43P: CB 43P Peak Elev=446.16' Inflow=1.25 cfs 0.118 af
18.0" Round Culvert n=0.013 L=38.0' S=0.0526 '/' Outflow=1.25 cfs 0.118 af

Pond 44P: DMH 44P Peak Elev=453.42' Inflow=0.79 cfs 0.063 af
15.0" Round Culvert n=0.013 L=79.0' S=0.0886 '/' Outflow=0.79 cfs 0.063 af

Pond 45P: CB 45P Peak Elev=466.17' Inflow=0.62 cfs 0.049 af
15.0" Round Culvert n=0.013 L=64.0' S=0.1219 '/' Outflow=0.62 cfs 0.049 af

Pond 46P: Driveway Culvert Peak Elev=431.77' Inflow=1.58 cfs 0.373 af
12.0" Round Culvert n=0.013 L=31.0' S=0.0161 '/' Outflow=1.58 cfs 0.373 af

Time span=0.00-24.00 hrs, dt=0.03 hrs, 801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10S: Flow to CB 10P Runoff Area=138,730 sf 3.23% Impervious Runoff Depth>1.64"
Flow Length=1,135' Tc=17.9 min CN=WQ Runoff=4.05 cfs 0.435 af

Subcatchment20S: Flow to CB 20P Runoff Area=102,298 sf 14.98% Impervious Runoff Depth>2.73"
Flow Length=578' Tc=16.9 min CN=WQ Runoff=5.06 cfs 0.535 af

Subcatchment22S: Flow to Pond 22P Runoff Area=75,133 sf 6.41% Impervious Runoff Depth>2.40"
Flow Length=363' Tc=9.5 min CN=WQ Runoff=4.02 cfs 0.345 af

Subcatchment23S: Flow to Pond 22P Runoff Area=31,796 sf 71.93% Impervious Runoff Depth>4.28"
Flow Length=412' Tc=6.0 min CN=WQ Runoff=3.12 cfs 0.261 af

Subcatchment30S: Flow to CB 30P Runoff Area=21,407 sf 23.53% Impervious Runoff Depth>3.80"
Flow Length=310' Slope=0.0100 '/' Tc=17.8 min CN=WQ Runoff=1.48 cfs 0.156 af

Subcatchment40S: Flow to CB 40P Runoff Area=6,946 sf 32.42% Impervious Runoff Depth>3.97"
Flow Length=126' Tc=6.3 min CN=WQ Runoff=0.68 cfs 0.053 af

Subcatchment41S: Flow to 41P Runoff Area=28,634 sf 1.45% Impervious Runoff Depth>1.46"
Flow Length=142' Tc=6.0 min CN=WQ Runoff=0.92 cfs 0.080 af

Subcatchment42S: Flow to CB 42P Runoff Area=6,835 sf 27.53% Impervious Runoff Depth>2.26"
Flow Length=128' Tc=8.1 min CN=WQ Runoff=0.31 cfs 0.030 af

Subcatchment43S: Flow to CB 43P Runoff Area=18,609 sf 12.79% Impervious Runoff Depth>2.07"
Flow Length=358' Tc=11.6 min CN=WQ Runoff=0.75 cfs 0.074 af

Subcatchment44S: Flow to CB 44P Runoff Area=2,206 sf 60.20% Impervious Runoff Depth>4.03"
Flow Length=54' Slope=0.1400 '/' Tc=6.0 min CN=WQ Runoff=0.21 cfs 0.017 af

Subcatchment45S: Flow to CB 45P Runoff Area=14,764 sf 8.05% Impervious Runoff Depth>2.32"
Flow Length=134' Tc=6.0 min CN=WQ Runoff=0.86 cfs 0.066 af

Subcatchment46S: Flow to CB 46P Runoff Area=12,239 sf 23.60% Impervious Runoff Depth>2.32"
Flow Length=258' Tc=10.0 min CN=WQ Runoff=0.56 cfs 0.054 af

Subcatchment50S: Flow to Abutter Runoff Area=11,007 sf 0.00% Impervious Runoff Depth>1.72"
Flow Length=213' Tc=10.6 min CN=WQ Runoff=0.39 cfs 0.036 af

Subcatchment60S: Flow to Pond P60 Runoff Area=110,256 sf 0.00% Impervious Runoff Depth>1.63"
Flow Length=684' Tc=14.6 min CN=WQ Runoff=3.33 cfs 0.345 af

Subcatchment61S: Flow to Abutter Runoff Area=81,036 sf 3.10% Impervious Runoff Depth>1.26"
Flow Length=734' Tc=14.5 min CN=WQ Runoff=1.82 cfs 0.196 af

Subcatchment214S: Flow to DCB 214 Runoff Area=84,870 sf 0.00% Impervious Runoff Depth>2.16"
Flow Length=816' Tc=15.2 min CN=WQ Runoff=3.51 cfs 0.351 af

Pond 60P: Pond for Runoff Requiring No Peak Elev=503.43' Storage=4,498 cf Inflow=3.33 cfs 0.345 af
Primary=1.40 cfs 0.298 af Secondary=0.00 cfs 0.000 af Outflow=1.40 cfs 0.298 af

Pond 211P: DMH 211P Peak Elev=473.88' Inflow=3.51 cfs 0.351 af
18.0" Round Culvert n=0.013 L=128.0' S=0.0078 '/' Outflow=3.53 cfs 0.351 af

Pond 212P: DMH 212P Peak Elev=480.14' Inflow=3.51 cfs 0.351 af
18.0" Round Culvert n=0.013 L=43.0' S=0.0988 '/' Outflow=3.51 cfs 0.351 af

Pond 213P: DMH 213P Peak Elev=488.94' Inflow=3.51 cfs 0.351 af
18.0" Round Culvert n=0.013 L=38.0' S=0.1066 '/' Outflow=3.51 cfs 0.351 af

Pond 214P: CB 214P Peak Elev=498.39' Inflow=3.51 cfs 0.351 af
18.0" Round Culvert n=0.013 L=45.0' S=0.0989 '/' Outflow=3.51 cfs 0.351 af

Pond 415P: Sediment Forebay 415P Peak Elev=441.84' Storage=0 cf Inflow=2.01 cfs 0.186 af
Outflow=2.01 cfs 0.186 af

Link 50L: Flow to Abutters Map 7 Lots 36 & 36-1 Inflow=0.39 cfs 0.036 af
Primary=0.39 cfs 0.036 af

Link 60L: Flow from Site to Abutter Map 7 Lot 36-1 Inflow=2.26 cfs 0.493 af
Primary=2.26 cfs 0.493 af

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	10 yr	Type III 24-hr		Default	24.00	1	4.04	2

Reach 20R: Overland Flow to 20P Avg. Flow Depth=0.09' Max Vel=5.19 fps Inflow=1.23 cfs 0.141 af
n=0.013 L=244.0' S=0.0922 '/' Capacity=1,102.26 cfs Outflow=1.23 cfs 0.141 af

Reach 46R: Flow from Driveway Culvert Avg. Flow Depth=0.67' Max Vel=0.45 fps Inflow=0.91 cfs 0.210 af
n=0.150 L=50.0' S=0.0074 '/' Capacity=12.13 cfs Outflow=0.90 cfs 0.209 af

Reach 60R: Flow to Driveway Culvert Avg. Flow Depth=0.05' Max Vel=1.69 fps Inflow=0.25 cfs 0.095 af
n=0.035 L=467.0' S=0.1499 '/' Capacity=166.52 cfs Outflow=0.25 cfs 0.094 af

Reach 210R: Overland Flow to 20P Avg. Flow Depth=0.09' Max Vel=5.38 fps Inflow=1.50 cfs 0.166 af
n=0.013 L=486.0' S=0.0874 '/' Capacity=1,073.41 cfs Outflow=1.48 cfs 0.166 af

Pond 10P: Existing CB Inflow=1.93 cfs 0.219 af
Primary=1.93 cfs 0.219 af

Pond 20P: Existing CB Inflow=4.20 cfs 0.598 af
Primary=4.20 cfs 0.598 af

Pond 21P: Infiltration Basin Peak Elev=469.75' Storage=3,377 cf Inflow=1.43 cfs 0.343 af
Discarded=0.13 cfs 0.140 af Primary=1.23 cfs 0.141 af Secondary=0.00 cfs 0.000 af Outflow=1.36 cfs 0.281 af

Pond 22P: Pocket Pond 22P Peak Elev=470.82' Storage=7,289 cf Inflow=3.89 cfs 0.348 af
Primary=1.43 cfs 0.343 af Secondary=0.00 cfs 0.000 af Outflow=1.43 cfs 0.343 af

Pond 23P: Sediment Forebay 23P Peak Elev=471.52' Storage=0 cf Inflow=3.89 cfs 0.348 af
Outflow=3.89 cfs 0.348 af

Pond 30P: Existing CB Inflow=0.87 cfs 0.092 af
Primary=0.87 cfs 0.092 af

Pond 40P: Existing CB Inflow=1.31 cfs 0.368 af
Primary=1.31 cfs 0.368 af

Pond 41P: Pocket Pond 41P Peak Elev=441.02' Storage=7,784 cf Inflow=1.43 cfs 0.134 af
Outflow=0.21 cfs 0.127 af

Pond 42P: CB 42P Peak Elev=443.77' Inflow=0.99 cfs 0.097 af
18.0" Round Culvert n=0.013 L=17.0' S=0.0782 '/' Outflow=0.99 cfs 0.097 af

Pond 43P: CB 43P Peak Elev=446.06' Inflow=0.80 cfs 0.080 af
18.0" Round Culvert n=0.013 L=38.0' S=0.0526 '/' Outflow=0.80 cfs 0.080 af

Pond 44P: DMH 44P Peak Elev=453.33' Inflow=0.51 cfs 0.043 af
15.0" Round Culvert n=0.013 L=79.0' S=0.0886 '/' Outflow=0.51 cfs 0.043 af

Pond 45P: CB 45P Peak Elev=466.08' Inflow=0.38 cfs 0.032 af
15.0" Round Culvert n=0.013 L=64.0' S=0.1219 '/' Outflow=0.38 cfs 0.032 af

Pond 46P: Driveway Culvert Peak Elev=431.54' Inflow=0.91 cfs 0.210 af
12.0" Round Culvert n=0.013 L=31.0' S=0.0161 '/' Outflow=0.91 cfs 0.210 af

Summary for Subcatchment 10S: Flow to CB 10P

Runoff = 1.93 cfs @ 12.26 hrs, Volume= 0.219 af, Depth> 0.82"
Routed to Pond 10P : Existing CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 yr Rainfall=4.04"

Area (sf)	CN	Description
3,674	98	Paved parking, HSG B
6,224	61	>75% Grass cover, Good, HSG B
801	98	Water Surface, HSG C
49,768	30	Woods, Good, HSG A
39,726	55	Woods, Good, HSG B
38,537	77	Woods, Good, HSG D
138,730		Weighted Average
134,255		96.77% Pervious Area
4,475		3.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.2100	0.19		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.78"
8.9	1,035	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.9	1,135	Total			

Summary for Subcatchment 20S: Flow to CB 20P

Runoff = 2.65 cfs @ 12.24 hrs, Volume= 0.291 af, Depth> 1.49"
Routed to Pond 20P : Existing CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 yr Rainfall=4.04"

Area (sf)	CN	Description
8,155	98	Paved parking, HSG B
7,166	98	Water Surface, HSG C
7,214	39	>75% Grass cover, Good, HSG A
39,175	61	>75% Grass cover, Good, HSG B
12,295	80	>75% Grass cover, Good, HSG D
2,837	30	Woods, Good, HSG A
8,405	55	Woods, Good, HSG B
17,051	77	Woods, Good, HSG D
102,298		Weighted Average
86,977		85.02% Pervious Area
15,321		14.98% Impervious Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 yr Rainfall=4.04"

Area (sf)	CN	Description
6,715	39	>75% Grass cover, Good, HSG A
2,210	61	>75% Grass cover, Good, HSG B
1,562	98	Roofs, HSG A
3,736	98	Roofs, HSG B
10,663	98	Paved parking, HSG A
6,910	98	Paved parking, HSG B
31,796		Weighted Average
8,925		28.07% Pervious Area
22,871		71.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	100	0.0100	0.97		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.78"
2.1	312	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.8	412	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 30S: Flow to CB 30P

Runoff = 0.87 cfs @ 12.24 hrs, Volume= 0.092 af, Depth> 2.25"
Routed to Pond 30P : Existing CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 yr Rainfall=4.04"

Area (sf)	CN	Description
5,038	98	Paved parking, HSG A
214	61	>75% Grass cover, Good, HSG B
4,495	80	>75% Grass cover, Good, HSG D
995	30	Woods, Good, HSG A
10,665	77	Woods, Good, HSG D
21,407		Weighted Average
16,369		76.47% Pervious Area
5,038		23.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0100	0.07		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.78"
6.2	260	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.8	310	Total			

Summary for Subcatchment 42S: Flow to CB 42P

Runoff = 0.19 cfs @ 12.11 hrs, Volume= 0.017 af, Depth> 1.31"
Routed to Pond 42P : CB 42P

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 yr Rainfall=4.04"

Area (sf)	CN	Description
1,038	98	Paved parking, HSG A
844	98	Paved parking, HSG B
3,444	39	>75% Grass cover, Good, HSG A
1,216	61	>75% Grass cover, Good, HSG B
293	80	>75% Grass cover, Good, HSG D
6,835		Weighted Average
4,953		72.47% Pervious Area
1,882		27.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.2800	0.21		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.78"
0.1	28	0.1070	4.91		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
8.1	128	Total			

Summary for Subcatchment 43S: Flow to CB 43P

Runoff = 0.34 cfs @ 12.17 hrs, Volume= 0.037 af, Depth> 1.04"
Routed to Pond 43P : CB 43P

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 yr Rainfall=4.04"

Area (sf)	CN	Description
2,222	98	Paved parking, HSG A
158	98	Paved parking, HSG B
2,678	39	>75% Grass cover, Good, HSG A
1,972	61	>75% Grass cover, Good, HSG B
1,094	80	>75% Grass cover, Good, HSG D
10,023	55	Woods, Good, HSG B
462	77	Woods, Good, HSG D
18,609		Weighted Average
16,229		87.21% Pervious Area
2,380		12.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	100	0.1800	0.38		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.78"
0.2	34	0.2540	3.53		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.6	134	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 46S: Flow to CB 46P

Runoff = 0.35 cfs @ 12.14 hrs, Volume= 0.032 af, Depth> 1.36"
Routed to Pond 46P : Driveway Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 yr Rainfall=4.04"

Area (sf)	CN	Description
2,876	98	Paved parking, HSG A
13	98	Paved parking, HSG D
6,407	39	>75% Grass cover, Good, HSG A
2,290	80	>75% Grass cover, Good, HSG D
276	30	Woods, Good, HSG A
114	55	Woods, Good, HSG B
263	77	Woods, Good, HSG D
12,239		Weighted Average
9,350		76.40% Pervious Area
2,889		23.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.2100	0.19		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.78"
1.0	158	0.1500	2.71		**Shallow Concentrated Flow, Shallow** Short Grass Pasture Kv= 7.0 fps
10.0	258	Total			

Summary for Subcatchment 50S: Flow to Abutter

Runoff = 0.13 cfs @ 12.18 hrs, Volume= 0.016 af, Depth> 0.74"
Routed to Link 50L : Flow to Abutters Map 7 Lots 36 & 36-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 yr Rainfall=4.04"

Area (sf)	CN	Description
20,216	30	Woods, Good, HSG A
2,509	98	Paved parking, HSG A
3,902	39	>75% Grass cover, Good, HSG A
163	80	>75% Grass cover, Good, HSG D
1,773	77	Woods, Good, HSG D
826	85	Gravel roads, HSG B
50,477	55	Woods, Good, HSG B
1,170	61	>75% Grass cover, Good, HSG B
81,036		Weighted Average
78,527		96.90% Pervious Area
2,509		3.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.2100	0.19		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.78"
5.5	634	0.1500	1.94		**Shallow Concentrated Flow, Shallow** Woodland Kv= 5.0 fps
14.5	734	Total			

Summary for Subcatchment 214S: Flow to DCB 214

Runoff = 1.49 cfs @ 12.23 hrs, Volume= 0.166 af, Depth> 1.02"
Routed to Pond 214P : CB 214P

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs
Type III 24-hr 10 yr Rainfall=4.04"

Area (sf)	CN	Description
4,107	61	>75% Grass cover, Good, HSG B
235	80	>75% Grass cover, Good, HSG D
50,341	55	Woods, Good, HSG B
30,187	77	Woods, Good, HSG D
84,870		Weighted Average
84,870		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.2100	0.19		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.78"
6.2	716	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
15.2	816	Total			

Summary for Reach 60R: Flow to Driveway Culvert 46P

Inflow Area = 2.531 ac, 0.00% Impervious, Inflow Depth > 0.45" for 10 yr event
Inflow = 0.25 cfs @ 13.19 hrs, Volume= 0.095 af
Outflow = 0.25 cfs @ 13.27 hrs, Volume= 0.094 af, Atten= 0%, Lag= 4.4 min
Routed to Link 60L : Flow from Site to Abutter Map 7 Lot 36-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 1.69 fps, Min. Travel Time= 4.6 min
Avg. Velocity = 1.25 fps, Avg. Travel Time= 6.2 min

Peak Storage= 68 cf @ 13.27 hrs
Average Depth at Peak Storage= 0.05' , Surface Width= 4.44'
Bank-Full Depth= 1.00' Flow Area= 13.3 sf, Capacity= 166.52 cfs

20.00' x 1.00' deep Parabolic Channel, n= 0.035 Earth, dense weeds
Length= 467.0' Slope= 0.1499 '/'
Inlet Invert= 502.00', Outlet Invert= 432.00'

‡

Summary for Reach 210R: Overland Flow to 20P

[80] Warning: Exceeded Pond 211P by 2.09' @ 0.00 hrs (9.57 cfs 1.719 af)

Inflow Area = 1.948 ac, 0.00% Impervious, Inflow Depth > 1.02" for 10 yr event
Inflow = 1.50 cfs @ 12.22 hrs, Volume= 0.166 af
Outflow = 1.48 cfs @ 12.25 hrs, Volume= 0.166 af, Atten= 1%, Lag= 1.9 min
Routed to Pond 20P : Existing CB

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 5.38 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 2.40 fps, Avg. Travel Time= 3.4 min

Peak Storage= 134 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 4.35'
Defined Flood Depth= 2.25' Flow Area= 31.7 sf, Capacity= 1,360.25 cfs
Bank-Full Depth= 2.00' Flow Area= 26.7 sf, Capacity= 1,073.41 cfs

Volume	Invert	Avail.Storage	Storage Description
#1	466.00'	3,854 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
466.00	238	61.0	0	0	238
468.00	887	160.0	1,056	1,056	1,993
470.00	1,983	201.0	2,797	3,854	3,225

Device	Routing	Invert	Outlet Devices
#1	Discarded	466.00'	**3.000 in/hr Exfiltration over Surface area**
#2	Primary	465.00'	**18.0" Round HDPE Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 465.00' / 464.75' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	469.65'	**2.0" x 2.0" Horiz. Grate X 10.00 columns** X 10 rows C= 0.600 in 36.0" x 36.0" Grate (31% open area) Limited to weir flow at low heads
#4	Secondary	469.75'	**4.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.13 cfs @ 12.51 hrs HW=469.75' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=1.23 cfs @ 12.51 hrs HW=469.75' TW=453.59' (Dynamic Tailwater)
↑—**2=HDPE Culvert** (Passes 1.23 cfs of 17.02 cfs potential flow)
↑—**3=Grate** (Weir Controls 1.23 cfs @ 1.03 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=466.00' TW=453.50' (Dynamic Tailwater)
↑—**4=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond 22P: Pocket Pond 22P

Inflow Area = 2.455 ac, 25.89% Impervious, Inflow Depth > 1.70" for 10 yr event
Inflow = 3.89 cfs @ 12.11 hrs, Volume= 0.348 af
Outflow = 1.43 cfs @ 12.30 hrs, Volume= 0.343 af, Atten= 63%, Lag= 11.3 min
Primary = 1.43 cfs @ 12.30 hrs, Volume= 0.343 af
Routed to Pond 21P : Infiltration Basin
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 21P : Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3
Starting Elev= 469.35' Surf.Area= 1,930 sf Storage= 3,827 cf
Peak Elev= 470.82' @ 12.46 hrs Surf.Area= 2,800 sf Storage= 7,289 cf (3,462 cf above start)
Flood Elev= 472.00' Surf.Area= 5,229 sf Storage= 12,066 cf (8,239 cf above start)

Plug-Flow detention time= 203.1 min calculated for 0.255 af (73% of inflow)
Center-of-Mass det. time= 38.3 min (836.7 - 798.5)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 471.52' @ 12.11 hrs Surf.Area= 501 sf Storage= 0 cf
Flood Elev= 472.00' Surf.Area= 650 sf Storage= 0 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	469.00'	0 cf	**Custom Stage Data (Irregular)** Listed below (Recalc) 792 cf Overall x 0.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
469.00	3	16.6	0	0	3
470.00	135	65.6	53	53	326
471.00	363	86.1	240	292	585
472.00	650	105.0	500	792	888

Device	Routing	Invert	Outlet Devices
#1	Primary	471.00'	**4.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=3.85 cfs @ 12.11 hrs HW=471.51' TW=470.32' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 3.85 cfs @ 1.88 fps)

Summary for Pond 30P: Existing CB

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.491 ac, 23.53% Impervious, Inflow Depth > 2.25" for 10 yr event
Inflow = 0.87 cfs @ 12.24 hrs, Volume= 0.092 af
Primary = 0.87 cfs @ 12.24 hrs, Volume= 0.092 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 1L

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3

Summary for Pond 40P: Existing CB

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.463 ac, 5.27% Impervious, Inflow Depth > 0.68" for 10 yr event
Inflow = 1.31 cfs @ 12.20 hrs, Volume= 0.368 af
Primary = 1.31 cfs @ 12.20 hrs, Volume= 0.368 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 443.77' @ 12.12 hrs
Flood Elev= 447.18'

Device	Routing	Invert	Outlet Devices
#1	Primary	443.33'	**18.0" Round Culvert** L= 17.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 443.33' / 442.00' S= 0.0782 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.99 cfs @ 12.12 hrs HW=443.77' TW=441.72' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.99 cfs @ 2.27 fps)

Summary for Pond 43P: CB 43P

Inflow Area = 0.817 ac, 13.76% Impervious, Inflow Depth > 1.17" for 10 yr event
Inflow = 0.80 cfs @ 12.12 hrs, Volume= 0.080 af
Outflow = 0.80 cfs @ 12.12 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min
Primary = 0.80 cfs @ 12.12 hrs, Volume= 0.080 af
Routed to Pond 42P : CB 42P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 446.06' @ 12.12 hrs
Flood Elev= 449.41'

Device	Routing	Invert	Outlet Devices
#1	Primary	445.66'	**18.0" Round Culvert** L= 38.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 445.66' / 443.66' S= 0.0526 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.80 cfs @ 12.12 hrs HW=446.06' TW=443.77' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.80 cfs @ 2.14 fps)

Summary for Pond 44P: DMH 44P

Inflow Area = 0.390 ac, 14.83% Impervious, Inflow Depth > 1.32" for 10 yr event
Inflow = 0.51 cfs @ 12.10 hrs, Volume= 0.043 af
Outflow = 0.51 cfs @ 12.10 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min
Primary = 0.51 cfs @ 12.10 hrs, Volume= 0.043 af
Routed to Pond 43P : CB 43P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 453.33' @ 12.10 hrs
Flood Elev= 462.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	453.00'	**15.0" Round Culvert** L= 79.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 453.00' / 446.00' S= 0.0886 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Summary for Pond 60P: Pond for Runoff Requiring No Treatment

Inflow Area = 2.531 ac, 0.00% Impervious, Inflow Depth > 0.67" for 10 yr event
Inflow = 1.05 cfs @ 12.26 hrs, Volume= 0.140 af
Outflow = 0.25 cfs @ 13.19 hrs, Volume= 0.095 af, Atten= 76%, Lag= 56.1 min
Primary = 0.25 cfs @ 13.19 hrs, Volume= 0.095 af
Routed to Reach 60R : Flow to Driveway Culvert 46P
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 60R : Flow to Driveway Culvert 46P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 502.26' @ 13.19 hrs Surf.Area= 1,584 sf Storage= 2,242 cf
Flood Elev= 504.00' Surf.Area= 2,640 sf Storage= 5,886 cf

Plug-Flow detention time= 208.7 min calculated for 0.095 af (67% of inflow)
Center-of-Mass det. time= 93.2 min (995.5 - 902.3)

Volume	Invert	Avail.Storage	Storage Description
#1	500.00'	5,886 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
500.00	488	141.6	0	0	488
502.00	1,451	179.3	1,854	1,854	1,503
504.00	2,640	217.0	4,032	5,886	2,756

Device	Routing	Invert	Outlet Devices
#1	Primary	501.00'	**12.0" Round Culvert** L= 44.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 501.00' / 500.00' S= 0.0227 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	502.00'	**4.0" Vert. Two 4" Orifices X 2.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	503.00'	**6.0" W x 6.0" H Vert. 6" Weir** C= 0.600 Limited to weir flow at low heads
#4	Device 1	503.50'	**2.0" x 2.0" Horiz. Grate X 10.00 columns** X 10 rows C= 0.600 in 36.0" x 36.0" Grate (31% open area) Limited to weir flow at low heads
#5	Secondary	503.75'	**4.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=1.49 cfs @ 12.23 hrs HW=479.80' TW=473.64' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.49 cfs @ 2.53 fps)

Summary for Pond 213P: DMH 213P

Inflow Area = 1.948 ac, 0.00% Impervious, Inflow Depth > 1.02" for 10 yr event
Inflow = 1.49 cfs @ 12.23 hrs, Volume= 0.166 af
Outflow = 1.49 cfs @ 12.23 hrs, Volume= 0.166 af, Atten= 0%, Lag= 0.0 min
Primary = 1.49 cfs @ 12.23 hrs, Volume= 0.166 af
Routed to Pond 212P : DMH 212P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 488.60' @ 12.23 hrs
Flood Elev= 497.69'

Device	Routing	Invert	Outlet Devices
#1	Primary	488.05'	**18.0" Round Culvert** L= 38.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 488.05' / 484.00' S= 0.1066 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.49 cfs @ 12.23 hrs HW=488.60' TW=479.80' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.49 cfs @ 2.53 fps)

Summary for Pond 214P: CB 214P

Inflow Area = 1.948 ac, 0.00% Impervious, Inflow Depth > 1.02" for 10 yr event
Inflow = 1.49 cfs @ 12.23 hrs, Volume= 0.166 af
Outflow = 1.49 cfs @ 12.23 hrs, Volume= 0.166 af, Atten= 0%, Lag= 0.0 min
Primary = 1.49 cfs @ 12.23 hrs, Volume= 0.166 af
Routed to Pond 213P : DMH 213P

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 498.05' @ 12.23 hrs
Flood Elev= 504.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	497.50'	**18.0" Round Culvert** L= 45.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 497.50' / 493.05' S= 0.0989 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.49 cfs @ 12.23 hrs HW=498.05' TW=488.60' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.49 cfs @ 2.53 fps)

19. RIPRAP APRON CALCULATIONS

KEACH-NORDSTROM ASSOCIATES, INC.

RIP RAP OUTLET PROTECTION APRON CALCULATIONS

Project:	Jennesstown Manor	Date:	11/12/2025
KNA #:	24-0307-1		

The purpose of this spreadsheet is to calculate the dimensions of Inlet/Outlet Protection apron (riprap) required during the SCS/NRCS 50-year type III 24-hr storm event. The spillway weir(s) inlet/outlet apron protection will be sized for the SCS/NRCS 50-year type III 24-hr storm event.

Required Input:

Q	peak flow in CFS
Do	diameter in feet of outlet or width of channel
Tw	tail water at end of apron

Depending on the tail water conditions, either **column 1** or **column 2** is used for calculations

	Column One where Tw<1/2Do	Column Two where Tw>1/2Do
Length of Apron		
	La = (1.8Q/Do^3/2)+7Do	La = 3*Q/Do^3/2+7Do
Width of Apron at outfall		
	W1 = 3*Do	W1 = 3*Do
	W2 = 3*Do + La	W2 = 3*Do+0.4*La

If defined channel, then use channel width for W1 and W2

Rock Rip Rap Size:

d50 = (0.02*Q^4/3)/(Tw*Do)

RIRAP GRADATION ENVELOPE

Calculation Summary Table:

Input to Chart					Calculated Output						d100		d85		d50		d15			USE			
Description (Optional)		Q-25** (cfs)	Do (ft)	Tw (ft)	La	W1	W2 no channel	d50, ft	d50 in	USE d50 in.	FROM in	TO in	FROM in	TO in	FROM in	TO in	FROM in	TO in	depth in	Depth in.	Length ft.	W1 ft.	W2 ft.
41P	Pond Outlet	0.26	1.50	0.75	11	5	15	0.0	0.04	4	6	8	5	7	4	6	1	2	10	10	11	5	15
21P	Infiltration Pond Outlet	2.22	1.50	0.75	13	5	17	0.1	0.62	5	8	10	7	9	5	8	2	3	12.5	13	13	5	17
22P	Pocket Pond Outlet	2.22	1.00	0.50	11	3	14	0.1	1.39	6	9	12	8	11	6	9	2	3	15	15	11	3	14
211P	Outlet Head Wall #210	2.48	1.50	0.75	13	5	17	0.1	0.72	3	5	6	4	5	3	5	1	2	7.5	8	13	5	17
60P	Outlet FES #60	0.69	1.00	0.75	9	3	7	0.0	0.20	3	5	6	4	5	3	5	1	2	7.5	8	9	3	7

* Center Apron with Headwall and Outlet Pipe (All Cases)
* Line Apron with 6.0 oz. Geotextile Fabric (All Cases)
**Q-100 Used When no Flow is Present in the Q-10

20. SWALE RIPRAP CALCULATIONS

Rockingham County Conservation District

OPEN CHANNEL FLOW DESIGN/ANALYSIS

D_{50} RIPRAP SIZING-FLOW REGIME-FILTER GRADATION CHECK

PROJECT NAME :	Jennesstown Manor, Warner, NH				
PROJECT # :	23S Swale to Pond 22				
BY :	JL		CHECKED BY :		
DATE :	11/20/2025	STORM:	25-Yr	DATE :	

UNIFORM STEADY CHANNEL FLOW:

PEAK DISCHARGE REQUIRED =	2.7	CFS
CHANNEL BOTTOM WIDTH =	0.0	FT (USE 0 IF SECTION IS A "V" DITCH)
HYDRAULIC GRADIENT =	0.01000	FT/FT
LEFT SIDE SLOPE =	3.0	:1
RIGHT SIDE SLOPE =	3.0	:1
DEPTH OF FLOW =	0.320	FT
MANNINGS "n" =	0.0230	(CHECK RIPRAP SIZING "n" BELOW)
AREA =	0.31	SQ FT
WETTED PERIMETER =	2.02	FT
HYDRAULIC RADIUS =	0.15	FT
TOP WIDTH =	1.92	FT
VELOCITY =	1.84	FT/SEC
PEAK DISC. DETERMINED =	0.6	CFS

RIPRAP SIZING, TRAPEZOIDAL SECTION:

D_{50} =	0.0352	FT
NEW "n" =	0.0238	(ADJUST DESIGN/ANALYSIS "n" ABOVE)

RIPRAP SIZING, "V" DITCH:

D_{50} =	0.0481	FT
NEW "n" =	0.0230	(ADJUST DESIGN/ANALYSIS "n" ABOVE)

FLOW REGIME:

Nf = 0.810

Nf <=0.7, SUB CRITICAL FLOW
Nf >0.7 BUT <1.3, CRITICAL FLOW ZONE
Nf >1.3, SUPER CRITICAL FLOW

IF Nf>=0.7 A HYDRAULIC JUMP WILL PROBABLY OCCUR, DESIGN ACCORDINGLY

TO AVOID MOVEMENT OF PARTICLES:

Filter fabric required beneath the rock

FORMULAS USED:

UNIFORM CHANNEL FLOW, Q = (A X 1.486 X R^(2/3) X S^(1/2))/"n"
FLOW REGIME, Nf= (Q X T^(1/2))/(A^(3/2) X g^(1/2))
RIPRAP SIZING, TRAPEZDL., ((118 X Q X S^(13/6) X R/P)^(2/5)
RIPRAP SIZING, "V", ((64.4 X Q X S^(13/6) X (Z/(Z^2 + 1))^(2/5)
NEW RIPRAP "n", (D. OF F.^(1/6)/(21.6 X LOG(D. OF F./D50)+14)

REFERENCES: KING'S HANDBOOK OF HYDRAULICS AND NCHRP-REPORT 108

Rockingham County Conservation District

OPEN CHANNEL FLOW DESIGN/ANALYSIS

D_{50} RIPRAP SIZING-FLOW REGIME-FILTER GRADATION CHECK

PROJECT NAME :	Jennesstown Manor, Warner, NH				
PROJECT # :	22S Swale to Pond 22				
BY :	JL		CHECKED BY :		
DATE :	11/20/2025	STORM:	25-Yr	DATE :	

UNIFORM STEADY CHANNEL FLOW:

PEAK DISCHARGE REQUIRED =	3.0	CFS
CHANNEL BOTTOM WIDTH =	0.0	FT (USE 0 IF SECTION IS A "V" DITCH)
HYDRAULIC GRADIENT =	0.01000	FT/FT
LEFT SIDE SLOPE =	3.0	:1
RIGHT SIDE SLOPE =	3.0	:1
DEPTH OF FLOW =	0.150	FT
MANNINGS "n" =	0.0203	(CHECK RIPRAP SIZING "n" BELOW)
AREA =	0.07	SQ FT
WETTED PERIMETER =	0.95	FT
HYDRAULIC RADIUS =	0.07	FT
TOP WIDTH =	0.90	FT
VELOCITY =	1.26	FT/SEC
PEAK DISC. DETERMINED =	0.1	CFS

RIPRAP SIZING, TRAPEZOIDAL SECTION:

D_{50} =	0.0165	FT
NEW "n" =	0.0210	(ADJUST DESIGN/ANALYSIS "n" ABOVE)

RIPRAP SIZING, "V" DITCH:

D_{50} =	0.0225	FT
NEW "n" =	0.0203	(ADJUST DESIGN/ANALYSIS "n" ABOVE)

FLOW REGIME:

Nf <=0.7, SUB CRITICAL FLOW

Nf = 0.811 Nf >0.7 BUT <1.3, CRITICAL FLOW ZONE

Nf >1.3, SUPER CRITICAL FLOW

IF Nf>=0.7 A HYDRAULIC JUMP WILL PROBABLY OCCUR, DESIGN ACCORDINGLY

TO AVOID MOVEMENT OF PARTICLES:

Filter fabric required beneath the rock

FORMULAS USED:

UNIFORM CHANNEL FLOW,	Q = (A X 1.486 X R^(2/3) X S^(1/2))/"n"
FLOW REGIME,	Nf= (Q X T^(1/2))/(A^(3/2) X g^(1/2))
RIPRAP SIZING, TRAPEZDL.,	((118 X Q X S^(13/6) X R/P)^(2/5)
RIPRAP SIZING, "V",	((64.4 X Q X S^(13/6) X (Z/(Z^2 + 1))^(2/5)
NEW RIPRAP "n",	(D. OF F.^(1/6)/(21.6 X LOG(D. OF F./D50)+14)

REFERENCES: KING'S HANDBOOK OF HYDRAULICS AND NCHRP-REPORT 108

OPEN CHANNEL FLOW DESIGN/ANALYSIS

D_{50} RIPRAP SIZING-FLOW REGIME-FILTER GRADATION CHECK

PROJECT NAME :	Jennesstown Manor, Warner, NH				
PROJECT # :	42S Swale to Pond 41				
BY :	JL		CHECKED BY :		
DATE :	11/20/2025	STORM:	25-Yr	DATE :	

UNIFORM STEADY CHANNEL FLOW:

PEAK DISCHARGE REQUIRED =	0.3	CFS
CHANNEL BOTTOM WIDTH =	0.0	FT (USE 0 IF SECTION IS A "V" DITCH)
HYDRAULIC GRADIENT =	0.15000	FT/FT
LEFT SIDE SLOPE =	3.0	:1
RIGHT SIDE SLOPE =	3.0	:1
DEPTH OF FLOW =	0.150	FT
MANNINGS "n" =	0.0693	(CHECK RIPRAP SIZING "n" BELOW)
AREA =	0.07	SQ FT
WETTED PERIMETER =	0.95	FT
HYDRAULIC RADIUS =	0.07	FT
TOP WIDTH =	0.90	FT
VELOCITY =	1.43	FT/SEC
PEAK DISC. DETERMINED =	0.1	CFS

RIPRAP SIZING, TRAPEZOIDAL SECTION:

D_{50} =	0.1812	FT
NEW "n" =	0.0596	(ADJUST DESIGN/ANALYSIS "n" ABOVE)

RIPRAP SIZING, "V" DITCH:

D_{50} =	0.2477	FT
NEW "n" =	0.0692	(ADJUST DESIGN/ANALYSIS "n" ABOVE)

FLOW REGIME:

Nf = 0.919

Nf <=0.7, SUB CRITICAL FLOW
Nf >0.7 BUT <1.3, CRITICAL FLOW ZONE
Nf >1.3, SUPER CRITICAL FLOW

IF Nf>=0.7 A HYDRAULIC JUMP WILL PROBABLY OCCUR, DESIGN ACCORDINGLY

TO AVOID MOVEMENT OF PARTICLES:

Filter fabric required beneath the rock

FORMULAS USED:

UNIFORM CHANNEL FLOW,	Q = (A X 1.486 X R^(2/3) X S^(1/2))/"n"
FLOW REGIME,	Nf= (Q X T^(1/2))/(A^(3/2) X g^(1/2))
RIPRAP SIZING, TRAPEZDL.,	((118 X Q X S^(13/6) X R/P)^(2/5)
RIPRAP SIZING, "V",	((64.4 X Q X S^(13/6) X (Z/(Z^2 + 1))^(2/5)
NEW RIPRAP "n",	(D. OF F.^(1/6)/(21.6 X LOG(D. OF F./D50)+14)

REFERENCES: KING'S HANDBOOK OF HYDRAULICS AND NCHRP-REPORT 108

Rockingham County Conservation District

OPEN CHANNEL FLOW DESIGN/ANALYSIS

D_{50} RIPRAP SIZING-FLOW REGIME-FILTER GRADATION CHECK

PROJECT NAME :	Jennesstown Manor, Warner, NH				
PROJECT # :	43S Swale to CB 43				
BY :	JL		CHECKED BY :		
DATE :	11/20/2025	STORM:	25-Yr	DATE :	

UNIFORM STEADY CHANNEL FLOW:

PEAK DISCHARGE REQUIRED =	0.6	CFS
CHANNEL BOTTOM WIDTH =	0.0	FT (USE 0 IF SECTION IS A "V" DITCH)
HYDRAULIC GRADIENT =	0.15000	FT/FT
LEFT SIDE SLOPE =	3.0	:1
RIGHT SIDE SLOPE =	3.0	:1
DEPTH OF FLOW =	0.130	FT
MANNINGS "n" =	0.0676	(CHECK RIPRAP SIZING "n" BELOW)
AREA =	0.05	SQ FT
WETTED PERIMETER =	0.82	FT
HYDRAULIC RADIUS =	0.06	FT
TOP WIDTH =	0.78	FT
VELOCITY =	1.33	FT/SEC
PEAK DISC. DETERMINED =	0.1	CFS

RIPRAP SIZING, TRAPEZOIDAL SECTION:

D_{50} =	0.1571	FT
NEW "n" =	0.0582	(ADJUST DESIGN/ANALYSIS "n" ABOVE)

RIPRAP SIZING, "V" DITCH:

D_{50} =	0.2147	FT
NEW "n" =	0.0676	(ADJUST DESIGN/ANALYSIS "n" ABOVE)

FLOW REGIME:

Nf <=0.7, SUB CRITICAL FLOW

Nf = 0.919 Nf >0.7 BUT <1.3, CRITICAL FLOW ZONE

Nf >1.3, SUPER CRITICAL FLOW

IF Nf>=0.7 A HYDRAULIC JUMP WILL PROBABLY OCCUR, DESIGN ACCORDINGLY

TO AVOID MOVEMENT OF PARTICLES:

Filter fabric required beneath the rock

FORMULAS USED:

UNIFORM CHANNEL FLOW, Q = (A X 1.486 X R^(2/3) X S^(1/2))/"n"

FLOW REGIME, Nf= (Q X T^(1/2))/(A^(3/2) X g^(1/2))

RIPRAP SIZING, TRAPEZDL., ((118 X Q X S^(13/6) X R/P)^(2/5)

RIPRAP SIZING, "V", ((64.4 X Q X S^(13/6) X (Z/(Z^2 + 1))^(2/5)

NEW RIPRAP "n", (D. OF F.^(1/6)/(21.6 X LOG(D. OF F./D50)+14)

REFERENCES: KING'S HANDBOOK OF HYDRAULICS AND NCHRP-REPORT 108

Rockingham County Conservation District

OPEN CHANNEL FLOW DESIGN/ANALYSIS

D_{50} RIPRAP SIZING-FLOW REGIME-FILTER GRADATION CHECK

PROJECT NAME :	Jennesstown Manor, Warner, NH				
PROJECT # :	44S Swale to CB 44				
BY :	JL		CHECKED BY :		
DATE :	11/20/2025	STORM:	25-Yr	DATE :	

UNIFORM STEADY CHANNEL FLOW:

PEAK DISCHARGE REQUIRED =	0.1	CFS
CHANNEL BOTTOM WIDTH =	0.0	FT (USE 0 IF SECTION IS A "V" DITCH)
HYDRAULIC GRADIENT =	0.15000	FT/FT
LEFT SIDE SLOPE =	3.0	:1
RIGHT SIDE SLOPE =	3.0	:1
DEPTH OF FLOW =	0.164	FT
MANNINGS "n" =	0.0703	(CHECK RIPRAP SIZING "n" BELOW)
AREA =	0.08	SQ FT
WETTED PERIMETER =	1.04	FT
HYDRAULIC RADIUS =	0.08	FT
TOP WIDTH =	0.98	FT
VELOCITY =	1.49	FT/SEC
PEAK DISC. DETERMINED =	0.1	CFS

RIPRAP SIZING, TRAPEZOIDAL SECTION:

D_{50} =	0.1981	FT
NEW "n" =	0.0605	(ADJUST DESIGN/ANALYSIS "n" ABOVE)

RIPRAP SIZING, "V" DITCH:

D_{50} =	0.2707	FT
NEW "n" =	0.0703	(ADJUST DESIGN/ANALYSIS "n" ABOVE)

FLOW REGIME:

Nf <=0.7, SUB CRITICAL FLOW

Nf = 0.919 Nf >0.7 BUT <1.3, CRITICAL FLOW ZONE

Nf >1.3, SUPER CRITICAL FLOW

IF Nf>=0.7 A HYDRAULIC JUMP WILL PROBABLY OCCUR, DESIGN ACCORDINGLY

TO AVOID MOVEMENT OF PARTICLES:

Filter fabric required beneath the rock

FORMULAS USED:

UNIFORM CHANNEL FLOW,	Q = (A X 1.486 X R^(2/3) X S^(1/2))/"n"
FLOW REGIME,	Nf= (Q X T^(1/2))/(A^(3/2) X g^(1/2))
RIPRAP SIZING, TRAPEZDL.,	((118 X Q X S^(13/6) X R/P)^(2/5)
RIPRAP SIZING, "V",	((64.4 X Q X S^(13/6) X (Z/(Z^2 + 1))^(2/5)
NEW RIPRAP "n",	(D. OF F.^(1/6)/(21.6 X LOG(D. OF F./D50)+14)

REFERENCES: KING'S HANDBOOK OF HYDRAULICS AND NCHRP-REPORT 108

Rockingham County Conservation District

OPEN CHANNEL FLOW DESIGN/ANALYSIS

D_{50} RIPRAP SIZING-FLOW REGIME-FILTER GRADATION CHECK

PROJECT NAME :	Jennesstown Manor, Warner, NH				
PROJECT # :	45S Swale to CB 45				
BY :	JL		CHECKED BY :		
DATE :	11/20/2025	STORM:	25-Yr	DATE :	

UNIFORM STEADY CHANNEL FLOW:

PEAK DISCHARGE REQUIRED =	0.7	CFS
CHANNEL BOTTOM WIDTH =	0.0	FT (USE 0 IF SECTION IS A "V" DITCH)
HYDRAULIC GRADIENT =	0.15000	FT/FT
LEFT SIDE SLOPE =	3.0	:1
RIGHT SIDE SLOPE =	3.0	:1
DEPTH OF FLOW =	0.140	FT
MANNINGS "n" =	0.0685	(CHECK RIPRAP SIZING "n" BELOW)
AREA =	0.06	SQ FT
WETTED PERIMETER =	0.89	FT
HYDRAULIC RADIUS =	0.07	FT
TOP WIDTH =	0.84	FT
VELOCITY =	1.38	FT/SEC
PEAK DISC. DETERMINED =	0.1	CFS

RIPRAP SIZING, TRAPEZOIDAL SECTION:

D_{50} =	0.1692	FT
NEW "n" =	0.0589	(ADJUST DESIGN/ANALYSIS "n" ABOVE)

RIPRAP SIZING, "V" DITCH:

D_{50} =	0.2312	FT
NEW "n" =	0.0685	(ADJUST DESIGN/ANALYSIS "n" ABOVE)

FLOW REGIME:

		Nf <=0.7, SUB CRITICAL FLOW
Nf =	0.919	Nf >0.7 BUT <1.3, CRITICAL FLOW ZONE
		Nf >1.3, SUPER CRITICAL FLOW

IF Nf>=0.7 A HYDRAULIC JUMP WILL PROBABLY OCCUR, DESIGN ACCORDINGLY

TO AVOID MOVEMENT OF PARTICLES:

Filter fabric required beneath the rock

FORMULAS USED:

UNIFORM CHANNEL FLOW,	Q = (A X 1.486 X R^(2/3) X S^(1/2))/"n"
FLOW REGIME,	Nf= (Q X T^(1/2))/(A^(3/2) X g^(1/2))
RIPRAP SIZING, TRAPEZDL.,	((118 X Q X S^(13/6) X R/P)^(2/5)
RIPRAP SIZING, "V",	((64.4 X Q X S^(13/6) X (Z/(Z^2 + 1))^(2/5)
NEW RIPRAP "n",	(D. OF F.^(1/6)/(21.6 X LOG(D. OF F./D50)+14)

REFERENCES: KING'S HANDBOOK OF HYDRAULICS AND NCHRP-REPORT 108

21. SITE SPECIFIC SOIL SURVEY REPORT

Hurley Environmental
AND LAND PLANNING, LLC

SITE-SPECIFIC SOIL SURVEY REPORT
Route 103
Warner

1. MAPPING STANDARDS

Site-Specific Soil Mapping Standards for New Hampshire and Vermont. SSSNNE Special Publication No. 3, Version 7.0, July 2021. This map product is within the technical standards of the National Cooperative Soil Survey. It is a special product, intended for the submission to NH DES Alteration of Terrain. It was produced by a professional soil scientist and is not a product of the USDA Natural Resource Conservation Service.

Hydrologic Soil Group was determined using SSSNNE Special Publication No. 5.
Scale of soil map:
Approximately 1" equals 40'
Contours:
Intervals of 2 feet

2. DATE SOIL MAP PRODUCED

Date(s) of on-site field work: 11/23/24
Date(s) of test pits: 2/3/25
Test pits recorded by: Gifford Colburn, Keach Nordstrom

3. GEOGRAPHIC LOCATION AND SIZE OF SITE

City or town where soil mapping was conducted: Warner
Location: Route 103, Map 7, Lot 39
Size of area: approximately 10 acres
Was the map for the entire lot? No
The area where the map was created is for the front, 10 acres of the lot. Tis portion of the lot has been recently cleared. Several areas of open rock outcrops and steep hillsides are present as, well as low areas within the topography. The site slopes steeply from the road up to the west. Several small wetlands are present.

4. PURPOSE OF THE SOIL MAP

Was the map prepared to meet the requirement of Alteration of Terrain? Yes
If no, what was the purpose of the map?
Who was the map prepared for? Keach Nordstrom.

5. SOIL IDENTIFICATION LEGEND

SSSM SYM.	SSS MAP NAME	HISS SYM.	HYDROLOGIC SOIL GRP.
55	Hermon Very Stony	121	B
442	Chichester	221	B
58	Waumbek	321	A
829	Waumbek-Hermon Association	321	B
399	Ledge Outcrop	228	D
414	Moosilauke Poorly Drained	521	C

SLOPE PHASE:
0-8% B 8-15% C 15-25% D 25%+ E

55 Hermon Very Stony 121 B
The Hermon series consists of very deep, somewhat excessively drained soils on upland till plains, hills and ridges. These soils formed in glacial till. Estimated saturated hydraulic conductivity is high or very high throughout the mineral soil. Slopes ranges from 0 through 60 percent. These soils are dominated by sandy loam over loamy sand and sand. Some profiles have single grain sand to gravel and some cobble. No ESHWT was encountered within 60 inches and no significant ledge was encountered. These soils are found in a few isolated areas on the site.
Typical Profile
0-10" 10YR3/2, FSL, GR, FR
10-24" 7.5YR4/6, LS, GR, FR
24-72" 10YR4/3, FSL, GR, FR
72-108" 2.5Y5/3, S, GR, FR, Redox 20%
ESHWT 72
Observed Water None
Refusal None

442 Chichester 221 B
The Chichester series consists of very deep, well drained soils that formed in a loamy mantle overlying sandy till on glaciated hills, valley sides and till plains. Saturated hydraulic conductivity is moderately high or high in the solum and high or very high in the substratum. Slope ranges from 3 through 50 percent. These soils are found within the central portion of the site. No ESHWT was encountered within 40 inches and no significant ledge was encountered.
Typical Profile
0-12" 10YR3/2, FSL, GR, FR
12-16" 7.5YR4/6, LS, GR, FR
16-55" 10YR5/3, FSL, GR, FR
55-90" 10YR4/2, S, GR, FR, Redox 20%
ESHWT 55
Observed Water None
Refusal None

58 Waumbek 321 A
The Waumbek series consists of very deep, moderately well drained soils formed in stony, sandy till. They are on glaciated uplands. Permeability is moderately rapid or rapid in the solum and rapid in the substratum. These soils are found in the higher elevations on the site. They are dominated by sandy loam in the upper layers and underlain by loam y sand and sand. They have ESHWT between 15-40 inches and no significant ledge was encountered. These soils are found in the mid-slope areas of the site in the southern portion of the site.

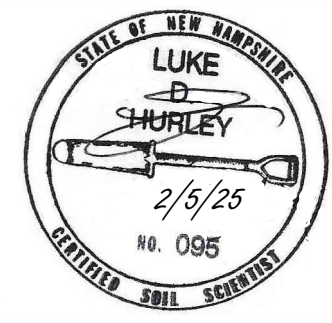
Typical Profile
0-10” 10YR3/2, FSL, GR, FR
10-32” 7.5YR4/6, LS, GR, FR
32-108” 10YR6/23, FSL, GR, FR, Redox 20%
ESHWT 32
Observed Water None
Refusal None

829 Waumbek-Hermon Association 321 B
The Waumbek-Hermon Association is an overlapping soil type where the two individual series cannot be separated out into sizeable individual units. This series has an ESHWT between 15-40 inches and no significant ledge.
The Waumbek series consists of very deep, moderately well drained soils formed in stony, sandy till. They are on glaciated uplands. Permeability is moderately rapid or rapid in the solum and rapid in the substratum.
The Hermon series consists of very deep, somewhat excessively drained soils on upland till plains, hills and ridges. These soils formed in glacial till. Estimated saturated hydraulic conductivity is high or very high throughout the mineral soil.

399 Ledge Outcrop 228 D
Several areas of the site have steep rock slopes of either exposed ledge or ledge very close to the surface.

414 Moosilauke Poorly Drained 521 C
The Moosilauke series consists of very deep, poorly and somewhat poorly drained soils that formed in glacial outwash or drift in low depressions and shallow drainageway on uplands. Saturated hydraulic conductivity is high in the solum and high or very high in the substratum. Slope ranges from 0 to 15 percent. These are the small isolated wetlands found on the site.

6. RESPONSIBLE SOIL SCIENTIST
Name: Luke Hurley
Certified Soil Scientist Number: CSS #095



7. OTHER DISTINGUISHING FEATURES OF SITE
Is the site in a natural condition? The current mapping portion, yes.

8. Inclusions
No Inclusions were mapped.

22. INFILTRATION FEASIBILITY REPORT

INFILTRATION FEASIBILITY REPORT

Jenesstown Manor

Map 7; Lots 39 & 39-1
Route 103
Warner, New Hampshire

March 7, 2025

KNA Project No. 24-0307-1

KEACH-NORDSTROM ASSOCIATES, INC.

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I. Location of Practice

One infiltration practice is proposed for this project. An above ground infiltration pond (21P) is proposed on Map 7 Lot 39-1, but will handle runoff from Map 7 Lot 39 as well as Map 7 lot 39-1. There will a drainage and grading easement between these two lots.

II. Existing Topography

The existing grades on the site are primarily moderately steep (15-25%) or steep slopes (25%+) that slope northeasterly to Route 103.

III. Test Pit Locations

There were nine test pits performed for the area of development. Test Pit 2 was used for the design of the infiltration pond 21P.

IV. Seasonal High Water Table Elevation Summaries

The results from the Test Pit 2 performed is as follows:

Test Pit #2

The existing elevation of the ground in the area of the practice	= 468.89 (approx. original grade)
Distance to SHWT	= 32”
Elevation of SHWT	= 464.22
Lowest Elevation of Test Pit	= 456.89

Elevation of SHWT	= 464.22
Required separation	= 1.0 (prior treatment)
Bottom of infiltration practice	= 466.00

The results from the test pit performed is as follows:

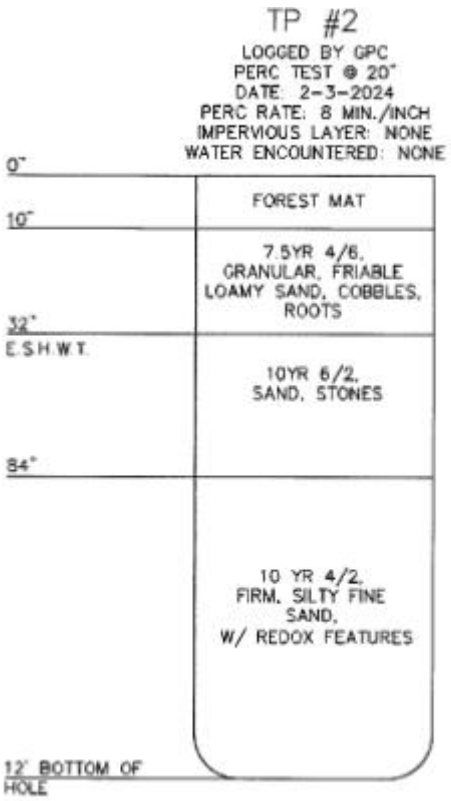
V. Infiltration Rate Summary

The infiltration rate for the Infiltration Pond 21P was calculated by the default method, as described in Env-Wq 1504.14. The practice is located in an area primarily identified in the Site-Specific Soil Survey as 58D – Waumbek. The area for the proposed infiltration system is natural undisturbed woodland, therefore the soil used to determine the infiltration was Waumbek.

The Ksat Values for New Hampshire Soils by USDA Natural for New Hampshire Soils, Society of Soil Scientists for Northern New England, Special Publication No. 5, September 2009, provides a value of the Waumbek soil type of 6.00 inches per hour. Using an applicable factor of safety of 2 at a conservative rate of 6 inches per hour, the infiltration rate utilized in the drainage analysis is 3.0 inches per hour.

VI. Profile Descriptions

Profile descriptions are provided as follows.



23. OPERATIONS AND MAINATENANCE PLAN WITH CHECKLIST

STORMWATER

OPERATION & MAINTENANCE PLAN

Jennesstown Manor
Route 103
Warner, New Hampshire

Map 7 / Lots 39 & 39-1

March 7, 2024

REVISED: NOVEMBER 18, 2025

KEACH-NORDSTROM ASSOCIATES, INC.

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I. General

Introduction

The project owner or their assigned heirs will maintain the stormwater treatment facilities after construction is completed. The Applicant of the project is Peacock Hill Road, LLC located at 145 Old Town Road Weare, NH. The Applicant will maintain the stormwater system.

The subject property is referenced on Map 7; Lots 39 and 39-1 in Warner, New Hampshire. Any transfer of responsibility for inspection and maintenance activities or transfer of ownership shall be documented to Warner in writing. The contract documents will require the contractor to designate a person responsible for maintenance of the sedimentation control features during construction. Long-term operation and maintenance for the stormwater management facilities are presented below.

Maintenance will be performed as described unless and until the system is formally accepted by a municipality or quasi-municipal district or is placed under the jurisdiction of a legally created association that will be responsible for the maintenance of the system.

Post Construction:

The following standards will be met after construction is complete:

Documentation:

A maintenance log will be kept summarizing inspections, maintenance, and any corrective actions taken. The log will include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the clean out of any sediments or debris, the location where the sediment and debris was disposed after removal will be indicated. The log will be made accessible to department and/or Warner staff and a copy provided upon request.

Maintenance Requirements

Pocket Ponds:

- Systems should be inspected at least twice annually and following any rainfall event exceeding 2.5 inches in a 24-hour period, with maintenance or rehabilitation conducted as warranted by such inspection.
- System embankments should be mowed periodically to maintain grass cover and any other vegetation found on the embankment should be removed at each inspection.
- Trash and debris found within the pond or in the outlet structure should be removed at each inspection.
- Removal of accumulated sediment.
- Inspection and repair of embankments, inlet and outlet structures, and appurtenances.

Infiltration Ponds:

- Systems should be inspected at least twice annually and following any rainfall event exceeding 2.5 inches in a 24-hour period, with maintenance or rehabilitation conducted as warranted by such inspection.
- Trash and debris should be removed at each inspection.
- Inspection of pre-treatment measures at least twice annually and removal of accumulated sediment as warranted by inspection, but no less than once annually.
- At least once annually, the system should be inspected for drawdown time. If the pond does not drain within 72-hours following a rainfall event, a qualified professional should assess the condition of the facility to determine measures required to restore filtration function or infiltration function (as applicable), including but not limited to the removal of accumulated sediments or reconstruction of the basin bottom.

Catch Basins and Closed Drainage Network:

- Catch basins may require frequent maintenance. This may require several cleanings of the sumps each year. At a minimum, it is recommended that catch basins be inspected at least twice annually.
- Sediment should be removed when it approaches half of the sump depth.
- If floating hydrocarbons are observed during an inspection, the material should be removed immediately by skimming, absorbent materials, or other methos and disposed in conformance with the applicable state and federal regulations.

Outlet Protection:

- Inspect the outlet protection annually for damage and deterioration. Repair damages immediately.

General:

- If any invasive species begin to grow in the stormwater management practices the species shall be disposed of in an appropriate manner that will not allow the pest to survive or spread. The disposal of such species shall be witnessed or approved by a state inspector. Methods for disposal may include, but not be limited to:
    - Encapsulating the plant(s) in plastic bags and disposing of the plant material in one of the following ways:
        - Trash pickup;
        - Discarding;
        - Open burning;
        - Incineration; or
        - Burial of infested nursery.

II. Supporting Documents

Annual Inspection and Maintenance Reporting Form
for
Jennesstown Manor
Warner, New Hampshire

Date: _____

To: Peacock Hill Road, LLC

Re: Certification of Inspection and Maintenance; Submittal of Forms

Property Name: _____

Property Address: _____

Contact Name: _____

Contact Phone #: _____

Contact Email Address: _____

I verify that the required stormwater facility inspections and required maintenance have been completed in accordance with the Operation & Maintenance Plan associated with the above referenced property.

The required Long-Term Inspection & Maintenance Plan Checklist is attached to this form.

_____ _____
Name of Party Responsible for Inspection & Maintenance — Property Owner

_____ _____
Authorized Signature — Signature

Long-Term Inspection & Maintenance Plan Checklist
Jennesstown Manor – Warner, NH

Current Owner Name:	Date:
Business Address:	Inspector:
Weather:	
Date of Last Rainfall:	Amount: Inches:

Best Management Practice

Pocket Pond #22P	Reason for Inspection		
	Spring ☐	Fall/Yearly ☐	After Major Storm ☐

Maintenance Required? Yes ☐ No ☐
Corrective Action Needed & Notes:

Sideslopes & berms need repair? Yes ☐ No ☐
Clean inlet & outlet structures? Yes ☐ No ☐

Pocket Pond #41P	Reason for Inspection		
	Spring ☐	Fall/Yearly ☐	After Major Storm ☐

Maintenance Required? Yes ☐ No ☐
Corrective Action Needed & Notes:

Sideslopes & berms need repair? Yes ☐ No ☐
Clean inlet & outlet structures? Yes ☐ No ☐

Infiltration Pond #21P	Reason for Inspection		
	Spring ☐	Fall/Yearly ☐	After Major Storm ☐

Maintenance Required? Yes ☐ No ☐
Corrective Action Needed & Notes:

Visual Inspection of vegetation? Yes ☐ No ☐
Maintenance Required? Yes ☐ No ☐
Corrective Action Needed & Notes:

Visual inspection of drawdown time? Yes ☐ No ☐
Drawdown time less than 72 hours? Yes ☐ No ☐

(if no, call a qualified professional for inspection)

Pond #60P	Reason for Inspection		
	Spring ☐	Fall/Yearly ☐	After Major Storm ☐

Maintenance Required? Yes ☐ No ☐
Corrective Action Needed & Notes:

Visual Inspection of vegetation? Yes ☐ No ☐
Maintenance Required? Yes ☐ No ☐
Corrective Action Needed & Notes:

Visual inspection of drawdown time? Yes ☐ No ☐
Drawdown time less than 72 hours? Yes ☐ No ☐
(if no, call a qualified professional for inspection)

Catch Basins & Closed Drainage Network	Reason for Inspection		
	Spring ☐	Fall/Yearly ☐	After Major Storm ☐

Maintenance Required? Yes ☐ No ☐
Corrective Action Needed & Notes:

Photo:

Outlet Protection	Reason for Inspection		
	Spring ☐	Fall/Yearly ☐	After Major Storm ☐

Maintenance Required? Yes ☐ No ☐
Corrective Action Needed & Notes:

General	Reason for Inspection		
	Spring ☐	Fall/Yearly ☐	After Major Storm ☐

Maintenance Required? Yes ☐ No ☐
Corrective Action Needed & Notes:

Long-Term Inspection & Maintenance Log
Jennesstown Manor - Warner, NH

Date	Inspection (Yes or No)	Maintenance (Yes or No)	List BMPs Inspected and/or Provide Comments	Inspected By:

III. Control of Invasive Plants

Invasive plants are introduced, alien, or non-native plants, which have been moved by people from their native habitat to a new area. Some Exotic plants are imported for human use such as landscaping, erosion control, or food crops. They also can arrive as “hitchhikers” among shipments of other plants, seeds, packing materials, or fresh produce. Some exotic plants become invasive and cause harm by:

- becoming weedy and overgrown;
- killing established shade trees;
- obstructing pipes and drainage systems;
- forming dense beds in water;
- lowering water levels in lakes, streams, and wetlands;
- destroying natural communities;
- promoting erosion on stream banks and hillsides; and
- resisting control except by hazardous chemical.

During maintenance activities, check for the presence of invasive plants and suitably remove according to the methods provided in the table below. The following table, based on the “Control of Invasive Plants” published by the New Hampshire Department of Agriculture, describes the most common invasive plants in this region and proper methods of disposal.

Name	Description	Invasive Qualities	Control Methods
Invasive Trees			
Norway Maple	- Large leaves - Will exude milky white sap when leaves are broken - Leaves turn color in Late October (fall foliage is yellow)	- Suppresses growth of grass, garden plants, and forest understory -Wind-borne seeds can germinate and grow in deep shade	- Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out plants, including the root systems. Use a forked spade or weed wrench. - Cut down the tree. Grind out the stump, or clip off re-growth. - Girdle[1] - Frill[2] - Cut stem/ cut stump with glyphosate. Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.* - Foliar spray with glyphosate [3]* (mid-October to early November).
Tree of Heaven	- Long compound leaves with 11-25 lance shaped leaflets - Smell like peanut butter or burnt coffee when crushed	- Tough, can grow in poor conditions - Produces large quantities of wind-borne seeds - Grows rapidly - Secretes a toxin that kills other plants - Cannot be removed by mechanical means alone	- Pull seedlings when soil is moist. - Frill[2] (no more than 1” gap between cuts). Use Garlon 3a herbicide. - Cut stem/ cut stump with Garlon 3a. Follow label directions for cut stump application. Clip off sucker sprouts or paint with Garlon 3a.* - Foliar spray[3]* (on regrowth) - Paint bottom 12” of bark with Garlon 4 Ultra (February/March). Use maximum strength specified on label for all herbicide applications.
Invasive Shrubs			

Autumn Olive	- Formerly recommended for erosion control and wildlife value	- Highly invasive, diminishes the overall quality of wildlife habitat	- Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems. Use a forked spade or weed wrench for trees or shrubs (up to 4” diameter trunks). - Cut down the tree. Grind out the stump, or clip off re-growth. - Cut stem/ cut stump with glyphosate. Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.* - Bury stump - Do not mow
Multiflora Rose	- Formerly recommended for erosion control, hedges, and wildlife habitat - Covered in white flowers in June - Very hard, curved thorns - Fringed edge to leaf stalk	- Huge shrub that chokes out all other vegetation - Too dense for most birds to nest in - Grows up trees like a vine in Shade	- Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems (at least 6” from the crown and 6” down). Use a forked spade or weed wrench for trees or shrubs. - Controlled burning[4] (on extensive infestations) - Cut stem/ cut stump with glyphosate. Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.* - Foliar spray[3]* (mix Rodeo with extra sticker-spreader, or use Roundup Sure Shot Foam on small plants) - Herbicide may be applied in winter when other plants are dormant.

Bush Honeysuckles	- Includes Belle, Amur, Morrow's, and Tatarian Honeysuckle	- Creates dense shade reducing plant diversity and eliminating nest sites in forest interior spaces	- Deadhead to prevent spread of seeds (on ornamentals). Cut off seeds or fruits before they ripen. Bag and burn, or send to a landfill. - Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems. Use a forked spade or weed wrench for trees or shrubs. - Mow or cutting at least 4 times a season to deplete plants' store of nutrients and carbohydrates, reduce seed formation, and kill or minimize spread of plants. If necessary, repeat each year (on shady sites only, brush cut in early spring and fall). - Controlled burning[4] (during growing season) - Cut down the tree. Grind out the stump, or clip off re-growth. - Cut stem/ cut stump with Glyphosate (late in the growing season). Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.*

Invasive Shrubs (continued)

Blunt-Leaved Privet	- Medium sized shrub - Simple, oblong, dark green leaves 1-2" in length - Fragrant white flowers (spring) - Blackish-purple fruit (late summer)	- Toxic to mammals - Loss of valuable habitat	- Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems. Use a forked spade or weed wrench for trees or shrubs. - Cut down the tree. Grind out the stump, or clip off re-growth. - Cut stem/ cut stump with Glyphosate. Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.* - Trim off all flowers - Do not cut back or mow

Burning Bush, Winged Euonymus	- Wide, corky wings on the Branches - Brilliant red autumn leaves - Fruit	- High seed production	- Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems. Use a forked spade or weed wrench for trees or shrubs. - Cut down the tree. Grind out the stump, or clip off re-growth. - Cut stem/ cut stump with Glyphosate. Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.* - Trim off all flowers
Japanese Barberry	- Spiny deciduous shrub - Small leaves	- Very dense, displaces native plants - Can change chemistry of soil	- Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems. Use a forked spade or weed wrench for trees or shrubs. - Cut down the tree. Grind out the stump, or clip off re-growth. - Cut stem/ cut stump with Glyphosate. Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.* - Trim off all flowers

Invasive Woody Vines			
Japanese Honeysuckle	- Gold and White flowers - Heavy scent and sweet nectar in June	- Shade shrubs and young trees of the forest understory, eventually killing them, and changing the open structure of the forest into a dense tangle - Rampant grower - Spirals around trees, often strangling them	- Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems. Use a forked spade or weed wrench for trees or shrubs. - Mow or cutting at least 4 times a season to deplete plants' store of nutrients and carbohydrates, reduce seed formation, and kill or minimize spread of plants. If necessary, repeat each year. - Cut stem/ cut stump with Glyphosate. Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.*

			- Foliar spray[3]* (fall or early spring when native vegetation is dormant) Plan to re-treat repeatedly
Oriental Bittersweet	- Bright orange seed capsules in clusters all along the stem - Flowers	- Shade shrubs and young trees of the forest understory, eventually killing them, and changing the open structure of the forest into a dense tangle	- Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems. Use a forked spade or weed wrench for trees or shrubs. - Keep ornamental plants cut back, remove all fruits as soon as they open, and bag or burn fruits. - Cut stem/ cut stump with Garlon 3a. Follow label directions for cut stump application. Clip off sucker sprouts or paint with Garlon 3a.*
Japanese Knotweed, Mexican Bamboo	- The stems have knotty joints, similar to bamboo - Grows 6-10' tall - Large, pointed oval or triangular leaves	- Shade shrubs and young trees of the forest understory, eventually killing them, and changing the open structure of the forest into a dense tangle - Can grow in shade	- Cut stem/ cut stump with Glyphosate (at least 3 times each during growing season). Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.* - Foliar spray[3]* - Treat with Rodeo - In gardens, heavy mulch or dense shade may kill it.

Invasive Herbaceous Plants

Garlic Mustard	- White-flowered biennial - Rough scalloped leaves (kidney, heart, or arrow shaped) - Garlic smell, mustard taste when its leaves are crushed	- Shade shrubs and young trees of the forest understory, eventually killing them, and changing the open structure of the forest into a dense tangle - Rampant grower - Spirals around trees, often strangling them	- Pull seedlings and small or shallow-rooted plants when soil is moist (before it flowers in spring). Dig out larger plants, including the crown and root systems. Use a forked spade or weed wrench for trees or shrubs. Tamp down soil afterwards. - Deadhead to prevent spread of seeds. Cut off seeds or fruits before they ripen. Bag and burn or send to a landfill. - Foliar spray[3]* (may be appropriate in some settings)
Japanese Stilt Grass	- Lime green color - Line of silvery hairs down the middle of the 2-3” long blade	- Tolerates sun or dense shade -Quickly invades areas left bare or disturbed by tilling or flooding - Builds a large seed bank in the soil	- Pull seedlings and small or shallow-rooted plants when soil is moist (pulled easily in early to mid-summer).Dig out larger plants, including root systems. Use a forked spade or weed wrench for trees or shrubs. Be sure to pull before it goes to seed. If seeds have formed, bag and burn or send to a landfill. - Mow or cutting at least 4 times a season to deplete plants’ store of nutrients and carbohydrates, reduce seed formation, and kill or minimize spread of plants. If necessary, repeat each year. Mowing weekly or when it has just begun to flower may prevent it from setting seed. - Foliar spray[3]* (use glyphosate or herbicidal soap on large infestations. - Use a corn-based pre-emergence herbicide on annual weeds (spring). This product is also an organic fertilizer, i.e., it can stimulate growth of existing plants, including weeds, so it is appropriate for lawns and gardens but may not be appropriate in woodlands.

Mile-A-Minute Vine, Devil's Tail Tearthumb	- Triangular leaves - Barbed stems - Turquoise berries	- Rapid growth - Quickly covers and shades out herbaceous plants	- Pull seedlings and small or shallow-rooted plants when soil is moist (pulled easily in early to mid-summer).Dig out larger plants, including root systems. Use a forked spade or weed wrench for trees or shrubs. Be sure to pull before it goes to seed. If seeds have formed, bag and burn or send to a landfill. - Mow or cutting at least 4 times a season to deplete plants' store of nutrients and carbohydrates, reduce seed formation, and kill or minimize spread of plants. If necessary, repeat each year. Mowing weekly or when it has just begun to flower may prevent it from setting seed. - Foliar spray[3]* (use glyphosate or herbicidal soap on large infestations. - Use a corn-based pre-emergence herbicide on annual weeds (spring). This product is also an organic fertilizer, i.e., it can stimulate growth of existing plants, including weeds, so it is appropriate for lawns and gardens but may not be appropriate in woodlands.
Spotted Knapweed	- Thistle-like flowers	- Dense, crowds out native species	- Do not pull unless the plant is young and the ground is very soft. The root will break and produce several new plants. - Wear sturdy gloves - Deadhead to prevent spread of seeds. Cut off seeds or fruits before they ripen. Bag and burn, or send to a landfill. - In lawns, spot treat with broad-leaf weed killer. Good lawn care practices (test soil; use lime and fertilizer only when soil test shows a need; mow high and frequently; leave clippings on lawn) reduce weed infestations. - Cut stem/ cut stump with Glyphosate. Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.* - Foliar spray[3]*

[1]Girdle: Cut through the bark and growing layer all around the trunk, about 6” above the ground. Girdling is most effective in spring (when the sap is rising) & middle-late summer (when the tree is sending food to the roots). Clip off sucker sprouts.

[2]Frill: Using a machete, hatchet, or similar device, hack scars (several holes in larger trees) downward into the growing layer, and squirt in glyphosate (or triclopyr if specified in table). Follow label directions for injection and frill applications. This is most effective from middle to late summer. Clip off any sucker sprouts or treat with glyphosate.

[3]Foliar Spray: Use a backpack or garden sprayer or mist blower, following label directions. Avoid overspray and/or dripping onto non-target plants, because glyphosate kills most plants except moss. If it rolls off waxy or grass-like foliage, use additional sticker-spreader. Deciduous trees, shrubs, and perennials move nutrients down to the roots in late summer. Glyphosate is particularly effective at this time and when plants have just gone out of flowering. Several invasive species retain their foliage after native plants have lost theirs, and resume growth earlier in spring than most natives. This allows you to treat them without harming the natives. However, the plant must be actively growing for the herbicide to work. Retreatments may be necessary the following year if suckering occurs or the plant hasn’t been entirely killed.

[4]Controlled Burning: Burning during the spring (repeated over several years) will allow native vegetation to compete more effectively with the invasive species. This requires a permit. Spot treatment with glyphosate in late fall can be used to make this method more effective

*Herbicides: It is highly recommended that small populations try to be controlled using non-chemical methods where feasible. However, for large infestations, and for a few plants herbicide use is essential. Apply herbicides carefully to avoid non-target plants, glyphosate is the least environmentally damaging herbicide in most cases. Add food coloring for visibility, and a soap-based sticker such as Cide-Kick. Glyphosate is ineffective on some plants; for these, triclopyr or Garlon 3a may be indicated. When using herbicides read the entire label and observe all precautions listed, including proper disposal. If in doubt, call your local Cooperative Extension Service.

IV. Stormwater Practice Location Plan

24. PLANS

PRE-DEVELOPMENT DRAIN AREAS PLAN (11”x17” - COLORLESS)
POST-DEVELOPMENT DRAIN AREAS PLAN (11”x17” - COLORLESS)
PRE-DEVELOPMENT SOILS MAP (11”x17” - COLOR)
POST-DEVELOPMENT SOILS MAP (11”x17” - COLOR)
PRE-DEVELOPMENT DRAIN AREAS PLAN (22”x34” - COLORLESS)
POST-DEVELOPMENT DRAIN AREAS PLAN (22”x34” - COLORLESS)
NON-RESIDENTIAL SITE PLAN SET (22” x 34” - COLORLESS)

UTILITY NOTE

THE UNDERGROUND UTILITIES DEPICTED HEREON HAVE BEEN DRAWN FROM FIELD SURVEY INFORMATION AND OR PLOTTED FROM EXISTING DRAWINGS. KEACH–NORDSTROM ASSOCIATES, INC. MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES DEPICTED COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. FURTHER, KEACH–NORDSTROM ASSOCIATES, INC. DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE. KEACH–NORDSTROM ASSOCIATES, INC. HAS NOT PHYSICALLY LOCATED THE UNDERGROUND PORTIONS OF THE UTILITIES.

NPDES NOTE

THIS PROJECT DISTURBS IN EXCESS OF 1–ACRE OF LAND. THEREFORE IT WILL BE REQUIRED TO OBTAIN NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT COVERAGE AS ISSUED BY THE ENVIRONMENTAL PROTECTION AGENCY (EPA). THE OWNER/DEVELOPER AND "OPERATOR" (GENERAL CONTRACTOR) SHALL EACH BE REQUIRED TO PREPARE AND SUBMIT A NOTICE OF INTENT (NOI) TO THE EPA PRIOR TO THE START OF CONSTRUCTION AND SHALL BE RESPONSIBLE FOR THE PREPARATION AND IMPLEMENTATION OF A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) MEETING THE REQUIREMENTS OF THE CURRENT CONSTRUCTION GENERAL PERMIT.

DIG SAFE

811

UTILITIES UNDERGROUND PLANT DAMAGE PREVENTION SYSTEM

MAP 7 LOT 39–2
352,552 SF
8.093 ACRES
200.00' FRONTAGE

MAP 7 LOT 39–1
665,946 SF
15.288 ACRES
368.04' FRONTAGE

MAP 7 LOT 39
488,497 SF
11.214 ACRES
350.88' FRONTAGE

10S 20S 30S 40S 50S 60S 50L 60L 10P 20P 30P 40P 60P

N.H. ROUTE 103

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

DRAINAGE LEGEND:

THE LEGEND BELOW REFLECTS THE HYDROCAD MODEL USED FOR DRAINAGE CALCULATIONS.

- SSSM SOIL LINES
- 30B — DENOTES SOIL TYPE
- P — DENOTES POND
- S — DENOTES SUBCATCHMENT AREA
- R — DENOTES REACH
- L — DENOTES POINT OF INTEREST
- LIMIT OF SUBCATCHMENT AREA
- TIME OF CONCENTRATION

MAGNETIC NORTH

SITE SPECIFIC SOIL MAP UNIT KEY

SYMBOL	MAP UNIT	HISS SYM	HSG
55	HERMON VERY STONY	121	B
442	CHICHESTER	221	B
58	WAUMBEK	321	A
829	WAUMBEK–HERMON ASSOCIATION	321	B
414	MOOSILAUKE POORLY DRAINED	521	C
399	LEDGE OUTCROP	228	D

THIS MAP PRODUCT IS WITHIN THE TECHNICAL STANDARDS OF THE NATIONAL COOPERATIVE SOIL SURVEY. IT IS A SPECIAL PURPOSE PRODUCT, INTENDED FOR INFILTRATION REQUIREMENTS BY THE NH DES ALTERATION OF TERRAIN BUREAU. IT WAS PRODUCED BY A PROFESSIONAL SOIL SCIENTIST, AND IS NOT A PRODUCT OF THE USDA NATURAL RESOURCES CONSERVATION SERVICE. THERE IS A REPORT THAT ACCOMPANIES THIS MAP.

THE SITE SPECIFIC SOIL SURVEY (SSSS) WAS PRODUCED NOVEMBER 23, 2024 AND WAS PREPARED BY LUKE HURLEY, CSS # 095, HURLEY ENVIRONMENTAL AND LAND PLANNING, LLC..

SOILS WERE IDENTIFIED WITH THE NEW HAMPSHIRE STATE–WIDE NUMERICAL SOILS LEGEND, USDA NRCS, DURHAM, NH. ISSUE # 10, JANUARY 2011. THE NUMERIC LEGEND WAS AMENDED TO IDENTIFY THE CORRECT SOIL COMPONENTS OF THE COMPLEX.

HYDROLOGIC SOIL GROUP FROM KSAT VALUES FOR NEW HAMPSHIRE SOILS, SOCIETY OF SOIL SCIENTISTS OF NEW ENGLAND, SPECIAL PUBLICATION NO. 5, SEPTEMBER, 2009.

PRE-DEVELOPMENT DRAINAREAS PLAN

JENNESSTOWN MANOR
MAP 7, LOTS 39 & 39-1

ROUTE 103
WARNER, NEW HAMPSHIRE
MERRIMACK COUNTY

OWNER/APPLICANT:
PEACOCK HILL ROAD, LLC
145 OLD TOWN ROAD
WEARE, NH 03281
BK. 3829 PG. 2512

KEACH–NORDSTROM ASSOCIATES, INC.
Civil Engineering Land Surveying Landscape Architecture
10 Commerce Park North, Suite 3B, Bedford, NH 03110 Phone (603) 627–2881

REVISIONS

No.	DATE	DESCRIPTION	BY
1	5/22/25	PER PB AND AOT COMMENTS	AEW
2	9/4/25	PER AOT COMMENTS	AEW
3	10/2/25	PER AOT COMMENTS	AEW
4	10/31/25	PER ARIES & FIRE COMMENTS	JDL
5	11/18/25	PER AOT & COND. OF APPROVAL	AEW

DATE: MARCH 25, 2025 | **SCALE:** 1" = 50'
PROJECT NO: 24–0307–1 | **SHEET** 1 **OF** 2

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811 CALL TOLL FREE
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414	MOOSILAUKE POORLY DRAINED	521	C
399	LEDGE OUTCROP	228	D

THIS MAP PRODUCT IS WITHIN THE TECHNICAL STANDARDS OF THE NATIONAL COOPERATIVE SOIL SURVEY. IT IS A SPECIAL PURPOSE PRODUCT, INTENDED FOR INFILTRATION REQUIREMENTS BY THE NH DES ALTERATION OF TERRAIN BUREAU. IT WAS PRODUCED BY A PROFESSIONAL SOIL SCIENTIST, AND IS NOT A PRODUCT OF THE USDA NATURAL RESOURCES CONSERVATION SERVICE. THERE IS A REPORT THAT ACCOMPANIES THIS MAP.

THE SITE SPECIFIC SOIL SURVEY (SSSS) WAS PRODUCED NOVEMBER 23, 2024 AND WAS PREPARED BY LUKE HURLEY, CSS # 095, HURLEY ENVIRONMENTAL AND LAND PLANNING, LLC..

SOILS WERE IDENTIFIED WITH THE NEW HAMPSHIRE STATE–WIDE NUMERICAL SOILS LEGEND, USDA NRCS, DURHAM, NH. ISSUE # 10, JANUARY 2011. THE NUMERIC LEGEND WAS AMENDED TO IDENTIFY THE CORRECT SOIL COMPONENTS OF THE COMPLEX.

HYDROLOGIC SOIL GROUP FROM KSAT VALUES FOR NEW HAMPSHIRE SOILS, SOCIETY OF SOIL SCIENTISTS OF NEW ENGLAND, SPECIAL PUBLICATION NO. 5, SEPTEMBER, 2009.

POST-DEVELOPMENT DRAINAREAS PLAN

JENNESSTOWN MANOR
MAP 7, LOTS 39 & 39-1

ROUTE 103
WARNER, NEW HAMPSHIRE
MERRIMACK COUNTY

OWNER/APPLICANT:
PEACOCK HILL ROAD, LLC
145 OLD TOWN ROAD
WEARE, NH 03281
BK. 3829 PG. 2512

KEACH–NORDSTROM ASSOCIATES, INC.
Civil Engineering Land Surveying Landscape Architecture
10 Commerce Park North, Suite 3B, Bedford, NH 03110 Phone (603) 627–2881

REVISIONS

No.	DATE	DESCRIPTION	BY
1	5/22/25	PER PB AND AOT COMMENTS	AEW
2	9/4/25	PER AOT COMMENTS	AEW
3	10/2/25	PER AOT COMMENTS	AEW
4	10/31/25	PER ARIES & FIRE COMMENTS	JDL
5	11/18/25	PER AOT & COND. OF APPROVAL	AEW

DATE: MARCH 25, 2025 | **SCALE:** 1" = 50'
PROJECT NO: 24–0307–1 | **SHEET** 2 **OF** 2

HYDROLOGIC SOIL GROUP A
HYDROLOGIC SOIL GROUP B
HYDROLOGIC SOIL GROUP D
OPEN WATER FEATURE
IMPERVIOUS COVER

MAP 7 LOT 39-2
352,552 SF
8.093 ACRES
200.00' FRONTAGE

MAP 7 LOT 39-1
665,946 SF
15.288 ACRES
368.04' FRONTAGE

MAP 7 LOT 39
488,497 SF
11.214 ACRES
350.88' FRONTAGE

10S 20S 30S 40S 50S 60S 50L 10P 20P 30P 40P 60P 60L

N.H. ROUTE 103

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

DRAINAGE LEGEND:

THE LEGEND BELOW REFLECTS THE HYDROCAD MODEL USED FOR DRAINAGE CALCULATIONS.

- SSSM SOIL LINES
- 30B — DENOTES SOIL TYPE
- P — DENOTES POND
- S — DENOTES SUBCATCHMENT AREA
- R — DENOTES REACH
- L — DENOTES POINT OF INTEREST
- LIMIT OF SUBCATCHMENT AREA
- TIME OF CONCENTRATION

MAGNETIC NORTH

DIG SAFE
811 CALL TOLL FREE
IT'S NOT ONLY THE LAW
UTILITIES UNDERGROUND PLANT DAMAGE PREVENTION SYSTEM

UTILITY NOTE

THE UNDERGROUND UTILITIES DEPICTED HEREON HAVE BEEN DRAWN FROM FIELD SURVEY INFORMATION AND OR PLOTTED FROM EXISTING DRAWINGS. KEACH-NORDSTROM ASSOCIATES, INC. MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES DEPICTED COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. FURTHER, KEACH-NORDSTROM ASSOCIATES, INC. DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE. KEACH-NORDSTROM ASSOCIATES, INC. HAS NOT PHYSICALLY LOCATED THE UNDERGROUND PORTIONS OF THE UTILITIES.

NPDES NOTE

THIS PROJECT DISTURBS IN EXCESS OF 1-ACRE OF LAND. THEREFORE IT WILL BE REQUIRED TO OBTAIN NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT COVERAGE AS ISSUED BY THE ENVIRONMENTAL PROTECTION AGENCY (EPA). THE OWNER/DEVELOPER AND "OPERATOR" (GENERAL CONTRACTOR) SHALL EACH BE REQUIRED TO PREPARE AND SUBMIT A NOTICE OF INTENT (NOI) TO THE EPA PRIOR TO THE START OF CONSTRUCTION AND SHALL BE RESPONSIBLE FOR THE PREPARATION AND IMPLEMENTATION OF A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) MEETING THE REQUIREMENTS OF THE CURRENT CONSTRUCTION GENERAL PERMIT.

PRE-DEVELOPMENT DRAINAREAS PLAN

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MAP 7, LOTS 39 & 39-1

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