NHDES ALTERATION OF TERRAIN PERMIT APPLICATION & STORMWATER MANAGEMENT PLAN

COMMERCE DRIVE SOLAR, LLC
COMMERCE DRIVE
FRANKLIN, NEW HAMPSHIRE 03235

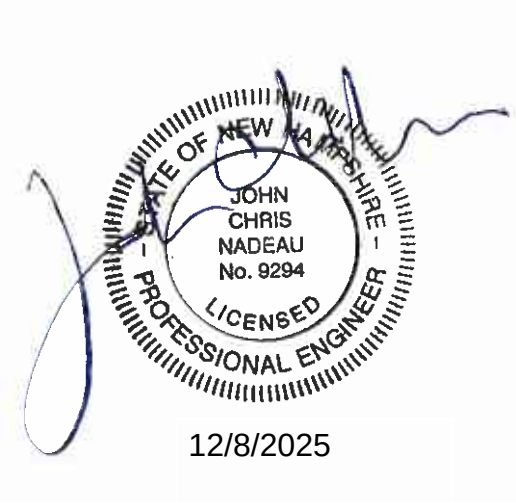
FOR

COMMERCE DRIVE SOLAR, LLC
530 GAITHER ROAD, SUITE 900
ROCKVILLE, MARYLAND 20850

BY
NOBIS GROUP®

(800) 394-4182

www.nobis-group.com



12/8/2025

Nobis Project No. 101025.000
DECEMBER 04, 2025

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NHDES ALTERATION OF TERRAIN APPLICATION

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: Commerce Drive Solar, LLC.	Contact Name: Xander Fowler	
Email: xander.fowler@standard Solar.com	Daytime Telephone: 301-944-5112	
Mailing Address: 530 Gaither Road - Suite 900		
Town/City: Rockville	State: MD	ZIP Code: 20850
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: Franklin Commons Realty Group, LLC	Contact Name: Fredrick McAllister	
Email: fred@stencilsonline.com	Daytime Telephone: 603-738-6181	
Mailing Address: P.O. Box 1340		
Town/City: Grantham	State: NH	ZIP Code: 03753
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: Nobis Group	Contact Name: Garrett Seibert	
Email: gseibert@nobis-group.com	Daytime Telephone: 603-513-1018	
Address: 18 Chenell Drive		
Town/City: Concord	State: NH	ZIP Code: 03301

6. PROJECT TYPE

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

7. PROJECT LOCATION INFORMATION

Project Name: Commerce Drive Solar

Street/Road Address: Commerce Drive

Town/City: Franklin	County: Merrimack

Tax Map: 102	Block:	Lot Number: 9	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 ☐ Withdrawal ☐ Discharge ☒ No
2. Artificial pond created by impounding a stream or wetland Purpose:	☐ Yes ☐ Withdrawal ☐ Discharge ☒ No
3. Unlined pond dug into the water table Purpose:	☐ Yes ☐ Withdrawal ☐ Discharge ☒ No

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: Merrimack
☐ 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")

Development of a ~2 MW solar array on a undeveloped wooded lot. Construction will include an access road, stormwater management areas, and utility interconnection equipment.

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

n/a

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):

(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 588,188

F. Additional impervious cover as a result of the project, in square feet (use "-"to indicate a net reduction in impervious coverage). 14,418

Total final impervious cover, in square feet 14,418

G. Total undisturbed cover, in square feet 463,786

H. Number of lots proposed: 1

I. Total length of roadway, in linear feet: 1018 LF

J. Name(s) of receiving water(s): Unnamed Wetlands

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:

No species on record.

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: *Rick Berube* Date: 1/14/26

Name (print or type): Rick Berube Title: Authorized Signatory

☐ PROPERTY OWNER ☑ PROPERTY OWNER'S AGENT:

Signature: [signature] Date: 1.13.26

Name (print or type): Fred McAllister Title: Member - Manager

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

- [■] Plans printed on 34 - 36" by 22 - 24" white paper.
- [■] Professional Engineer stamp.
- [■] Wetland delineation.
- [■] Temporary erosion control measures.
- [■] 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.
- [■] Pre-existing 2-foot contours.
- [■] Proposed 2-foot contours.
- [■] Drainage easements protecting the drainage/treatment structures.
- [■] 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.
- [ ] 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.

DETAILS

- [■] Typical roadway cross-section.
- [■] Detention basin with inverts noted on the outlet structure.
- [■] Stone berm level spreader.
- [■] Outlet protection – riprap aprons.
- [■] A general installation detail for an erosion control blanket.
- [■] Silt fences or mulch berm.
- [ ] 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.
- [■] Stone check dams.
- [■] Gravel construction exit.
- [■] Temporary sediment trap.
- [■] The treatment BMPs proposed.
- [ ] Any 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.
- [ ] 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.

Franklin Commons Realty Group
Fred McAllister
70 Industrial Park Drive
Franklin, NH 03235

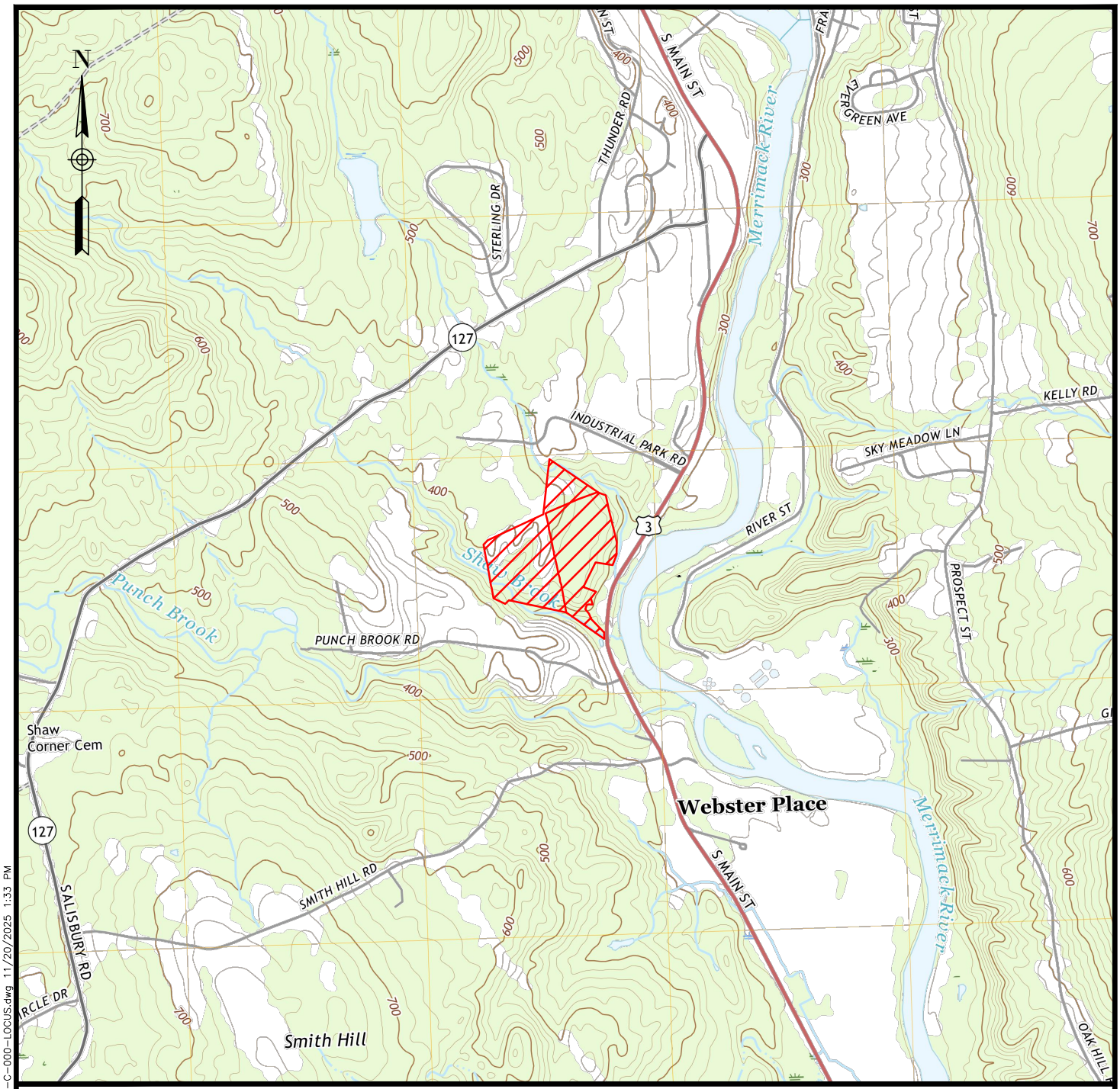
To whom it may concern,

Franklin Commons Realty Group is the owner of the property identified locally as Map 102 Lot 9. Franklin Commons Realty Group hereby authorizes Nobis Group and Commerce Drive Solar, LLC to execute and submit applications and any applicable materials to local and state boards, commissions, agencies and the like on behalf of Franklin Commons Realty for the purpose of obtaining municipal and state permits and approvals of the proposed solar array facility at the property.

Sincerely,

(Signature)

1.13.26
(Date)



NOTES:

1. THE PURPOSE OF THIS FIGURE IS TO DEPICT THE LOCATION OF THE SITE AND SHOW GENERAL TOPOGRAPHIC LINES.
2. SITE BOUNDARY IS BASED ON THE SURVEY PRODUCED BY DOUCET SURVEY LLC, MAP PRODUCED FROM USGS 2021 TOPO MAP.

0 2000' 4000'

GRAPHIC SCALE

Nobis Group®
18 Chenell Drive
Concord, NH 03301
T(603) 224-4182
www.nobis-group.com

FIGURE 1

USGS MAP
COMMERCE DRIVE SOLAR
COMMERCE DRIVE
FRANKLIN, NEW HAMPSHIRE

DRAWN BY: GAK	CHECKED BY: GS
PROJECT NO. 101025.000	DATE: NOVEMBER 2025

J:\101025.000 Standard Solar – Commerce Drive\CAD\DWG\101025.000-C-000-LOCUS.dwg 11/20/2025 1:33 PM

NARRATIVE

1.0 PROJECT NARRATIVE

1.1 PROJECT DESCRIPTION

The subject site (Site) consists of a 23-acre parcel located between the end of Commerce Drive and South Main Street in Franklin New Hampshire. The parcel is catalogued locally as Tax Map 102 Lot 09. The proposed project consists of a 2 MW AC solar array installation, new electrical conduit and equipment to convert electrical energy, and an access road/turnaround area. The access road and turnaround area will be constructed in the right of way of the adjacent lot, catalogued locally as Tax Map 102 Lot 402. To mitigate the additional stormwater runoff resulting from tree clearing for the installation, two detention ponds are proposed. A swale has been proposed to treat stormwater from the new access road. Earthwork will be minimized to the extent possible but minor grading will be needed for the access road and to convey stormwater to the proposed detention ponds.

The purpose of this report is to demonstrate that the proposed solar installation will not adversely affect surrounding resources through implementation of specific storm water best management practices (BMPs) to control storm water quality and quantity.

1.2 EXISTING SITE CONDITIONS

The site is currently an undeveloped wooded lot. Stormwater generally flows from a high point on the west side of the site to the south and east. Wetlands have been located adjacent to the project area to the east and south.

1.3 PROPOSED SITE CONDITIONS

The proposed development includes post-mounted solar panel arrays connected with electrical conduit over approximately 15 acres of the Site. Access to the project will be from Commerce Drive via a 14-foot gravel access driveway. The access driveway and a turnaround will be constructed within a right-of-way on the adjacent parcel to the west (Tax Map 102 Lot 402). Disturbed areas beneath and surrounding the solar panels will be loamed and seeded following installation. Two stormwater detention basins are proposed: one located to the south and one to the northeast of the project area. These basins are designed to receive runoff from the two solar array areas and are responsible for attenuating post-construction stormwater flows, the basins will function as sediment basins during construction. As stormwater treatment is not required for runoff from the solar panel areas, the basins were not designed to provide water quality treatment. A treatment swale is proposed to improve water quality for runoff from the gravel access drive. Stormwater from the drive flows across the relatively flat area between the two solar array areas which naturally conveys flow toward the northern end of the proposed swale, allowing it to function effectively. The swale discharges to the east through a level spreader, which is designed to evenly distribute flow and minimize the potential for erosion at the outlet.

1.4 SOILS

Based on a Site Specific Soil Survey of the project area, soils are identified as Hydrologic Soil Group (HSG) A and B. Within the areas of proposed solar array installation, the HSG is predominantly B.

1.5 SLOPES

Slopes in the solar panel areas are 5% or less. The classification has been used to determine the runoff curve number of the panel areas in accordance Env-Wq 1511.

1.6 POINTS OF INTEREST

Stormwater generally flows from a high point located at the northwest of the site towards the east and south. Evaluation of stormwater for the project is limited to the area to be leased for the solar installation. There are three points of interest (POIs) evaluated in the stormwater analysis and they are located at selected points to evaluate all the stormwater runoff from the project area. POI 1 represents the flow towards wetland at the northeastern corner of the site. POI 2 represents the flow leaving the project area along the eastern edge. POI 3 represents the flow leaving the project area to the south between two topographical peaks.

1.7 EROSION AND SEDIMENT CONTROL PRACTICES / SITE STABILIZATION

Temporary erosion/sediment control during construction will include use of silt fence, mulch, hydro-seeding, and an entry tracking pad in accordance with best management practices. Steep slopes (3 to 1 and steeper) will be stabilized using permanent erosion control matting in order to promote a healthy stand of vegetation. Both proposed detention basins will be used as sediment basins during earthwork activities. Both sediment basins have been sized to retain the volume of a 2-year storm event during bare soil conditions. Calculations are included in the "Additional Calculations" section of this document.

The contractor will be responsible for all temporary erosion and sediment control measures during construction, while the project owner (lessee) will be responsible for maintaining all permanent erosion and sediment control measures as may be required.

1.8 SUMMARY OF RESULTS

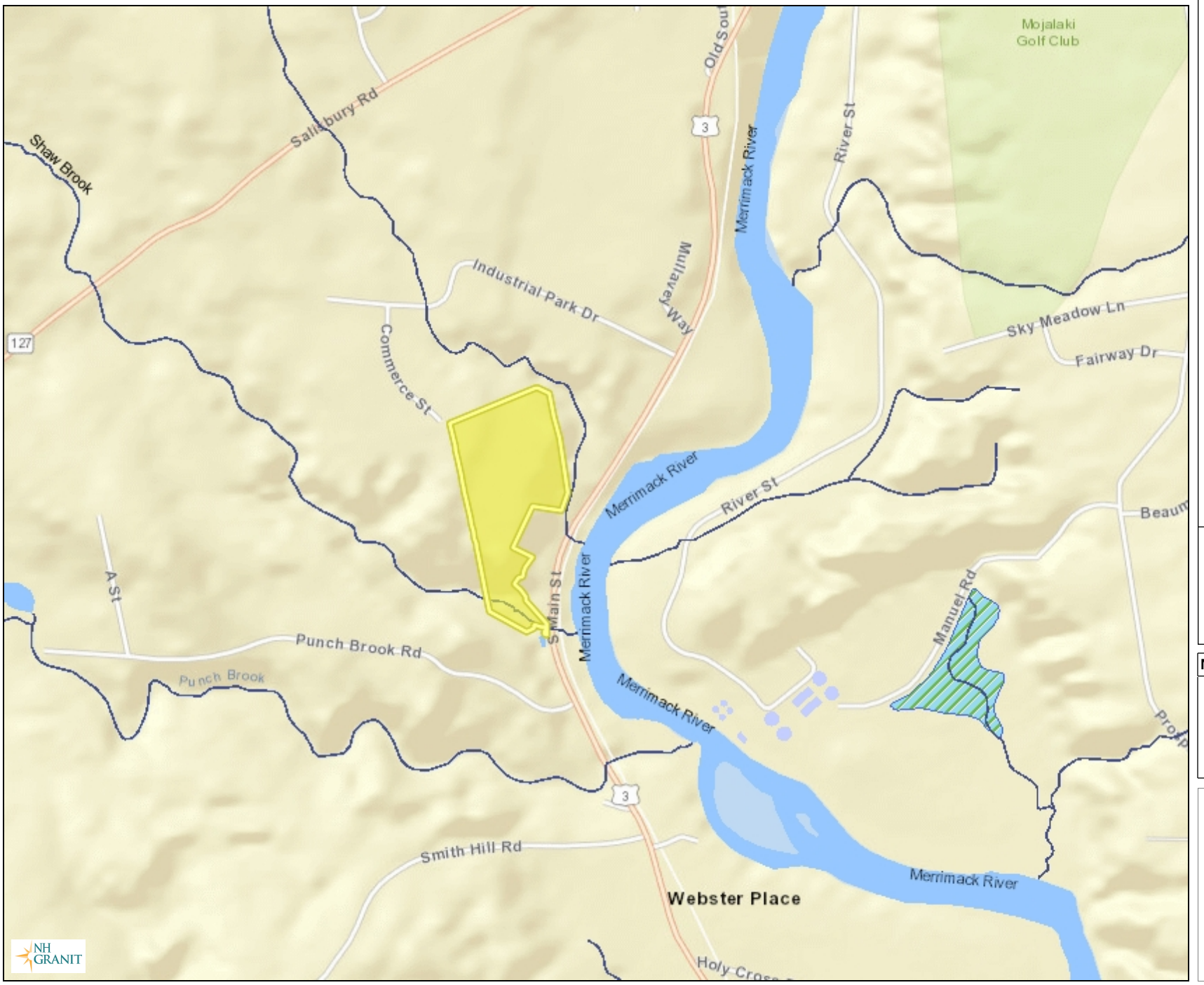
POI DESCRIPTION		STORM EVENT			Volume
		2 Yr (cfs)	10 Yr (cfs)	50 Yr (cfs)	2 Yr (ac-ft)
POI 1 northeast wetland	EXIST. =	0.0	0.5	2.3	0.02
	PROP. =	0.0	0.3	1.0	0.013
POI 2 eastern property line	EXIST. =	0.2	2.0	8.6	0.097
	PROP. =	0.2	2.0	7.7	0.189
POI 3 flow towards the south	EXIST. =	0.1	0.9	4.3	0.046
	PROP. =	0.1	0.7	3.9	0.046

1.9 CONCLUSIONS

The preceding table and following calculations reflect the results of the proposed solar installation on the peak storm water discharge rates and volumes. The peak flow has been retained on the Site and therefore will not impact off-site systems or downgradient properties in the modeled storm events. The post development peak flow rates will be less than or equal to the existing flow rates as a result of attenuation provided by the proposed stormwater detention basins. Calculations are included for the 2-year, 10-year, and 50-year storm events. The proposed design meets the Env-Wq 1507.05 Channel Protection Requirement. The 2-year, 24 hour post development peak flow rate at each point of interest is less than the 2 year, 24 hour pre-development peak flow rate and; the 2-year, 24 hour post-development storm volume does not increase by more than .1 ac-ft over the pre-development volume.

WEB GIS INFORMATION

Map by NH GRANIT



Legend

- Surface Waters with Impa Mile Buffer
- Stream Centerlines
  - Perennial Stream
  - Intermittent Stream
- Water Bodies
  - Lake/Pond
  - Reservoir
  - Estuary
  - Swamp/Marsh
- Other Water Features
  - River
  - Spillway
  - Inundation Area
  - Dam/Weir
  - Canal/Ditch
  - Rapids

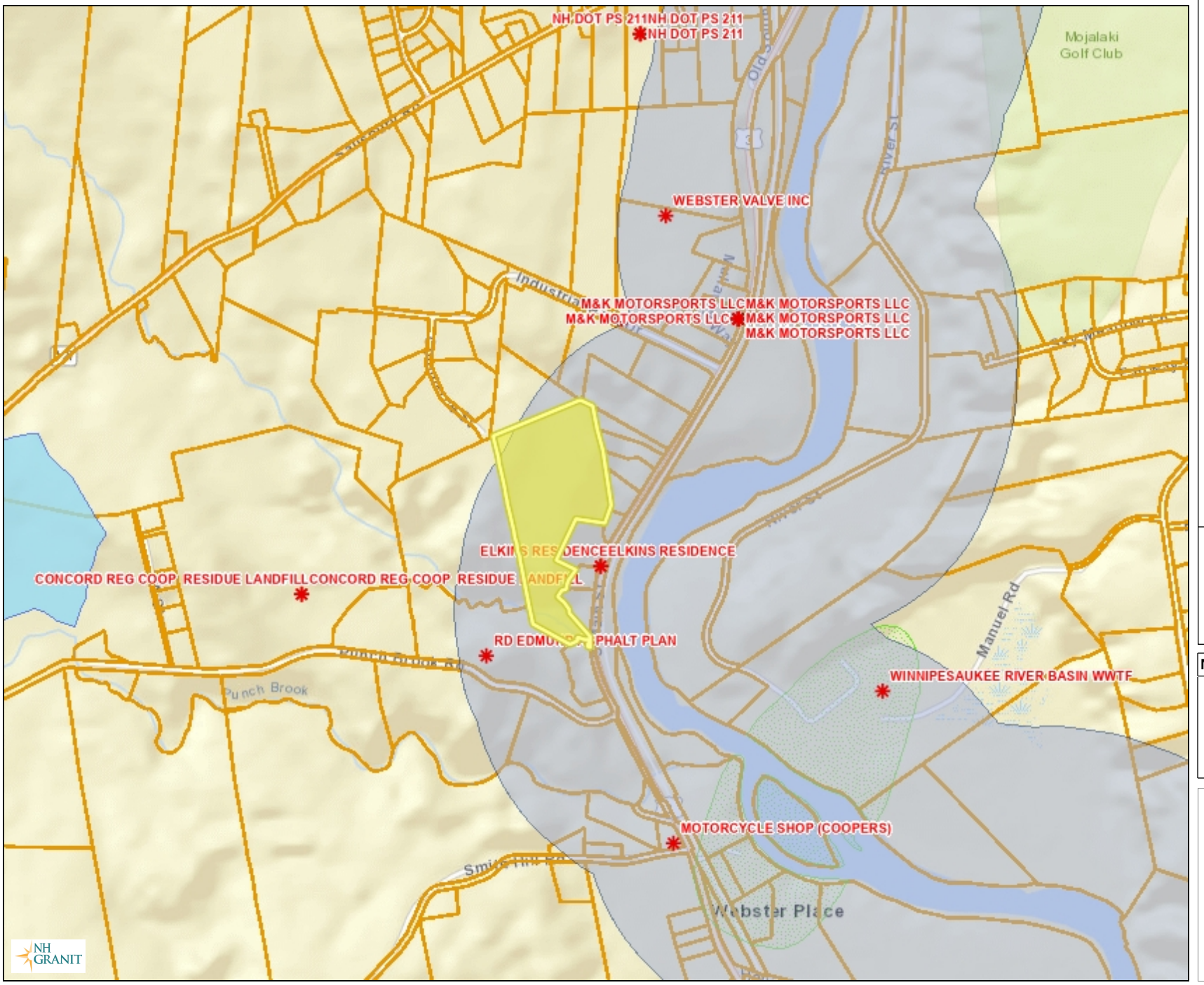
Map Scale

1: 12,988

Map Generated: 8/14/2023

Notes

Map by NH GRANIT



Legend

- Remediation Sites
- Coastal and Great Bay Re
- Designated Rivers Quarte
- Public Water Supply Well
- Groundwater Classificatio
- Groundwater Classificatio
- Water Supply Intake Prote
- Wellhead Protection Area
- Class A Lakes with a Qua
- Class A - All Features
- All Lakes, with a Quarter I
- Outstanding Resource Wa
- Surface Waters with Impa Mile Buffer
- Watersheds with Chloride
- Parcels

Map Scale

1: 12,988

Map Generated: 8/14/2023

Notes

NH NATURAL HERITAGE BUREAU REVIEW

New Hampshire Department of Environmental Services
DataCheck Results Letter

To: Garrett Seibert
70 Chenell Drive
Concord, NH 03301

From: NHDES Ecological Reviews

Date: 10/14/2025 (This letter is valid through 10/14/2026)

Re: Review by NHDES Ecological Reviews of request dated 10/14/2025

Permit Types: Stormwater Pollution Prevention
Alteration of Terrain Permit

Project ID: DCT25-2904

Applicant: Garrett Seibert

Location: Franklin
Tax Map: 102, Tax Lot: 9
Address: Commerce Drive

Project Description: 2MW ground mounted solar development with associated utilities and access drive

The NHDES Ecological Review database has been checked for records of rare species and exemplary natural communities near the area mapped (see next page). The species considered include those listed as Threatened or Endangered by either the state of New Hampshire or the federal government. There are currently no recorded occurrences of sensitive species near this project area.

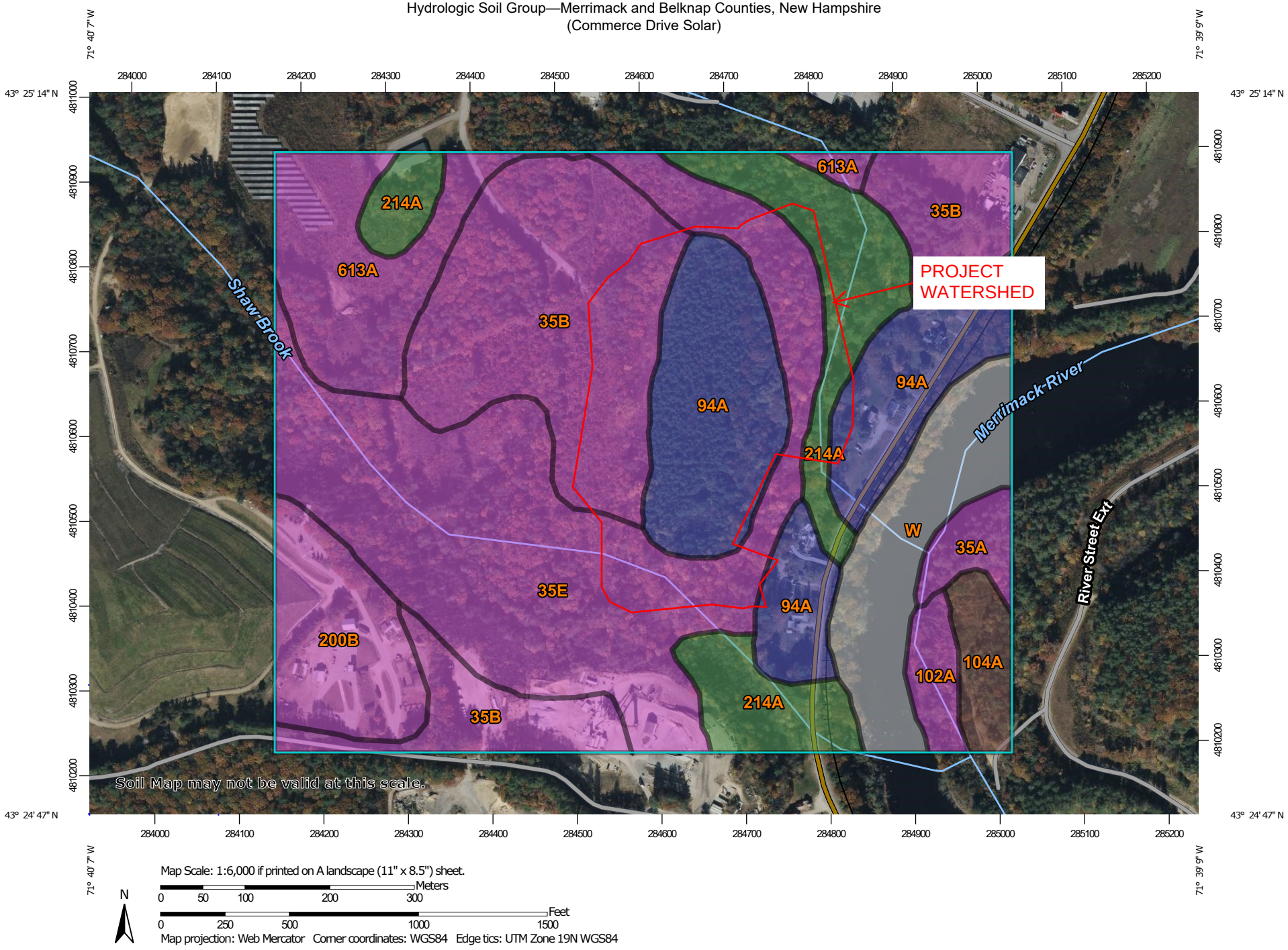
A negative result (no record in the database) does not mean that a sensitive species is not present. These data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to the NH Natural Heritage Bureau and/or the NH Fish and Game Department. However, many areas have never been surveyed or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

Based on the information submitted, no further consultation with the NH Fish and Game Department pursuant to Fis 1004 is required.

MAP OF PROJECT BOUNDARIES FOR: DCT25-2904

NRCS SOIL INFORMATION

Hydrologic Soil Group—Merrimack and Belknap Counties, New Hampshire
(Commerce Drive Solar)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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.

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

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

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

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

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

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

Soil Survey Area: 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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
35A	Champlain loamy fine sand, 0 to 3 percent slopes	A	2.4	1.6%
35B	Champlain loamy fine sand, 3 to 8 percent slopes	A	34.2	22.3%
35E	Champlain loamy fine sand, 15 to 60 percent slopes	A	39.3	25.7%
94A	Agawam-Ninigret fine sandy loams, 0 to 3 percent slopes	B	24.1	15.7%
102A	Sunday loamy fine sand, 0 to 3 percent slopes, occasionally flooded	A	2.4	1.6%
104A	Podunk fine sandy loam, 0 to 3 percent slopes, frequently flooded	B/D	3.3	2.1%
200B	Udorthents, refuse substratum, 0 to 8 percent slopes	A	9.2	6.0%
214A	Naumburg loamy sand, 0 to 5 percent slopes	A/D	15.8	10.3%
613A	Croghan loamy fine sand, 0 to 8 percent slopes, wooded	A	11.9	7.8%
W	Water		10.7	7.0%
Totals for Area of Interest			**153.2**	**100.0%**

Description

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

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

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

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

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

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

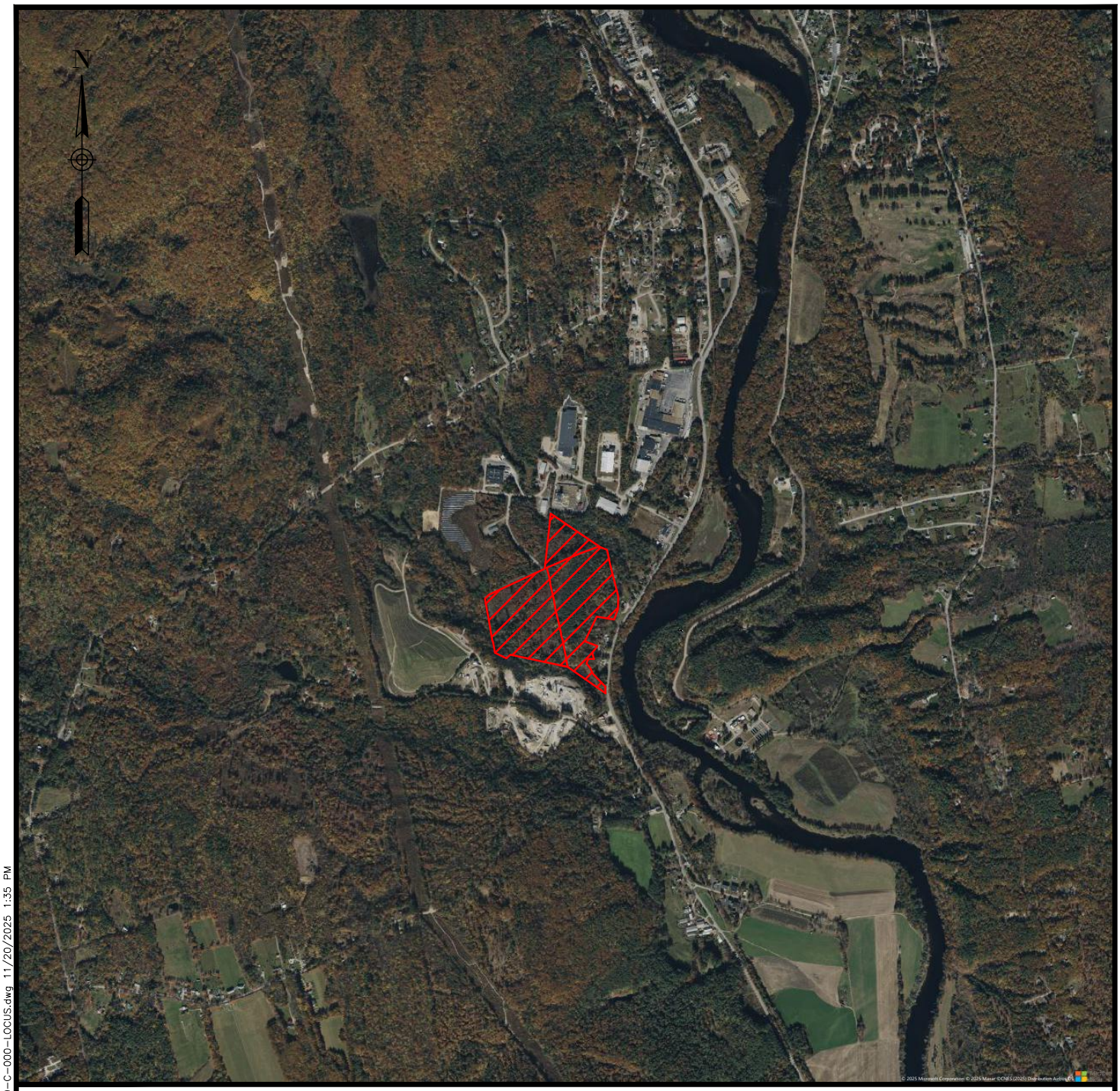
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



NOTES:

1. THE PURPOSE OF THIS FIGURE IS TO DEPICT THE LOCATION OF THE SITE.
2. THIS PLAN IS BASED ON THE SURVEY PRODUCED BY DOUCET SURVEY LLC, AERIAL IMAGE FOUND AT CNES (2025) DISTRIBUTION AIRBUS.

0 2000' 4000'

GRAPHIC SCALE

Nobis Group®
18 Chenell Drive
Concord, NH 03301
T(603) 224-4182
www.nobis-group.com

FIGURE 4

AERIAL MAP
COMMERCE DRIVE SOLAR
COMMERCE DRIVE
FRANKLIN, NEW HAMPSHIRE

DRAWN BY: GAK	CHECKED BY: GS
PROJECT NO. 101025.000	DATE: NOVEMBER 2025

J:\101025.000 Standard Solar – Commerce Drive\CAD\DWG\101025.000-C-000-LOCUS.dwg 11/20/2025 1:35 PM

SITE PHOTGRAPHS

Commerce Drive Solar
Commerce Drive
Franklin, NH 03235

Site Photos

Nobis Group®
18 Chenell Drive
Concord, NH 03301
T (603) 224-4182

SITE DESIGN CRITERIA

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

0.12	ac	Area of HSG A soil that was replaced by impervious cover	0.40"
0.22	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"
0.30	inches	Rd = Weighted groundwater recharge depth	
0.1002	ac-in	GRV = AI * Rd	
364	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):

Pond 1 storage below the lowest outlet is 5,464 cf

5,464 cf > 364 cf

See stage storage table on following page.

Stage-Area-Storage for Pond Pd 1:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
369.00	9,995	0
369.02	10,068	201
369.04	10,140	403
369.06	10,214	606
369.08	10,287	811
369.10	10,361	1,018
369.12	10,434	1,226
369.14	10,509	1,435
369.16	10,583	1,646
369.18	10,658	1,858
369.20	10,733	2,072
369.22	10,808	2,288
369.24	10,883	2,505
369.26	10,959	2,723
369.28	11,035	2,943
369.30	11,111	3,164
369.32	11,188	3,387
369.34	11,265	3,612
369.36	11,342	3,838
369.38	11,419	4,066
369.40	11,497	4,295
369.42	11,574	4,526
369.44	11,653	4,758
369.46	11,731	4,992
369.48	11,810	5,227
369.50	11,888	5,464
369.52	11,968	5,703
369.54	12,047	5,943
369.56	12,127	6,184
369.58	12,207	6,428
369.60	12,287	6,673
369.62	12,367	6,919
369.64	12,448	7,167
369.66	12,529	7,417
369.68	12,610	7,669
369.70	12,692	7,922
369.72	12,774	8,176
369.74	12,856	8,433
369.76	12,938	8,690
369.78	13,020	8,950
369.80	13,103	9,211
369.82	13,186	9,474
369.84	13,270	9,739
369.86	13,353	10,005
369.88	13,437	10,273
369.90	13,521	10,542
369.92	13,606	10,814
369.94	13,690	11,087
369.96	13,775	11,361
369.98	13,861	11,638
370.00	13,946	11,916
370.02	14,066	12,196
370.04	14,186	12,478
370.06	14,306	12,763
370.08	14,427	13,051
370.10	14,549	13,340
370.12	14,671	13,633
370.14	14,794	13,927
370.16	14,917	14,224
370.18	15,041	14,524
370.20	15,165	14,826
370.22	15,289	15,131
370.24	15,415	15,438
370.26	15,540	15,747
370.28	15,666	16,059
370.30	15,793	16,374
370.32	15,920	16,691
370.34	16,048	17,011
370.36	16,176	17,333
370.38	16,305	17,658
370.40	16,434	17,985
370.42	16,564	18,315
370.44	16,695	18,648
370.46	16,825	18,983
370.48	16,957	19,321
370.50	17,088	19,661
370.52	17,221	20,004
370.54	17,354	20,350
370.56	17,487	20,698
370.58	17,621	21,049
370.60	17,755	21,403
370.62	17,890	21,760
370.64	18,026	22,119
370.66	18,161	22,481
370.68	18,298	22,845
370.70	18,435	23,213
370.72	18,572	23,583
370.74	18,710	23,955
370.76	18,849	24,331
370.78	18,988	24,709
370.80	19,127	25,091
370.82	19,267	25,475
370.84	19,408	25,861
370.86	19,549	26,251
370.88	19,690	26,643
370.90	19,832	27,038
370.92	19,975	27,437
370.94	20,118	27,837
370.96	20,261	28,241
370.98	20,405	28,648
371.00	**20,550**	**29,057**

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

TREATMENT SWALE DESIGN CRITERIA
(Env-Wq 1508.08)

Node Name: **R-2 (Treatment Swale)**

Enter the node name in the drainage analysis (e.g., reach TS 5), if applicable.

Yes	Yes/No	Have you reviewed the restrictions on unlined swales outlined in Env-Wq 1508.08(a)?	
No	Yes/No	Is the system lined? (required if not treated or if above SHWT)	
4.25	ac	A = Area draining to the practice	
0.33	ac	A_I = Impervious area draining to the practice	
23.6	minutes	T_c = Time of Concentration	
0.08	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.12	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.51	ac-in	WQV= 1" x Rv x A	
1,849	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
1	inches	P = Amount of rainfall. For WQF in NH, P = 1".	
0.12	inches	D_{WQ} = Water quality depth. D_{WQ} = WQV/A	
82	unitless	CN = Unit peak discharge curve number. CN =1000/(10+5P+10Q–10*[Q^2 + 1.25*Q*P] $^{0.5}$)	
2.15	inches	S = Potential maximum retention. S = (1000/CN) - 10	
0.429	inches	Ia = initial abstraction. Ia = 0.2S	
270	cfs/mi^2/in	q_u = Unit peak discharge. Obtain this value from TR-55 exhibits 4-II and 4-III	
0.21	cfs	WQF = q_u x WQV. Conversion: to convert "cfs/mi^2/in * ac-in" to "cfs" multiply by 1mi^2/640ac	
150.00	feet	L = Swale length [1]	**≥ 100'**
7.00	feet	w = Bottom of the swale width [2]	**0 - 8 feet**
369.00	feet	E_{SHWT} = Elevation of SHWT. If none found, use the lowest elev. of test pit.	
370.00	feet	E_{BTM} = Elevation of the bottom of the practice	**≥ E_{SHWT}**
3.0	:1	SS_{RIGHT} = Right side slope	**≥3:1**
3.0	:1	SS_{LEFT} = Left side slope	**≥3:1**
0.007	ft/ft	S = Slope of swale in decimal form [3]	**0.005 - .05**
1.7	inches	d = Flow depth in swale at WQF (attach stage-discharge table)	**≤ 4"**
0.15	unitless	d must be < 4", therefore Manning's n = 0.15	
1.05	ft^2	Cross-sectional area check (assume trapezoidal channel)	
7.90	feet	Check wetted perimeter	
0.22	cfs	WQF_{check}. [4]	**WQF_{check} = WQF?**
4%		Percent difference between WQF_{check} and WQF [4]	**+/- 10%**
12	minutes	HRT = hydraulic residence time during the WQF	**≥ 10 min**
370.30	ft	Peak elevation of the 10-year storm event [5]	
371.00	ft	Elevation of the top of the swale	
YES	Yes/No	10 peak elevation ≤ the top of swale	**← yes**

1. Any portion of the swale that is in a roadside ditch shall not count towards the swale length.
2. Widths up to 16' allowed if a dividing berm or structure is used such that neither width is more than 8'.
3. If > 0.02 (2%) then check dams are required. No additional detention time is credited for check dams.
4. The WQF_{check} & WQF should be near equal (within 10%) if you have selected the correct depth off the stage-
5. If the swale does not discharge the 50-year storm without overtopping, hydrologic routing of secondary discharge

Designer's Notes:

Stage-Discharge for Reach R-2:

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
371.00	0.00	0.00
371.01	0.04	0.00
371.02	0.06	0.01
371.03	0.08	0.02
371.04	0.09	0.03
371.05	0.11	0.04
371.06	0.12	0.05
371.07	0.13	0.07
371.08	0.15	0.08
371.09	0.16	0.10
371.10	0.17	0.12
371.11	0.18	0.14
371.12	0.19	0.17
371.13	0.20	0.19
371.14	0.21	0.22
371.15	0.22	0.24
371.16	0.23	0.27
371.17	0.24	0.30
371.18	0.25	0.33
371.19	0.25	0.36
371.20	0.26	0.40
371.21	0.27	0.43
371.22	0.28	0.47
371.23	0.29	0.50
371.24	0.29	0.54
371.25	0.30	0.58
371.26	0.31	0.62
371.27	0.31	0.66
371.28	0.32	0.71
371.29	0.33	0.75
371.30	0.33	0.79
371.31	0.34	0.84
371.32	0.35	0.89
371.33	0.35	0.93
371.34	0.36	0.98
371.35	0.37	1.03
371.36	0.37	1.09
371.37	0.38	1.14
371.38	0.39	1.19
371.39	0.39	1.25
371.40	0.40	1.30
371.41	0.40	1.36
371.42	0.41	1.42
371.43	0.41	1.48
371.44	0.42	1.54
371.45	0.43	1.60
371.46	0.43	1.66
371.47	0.44	1.73
371.48	0.44	1.79
371.49	0.45	1.86
371.50	0.45	1.92
371.51	0.46	1.99
371.52	0.46	2.06
371.53	0.47	2.13
371.54	0.47	2.20
371.55	0.48	2.27
371.56	0.48	2.35
371.57	0.49	2.42
371.58	0.49	2.50
371.59	0.50	2.57
371.60	0.50	2.65
371.61	0.51	2.73
371.62	0.51	2.81
371.63	0.52	2.89
371.64	0.52	2.97
371.65	0.53	3.06
371.66	0.53	3.14
371.67	0.53	3.23
371.68	0.54	3.31
371.69	0.54	3.40
371.70	0.55	3.49
371.71	0.55	3.58
371.72	0.56	3.67
371.73	0.56	3.76
371.74	0.57	3.86
371.75	0.57	3.95
371.76	0.57	4.05
371.77	0.58	4.14
371.78	0.58	4.24
371.79	0.59	4.34
371.80	0.59	4.44
371.81	0.59	4.54
371.82	0.60	4.64
371.83	0.60	4.75
371.84	0.61	4.85
371.85	0.61	4.96
371.86	0.61	5.06
371.87	0.62	5.17
371.88	0.62	5.28
371.89	0.63	5.39
371.90	0.63	5.50
371.91	0.63	5.61
371.92	0.64	5.73
371.93	0.64	5.84
371.94	0.65	5.96
371.95	0.65	6.08
371.96	0.65	6.20
371.97	0.66	6.31
371.98	0.66	6.44
371.99	0.66	6.56
372.00	**0.67**	**6.68**

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STATE OF NEW HAMPSHIRE
JOHN CHRIS NADEAU
No. 9294
LICENSED PROFESSIONAL ENGINEER

12/8/2025

NOT ISSUED FOR CONSTRUCTION

COMMERCE DRIVE SOLAR, LLC

SOUTH MAIN STREET
FRANKLIN, NH 03235

TAX MAP:
MAP 102 / LOT 009

OWNER(S):
FRANKLIN COMMONS REALTY GROUP, LLC
70 INDUSTRIAL PARK DRIVE, SUITE 7
FRANKLIN, NH 03235

APPLICANT:
COMMERCE DRIVE SOLAR, LLC
530 GAITHER ROAD, SUITE 900
ROCKVILLE, MD 20850

NO.	DATE	DESCRIPTION
1	10/16/25	AOT SUBMISSION

REVISIONS

0 80' 160'
GRAPHIC SCALE

DATE:	MAY 2024
NOBIS PROJECT NO.	100704.000
DRAWN BY:	GS
CHECKED BY:	JCN
CAD DRAWING FILE:	101025.000-C-300-G&D.dwg

SHEET TITLE

SLOPE PLAN

FIGURE
5

J:\101025.000 Standard Solar — Commerce Drive\CAD\DWG\101025.000-C-300-G&D.dwg 10/9/2025 10:27 AM

nobis
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18 Chenell Drive
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STATE OF NEW HAMPSHIRE
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530 GAITHER ROAD, SUITE 900
ROCKVILLE, MD 20850

NO.	DATE	DESCRIPTION
1	10/16/25	AOT SUBMISSION

REVISIONS

0 100' 200'
GRAPHIC SCALE

DATE:	MAY 2024
NOBIS PROJECT NO.	100704.000
DRAWN BY:	GS
CHECKED BY:	JCN
CAD DRAWING FILE:	101025.000-C-310-DAP - PROPOSED.dwg

SHEET TITLE

CURVE NUMBER PLAN

FIGURE
6

J:\101025.000 Standard Solar — Commerce Drive\CAD\DWG\101025.000–C–310–DAP – PROPOSED.dwg 11/20/2025 2:37 PM

HYDRAULIC CALCULATIONS

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	43.418 degrees North
Longitude	71.66 degrees West
Elevation	110 feet
Date/Time	Mon Aug 14 2023 12:45:17 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	0.96	1.18	1.48	1.85	2.32	2.57	**1yr**	2.06	2.47	2.87	3.54	4.07	**1yr**
2yr	0.32	0.49	0.61	0.80	1.00	1.26	**2yr**	0.87	1.15	1.45	1.79	2.22	2.73	3.06	**2yr**	2.42	2.95	3.42	4.09	4.68	**2yr**
5yr	0.38	0.58	0.73	0.98	1.26	1.58	**5yr**	1.08	1.47	1.83	2.26	2.77	3.39	3.86	**5yr**	3.00	3.71	4.29	5.05	5.75	**5yr**
10yr	0.42	0.67	0.84	1.15	1.49	1.90	**10yr**	1.29	1.76	2.19	2.70	3.30	3.99	4.60	**10yr**	3.53	4.42	5.10	5.92	6.71	**10yr**
25yr	0.51	0.80	1.02	1.41	1.87	2.39	**25yr**	1.61	2.25	2.77	3.40	4.13	4.96	5.80	**25yr**	4.39	5.58	6.41	7.31	8.25	**25yr**
50yr	0.58	0.92	1.18	1.65	2.22	2.85	**50yr**	1.92	2.71	3.30	4.06	4.90	5.84	6.92	**50yr**	5.17	6.66	7.63	8.58	9.64	**50yr**
100yr	0.66	1.06	1.37	1.94	2.64	3.42	**100yr**	2.28	3.26	3.96	4.85	5.82	6.89	8.26	**100yr**	6.10	7.95	9.08	10.08	11.28	**100yr**
200yr	0.75	1.22	1.58	2.27	3.14	4.08	**200yr**	2.71	3.93	4.73	5.78	6.91	8.13	9.87	**200yr**	7.20	9.49	10.80	11.84	13.19	**200yr**
500yr	0.91	1.49	1.95	2.82	3.95	5.14	**500yr**	3.41	5.04	5.97	7.27	8.66	10.13	12.48	**500yr**	8.97	12.00	13.61	14.65	16.24	**500yr**

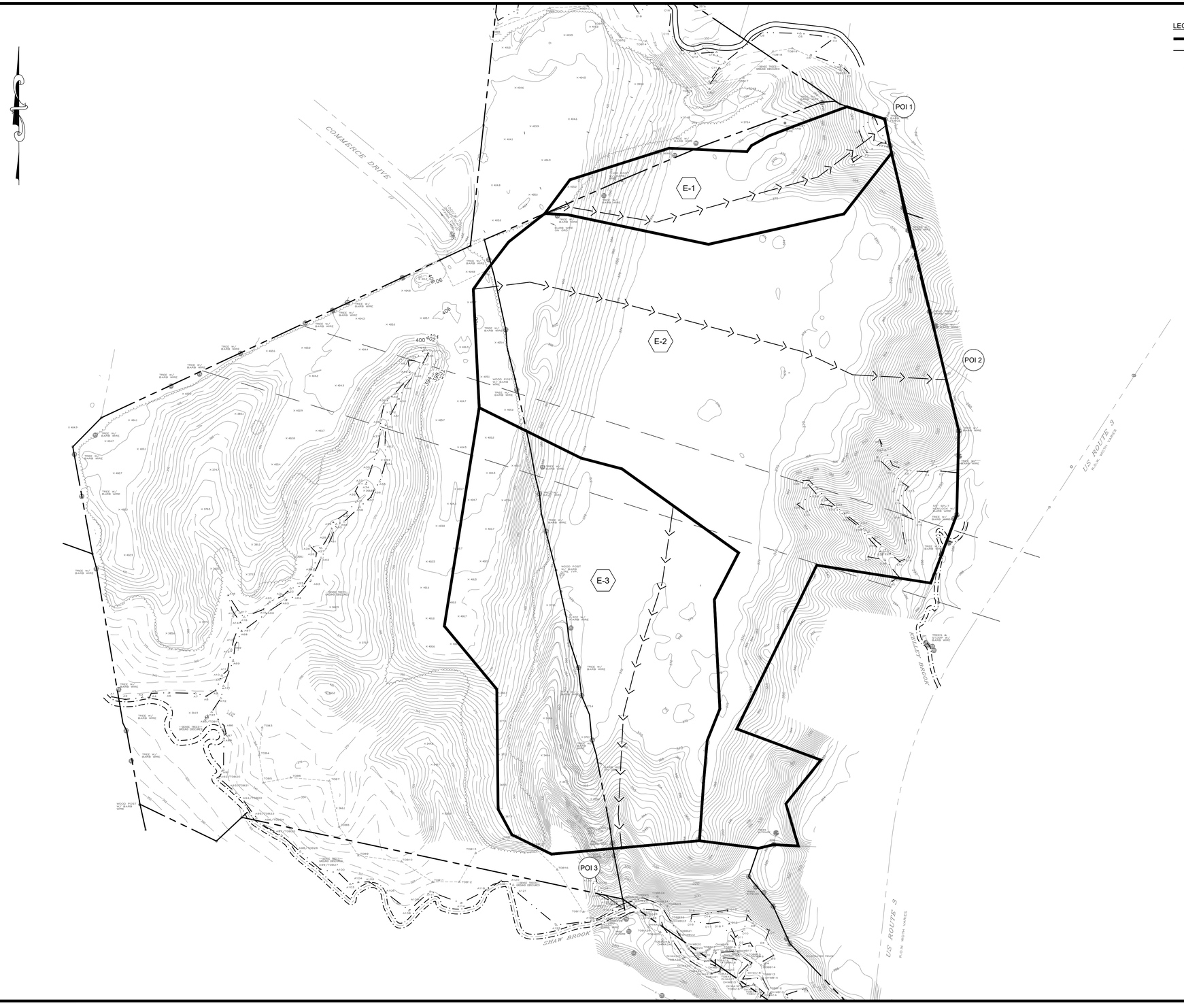
Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.23	0.36	0.43	0.58	0.72	0.87	**1yr**	0.62	0.85	0.96	1.32	1.59	2.14	2.38	**1yr**	1.89	2.28	2.70	3.30	3.83	**1yr**
2yr	0.31	0.47	0.58	0.79	0.97	1.14	**2yr**	0.84	1.12	1.30	1.69	2.18	2.67	2.99	**2yr**	2.36	2.87	3.33	3.99	4.55	**2yr**
5yr	0.34	0.53	0.66	0.90	1.15	1.36	**5yr**	0.99	1.33	1.56	2.00	2.58	3.20	3.59	**5yr**	2.83	3.45	4.02	4.73	5.36	**5yr**
10yr	0.38	0.58	0.72	1.01	1.30	1.53	**10yr**	1.13	1.49	1.73	2.22	2.88	3.69	4.10	**10yr**	3.27	3.95	4.63	5.37	6.04	**10yr**
25yr	0.43	0.66	0.82	1.17	1.54	1.82	**25yr**	1.33	1.78	2.05	2.56	3.38	4.46	4.89	**25yr**	3.95	4.71	5.61	6.36	7.10	**25yr**
50yr	0.48	0.73	0.91	1.31	1.76	2.07	**50yr**	1.52	2.03	2.33	2.85	3.79	5.18	5.57	**50yr**	4.58	5.36	6.49	7.22	8.02	**50yr**
100yr	0.53	0.80	1.00	1.45	1.99	2.36	**100yr**	1.71	2.31	2.63	3.18	4.27	6.00	6.38	**100yr**	5.31	6.13	7.52	8.18	9.03	**100yr**
200yr	0.59	0.88	1.12	1.62	2.25	2.68	**200yr**	1.95	2.62	2.97	3.54	4.80	7.00	7.33	**200yr**	6.20	7.05	8.72	9.31	10.18	**200yr**
500yr	0.68	1.00	1.29	1.88	2.67	3.16	**500yr**	2.31	3.09	3.47	4.07	5.63	8.59	8.83	**500yr**	7.60	8.49	10.63	11.04	11.87	**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	1.08	**1yr**	0.78	1.06	1.21	1.53	1.91	2.49	2.74	**1yr**	2.20	2.63	3.02	3.83	4.35	**1yr**
2yr	0.33	0.51	0.63	0.86	1.06	1.24	**2yr**	0.91	1.22	1.40	1.81	2.32	2.81	3.19	**2yr**	2.48	3.06	3.54	4.22	4.84	**2yr**
5yr	0.40	0.62	0.77	1.06	1.35	1.65	**5yr**	1.16	1.61	1.86	2.37	2.99	3.58	4.10	**5yr**	3.17	3.94	4.61	5.35	6.16	**5yr**
10yr	0.49	0.75	0.93	1.30	1.68	2.01	**10yr**	1.45	1.97	2.21	2.78	3.48	4.30	4.99	**10yr**	3.81	4.80	5.64	6.42	7.39	**10yr**
25yr	0.64	0.98	1.22	1.74	2.28	2.71	**25yr**	1.97	2.65	2.93	3.58	4.42	5.48	6.49	**25yr**	4.85	6.24	7.37	8.19	9.45	**25yr**
50yr	0.79	1.20	1.49	2.15	2.89	3.41	**50yr**	2.49	3.34	3.64	4.34	5.31	6.58	7.93	**50yr**	5.82	7.62	9.01	9.84	11.40	**50yr**
100yr	0.97	1.47	1.84	2.66	3.65	4.29	**100yr**	3.15	4.20	4.51	5.25	6.36	7.87	9.67	**100yr**	6.97	9.30	11.03	11.83	13.76	**100yr**
200yr	1.19	1.80	2.28	3.30	4.60	5.41	**200yr**	3.97	5.29	5.60	6.38	7.64	9.45	11.81	**200yr**	8.36	11.35	13.49	14.24	16.62	**200yr**
500yr	1.59	2.36	3.04	4.41	6.27	7.37	**500yr**	5.41	7.20	7.48	8.24	9.74	11.97	15.37	**500yr**	10.59	14.78	17.60	18.20	21.35	**500yr**

Powered by ACIS Northeast Regional Climate Center



LEGEND

- DRAINAGE AREA BOUNDARY
- FLOW PATH (TIME OF CONCENTRATION)
- E-1 — EXISTING CONDITIONS SUBCATCHMENT DESIGNATION
- POI 1 — POINT OF INTEREST
- R-1 — REACH
- Pd1 — POND

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STATE OF NEW HAMPSHIRE
JOHN CHRIS NADEAU
No. 9294
LICENSED PROFESSIONAL ENGINEER

12/8/2025

NOT ISSUED FOR CONSTRUCTION

COMMERCE DRIVE SOLAR, LLC

TAX MAP:
MAP 102 / LOT 009

OWNER(S):
FRANKLIN COMMONS REALTY GROUP, LLC
70 INDUSTRIAL PARK DRIVE, SUITE 7
FRANKLIN, NH 03235

APPLICANT:
COMMERCE DRIVE SOLAR, LLC
530 GAITHER ROAD, SUITE 900
ROCKVILLE, MD 20850

NO.	DATE	DESCRIPTION
1	12/08/25	AOT SUBMISSION

REVISIONS

0 100' 200'
GRAPHIC SCALE

DATE:	MAY 2024
NOBIS PROJECT NO.	101025.000
DRAWN BY:	GS
CHECKED BY:	JCN
CAD DRAWING FILE:	101025.000-C-310-DAP - EXISTING.dwg

SHEET TITLE

PRE-CONDITION DRAINAGE AREA PLAN

FIGURE
7

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LEGEND

- DRAINAGE AREA BOUNDARY
- FLOW PATH (TIME OF CONCENTRATION)
- P-1 — PROPOSED CONDITIONS SUBCATCHMENT DESIGNATION
- POI 1 — POINT OF INTEREST
- R-1 — REACH
- Pd1 — POND

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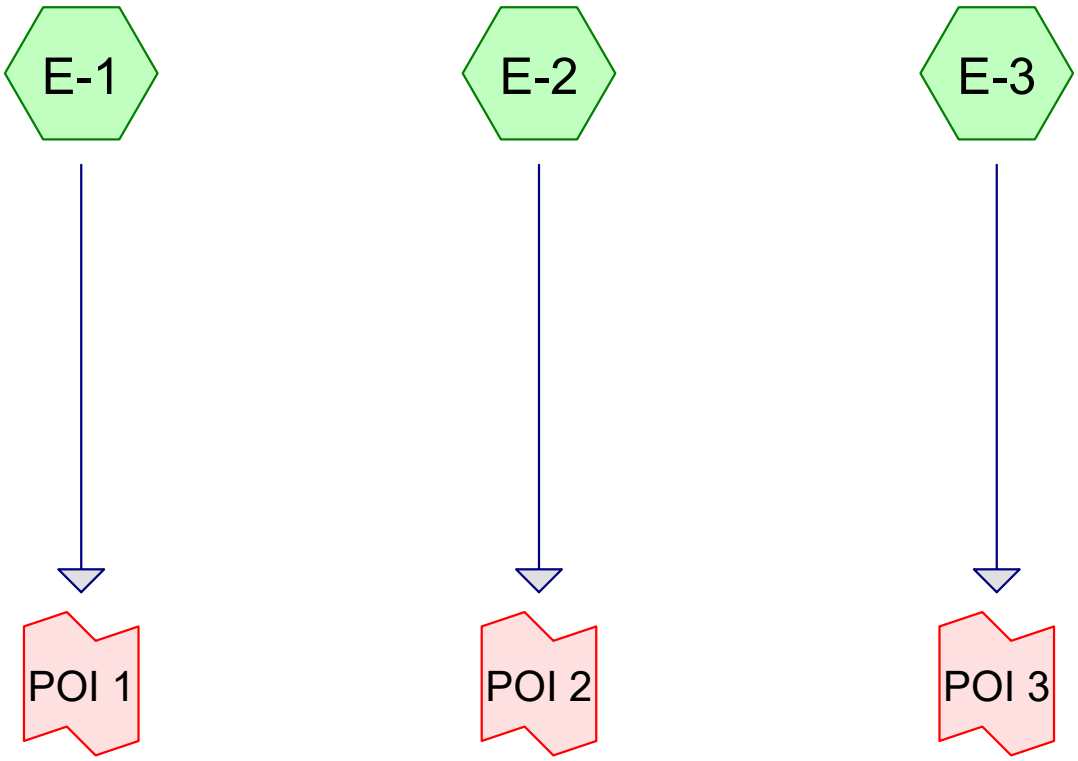
SHEET TITLE

POST-CONDITIONS DRAINAGE AREA PLAN

FIGURE
8

J:\101025.000 Standard Solar – Commerce Drive\CAD\DWG\101025.000-C-310-DAP – PROPOSED.dwg 12/4/2025 11:09 AM

Existing Conditions



Subcat Reach Pond Link

Routing Diagram for 101025.000 Pre-Conditions Drainage Model
Prepared by Nobis Engineering Inc, Printed 10/8/2025

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.941	30	Woods, Good, HSG A (E-1, E-2, E-3)
22.394	55	Woods, Good, HSG B (E-1, E-2, E-3)
0.056	77	Woods, Good, HSG D (E-1)
26.392	**51**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
3.941	HSG A	E-1, E-2, E-3
22.394	HSG B	E-1, E-2, E-3
0.000	HSG C	
0.056	HSG D	E-1
0.000	Other	
26.392		**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Runoff Area=111,243 sf 0.00% Impervious Runoff Depth=0.09"
Flow Length=751' Tc=17.6 min CN=53 Runoff=0.03 cfs 0.020 af

Subcatchment E-2: Runoff Area=655,621 sf 0.00% Impervious Runoff Depth=0.08"
Flow Length=1,000' Tc=40.4 min CN=52 Runoff=0.16 cfs 0.097 af

Subcatchment E-3: Runoff Area=382,776 sf 0.00% Impervious Runoff Depth=0.06"
Flow Length=719' Tc=47.0 min CN=51 Runoff=0.07 cfs 0.046 af

Link POI 1: Inflow=0.03 cfs 0.020 af
Primary=0.03 cfs 0.020 af

Link POI 2: Inflow=0.16 cfs 0.097 af
Primary=0.16 cfs 0.097 af

Link POI 3: Inflow=0.07 cfs 0.046 af
Primary=0.07 cfs 0.046 af

Total Runoff Area = 26.392 ac Runoff Volume = 0.163 af Average Runoff Depth = 0.07"
100.00% Pervious = 26.392 ac 0.00% Impervious = 0.000 ac

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Runoff Area=111,243 sf 0.00% Impervious Runoff Depth=0.44"
Flow Length=751' Tc=17.6 min CN=53 Runoff=0.52 cfs 0.094 af

Subcatchment E-2: Runoff Area=655,621 sf 0.00% Impervious Runoff Depth=0.40"
Flow Length=1,000' Tc=40.4 min CN=52 Runoff=1.95 cfs 0.507 af

Subcatchment E-3: Runoff Area=382,776 sf 0.00% Impervious Runoff Depth=0.37"
Flow Length=719' Tc=47.0 min CN=51 Runoff=0.90 cfs 0.268 af

Link POI 1: Inflow=0.52 cfs 0.094 af
Primary=0.52 cfs 0.094 af

Link POI 2: Inflow=1.95 cfs 0.507 af
Primary=1.95 cfs 0.507 af

Link POI 3: Inflow=0.90 cfs 0.268 af
Primary=0.90 cfs 0.268 af

Total Runoff Area = 26.392 ac Runoff Volume = 0.869 af Average Runoff Depth = 0.40"
100.00% Pervious = 26.392 ac 0.00% Impervious = 0.000 ac

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Runoff Area=111,243 sf 0.00% Impervious Runoff Depth=1.28"
Flow Length=751' Tc=17.6 min CN=53 Runoff=2.25 cfs 0.272 af

Subcatchment E-2: Runoff Area=655,621 sf 0.00% Impervious Runoff Depth=1.21"
Flow Length=1,000' Tc=40.4 min CN=52 Runoff=8.63 cfs 1.513 af

Subcatchment E-3: Runoff Area=382,776 sf 0.00% Impervious Runoff Depth=1.14"
Flow Length=719' Tc=47.0 min CN=51 Runoff=4.26 cfs 0.831 af

Link POI 1: Inflow=2.25 cfs 0.272 af
Primary=2.25 cfs 0.272 af

Link POI 2: Inflow=8.63 cfs 1.513 af
Primary=8.63 cfs 1.513 af

Link POI 3: Inflow=4.26 cfs 0.831 af
Primary=4.26 cfs 0.831 af

Total Runoff Area = 26.392 ac Runoff Volume = 2.616 af Average Runoff Depth = 1.19"
100.00% Pervious = 26.392 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment E-1:

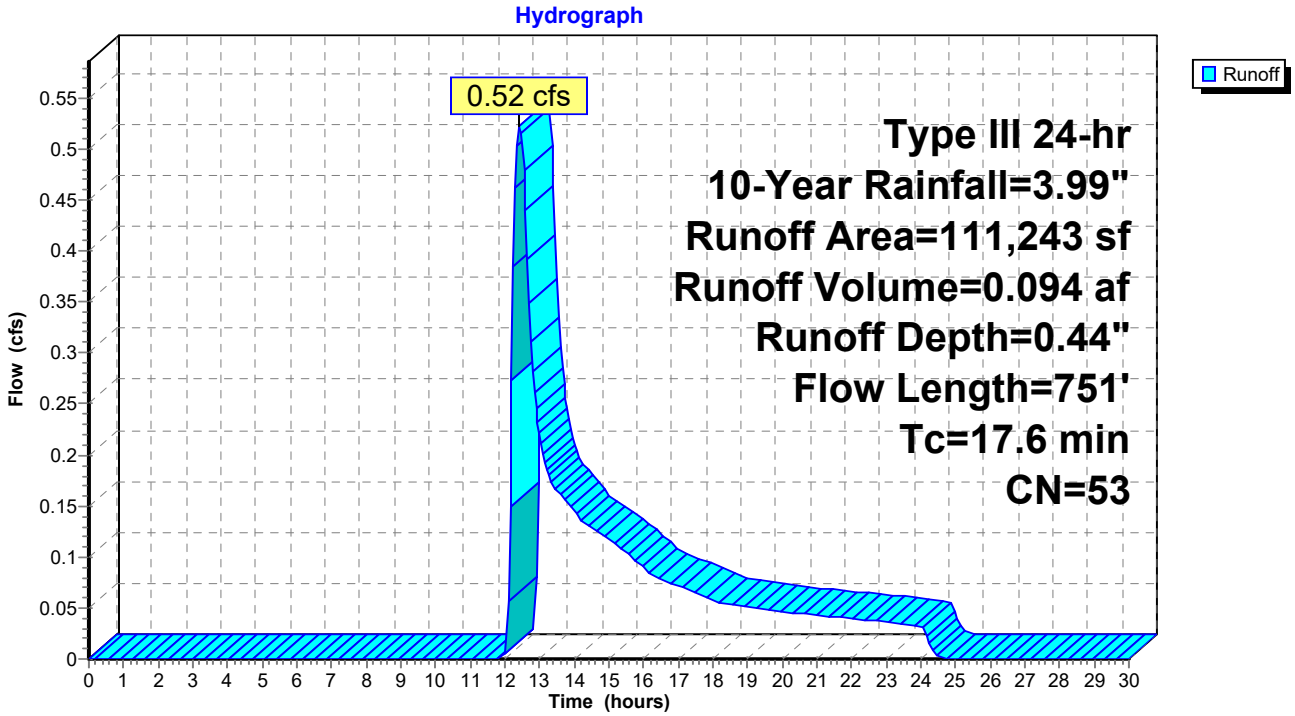
Runoff = 0.52 cfs @ 12.43 hrs, Volume= 0.094 af, Depth= 0.44"
Routed to Link POI 1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=3.99"

Area (sf)	CN	Description
12,292	30	Woods, Good, HSG A
2,453	77	Woods, Good, HSG D
96,498	55	Woods, Good, HSG B
111,243	53	Weighted Average
111,243		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	57	0.0280	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.73"
4.2	371	0.0860	1.47		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.4	323	0.1670	12.75	127.52	**Channel Flow,** Area= 10.0 sf Perim= 20.0' r= 0.50' n= 0.030 Earth, grassed & winding
17.6	751	Total			

Subcatchment E-1:



Summary for Subcatchment E-2:

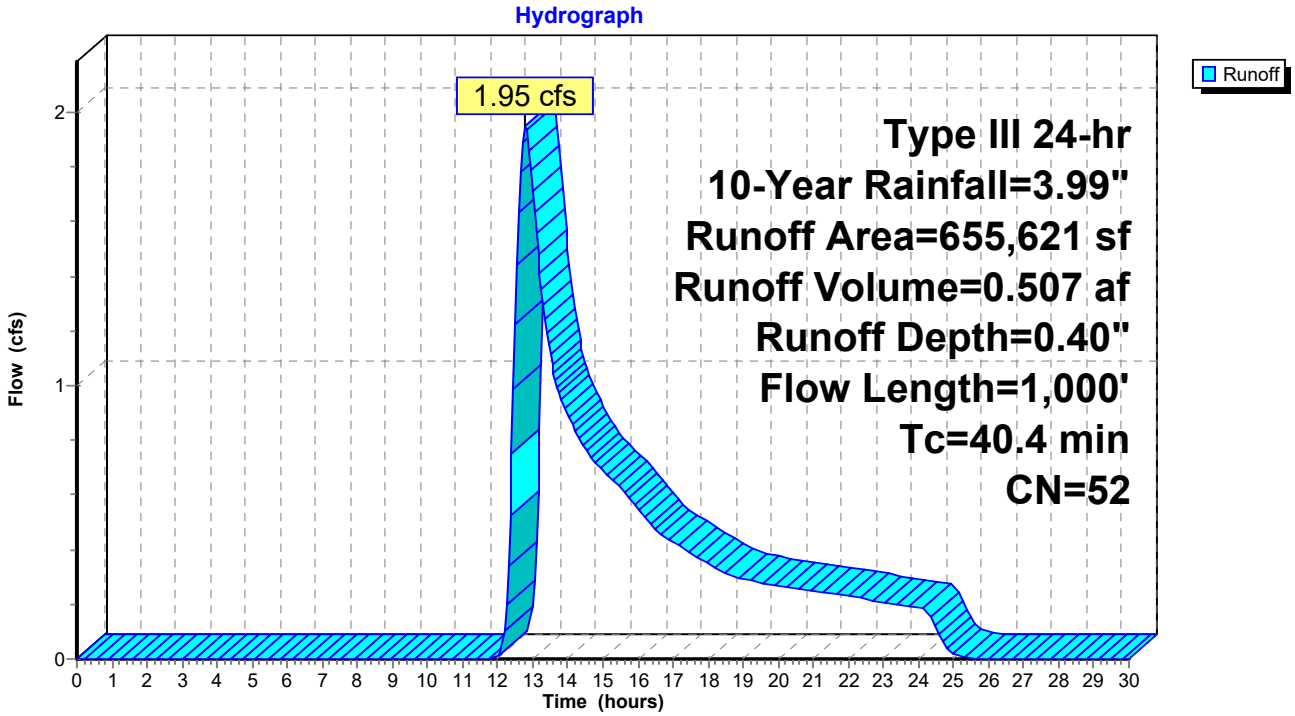
Runoff = 1.95 cfs @ 12.79 hrs, Volume= 0.507 af, Depth= 0.40"
Routed to Link POI 2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=3.99"

Area (sf)	CN	Description
5,761	30	Woods, Good, HSG A
85,413	30	Woods, Good, HSG A
564,448	55	Woods, Good, HSG B
655,621	52	Weighted Average
655,621		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.7	100	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.73"
9.6	707	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	193	0.3600	24.53	368.00	**Channel Flow,** Area= 15.0 sf Perim= 20.0' r= 0.75' n= 0.030 Earth, grassed & winding
40.4	1,000	Total			

Subcatchment E-2:



Summary for Subcatchment E-3:

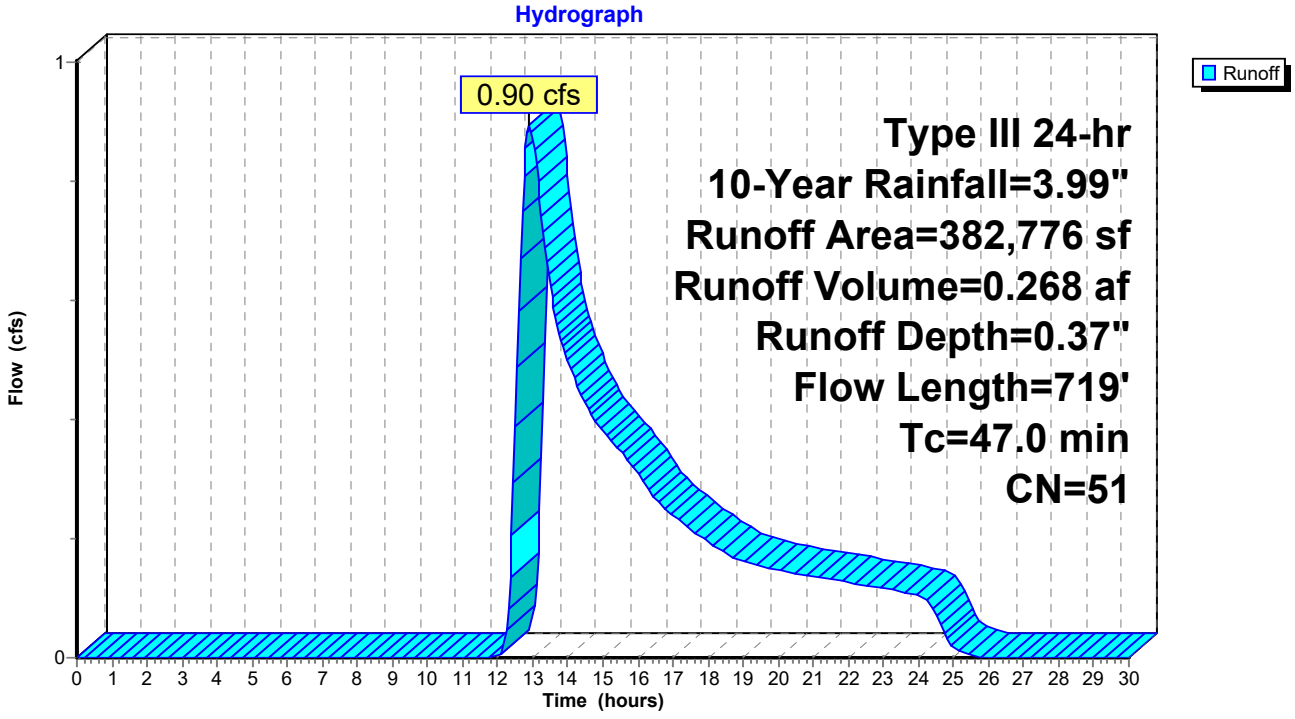
Runoff = 0.90 cfs @ 12.91 hrs, Volume= 0.268 af, Depth= 0.37"
Routed to Link POI 3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=3.99"

Area (sf)	CN	Description
68,219	30	Woods, Good, HSG A
314,558	55	Woods, Good, HSG B
382,776	51	Weighted Average
382,776		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.5	100	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.73"
6.5	619	0.1020	1.60		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
47.0	719	Total			

Subcatchment E-3:

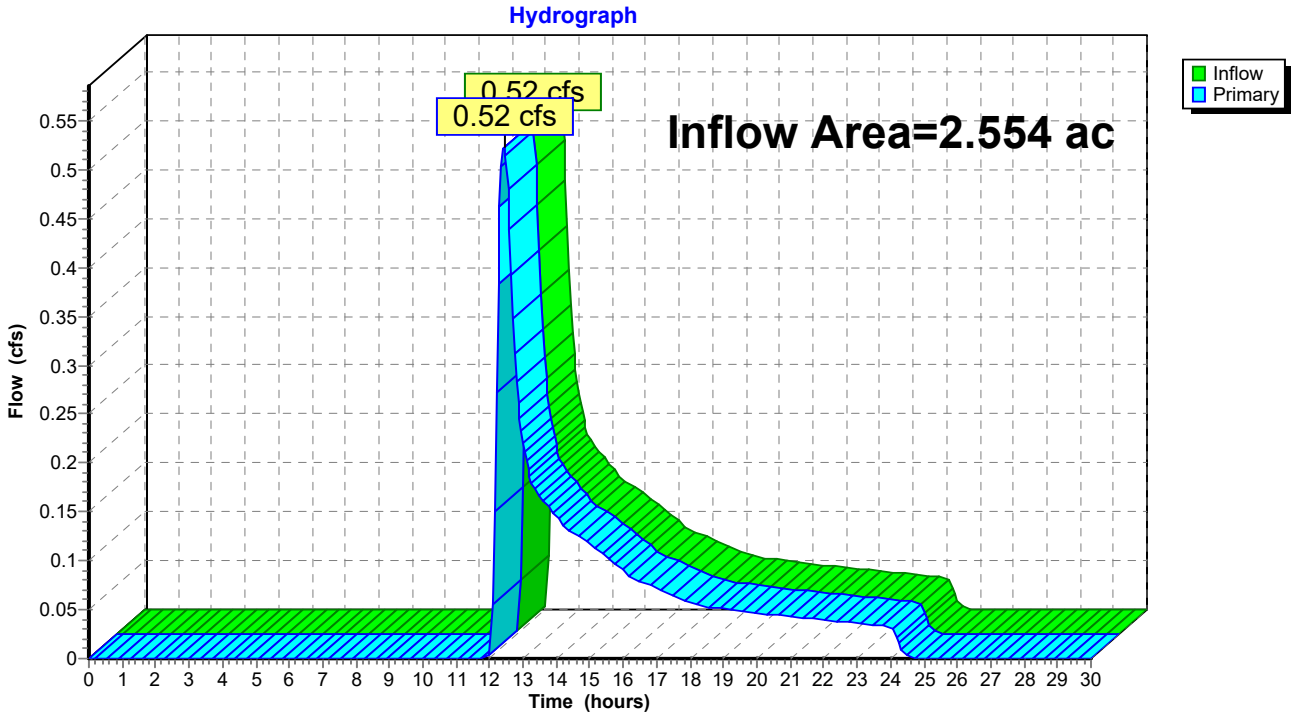


Summary for Link POI 1:

Inflow Area = 2.554 ac, 0.00% Impervious, Inflow Depth = 0.44" for 10-Year event
Inflow = 0.52 cfs @ 12.43 hrs, Volume= 0.094 af
Primary = 0.52 cfs @ 12.43 hrs, Volume= 0.094 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 1:

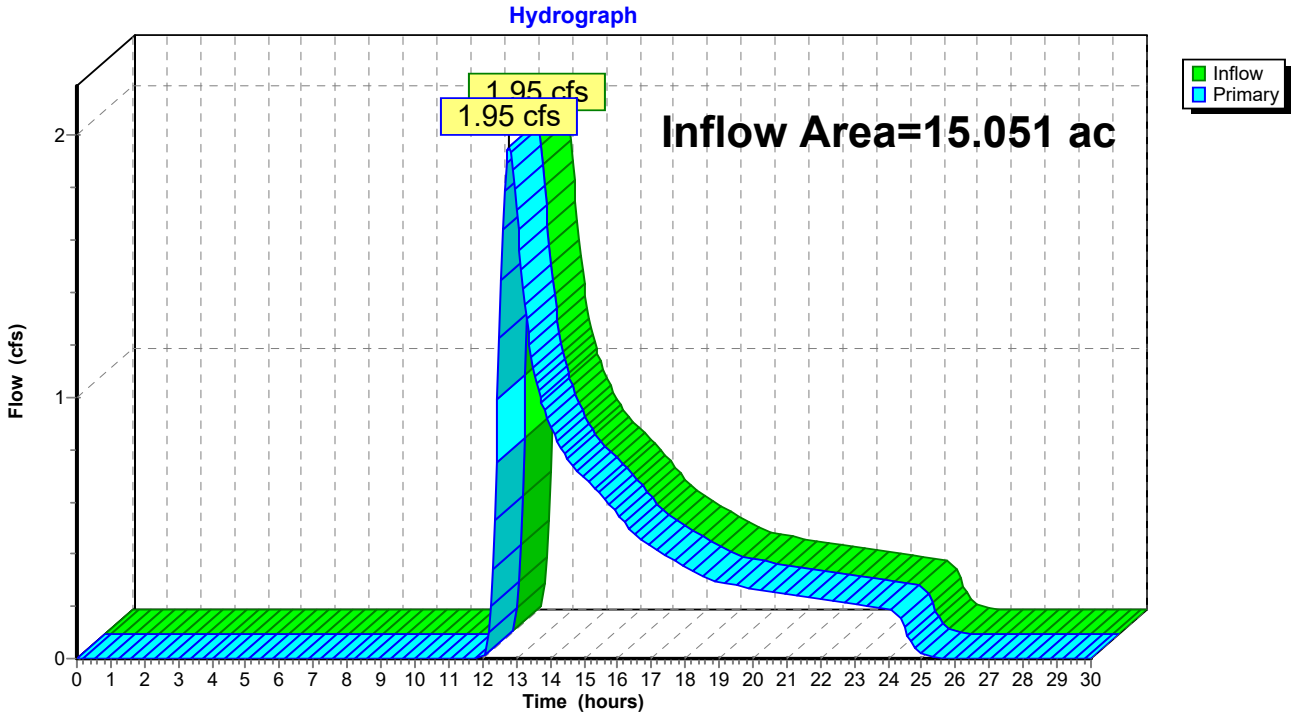


Summary for Link POI 2:

Inflow Area = 15.051 ac, 0.00% Impervious, Inflow Depth = 0.40" for 10-Year event
Inflow = 1.95 cfs @ 12.79 hrs, Volume= 0.507 af
Primary = 1.95 cfs @ 12.79 hrs, Volume= 0.507 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 2:

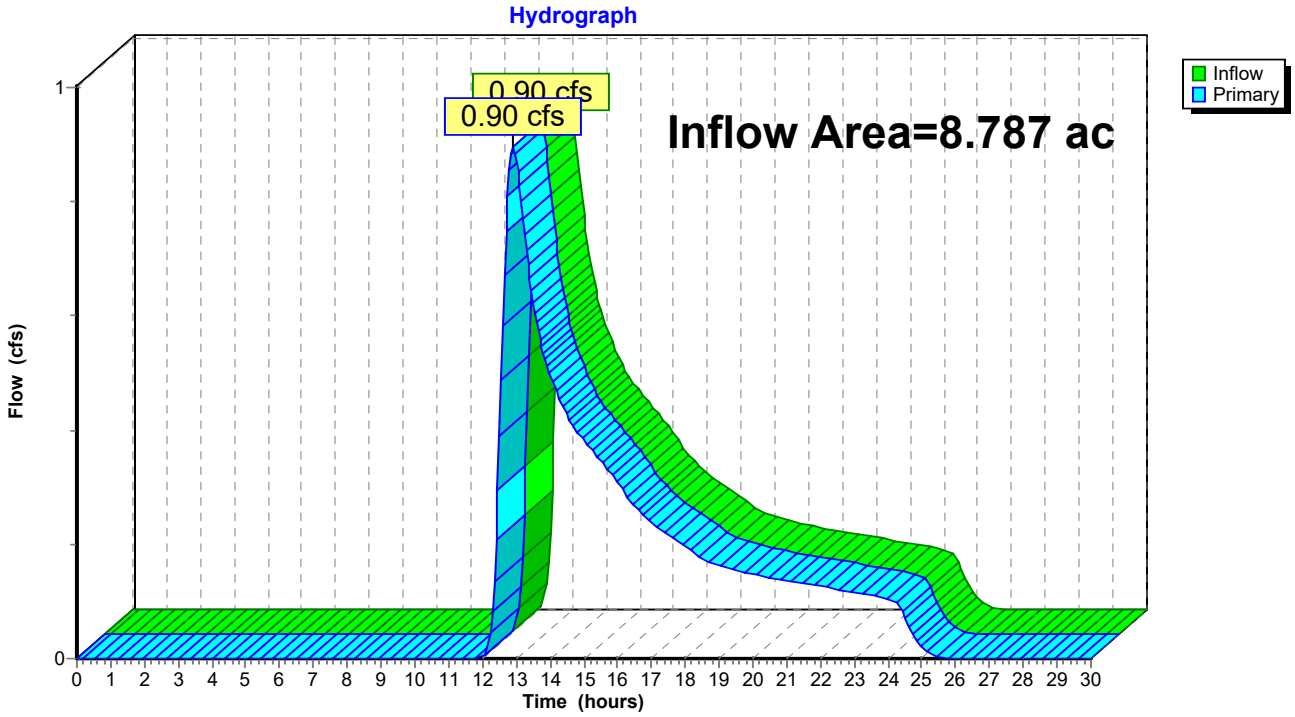


Summary for Link POI 3:

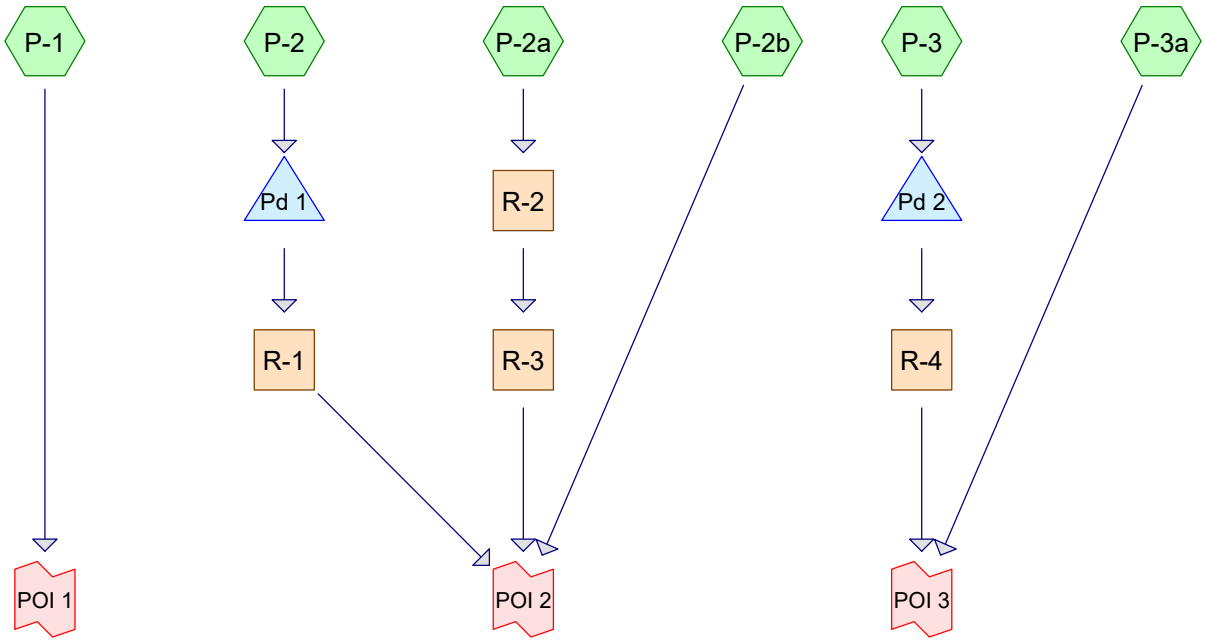
Inflow Area = 8.787 ac, 0.00% Impervious, Inflow Depth = 0.37" for 10-Year event
Inflow = 0.90 cfs @ 12.91 hrs, Volume= 0.268 af
Primary = 0.90 cfs @ 12.91 hrs, Volume= 0.268 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 3:



Proposed Conditions



Subcat Reach Pond Link

Routing Diagram for 101025.000 Post-Conditions Drainage Model
Prepared by Nobis Engineering Inc, Printed 12/8/2025

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.116	96	Gravel surface, HSG A (P-2a)
0.215	96	Gravel surface, HSG B (P-2a)
2.087	66	Panel <5% Non-Sheet, Good, HSG B (P-2)
0.921	61	Panel <5% Sheet, Good, HSG B (P-3)
0.631	39	Pasture/grassland/range, Good, HSG A (P-2, P-2a)
9.562	61	Pasture/grassland/range, Good, HSG B (P-1, P-2, P-2a, P-2b, P-3, P-3a)
3.194	30	Woods, Good, HSG A (P-2, P-2a, P-3a)
9.609	55	Woods, Good, HSG B (P-1, P-2, P-2a, P-2b, P-3a)
0.056	77	Woods, Good, HSG D (P-1)
26.392	**55**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
3.941	HSG A	P-2, P-2a, P-3a
22.394	HSG B	P-1, P-2, P-2a, P-2b, P-3, P-3a
0.000	HSG C	
0.056	HSG D	P-1
0.000	Other	
26.392		**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentP-1: Runoff Area=40,782 sf 0.00% Impervious Runoff Depth=0.17"
Flow Length=305' Tc=23.7 min CN=57 Runoff=0.04 cfs 0.013 af

SubcatchmentP-2: Runoff Area=332,886 sf 0.00% Impervious Runoff Depth=0.19"
Flow Length=723' Tc=37.7 min CN=58 Runoff=0.36 cfs 0.123 af

SubcatchmentP-2a: Runoff Area=185,051 sf 0.00% Impervious Runoff Depth=0.08"
Flow Length=1,025' Tc=26.6 min CN=52 Runoff=0.04 cfs 0.027 af

SubcatchmentP-2b: Runoff Area=272,257 sf 0.00% Impervious Runoff Depth=0.15"
Flow Length=645' Tc=15.3 min CN=56 Runoff=0.24 cfs 0.078 af

SubcatchmentP-3: Runoff Area=108,848 sf 0.00% Impervious Runoff Depth=0.27"
Flow Length=415' Slope=0.0050 '/' Tc=27.1 min CN=61 Runoff=0.25 cfs 0.056 af

SubcatchmentP-3a: Runoff Area=209,817 sf 0.00% Impervious Runoff Depth=0.06"
Flow Length=868' Tc=25.3 min CN=51 Runoff=0.04 cfs 0.025 af

Reach R-1: Avg. Flow Depth=0.01' Max Vel=0.34 fps Inflow=0.08 cfs 0.085 af
n=0.100 L=172.0' S=0.1453 '/' Capacity=13.66 cfs Outflow=0.08 cfs 0.084 af

Reach R-2: Avg. Flow Depth=0.05' Max Vel=0.11 fps Inflow=0.04 cfs 0.027 af
n=0.150 L=150.0' S=0.0067 '/' Capacity=6.68 cfs Outflow=0.04 cfs 0.027 af

Reach R-3: Avg. Flow Depth=0.01' Max Vel=0.21 fps Inflow=0.04 cfs 0.027 af
n=0.100 L=384.0' S=0.2188 '/' Capacity=27.72 cfs Outflow=0.04 cfs 0.027 af

Reach R-4: Avg. Flow Depth=0.01' Max Vel=0.32 fps Inflow=0.08 cfs 0.052 af
n=0.100 L=240.0' S=0.2250 '/' Capacity=17.63 cfs Outflow=0.08 cfs 0.052 af

Pond Pd 1: Peak Elev=369.73' Storage=8,297 cf Inflow=0.36 cfs 0.123 af
Outflow=0.08 cfs 0.085 af

Pond Pd 2: Peak Elev=369.69' Storage=2,346 cf Inflow=0.25 cfs 0.056 af
Outflow=0.08 cfs 0.052 af

Link POI 1: Inflow=0.04 cfs 0.013 af
Primary=0.04 cfs 0.013 af

Link POI 2: Inflow=0.24 cfs 0.189 af
Primary=0.24 cfs 0.189 af

Link POI 3: Inflow=0.12 cfs 0.077 af
Primary=0.12 cfs 0.077 af

Total Runoff Area = 26.392 ac Runoff Volume = 0.322 af Average Runoff Depth = 0.15"
100.00% Pervious = 26.392 ac 0.00% Impervious = 0.000 ac

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentP-1: Runoff Area=40,782 sf 0.00% Impervious Runoff Depth=0.61"
Flow Length=305' Tc=23.7 min CN=57 Runoff=0.30 cfs 0.048 af

SubcatchmentP-2: Runoff Area=332,886 sf 0.00% Impervious Runoff Depth=0.66"
Flow Length=723' Tc=37.7 min CN=58 Runoff=2.26 cfs 0.421 af

SubcatchmentP-2a: Runoff Area=185,051 sf 0.00% Impervious Runoff Depth=0.40"
Flow Length=1,025' Tc=26.6 min CN=52 Runoff=0.66 cfs 0.143 af

SubcatchmentP-2b: Runoff Area=272,257 sf 0.00% Impervious Runoff Depth=0.57"
Flow Length=645' Tc=15.3 min CN=56 Runoff=2.02 cfs 0.296 af

SubcatchmentP-3: Runoff Area=108,848 sf 0.00% Impervious Runoff Depth=0.81"
Flow Length=415' Slope=0.0050 '/' Tc=27.1 min CN=61 Runoff=1.15 cfs 0.168 af

SubcatchmentP-3a: Runoff Area=209,817 sf 0.00% Impervious Runoff Depth=0.37"
Flow Length=868' Tc=25.3 min CN=51 Runoff=0.64 cfs 0.147 af

Reach R-1: Avg. Flow Depth=0.03' Max Vel=0.52 fps Inflow=0.21 cfs 0.261 af
n=0.100 L=172.0' S=0.1453 '/' Capacity=13.66 cfs Outflow=0.21 cfs 0.260 af

Reach R-2: Avg. Flow Depth=0.26' Max Vel=0.31 fps Inflow=0.66 cfs 0.143 af
n=0.150 L=150.0' S=0.0067 '/' Capacity=6.68 cfs Outflow=0.62 cfs 0.143 af

Reach R-3: Avg. Flow Depth=0.02' Max Vel=0.58 fps Inflow=0.62 cfs 0.143 af
n=0.100 L=384.0' S=0.2188 '/' Capacity=27.72 cfs Outflow=0.56 cfs 0.143 af

Reach R-4: Avg. Flow Depth=0.02' Max Vel=0.53 fps Inflow=0.27 cfs 0.164 af
n=0.100 L=240.0' S=0.2250 '/' Capacity=17.63 cfs Outflow=0.27 cfs 0.163 af

Pond Pd 1: Peak Elev=370.31' Storage=16,500 cf Inflow=2.26 cfs 0.421 af
Outflow=0.21 cfs 0.261 af

Pond Pd 2: Peak Elev=370.08' Storage=4,032 cf Inflow=1.15 cfs 0.168 af
Outflow=0.27 cfs 0.164 af

Link POI 1: Inflow=0.30 cfs 0.048 af
Primary=0.30 cfs 0.048 af

Link POI 2: Inflow=2.03 cfs 0.699 af
Primary=2.03 cfs 0.699 af

Link POI 3: Inflow=0.79 cfs 0.310 af
Primary=0.79 cfs 0.310 af

Total Runoff Area = 26.392 ac Runoff Volume = 1.223 af Average Runoff Depth = 0.56"
100.00% Pervious = 26.392 ac 0.00% Impervious = 0.000 ac

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentP-1: Runoff Area=40,782 sf 0.00% Impervious Runoff Depth=1.58"
Flow Length=305' Tc=23.7 min CN=57 Runoff=0.98 cfs 0.123 af

SubcatchmentP-2: Runoff Area=332,886 sf 0.00% Impervious Runoff Depth=1.66"
Flow Length=723' Tc=37.7 min CN=58 Runoff=6.91 cfs 1.056 af

SubcatchmentP-2a: Runoff Area=185,051 sf 0.00% Impervious Runoff Depth=1.21"
Flow Length=1,025' Tc=26.6 min CN=52 Runoff=2.96 cfs 0.427 af

SubcatchmentP-2b: Runoff Area=272,257 sf 0.00% Impervious Runoff Depth=1.50"
Flow Length=645' Tc=15.3 min CN=56 Runoff=7.25 cfs 0.783 af

SubcatchmentP-3: Runoff Area=108,848 sf 0.00% Impervious Runoff Depth=1.90"
Flow Length=415' Slope=0.0050 '/' Tc=27.1 min CN=61 Runoff=3.11 cfs 0.395 af

SubcatchmentP-3a: Runoff Area=209,817 sf 0.00% Impervious Runoff Depth=1.14"
Flow Length=868' Tc=25.3 min CN=51 Runoff=3.13 cfs 0.456 af

Reach R-1: Avg. Flow Depth=0.15' Max Vel=1.55 fps Inflow=3.56 cfs 0.880 af
n=0.100 L=172.0' S=0.1453 '/' Capacity=13.66 cfs Outflow=3.55 cfs 0.878 af

Reach R-2: Avg. Flow Depth=0.63' Max Vel=0.52 fps Inflow=2.96 cfs 0.427 af
n=0.150 L=150.0' S=0.0067 '/' Capacity=6.68 cfs Outflow=2.88 cfs 0.427 af

Reach R-3: Avg. Flow Depth=0.06' Max Vel=1.10 fps Inflow=2.88 cfs 0.427 af
n=0.100 L=384.0' S=0.2188 '/' Capacity=27.72 cfs Outflow=2.79 cfs 0.427 af

Reach R-4: Avg. Flow Depth=0.06' Max Vel=1.11 fps Inflow=1.80 cfs 0.390 af
n=0.100 L=240.0' S=0.2250 '/' Capacity=17.63 cfs Outflow=1.76 cfs 0.390 af

Pond Pd 1: Peak Elev=370.54' Storage=20,386 cf Inflow=6.91 cfs 1.056 af
Outflow=3.56 cfs 0.880 af

Pond Pd 2: Peak Elev=370.64' Storage=6,897 cf Inflow=3.11 cfs 0.395 af
Outflow=1.80 cfs 0.390 af

Link POI 1: Inflow=0.98 cfs 0.123 af
Primary=0.98 cfs 0.123 af

Link POI 2: Inflow=7.73 cfs 2.088 af
Primary=7.73 cfs 2.088 af

Link POI 3: Inflow=3.67 cfs 0.845 af
Primary=3.67 cfs 0.845 af

Total Runoff Area = 26.392 ac Runoff Volume = 3.240 af Average Runoff Depth = 1.47"
100.00% Pervious = 26.392 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment P-1:

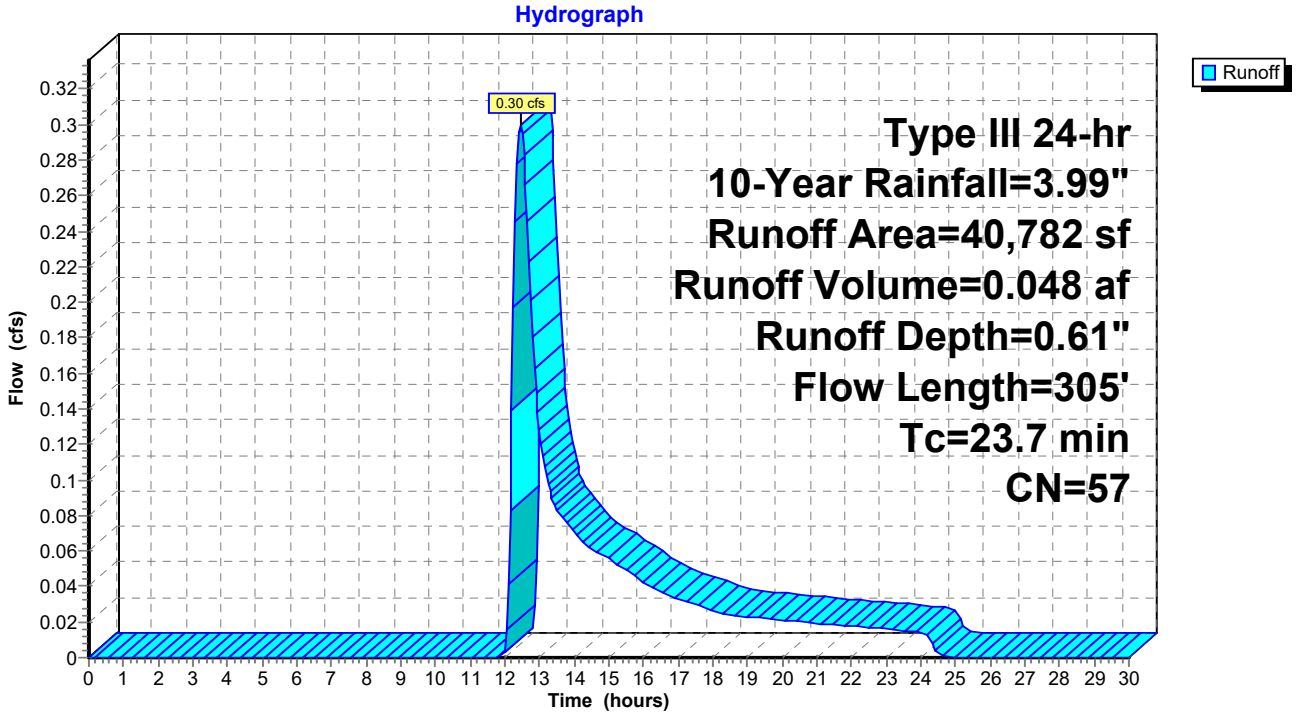
Runoff = 0.30 cfs @ 12.45 hrs, Volume= 0.048 af, Depth= 0.61"
Routed to Link POI 1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=3.99"

Area (sf)	CN	Description
2,453	77	Woods, Good, HSG D
32,581	55	Woods, Good, HSG B
5,748	61	Pasture/grassland/range, Good, HSG B
40,782	57	Weighted Average
40,782		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.2	100	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.73"
0.4	79	0.3500	2.96		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	126	0.1900	17.82	267.35	**Channel Flow,** Area= 15.0 sf Perim= 20.0' r= 0.75' n= 0.030 Earth, grassed & winding
23.7	305	Total			

Subcatchment P-1:



Summary for Subcatchment P-2:

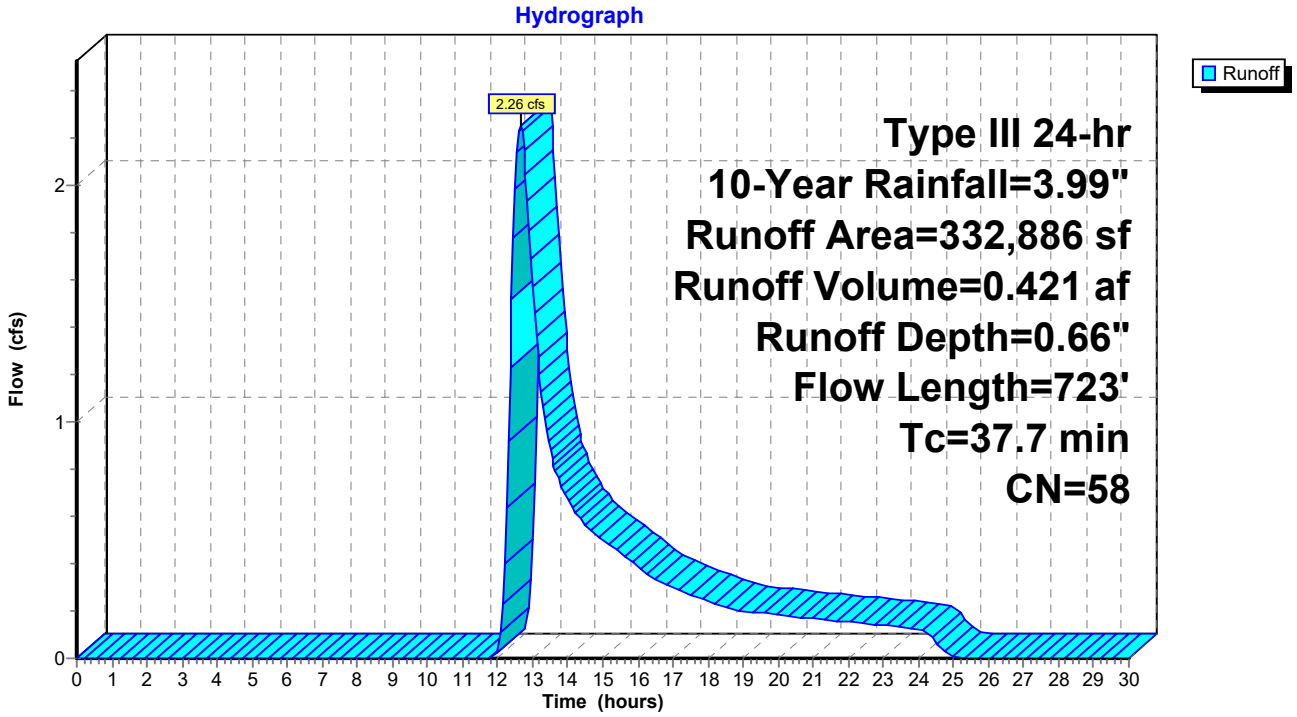
Runoff = 2.26 cfs @ 12.65 hrs, Volume= 0.421 af, Depth= 0.66"
Routed to Pond Pd 1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=3.99"

Area (sf)	CN	Description
801	30	Woods, Good, HSG A
2,794	39	Pasture/grassland/range, Good, HSG A
34,832	30	Woods, Good, HSG A
12,292	30	Woods, Good, HSG A
3,677	55	Woods, Good, HSG B
1,335	66	Panel <5% Non-Sheet, Good, HSG B
2,416	66	Panel <5% Non-Sheet, Good, HSG B
2,733	66	Panel <5% Non-Sheet, Good, HSG B
3,498	66	Panel <5% Non-Sheet, Good, HSG B
4,516	66	Panel <5% Non-Sheet, Good, HSG B
5,089	66	Panel <5% Non-Sheet, Good, HSG B
5,535	66	Panel <5% Non-Sheet, Good, HSG B
5,853	66	Panel <5% Non-Sheet, Good, HSG B
6,171	66	Panel <5% Non-Sheet, Good, HSG B
6,234	66	Panel <5% Non-Sheet, Good, HSG B
6,297	66	Panel <5% Non-Sheet, Good, HSG B
6,297	66	Panel <5% Non-Sheet, Good, HSG B
6,360	66	Panel <5% Non-Sheet, Good, HSG B
6,297	66	Panel <5% Non-Sheet, Good, HSG B
6,297	66	Panel <5% Non-Sheet, Good, HSG B
6,298	66	Panel <5% Non-Sheet, Good, HSG B
5,596	66	Panel <5% Non-Sheet, Good, HSG B
4,071	66	Panel <5% Non-Sheet, Good, HSG B
187,596	61	Pasture/grassland/range, Good, HSG B
332,886	58	Weighted Average
332,886		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.7	100	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.73"
7.0	623	0.0450	1.48		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
37.7	723	Total			

Subcatchment P-2:



Summary for Subcatchment P-2a:

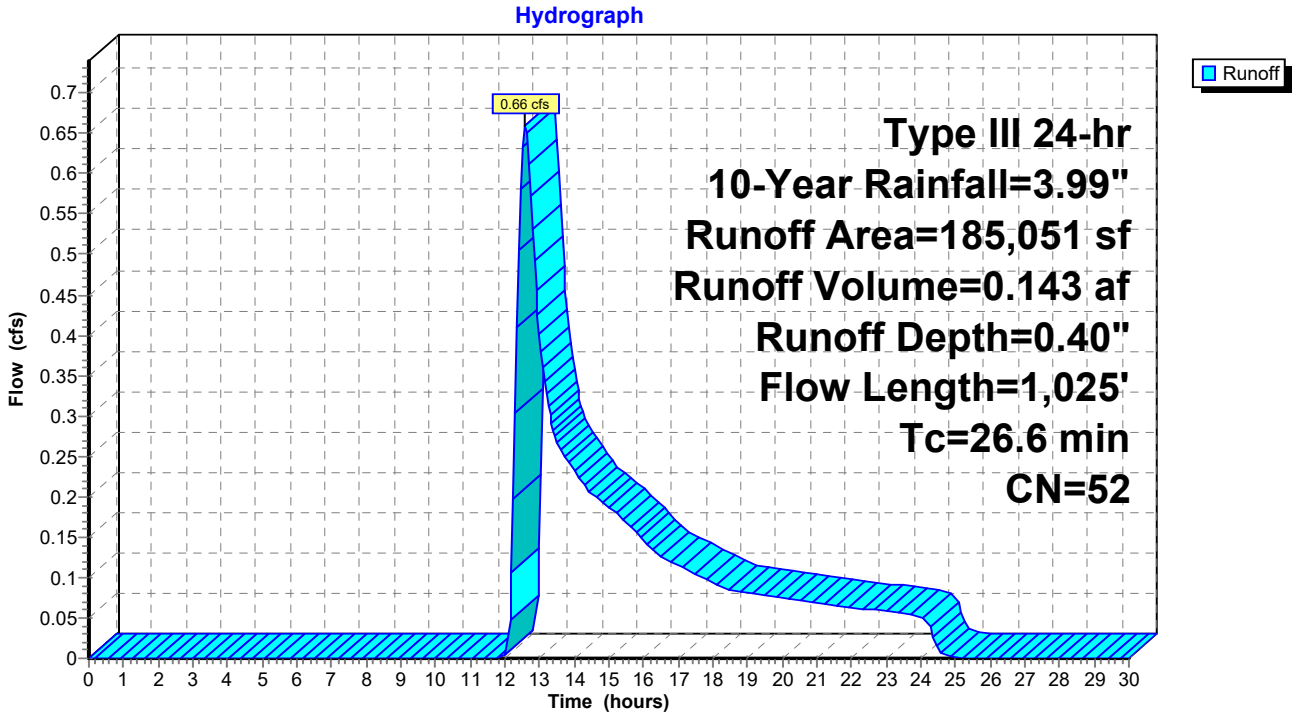
Runoff = 0.66 cfs @ 12.58 hrs, Volume= 0.143 af, Depth= 0.40"
Routed to Reach R-2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=3.99"

Area (sf)	CN	Description
788	39	Pasture/grassland/range, Good, HSG A
28,442	30	Woods, Good, HSG A
1	30	Woods, Good, HSG A
701	30	Woods, Good, HSG A
12	30	Woods, Good, HSG A
4	30	Woods, Good, HSG A
89	30	Woods, Good, HSG A
2,522	96	Gravel surface, HSG A
1,287	96	Gravel surface, HSG A
1,265	96	Gravel surface, HSG A
12,775	39	Pasture/grassland/range, Good, HSG A
2,484	39	Pasture/grassland/range, Good, HSG A
5,048	39	Pasture/grassland/range, Good, HSG A
3,607	39	Pasture/grassland/range, Good, HSG A
22,954	30	Woods, Good, HSG A
9,373	96	Gravel surface, HSG B
4,199	55	Woods, Good, HSG B
89,500	61	Pasture/grassland/range, Good, HSG B
185,051	52	Weighted Average
185,051		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.2	100	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.73"
1.0	477	0.0650	7.96	119.33	**Channel Flow,** Area= 15.0 sf Perim= 30.0' r= 0.50' n= 0.030 Earth, grassed & winding
2.4	448	0.0100	3.12	46.81	**Channel Flow,** Area= 15.0 sf Perim= 30.0' r= 0.50' n= 0.030 Earth, grassed & winding
26.6	1,025	Total			

Subcatchment P-2a:



Summary for Subcatchment P-2b:

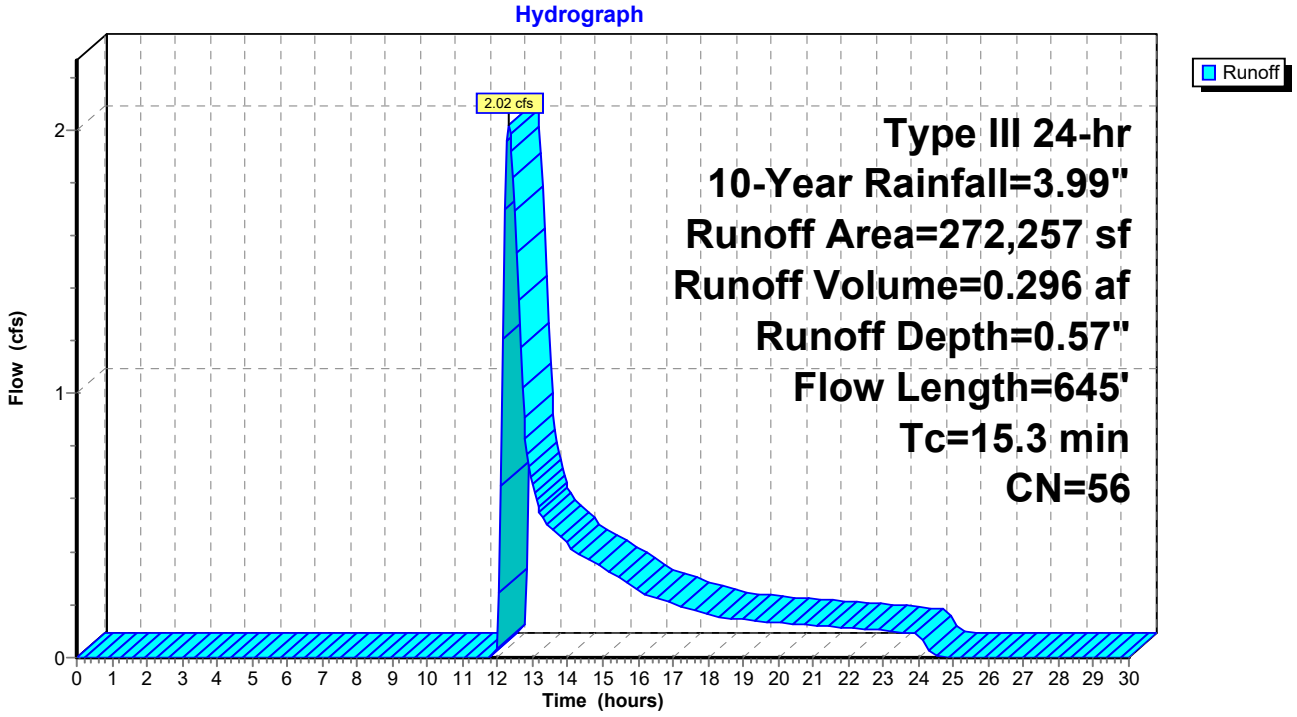
Runoff = 2.02 cfs @ 12.31 hrs, Volume= 0.296 af, Depth= 0.57"
Routed to Link POI 2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=3.99"

Area (sf)	CN	Description
42,941	61	Pasture/grassland/range, Good, HSG B
9	61	Pasture/grassland/range, Good, HSG B
229,307	55	Woods, Good, HSG B
272,257	56	Weighted Average
272,257		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	100	0.0150	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.73"
3.2	368	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	177	0.1500	12.09	181.28	**Channel Flow,** Area= 15.0 sf Perim= 30.0' r= 0.50' n= 0.030 Earth, grassed & winding
15.3	645	Total			

Subcatchment P-2b:



Summary for Subcatchment P-3:

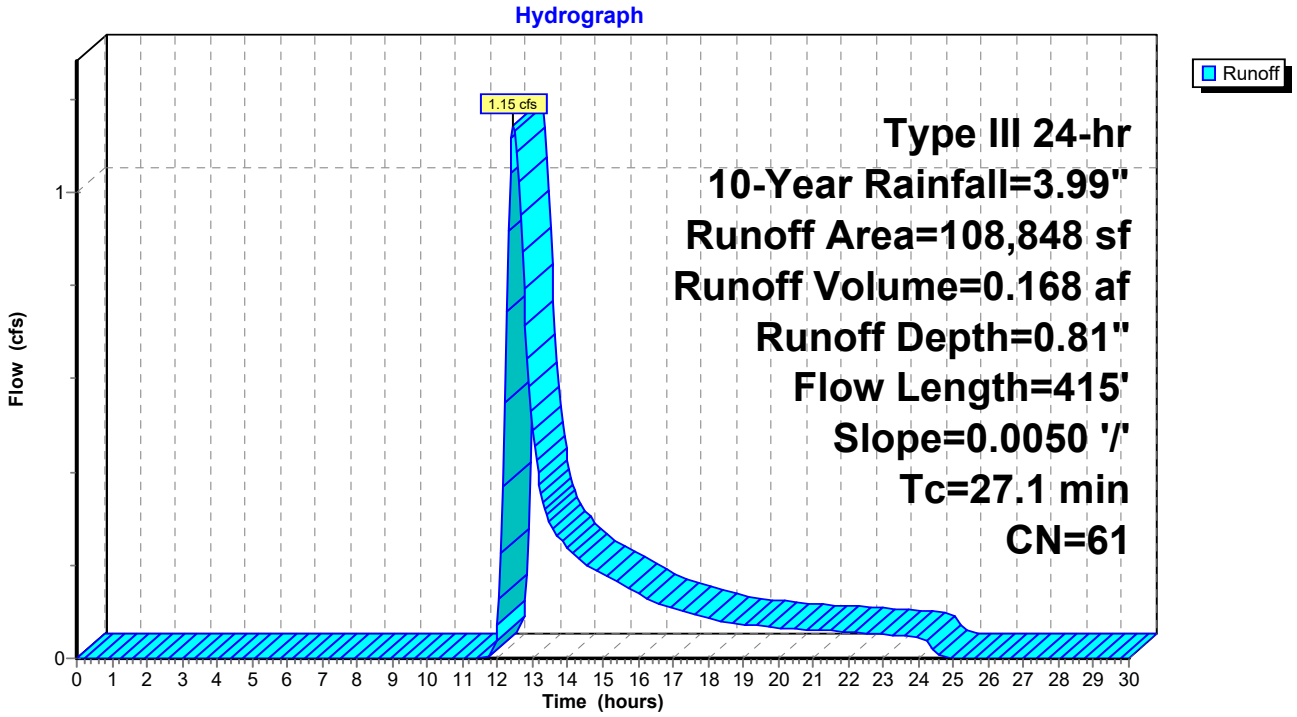
Runoff = 1.15 cfs @ 12.46 hrs, Volume= 0.168 af, Depth= 0.81"
Routed to Pond Pd 2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=3.99"

Area (sf)	CN	Description
2,672	61	Panel <5% Sheet, Good, HSG B
2,925	61	Panel <5% Sheet, Good, HSG B
3,116	61	Panel <5% Sheet, Good, HSG B
3,116	61	Panel <5% Sheet, Good, HSG B
3,307	61	Panel <5% Sheet, Good, HSG B
3,180	61	Panel <5% Sheet, Good, HSG B
3,307	61	Panel <5% Sheet, Good, HSG B
3,307	61	Panel <5% Sheet, Good, HSG B
3,371	61	Panel <5% Sheet, Good, HSG B
3,942	61	Panel <5% Sheet, Good, HSG B
3,940	61	Panel <5% Sheet, Good, HSG B
3,937	61	Panel <5% Sheet, Good, HSG B
68,728	61	Pasture/grassland/range, Good, HSG B
108,848	61	Weighted Average
108,848		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	100	0.0050	0.10		**Sheet Flow,** Range n= 0.130 P2= 2.73"
10.6	315	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
27.1	415	Total			

Subcatchment P-3:



Summary for Subcatchment P-3a:

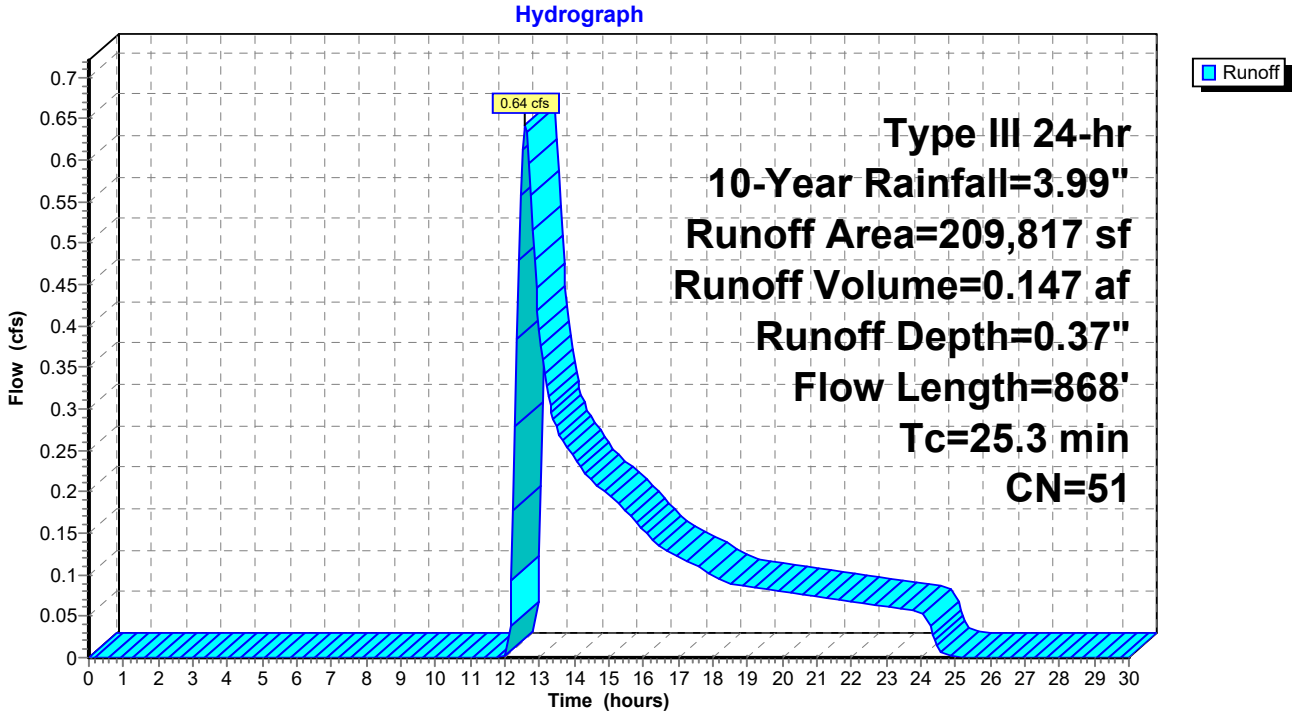
Runoff = 0.64 cfs @ 12.58 hrs, Volume= 0.147 af, Depth= 0.37"
Routed to Link POI 3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=3.99"

Area (sf)	CN	Description
38,989	30	Woods, Good, HSG A
148,823	55	Woods, Good, HSG B
22,004	61	Pasture/grassland/range, Good, HSG B
209,817	51	Weighted Average
209,817		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.2	100	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.73"
1.2	196	0.3000	2.74		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	572	0.1180	10.72	160.78	**Channel Flow,** Area= 15.0 sf Perim= 30.0' r= 0.50' n= 0.030 Earth, grassed & winding
25.3	868	Total			

Subcatchment P-3a:



Summary for Reach R-1:

Inflow Area = 7.642 ac, 0.00% Impervious, Inflow Depth > 0.41" for 10-Year event
Inflow = 0.21 cfs @ 18.49 hrs, Volume= 0.261 af
Outflow = 0.21 cfs @ 18.55 hrs, Volume= 0.260 af, Atten= 0%, Lag= 3.6 min
Routed to Link POI 2 :

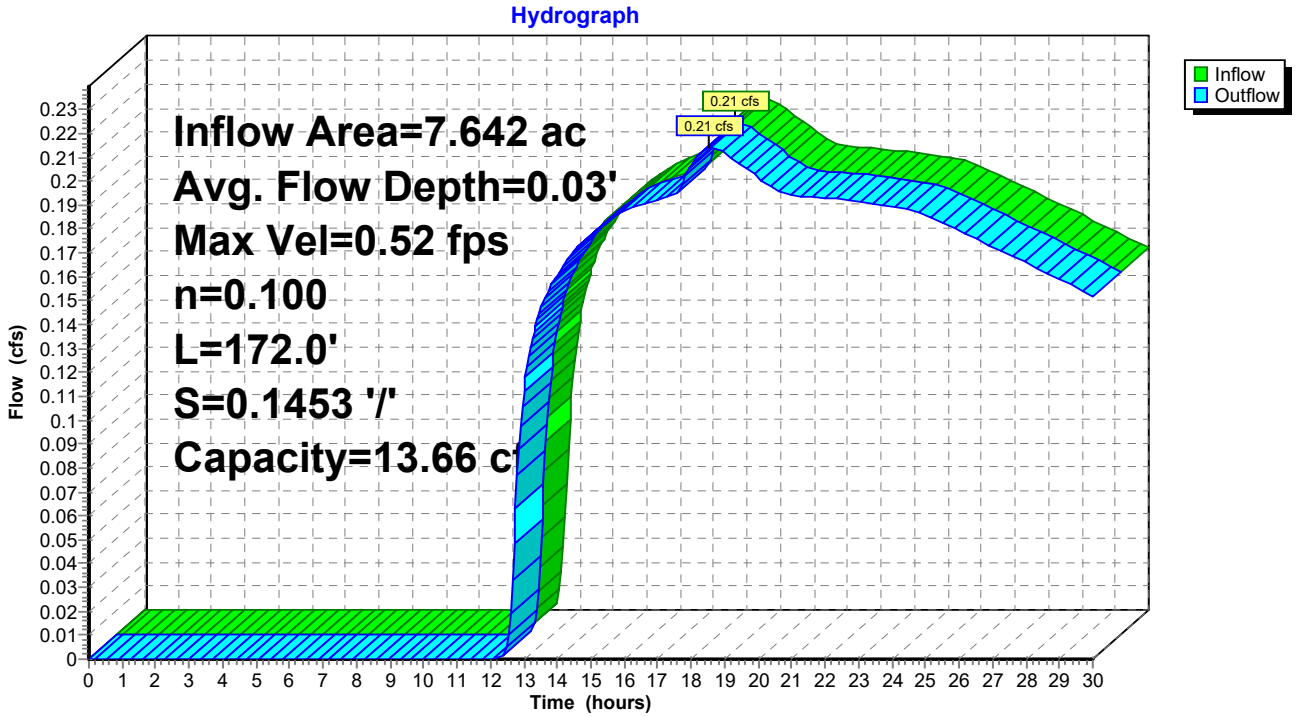
Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.52 fps, Min. Travel Time= 5.6 min
Avg. Velocity = 0.47 fps, Avg. Travel Time= 6.1 min

Peak Storage= 71 cf @ 18.55 hrs
Average Depth at Peak Storage= 0.03' , Surface Width= 15.17'
Bank-Full Depth= 0.33' Flow Area= 5.3 sf, Capacity= 13.66 cfs

15.00' x 0.33' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 3.0 '/' Top Width= 16.98'
Length= 172.0' Slope= 0.1453 '/'
Inlet Invert= 365.00', Outlet Invert= 340.00'

‡

Reach R-1:



Summary for Reach R-2:

Inflow Area = 4.248 ac, 0.00% Impervious, Inflow Depth = 0.40" for 10-Year event
Inflow = 0.66 cfs @ 12.58 hrs, Volume= 0.143 af
Outflow = 0.62 cfs @ 12.69 hrs, Volume= 0.143 af, Atten= 6%, Lag= 6.5 min
Routed to Reach R-3 :

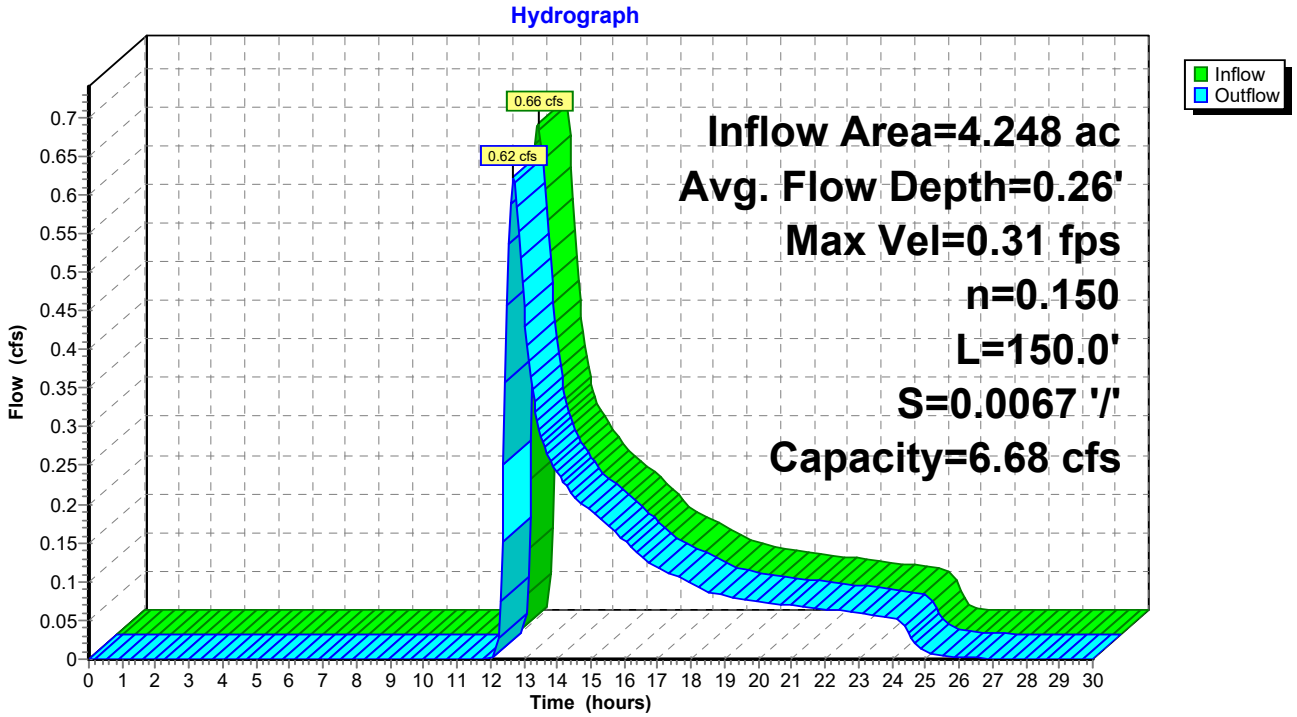
Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.31 fps, Min. Travel Time= 8.1 min
Avg. Velocity = 0.13 fps, Avg. Travel Time= 19.6 min

Peak Storage= 303 cf @ 12.69 hrs
Average Depth at Peak Storage= 0.26' , Surface Width= 8.56'
Bank-Full Depth= 1.00' Flow Area= 10.0 sf, Capacity= 6.68 cfs

7.00' x 1.00' deep channel, n= 0.150 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 150.0' Slope= 0.0067 '/'
Inlet Invert= 371.00', Outlet Invert= 370.00'

‡

Reach R-2:



Summary for Reach R-3:

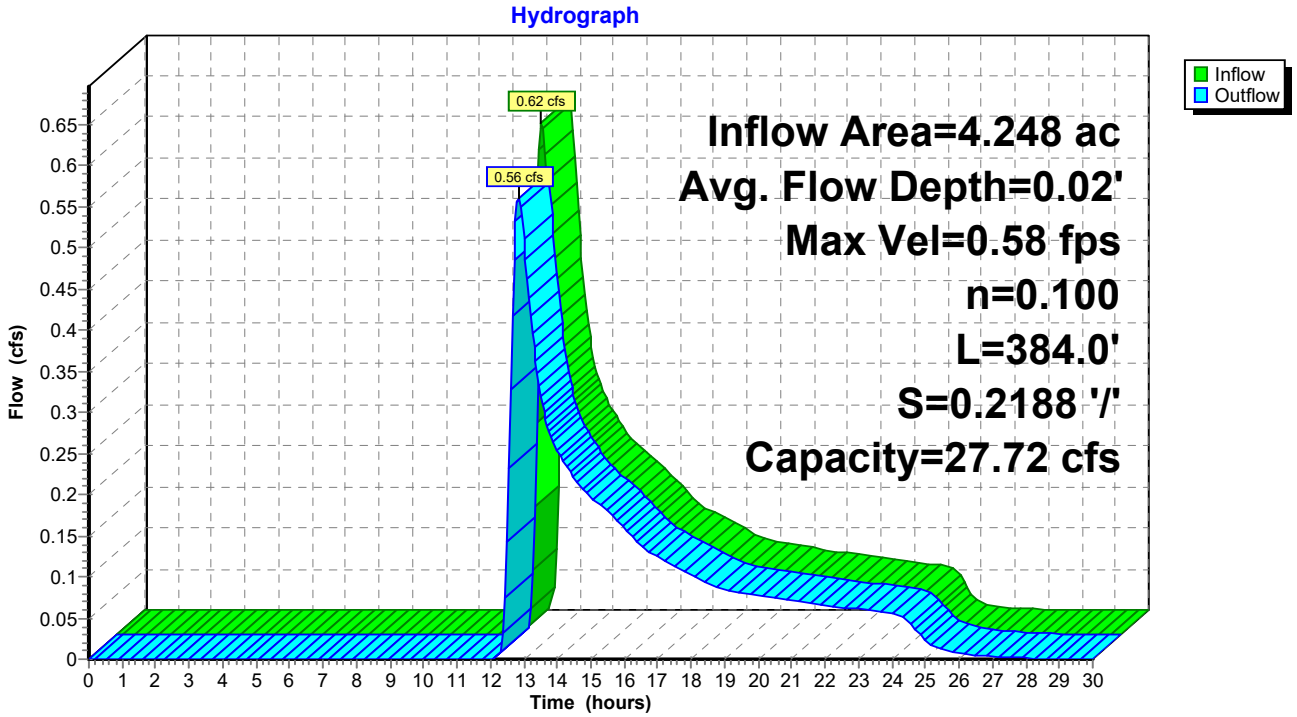
Inflow Area = 4.248 ac, 0.00% Impervious, Inflow Depth = 0.40" for 10-Year event
Inflow = 0.62 cfs @ 12.69 hrs, Volume= 0.143 af
Outflow = 0.56 cfs @ 12.84 hrs, Volume= 0.143 af, Atten= 10%, Lag= 9.1 min
Routed to Link POI 2 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.58 fps, Min. Travel Time= 11.0 min
Avg. Velocity = 0.26 fps, Avg. Travel Time= 24.9 min

Peak Storage= 371 cf @ 12.84 hrs
Average Depth at Peak Storage= 0.02' , Surface Width= 40.14'
Bank-Full Depth= 0.25' Flow Area= 10.2 sf, Capacity= 27.72 cfs

40.00' x 0.25' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 3.0 '/' Top Width= 41.50'
Length= 384.0' Slope= 0.2188 '/'
Inlet Invert= 370.00', Outlet Invert= 286.00'

Reach R-3:



Summary for Reach R-4:

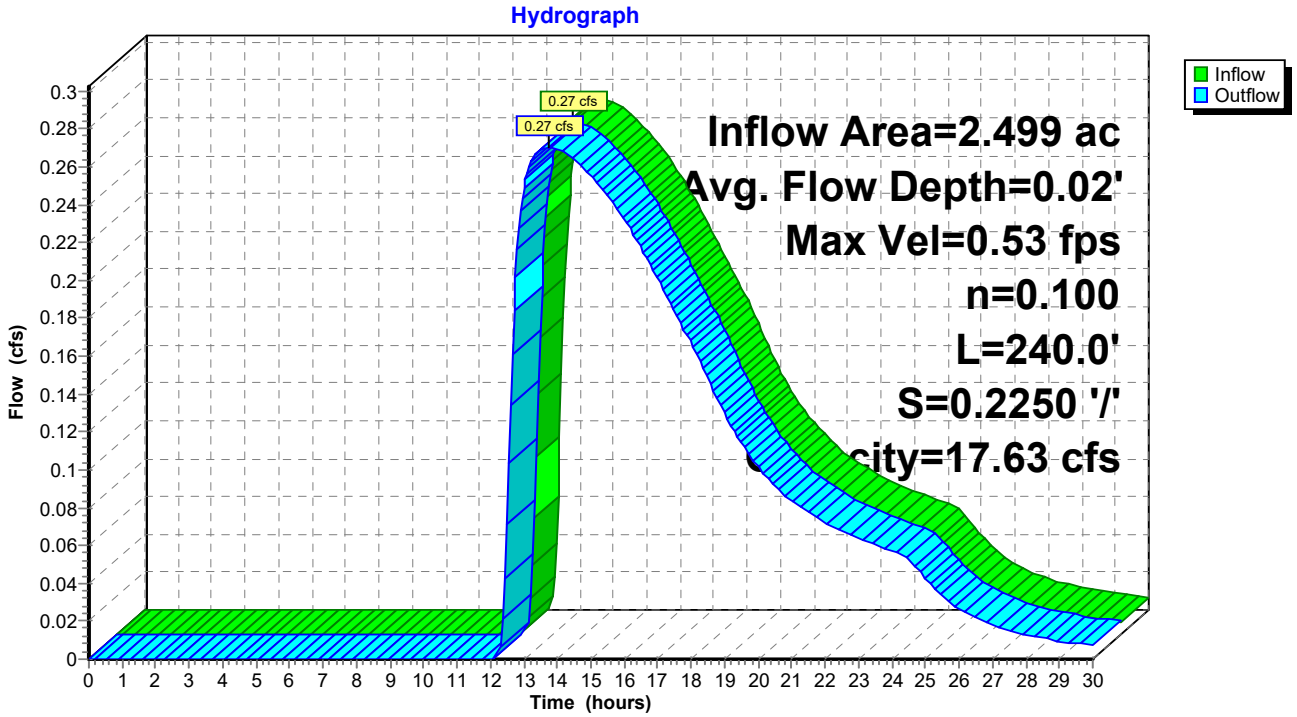
Inflow Area = 2.499 ac, 0.00% Impervious, Inflow Depth > 0.79" for 10-Year event
Inflow = 0.27 cfs @ 13.64 hrs, Volume= 0.164 af
Outflow = 0.27 cfs @ 13.73 hrs, Volume= 0.163 af, Atten= 0%, Lag= 5.0 min
Routed to Link POI 3 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.53 fps, Min. Travel Time= 7.6 min
Avg. Velocity = 0.33 fps, Avg. Travel Time= 12.0 min

Peak Storage= 123 cf @ 13.73 hrs
Average Depth at Peak Storage= 0.02' , Surface Width= 25.12'
Bank-Full Depth= 0.25' Flow Area= 6.4 sf, Capacity= 17.63 cfs

25.00' x 0.25' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 3.0 '/' Top Width= 26.50'
Length= 240.0' Slope= 0.2250 '/'
Inlet Invert= 366.00', Outlet Invert= 312.00'

Reach R-4:



Summary for Pond Pd 1:

Inflow Area = 7.642 ac, 0.00% Impervious, Inflow Depth = 0.66" for 10-Year event
Inflow = 2.26 cfs @ 12.65 hrs, Volume= 0.421 af
Outflow = 0.21 cfs @ 18.49 hrs, Volume= 0.261 af, Atten= 91%, Lag= 350.3 min
Primary = 0.21 cfs @ 18.49 hrs, Volume= 0.261 af
Routed to Reach R-1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 369.50' Surf.Area= 11,888 sf Storage= 5,464 cf
Peak Elev= 370.31' @ 18.49 hrs Surf.Area= 15,844 sf Storage= 16,500 cf (11,036 cf above start)

Plug-Flow detention time= 753.1 min calculated for 0.136 af (32% of inflow)
Center-of-Mass det. time= 344.4 min (1,277.1 - 932.7)

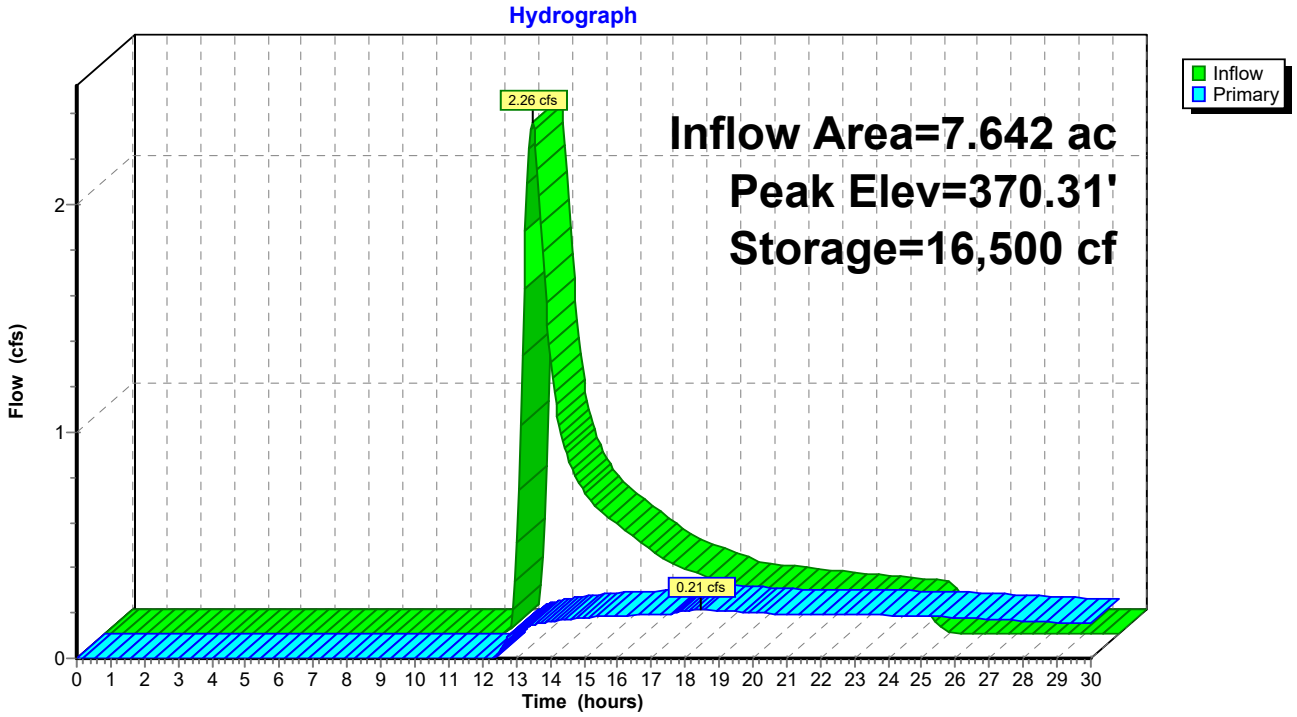
Volume	Invert	Avail.Storage	Storage Description
#1	369.00'	29,057 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
369.00	9,995	708.0	0	0	9,995
370.00	13,946	913.0	11,916	11,916	36,451
371.00	20,550	1,325.0	17,142	29,057	109,835

Device	Routing	Invert	Outlet Devices
#1	Primary	367.50'	**12.0" Round Culvert** L= 30.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 367.50' / 367.00' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	369.50'	**3.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	370.30'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	370.50'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.21 cfs @ 18.49 hrs HW=370.31' TW=365.03' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.21 cfs of 5.75 cfs potential flow)
  - **2=Orifice** (Orifice Controls 0.20 cfs @ 3.98 fps)
  - **3=Grate** (Weir Controls 0.02 cfs @ 0.29 fps)
- **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pd 1:


Hydrograph
Inflow
Primary
2.26 cfs
0.21 cfs
Inflow Area=7.642 ac
Peak Elev=370.31'
Storage=16,500 cf
Flow (cfs)
0
1
2
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Summary for Pond Pd 2:

Inflow Area = 2.499 ac, 0.00% Impervious, Inflow Depth = 0.81" for 10-Year event
Inflow = 1.15 cfs @ 12.46 hrs, Volume= 0.168 af
Outflow = 0.27 cfs @ 13.64 hrs, Volume= 0.164 af, Atten= 76%, Lag= 71.2 min
Primary = 0.27 cfs @ 13.64 hrs, Volume= 0.164 af
Routed to Reach R-4 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 369.50' Surf.Area= 3,651 sf Storage= 1,627 cf
Peak Elev= 370.08' @ 13.64 hrs Surf.Area= 4,647 sf Storage= 4,032 cf (2,405 cf above start)

Plug-Flow detention time= 293.2 min calculated for 0.126 af (75% of inflow)
Center-of-Mass det. time= 126.1 min (1,036.4 - 910.2)

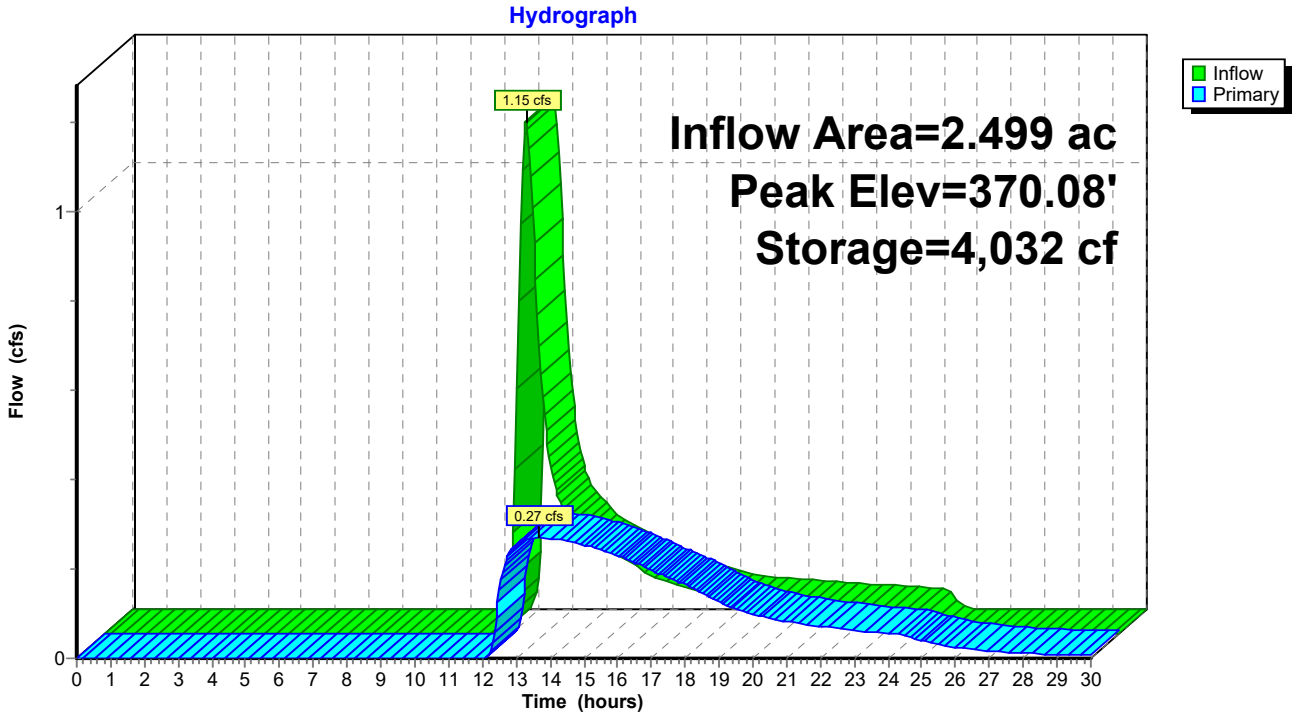
Volume	Invert	Avail.Storage	Storage Description
#1	369.00'	10,296 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
369.00	2,873	539.0	0	0	2,873
370.00	4,521	558.0	3,666	3,666	4,620
371.00	6,225	577.0	5,350	9,016	6,427
371.20	6,572	581.0	1,280	10,296	6,814

Device	Routing	Invert	Outlet Devices
#1	Primary	366.50'	**12.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 366.50' / 366.00' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	370.50'	**24.0" x 24.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	370.80'	**10.0' 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
#4	Device 1	369.50'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.27 cfs @ 13.64 hrs HW=370.08' TW=366.02' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.27 cfs of 6.64 cfs potential flow)
  - **2=Grate** (Controls 0.00 cfs)
  - **4=Orifice/Grate** (Orifice Controls 0.27 cfs @ 3.10 fps)
- **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pd 2:

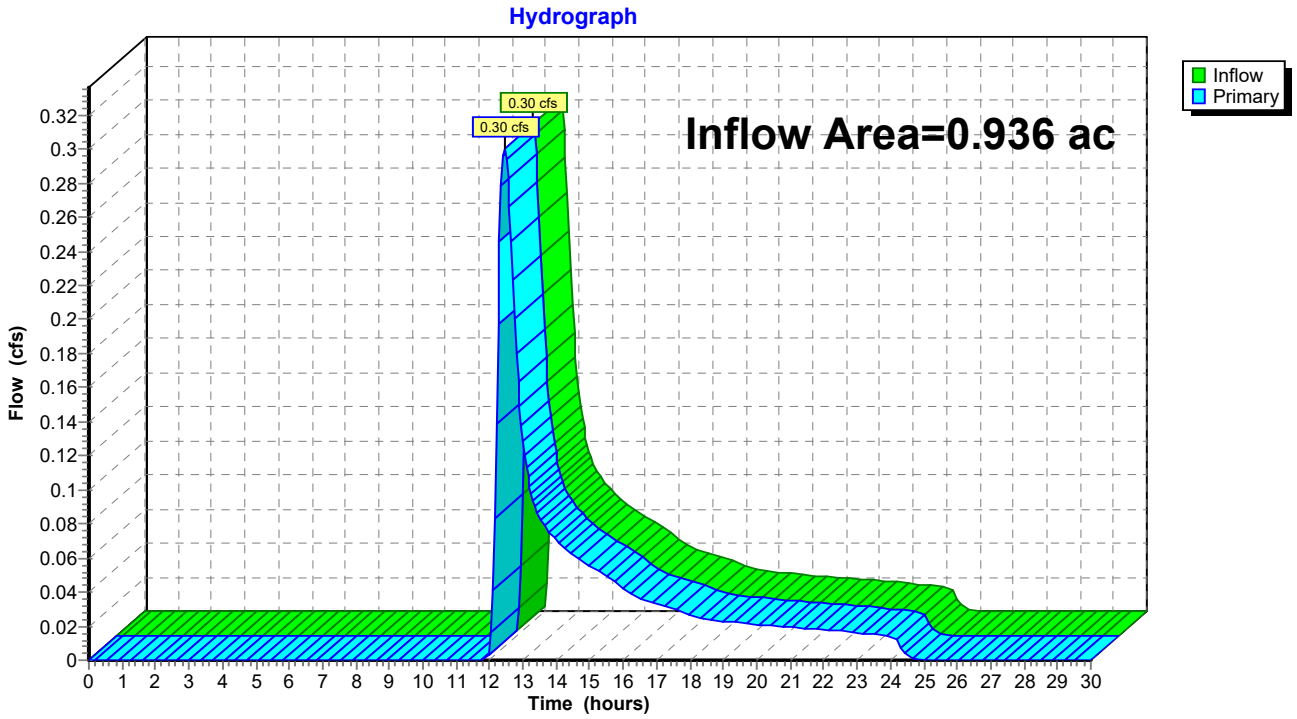

Hydrograph
Inflow
Primary
1.15 cfs
0.27 cfs
Inflow Area=2.499 ac
Peak Elev=370.08'
Storage=4,032 cf
Flow (cfs)
0
1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Time (hours)

Summary for Link POI 1:

Inflow Area = 0.936 ac, 0.00% Impervious, Inflow Depth = 0.61" for 10-Year event
Inflow = 0.30 cfs @ 12.45 hrs, Volume= 0.048 af
Primary = 0.30 cfs @ 12.45 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 1:

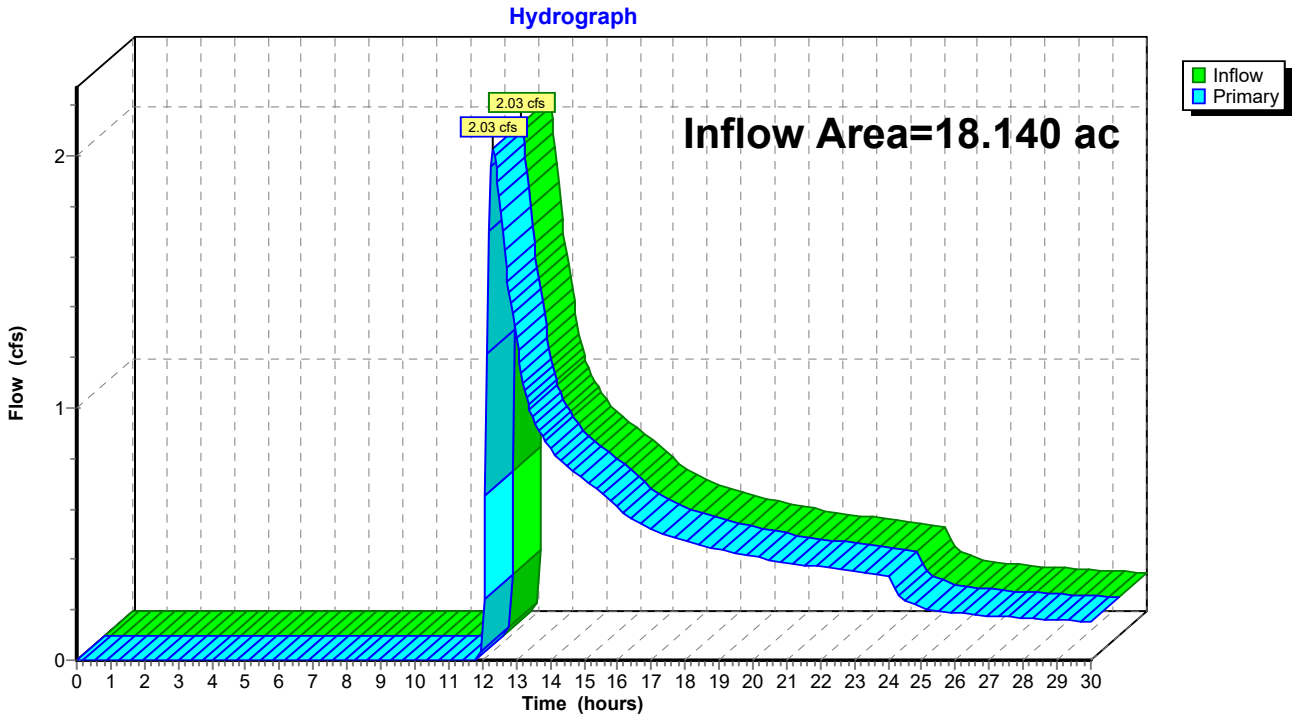


Summary for Link POI 2:

Inflow Area = 18.140 ac, 0.00% Impervious, Inflow Depth > 0.46" for 10-Year event
Inflow = 2.03 cfs @ 12.31 hrs, Volume= 0.699 af
Primary = 2.03 cfs @ 12.31 hrs, Volume= 0.699 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 2:

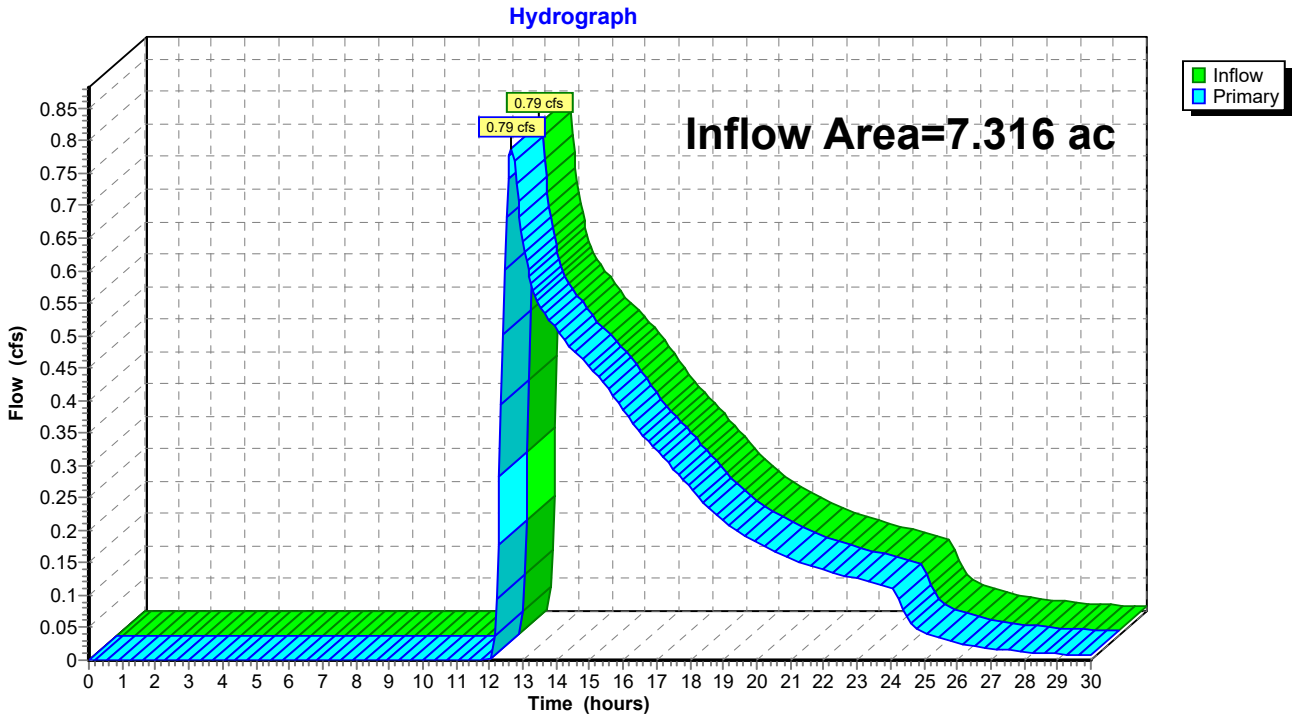


Summary for Link POI 3:

Inflow Area = 7.316 ac, 0.00% Impervious, Inflow Depth > 0.51" for 10-Year event
Inflow = 0.79 cfs @ 12.65 hrs, Volume= 0.310 af
Primary = 0.79 cfs @ 12.65 hrs, Volume= 0.310 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link POI 3:



ADDITIONAL CALCULATIONS

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RIPRAP OUTLET APRON SIZING CALCULATIONS

DESCRIPTION / ID **POND 1**

Do=	Diameter of pipe or width of channel(ft)	Do=	1
Q=	Discharge from pipe or channel(cfs)	Q10=	0.16
La=	Length of apron(ft)	Tw =	0.1
Wa=	Width of apron at the outlet(ft)	Tw<1/2Do?	YES
Tw=	Tailwater at outlet(depth above invert(ft))	Well defined channel?	no
W =	Width of apron at the downstream end(ft)		

Wa= 3*Do = 3

When Tailwater depth at the outlet of the pipe or channel is less than one half the diameter of the pipe or one half the width of the channel

$$La = \frac{1.8*Q}{Do^{3/2}} + 7*Do = 7.288$$

When Tailwater depth at the outlet of the pipe or channel is equal to or greater than one half the diameter of the pipe or one half the width of the channel

$$La = \frac{3.0*Q}{Do^{3/2}} + 7*Do = N/A$$

When Tailwater depth at the outlet of the pipe or channel is less than one half the diameter of the pipe or one half the width of the channel

*W= 3*Do+La = 10.288

When Tailwater depth at the outlet of the pipe or channel is equal to or greater than one half the diameter of the pipe or one half the width of the channel

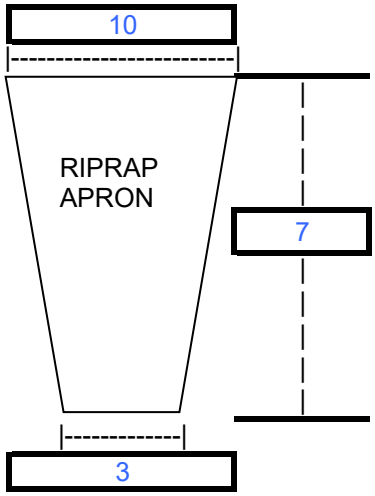
*W= 3*Do+0.4*La = N/A

*Where there is a stable well-defined channel downstream of the apron the bottom width of the apron shall be equal to the width of the channel

Rip-Rap size (need depth of TW)

$$D_{50=} \frac{0.02*Q^{(4/3)}}{T_w*D_o} = 0.02 \text{ feet} \quad 0.21 \text{ inches}$$

$D_{50=}$ 4 inches



Rip-Rap thickness:

$2.25*D_{50}=$ 9 inches

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RIPRAP OUTLET APRON SIZING CALCULATIONS

DESCRIPTION / ID **POND 2**

Do=	Diameter of pipe or width of channel(ft)	Do=	1
Q=	Discharge from pipe or channel(cfs)	Q10=	0.15
La=	Length of apron(ft)	Tw =	0.1
Wa=	Width of apron at the outlet(ft)	Tw<1/2Do?	YES
Tw=	Tailwater at outlet(depth above invert(ft))	Well defined channel?	yes
W =	Width of apron at the downstream end(ft)		

Wa= 3*Do = 3

When Tailwater depth at the outlet of the pipe or channel is less than one half the diameter of the pipe or one half the width of the channel

$$La = \frac{1.8*Q}{Do^{3/2}} + 7*Do = 7.270$$

When Tailwater depth at the outlet of the pipe or channel is equal to or greater than one half the diameter of the pipe or one half the width of the channel

$$La = \frac{3.0*Q}{Do^{3/2}} + 7*Do = N/A$$

When Tailwater depth at the outlet of the pipe or channel is less than one half the diameter of the pipe or one half the width of the channel

*W= 3*Do+La = 10.270

When Tailwater depth at the outlet of the pipe or channel is equal to or greater than one half the diameter of the pipe or one half the width of the channel

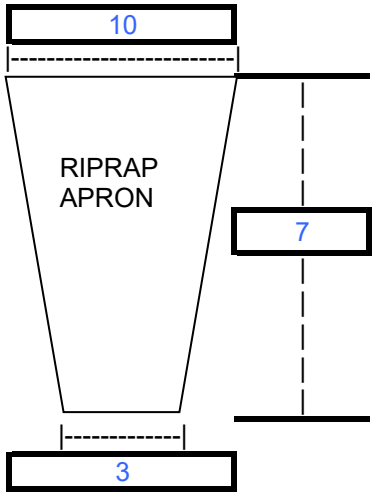
*W= 3*Do+0.4*La = N/A

*Where there is a stable well-defined channel downstream of the apron the bottom width of the apron shall be equal to the width of the channel

Rip-Rap size (need depth of TW)

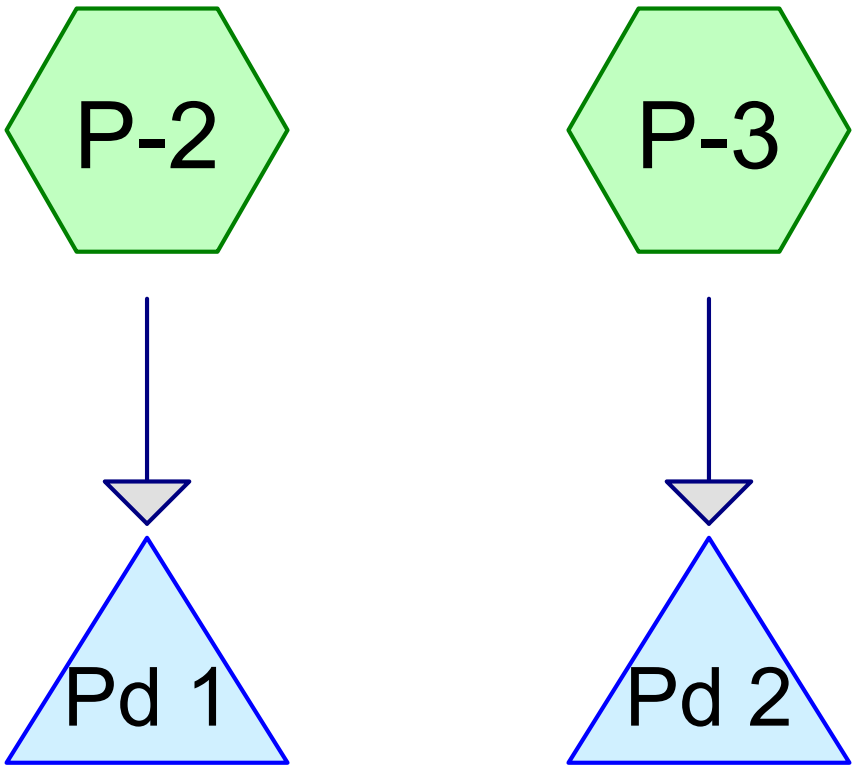
$$D_{50=} \frac{0.02*Q^{(4/3)}}{T_w*D_o} = 0.02 \text{ feet} \quad 0.19 \text{ inches}$$

$D_{50=}$ 4 inches



Rip-Rap thickness:

$2.25*D_{50}=$ 9 inches



Subcat Reach Pond Link

Routing Diagram for 101025.000 Bare Conditions Calcs
Prepared by Nobis Engineering Inc, Printed 12/4/2025

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.064	77	Newly graded area, HSG A (P-2)
8.892	86	Newly graded area, HSG B (P-2, P-3)
1.100	30	Woods, Good, HSG A (P-2)
0.084	55	Woods, Good, HSG B (P-2)
10.141	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
1.164	HSG A	P-2
8.976	HSG B	P-2, P-3
0.000	HSG C	
0.000	HSG D	
0.000	Other	
10.141		**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P-2: Runoff Area=332,885 sf 0.00% Impervious Runoff Depth=0.94"
Flow Length=723' Tc=35.6 min CN=78 Runoff=4.20 cfs 0.599 af

Subcatchment P-3: Runoff Area=108,848 sf 0.00% Impervious Runoff Depth=1.43"
Flow Length=415' Slope=0.0050 '/' Tc=16.3 min CN=86 Runoff=3.05 cfs 0.299 af

Pond Pd 1: Peak Elev=370.41' Storage=18,117 cf Inflow=4.20 cfs 0.599 af
Outflow=0.61 cfs 0.550 af

Pond Pd 2: Peak Elev=370.44' Storage=5,790 cf Inflow=3.05 cfs 0.299 af
Outflow=0.66 cfs 0.265 af

Total Runoff Area = 10.141 ac Runoff Volume = 0.898 af Average Runoff Depth = 1.06"
100.00% Pervious = 10.141 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment P-2:

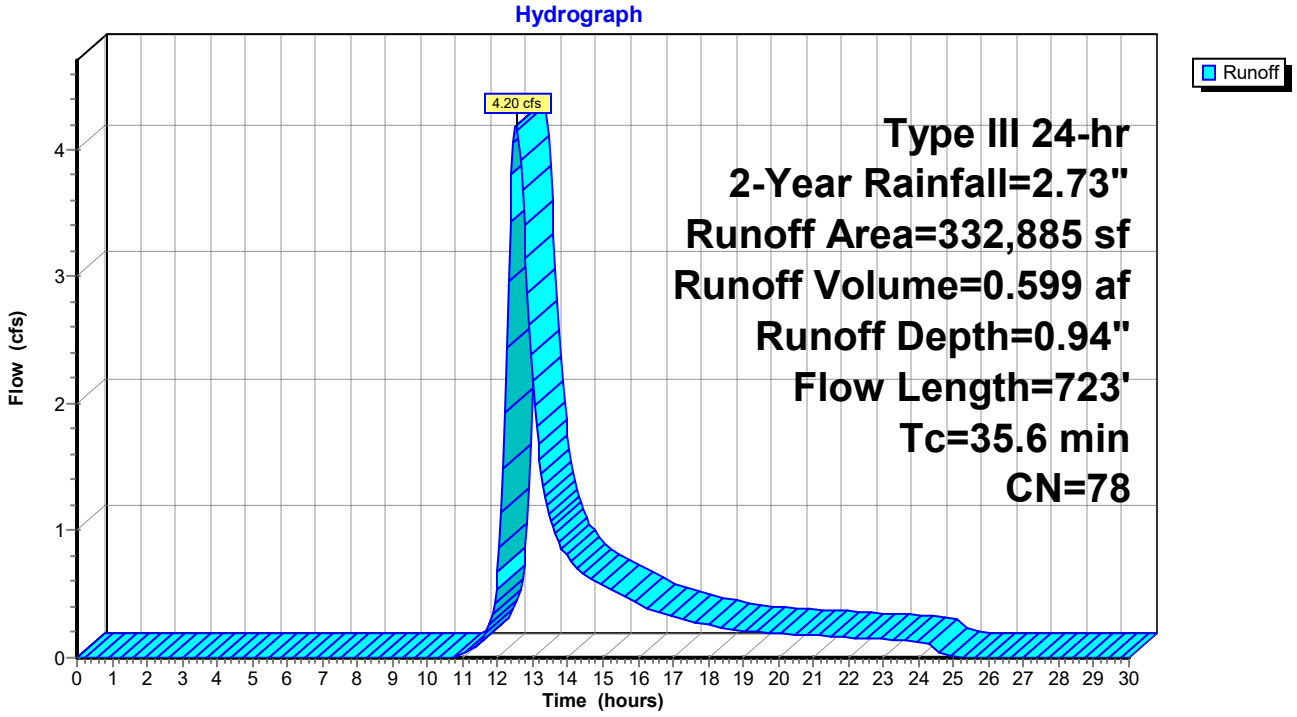
Runoff = 4.20 cfs @ 12.53 hrs, Volume= 0.599 af, Depth= 0.94"
Routed to Pond Pd 1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=2.73"

Area (sf)	CN	Description
801	30	Woods, Good, HSG A
2,794	77	Newly graded area, HSG A
34,832	30	Woods, Good, HSG A
12,292	30	Woods, Good, HSG A
278,489	86	Newly graded area, HSG B
3,677	55	Woods, Good, HSG B
332,885	78	Weighted Average
332,885		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.7	100	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.73"
4.9	623	0.0450	2.12		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
35.6	723	Total			

Subcatchment P-2:



Summary for Subcatchment P-3:

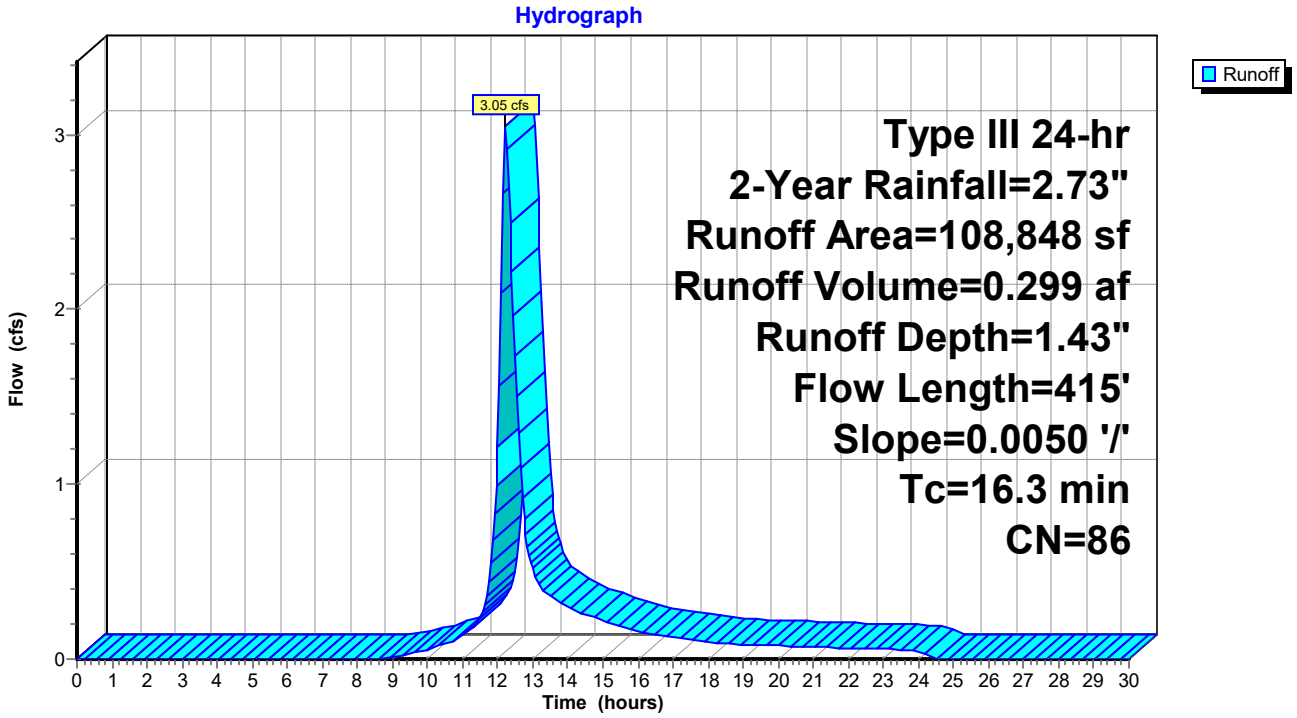
Runoff = 3.05 cfs @ 12.23 hrs, Volume= 0.299 af, Depth= 1.43"
Routed to Pond Pd 2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=2.73"

Area (sf)	CN	Description
108,848	86	Newly graded area, HSG B
108,848		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	100	0.0050	0.19		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.73"
7.4	315	0.0050	0.71		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
16.3	415	Total			

Subcatchment P-3:



Summary for Pond Pd 1:

Inflow Area = 7.642 ac, 0.00% Impervious, Inflow Depth = 0.94" for 2-Year event
Inflow = 4.20 cfs @ 12.53 hrs, Volume= 0.599 af
Outflow = 0.61 cfs @ 14.73 hrs, Volume= 0.550 af, Atten= 86%, Lag= 131.7 min
Primary = 0.61 cfs @ 14.73 hrs, Volume= 0.550 af
Routed to nonexistent node R-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 369.50' Surf.Area= 11,888 sf Storage= 5,464 cf
Peak Elev= 370.41' @ 14.73 hrs Surf.Area= 16,486 sf Storage= 18,117 cf (12,653 cf above start)

Plug-Flow detention time= 438.5 min calculated for 0.425 af (71% of inflow)
Center-of-Mass det. time= 246.9 min (1,132.6 - 885.8)

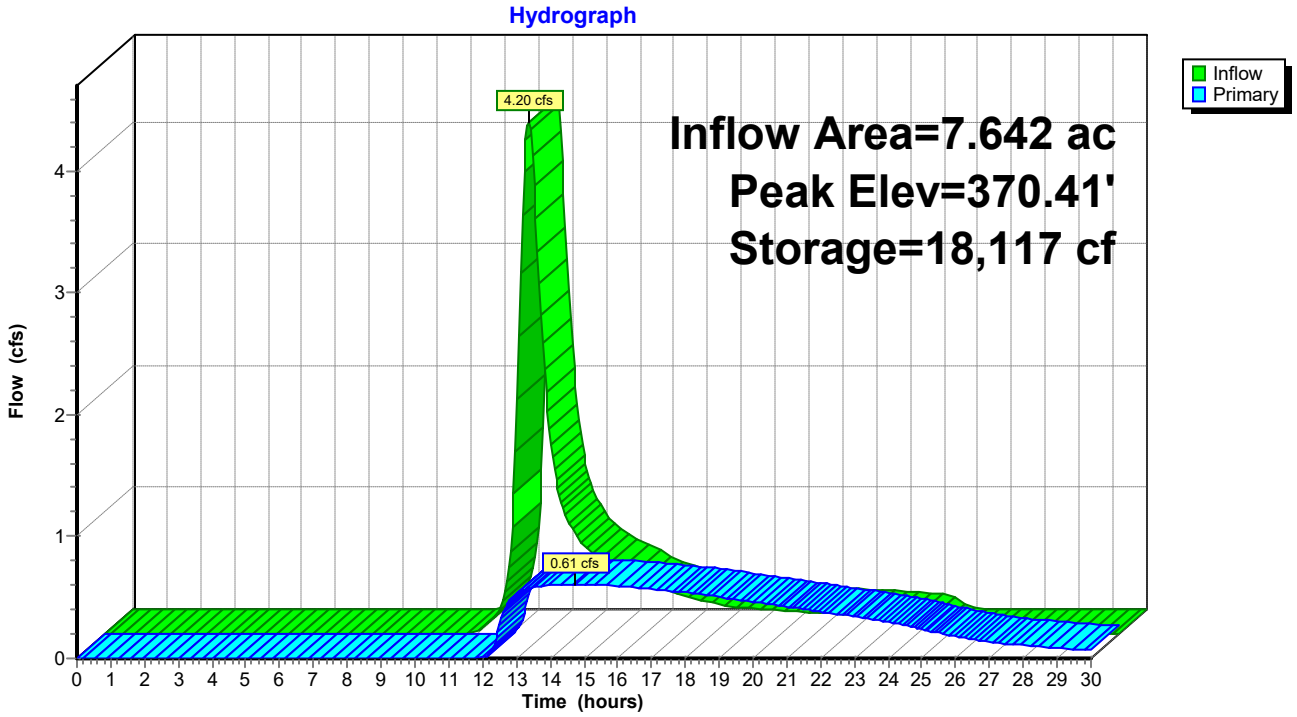
Volume	Invert	Avail.Storage	Storage Description
#1	369.00'	29,057 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
369.00	9,995	708.0	0	0	9,995
370.00	13,946	913.0	11,916	11,916	36,451
371.00	20,550	1,325.0	17,142	29,057	109,835

Device	Routing	Invert	Outlet Devices
#1	Primary	369.50'	**6.0" Round Culvert** L= 35.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 369.50' / 369.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Primary	370.50'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.61 cfs @ 14.73 hrs HW=370.41' (Free Discharge)
1=Culvert (Inlet Controls 0.61 cfs @ 3.08 fps)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond Pd 1:


Hydrograph
Inflow
Primary
4.20 cfs
0.61 cfs
Inflow Area=7.642 ac
Peak Elev=370.41'
Storage=18,117 cf
Flow (cfs)
0
1
2
3
4
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Summary for Pond Pd 2:

Inflow Area = 2.499 ac, 0.00% Impervious, Inflow Depth = 1.43" for 2-Year event
Inflow = 3.05 cfs @ 12.23 hrs, Volume= 0.299 af
Outflow = 0.66 cfs @ 12.84 hrs, Volume= 0.265 af, Atten= 78%, Lag= 36.5 min
Primary = 0.66 cfs @ 12.84 hrs, Volume= 0.265 af
Routed to nonexistent node R-4

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Starting Elev= 364.40' Storage= 0 cf
Peak Elev= 370.44' @ 12.84 hrs Surf.Area= 5,230 sf Storage= 5,790 cf

Plug-Flow detention time= 168.6 min calculated for 0.265 af (89% of inflow)
Center-of-Mass det. time= 116.8 min (956.0 - 839.2)

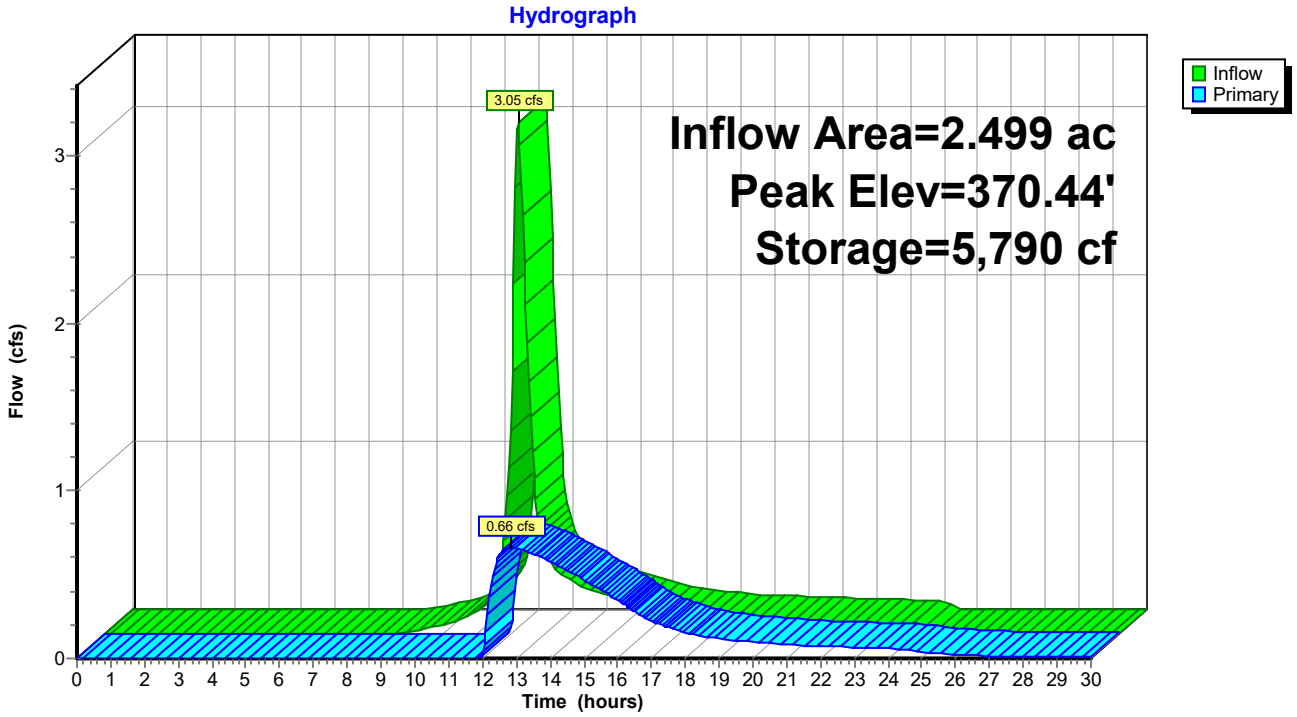
Volume	Invert	Avail.Storage	Storage Description
#1	369.00'	10,296 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
369.00	2,873	539.0	0	0	2,873
370.00	4,521	558.0	3,666	3,666	4,620
371.00	6,225	577.0	5,350	9,016	6,427
371.20	6,572	581.0	1,280	10,296	6,814

Device	Routing	Invert	Outlet Devices
#1	Primary	369.40'	**6.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 369.40' / 368.00' S= 0.0255 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Primary	370.80'	**10.0' 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=0.66 cfs @ 12.84 hrs HW=370.44' (Free Discharge)
1=Culvert (Inlet Controls 0.66 cfs @ 3.37 fps)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond Pd 2:


Hydrograph
Inflow
Primary
3.05 cfs
0.66 cfs
Inflow Area=2.499 ac
Peak Elev=370.44'
Storage=5,790 cf
Flow (cfs)
0
1
2
3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Time (hours)

SITE SPECIFIC SOIL SURVEY INFORMATION

February 29, 2024

Stoney Ridge ENVIRONMENTAL LLC

Garrett Seibert, Project Engineer
Nobis Group
18 Chenell Drive
Concord, NH 03301

RE: Commerce Drive
Franklin, New Hampshire

SUBJECT: Site-Specific Soil Map Report

Dear Mr. Seibert,

The purpose of this soil report and accompanying soil map is to document the soil characteristics for the project location referenced above.

This soil map was prepared by Stoney Ridge Environmental (SRE) utilizing the Site-Specific Soil Mapping Standards for New Hampshire and Vermont (SSSMS), SSSNNE Special Publication No. 3, Version 7, July 2021. The soil map units were identified using the New Hampshire State-Wide Numerical Soils Legend, Issue #10, January 2011. Further references used in the process of developing the soil map, soil legend and soil report are listed below:

1 *For disturbed soils, the January 4, 2011 Draft Proposal for Disturbed Soil Mapping Unit Supplement for AoT Site Specific Soil Maps was utilized.*

2 *Soil Science Division Staff. 2017. Soil Survey Manual. C. Ditzer, K. Scheffe and H.C. Monger (editors) USDA Handbook 18. Government Printing Office, Washington, D.C.*

3 *Field Indicators for Identifying Hydric Soils in New England. Version 4, June 2020.*

4 *Field Book for Describing and Sampling Soils. Version 3.0, National Survey Center. Natural Resources Conservation Services (NRCS). September 2012.*

5 *United States Department of Agriculture. Natural Resources Conservation Services. Official Series Descriptions. US Department of Agriculture, (NRCS).*

6 *Ksat Values for New Hampshire Soils. SSSNNE Special Publication No.5, September 2009.*

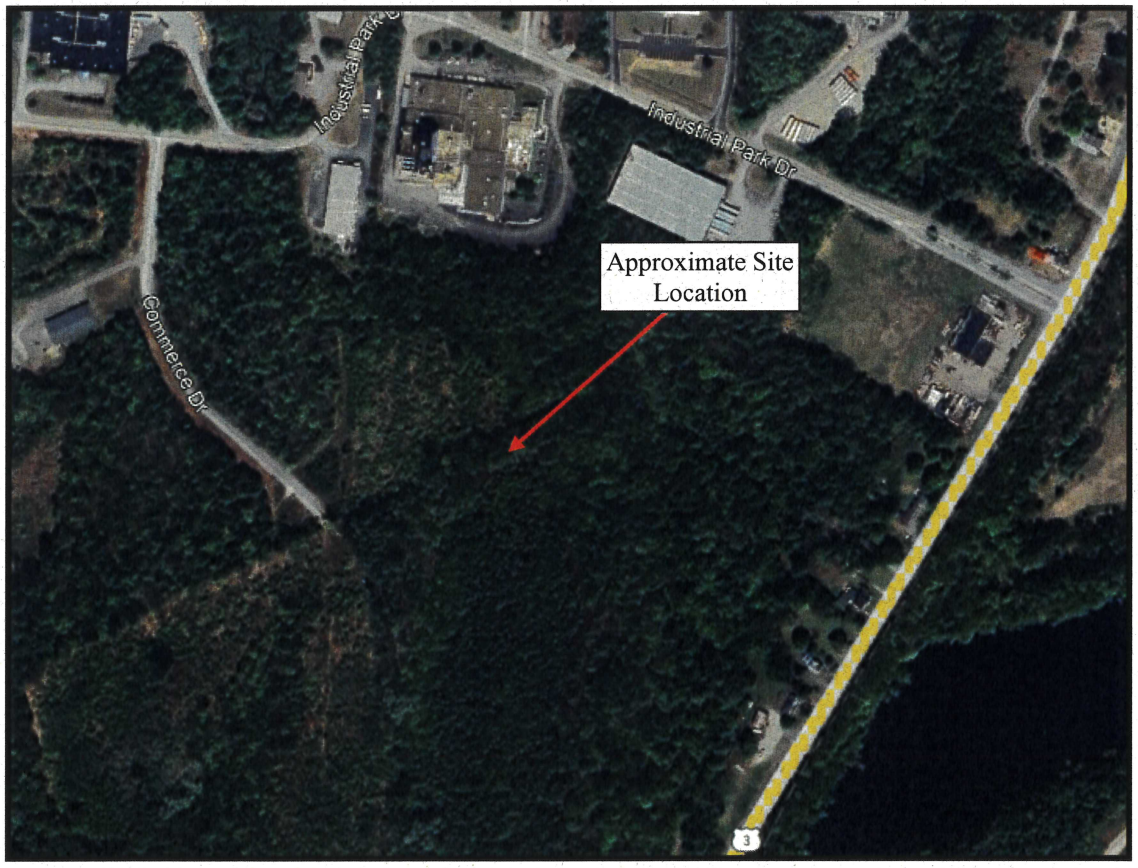
7 *Chapter 7. USDA NRCS Engineering Handbook.*

8 *The Site-Specific Soil Mapping Standards For New Hampshire And Vermont. SSSNNE Special Publication No.3, Version 7. July 2021.*

The Site-Specific Soil Mapping Standards apply the latest up to date knowledge of soils and provide the public with the most advanced soil resource information available today. The Site-Specific Standards are based on a universally recognized taxonomic system of soil classification and are supported by national soil mapping standards established by the USDA National Cooperative Soil Survey. They allow for the development of multi-purpose soil map products, which are carefully controlled and monitored through a state, regional, and national quality assessment program. The Site-Specific Standards are backed by the most advanced soil research program in the world. The Site-Specific Standards have been developed by the Society of Soil Scientists of Northern New England in cooperation with the USDA Natural Resources Conservation Service in response to the need to provide regulatory agencies, local officials, and land use planners with consistent, high-quality, large-scale soil resource information.

The accompanying soil map was developed on a base map of 1" = 50', with contour intervals of 2 feet. The base existing conditions plan was supplied by Nobis Group. The soils fieldwork for the Site-Specific Soils Map was performed in September 2023 and February 7 & 22 of 2024. The soil map was finalized in February of 2024. The field work included observing and recording test pits dug by a tracked excavator and hand dug test pits and augering. All field work and soil mapping was completed by Cynthia M. Balcius CSS, CWS & CPESC of SRE. Wetlands and surface waters were delineated by SRE in September of 2023.

Location Description



The site is located between Route 3 and Commerce Drive in Franklin, NH. Town Tax Maps identify the lots as Map 102 Lot's 9 & 402. The area of the soil mapping is approximately 50 acres in size. The lot is oddly shaped and accessed by Commerce Drive at the very end of the road. There are no existing buildings on site.

A photo of the site conditions looking towards the access from Commerce Drive.

General Soil Conditions

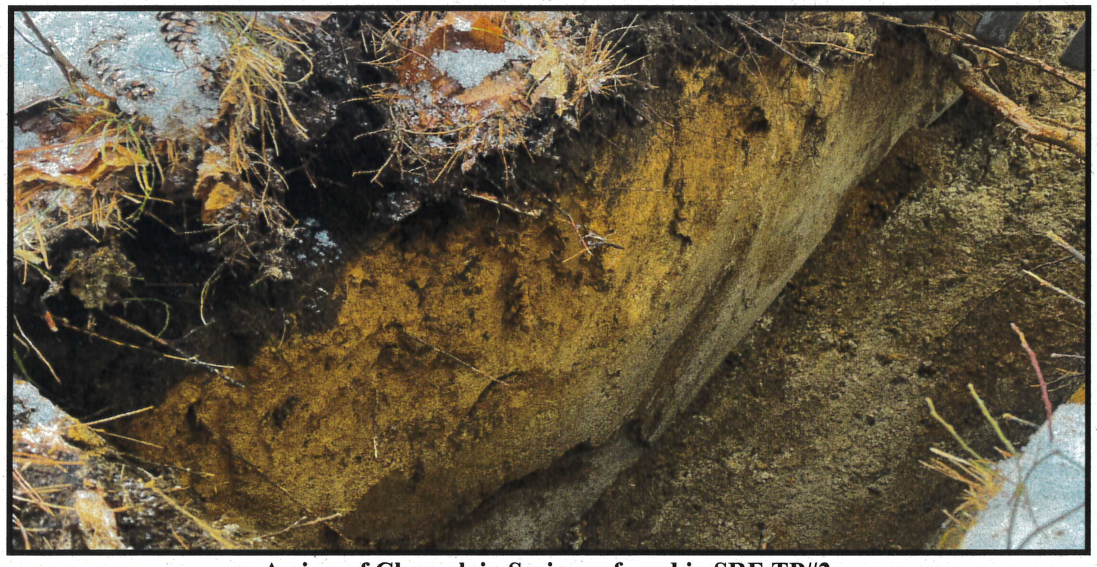
The overall soil conditions on site find soils developed in deep glacio-fluvial deposits of sandy to very fine sandy loam material. The overall topography and geography of the site encompasses a high terrace that steps down to a lower terrace and finally steeply grades down to Shaw Brook and its tributaries.

A view of the steep slopes between terraces.

A view of the steep slopes down to Shaw Brook.

Site Soil Descriptions

Champlain loamy sand (35A,B,C,D,E&F): The Champlain loamy sands are found in the northwest corner of the site where the site topography rises significantly on the high terrace. These soils are considered Somewhat Excessively Drained with seasonal highwater tables located greater than 40 inches below the surface. The K_{sat} rates for this soil type range from 2.0 to 20.0 inches per hour in the upper horizons and 20.0 to 100.0 inches per hour in the lower substratum.



A view of Champlain Series as found in SRE TP#2.

Agawam fine sandy loam (24C,D,E&F): Agawam fine sandy loams have developed in deep glacial outwash materials on the slopes and steps of the stream terraces on site. This soil is well drained with seasonal highwater tables found deeper than 40 inches in the soil profile. Slopes on site ranged from moderately sloping to steeply sloping. There are some inclusions of Ninigret soils found within this map unit (<5%). The K_{sat} rates for this soil type range from 6.0 to 20.0 inches per hour in the upper horizons and 20.0 to 100.0 inches per hour in the lower substratum.

Ninigret fine sandy loam (513A,B,C&D): Ninigret soils are moderately well drained and have developed in fine and very fine sandy glacio-fluvial materials. This soil series was mapped on the lower terrace and in some of the swales and lower elevational areas on site. Seasonal highwater tables are found between 15 to 40 inches below the surface. Slopes were gently sloping to moderately sloping and level to concave throughout the mapped area. The K_{sat} rates for this soil type range from 0.6 to 6.0 inches per hour in the upper horizons and 6.0 to 20.0 inches per hour in the lower substratum.

A typical Ninigret Series profile observed on site.

Raypol very fine sandy loam (540C,D&E/PD): Raypol soils are poorly drained and have developed in very fine sandy glacio-fluvial materials. This soil series was mapped in all the wetland areas within the soil mapping area. Seasonal highwater tables are found at the surface or close to the surface most of the year. Slopes are level to moderately sloping throughout the mapped area. The K_{sat} rates for this soil type range from 0.6 to 2.0 inches per hour in the upper horizons and 6.0 to 100.0 inches per hour in the lower substratum.

A view of Raypol Soils found in the wetland areas on site.

Test pit profiles have been included in this report. A Site-Specific Soil Map Unit legend for the site-specific soil map symbols used in the preparation of this map is also attached to this report.

This completes the narrative report that accompanies the site-specific soil map prepared for the site known as Commerce Drive II, Franklin, New Hampshire. If there are any questions regarding the soil map or the report, please feel free to contact me at 776-5825.

Sincerely,

Stoney Ridge Environmental, LLC

STATE OF NEW HAMPSHIRE CYNTHIA M. BALCIUS No. 054 CERTIFIED SOIL SCIENTIST

STATE OF NEW HAMPSHIRE CYNTHIA M. BALCIUS 2/29/24 No. 061 CERTIFIED WETLAND SCIENTIST

Cynthia M. Balcius, CSS, CWS, CPESC
Senior Soil & Wetland Scientist

Stoney Ridge ENVIRONMENTAL LLC

Nobis
Commerce Drive, Franklin II
SRE# 23-047
February 27, 2024

SITE-SPECIFIC SOIL MAP UNIT KEY

Symbol	Map Unit	Slope Class %	Drainage Class	HSG/Group
35A	Champlain loamy sand	0-3%	Somewhat Excessively Drained	A/1
35B	Champlain loamy sand	3-8%	Somewhat Excessively Drained	A/1
35C	Champlain loamy sand	8-15%	Somewhat Excessively Drained	A/1
35D	Champlain loamy sand	15-25%	Somewhat Excessively Drained	A/1
35E	Champlain loamy sand	25-50%	Somewhat Excessively Drained	A/1
35F	Champlain loamy sand	50%+	Somewhat Excessively Drained	A/1
24C	Agawam fine sandy loam	8-15%	Well Drained	B/2
24D	Agawam fine sandy loam	15-25%	Well Drained	B/2
24E	Agawam fine sandy loam	25-50%	Well Drained	B/2
24F	Agawam fine sandy loam	50%+	Well Drained	B/2
540C/PD	Raypol very fine sandy loam	8-15%	Poorly Drained	D/5
540D/PD	Raypol very fine sandy loam	15-25%	Poorly Drained	D/5
540E/PD	Raypol very fine sandy loam	25-50%	Poorly Drained	D/5
513A	Ninigret fine sandy loam	0-3%	Moderately Well Drained	B/3
513B	Ninigret fine sandy loam	3-8%	Moderately Well Drained	B/3
513C	Ninigret fine sandy loam	8-15%	Moderately Well Drained	B/3
513D	Ninigret fine sandy loam	15-25%	Moderately Well Drained	B/3

"This map product is within the technical standards of the National Cooperative Soil Survey. It is a special purpose product, produced by a certified soil scientist, and is not a product of the USDA Natural Resources Conservation Service. There is a narrative report that accompanies this map and map key."


513A
513A
513A
35A
35A
Existing Swale
Existing Swale
Existing Swale
Existing Swale
Existing Swale
COMMERCE DRIVE

Soil Test Pits
Commerce Drive
Franklin, NH

Weather: Clear **Date: February 7&22, 2024**

Test Pit Nobis TP1:

Depth (in)	Color	Texture	Structure	Consistence	Redox
0-18	10YR3/4	VFSL	GR	FR	
18-31	10YR 4/4	VFSL	GR	FR	c/d10YR 6/6
31-39	2.5Y 4/3	VFSL	GR	FR	c/d 10YR 6/2
39-55	5Y 5/2	LVFS	GR	FR	c/d 10YR 5/6

Notes: high water table, very fine sandy textures

ESHWT:	18”	**Water:**	55”	**Roots:**	24” med/coarse	**Ledge:**	>55”
Restrictive Layer	None	**Ksat Upper Horizons**	0.6-6.0 in/hr		**Ksat Lower Horizons**		6.0-20.0 in/hr
Soil Series:	513 Ninigret fine sandy loam		**HSG/SG:**	B/3	**Termination:**		55”
Recorded By:	**Cynthia M Balcius CSS# 084**			**Witness:**	**Joshua Reynolds**		

Test Pit Nobis TP7:

Depth (in)	Color	Texture	Structure	Consistence	Redox
0-10	10YR 3/3	VFSL	GR	FR	
10-18	10YR 5/6	VFSL	GR	FR	
18-32	2.5Y 6/4	FS	GR	FR	
32-51	2.5Y 5/4	S	SG	LO	c/d 10YR 5/6

Notes:

ESHWT:	32”	**Water:**	51”	**Roots:**	12” fine/med	**Ledge:**	>51”
Restrictive Layer	None	**Ksat Upper Horizons**	0.6-6.0 in/hr		**Ksat Lower Horizons**		6.0-20.0 in/hr
Soil Series:	513 Ninigret fine sandy loam		**HSG/SG:**	B/3	**Termination:**		51”
Recorded By:	**Cynthia M Balcius CSS# 084**			**Witness:**	**Joshua Reynolds**		

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Test Pit Nobis TP8:

Depth (in)	Color	Texture	Structure	Consistence	Redox
0-10	10YR 4/3	VFSL	GR	FR	
10-18	10YR 4/6	VFSL	WSBK	FR	
18-36	2.5Y 6/4	LFS	GR	FR	
36-60	5Y 6/3	S	SG	L	c/d 10YR 5/6

Notes:

ESHWT:	36”	**Water:**	60”	**Roots:**	12” fine/med	**Ledge:**	>60”
Restrictive Layer	None	**Ksat Upper Horizons**	0.6-6.0 in/hr		**Ksat Lower Horizons**		6.0-20.0 in/hr
Soil Series:	513 Ninigret fine sandy loam		**HSG/SG:**	B/3	**Termination:**		60”
Recorded By:	**Cynthia M Balcius CSS# 084**			**Witness:**	**Joshua Reynolds**		

Test Pit Nobis TP2:

Depth (in)	Color	Texture	Structure	Consistence	Redox
0-13	10YR 4/3	VFSL	GR	FR	
13-20	10YR 4/6	VFSL	WSBK	FR	
20-32	2.5Y 6/4	LFS	GR	FR	
32-60	2.5Y 5/4	LFS	GR	FR	c/d 10YR 5/8

Notes:

ESHWT:	32”	**Water:**	60”	**Roots:**	24” fine/med	**Ledge:**	>60”
Restrictive Layer	None	**Ksat Upper Horizons**	0.6-6.0 in/hr		**Ksat Lower Horizons**		6.0-20.0 in/hr
Soil Series:	513 Ninigret fine sandy loam		**HSG/SG:**	B/3	**Termination:**		60”
Recorded By:	**Cynthia M Balcius CSS# 084**			**Witness:**	**Joshua Reynolds**		

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Test Pit Nobis TP3:

Depth (in)	Color	Texture	Structure	Consistence	Redox
0-9	10YR 3/2	VFSL	GR	FR	
9-23	2.5Y 6/6	FS	GR	FR	
23-54	2.5Y 6/4	S	SG	L	

Notes:

ESHWT:	23”	**Water:**	54”	**Roots:**	24” fine/med	**Ledge:**	>54”
Restrictive Layer	None	**Ksat Upper Horizons**	0.6-6.0 in/hr		**Ksat Lower Horizons**		6.0-20.0 in/hr
Soil Series:	513 Ninigret fine sandy loam		**HSG/SG:**	B/3	**Termination:**		54”
Recorded By:	**Cynthia M Balcius CSS# 084**			**Witness:**	**Joshua Reynolds**		

Test Pit Nobis TP4:

Depth (in)	Color	Texture	Structure	Consistence	Redox
0-6	10YR 2/2	FSL	GR	FR	
6-14	10YR 5/8	LFS	GR	FR	
14-30	2.5Y 6/6	FS	SG	L	
30-60	2.5Y 6/4	S	SG	L	c/d 10YR 5/6

Notes:

ESHWT:	30”	**Water:**	60”	**Roots:**	24” fine/med	**Ledge:**	>60”
Restrictive Layer	None	**Ksat Upper Horizons**	0.6-6.0 in/hr		**Ksat Lower Horizons**		6.0-20.0 in/hr
Soil Series:	513 Ninigret fine sandy loam		**HSG/SG:**	B/3	**Termination:**		60”
Recorded By:	**Cynthia M Balcius CSS# 084**			**Witness:**	**Joshua Reynolds**		

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Test Pit Nobis TP5:

Depth (in)	Color	Texture	Structure	Consistence	Redox
0-7	10YR 4/4	VFSL	GR	FR	
7-14	10YR 5/6	VFSL	SBK	FR	
14-30	2.5Y 6/4	LFS	GR	FR	
30-62	2.5Y 5/4	LVFS	GR	FR	c/d 10YR 5/8

Notes:

ESHWT:	30”	**Water:**	62”	**Roots:**	18” fine/med	**Ledge:**	>62”
Restrictive Layer	None	**Ksat Upper Horizons**	0.6-6.0 in/hr		**Ksat Lower Horizons**		6.0-20.0 in/hr
Soil Series:	513 Ninigret fine sandy loam		**HSG/SG:**	B/3	**Termination:**		62”
Recorded By:	**Cynthia M Balcius CSS# 084**			**Witness:**	**Joshua Reynolds**		

Test Pit Nobis TP6:

Depth (in)	Color	Texture	Structure	Consistence	Redox
0-7	10YR 4/4	VFSL	GR	FR	
7-17	10YR 5/6	VFSL	WSBK	FR	
17-28	2.5Y 6/4	LVFS	GR	FR	
28-62	2.5Y 6/4	S	SG	L	c/d 10YR 5/8

Notes:

ESHWT:	28”	**Water:**	None	**Roots:**	12” fine	**Ledge:**	>62”
Restrictive Layer	None	**Ksat Upper Horizons**	0.6-6.0 in/hr		**Ksat Lower Horizons**		6.0-20.0 in/hr
Soil Series:	513 Ninigret fine sandy loam		**HSG/SG:**	B/3	**Termination:**		62”
Recorded By:	**Cynthia M Balcius CSS# 084**			**Witness:**	**Joshua Reynolds**		

Test Pit Nobis TP9:

Depth (in)	Color	Texture	Structure	Consistence	Redox
0-13	10YR 3/3	VFSL	GR	FR	
13-24	10YR 5/4	VFSL	WSBK	FR	
24-64	2.5Y 6/4	LVFS	GR	FR	^v

Notes:

ESHWT:	24”	**Water:**	None	**Roots:**	18” fine	**Ledge:**	>64”
Restrictive Layer	None	**Ksat Upper Horizons**	0.6-6.0 in/hr		**Ksat Lower Horizons**		6.0-20.0 in/hr
Soil Series:	513 Ninigret fine sandy loam		**HSG/SG:**	B/3	**Termination:**		64”
Recorded By:	**Cynthia M Balcius CSS# 084**			**Witness:**	**Joshua Reynolds**		

Test Pit SRE TP1 (Hillside):

Depth (in)	Color	Texture	Structure	Consistence	Redox
0-8	10YR 3/3	VFSL	GR	FR	
8-18	2.5Y 5/4	VFSL	WSBK	FR	
18-63	5Y 5/3 & 10YR 5/6	VFSL & VFS	SBK	FR-FI	c/d 7.5YR 5/8

Notes:

ESHWT:	18”	**Water:**	None	**Roots:**	24” fine/med	**Ledge:**	>63”
Restrictive Layer	None	**Ksat Upper Horizons**	0.6-6.0 in/hr		**Ksat Lower Horizons**		6.0-20.0 in/hr
Soil Series:	513 Ninigret fine sandy loam		**HSG/SG:**	B/3	**Termination:**		63”
Recorded By:	**Cynthia M Balcius CSS# 084**			**Witness:**	**Joshua Reynolds**		

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Test Pit SRE TP2 (Flat Area off Commerce Drive):

Depth (in)	Color	Texture	Structure	Consistence	Redox
0-15	10YR 3/3	FSL	GR	FR	
15-22	10YR 4/6	LFS	GR	FR	
22-45	2.5Y 4/6	GRCOS	SG	LO	
45-58	5Y 6/3	S	GR	LO	

Notes: coarse sandy

ESHWT:	>58”	**Water:**	None	**Roots:**	12” med/coarse	**Ledge:**	>58”
Restrictive Layer	None	**Ksat Upper Horizons**	6.0-20.0 in/hr		**Ksat Lower Horizons**		20.0-100.0 in/hr
Soil Series:	35 Champlain loamy sand		**HSG/SG:**	A/1	**Termination:**		58”
Recorded By:	**Cynthia M Balcius CSS# 084**			**Witness:**	**Joshua Reynolds**		

Hand Dug SRE TP1:

Depth (in)	Color	Texture	Structure	Consistence	Redox
0-4	10YR 2/1	SL	GR	FR	
4-8	10YR ¾	FSL	GR	FR	
8-15	10YR 4/6	LFS	GR	FR	
15-40	2.5Y 6/6	S	GR	FR	

Notes: coarse sandy

ESHWT:	>40”	**Water:**	None	**Roots:**	8” Fine	**Ledge:**	>40”
Restrictive Layer	None	**Ksat Upper Horizons**	6.0-20.0 in/hr		**Ksat Lower Horizons**		20.0-100.0 in/hr
Soil Series:	35 Champlain loamy sand		**HSG/SG:**	A/1	**Termination:**		40”
Recorded By:	**Cynthia M Balcius CSS# 084**			**Witness:**	**Joshua Reynolds**		

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Hand Dug SRE TP2:

Depth (in)	Color	Texture	Structure	Consistence	Redox
0-8	10YR 3/3	FSL	GR	FR	
8-13	10YR 5/6	LVFS	GR	FR	
13-30	2.5Y 5/6	LVFS	WSBK	FR	
30-40	2.5Y 6/4	S	GR	FR	

Notes:

ESHWT:	>40”	**Water:**	None	**Roots:**	12” Fine/Med	**Ledge:**	>40”
Restrictive Layer	None	**Ksat Upper Horizons**	6.0-20.0 in/hr		**Ksat Lower Horizons**	20.0-100 in/hr	
Soil Series:	24 Agawam fine sandy loam		**HSG/SG:**	B/2	**Termination:**	40”	
Recorded By:	**Cynthia M Balcius CSS# 084**			**Witness:**	**Joshua Reynolds**		

Stoney Ridge Environmental LLC 8 Kiana Road, Alton, NH 03809, (p): 603-776-5825, (f) 603-776-5826

INSPECTION AND MAINTENANCE MANUAL

INSPECTION AND MAINTENANCE PROCEDURES

RESPONSIBLE PARTIES

Standard Solar
Attn. Amber Layne
530 Gaither Road, Suite 900
Rockville, Maryland 20850
amber.layne@standardsolar.com
(301)-944-5253

INSPECTION SCHEDULE

Grass-Vegetated Drainage Swales	Drainage swales shall be inspected prior to directing storm water to them. Thereafter, swales shall be inspected annually (minimum). Inspection results will be recorded using the Inspection Forms included at the end of this document.
Grass under Solar Panels	Areas disturbed by solar array installation shall be vegetated with permanent seed mix. These areas should be inspected at least monthly during construction to ensure healthy growth. After installation is complete, these areas should be inspected annually for signs of erosion, sediment buildup, or vegetation loss. Inspection results will be recorded using the Inspection Forms included at the end of this document.
Shade Management Zone (perimeter beyond fence)	Shade Management Zones should be inspected annually for signs of erosion, debris/trash, and to evaluate height of vegetation. Inspection results will be recorded using the Inspection Forms included at the end of this document.
Stormwater Basins	Stormwater basin embankments will be inspected annually (minimum) for settlement, erosion, seepage, animal burrows, woody vegetation, and other conditions that could cause degradation and reduced stability. Stone outlet protection and other structural appurtenances will be inspected annually (minimum). Inspection results will be recorded using the Inspection Forms included at the end of this document.
Pipe Riprap Outlets	Pipe riprap outlets will be inspected annually (minimum) for damage and deterioration. Inspection results will be recorded using the Inspection Forms included at the end of this document.

MAINTENANCE PROCEDURES

Grass-Vegetated Drainage Swales	Damage, erosion, and/or deterioration of drainage swales will be repaired immediately. Maintenance will be recorded in the Inspection and Maintenance Log included at the end of this document.
Grass under Solar Panels	Grass will be mowed periodically as needed to maintain a healthy stand of herbaceous vegetation. At a minimum, 85% of the soil surface should be vegetated. If erosion is evident, eroded areas will be repaired and reseeded with permanent seed mix. Temporary measures such as mulch should be used for protection during vegetation re-establishment. Maintenance will be recorded in the Inspection and Maintenance Log included at the end of this document.
Shade Management Zone (perimeter beyond fence)	Brush and other vegetation will be trimmed periodically as needed to maintain a height of growth that does not shade the solar panels (approximately 7 feet). If erosion is evident, eroded areas will be repaired and reseeded with permanent seed mix. Maintenance will be recorded in the Inspection and Maintenance Log included at the end of this document.
Stormwater Basin	Basin side slopes and crest will be mowed (at least once annually to control woody growth) and vegetation will be maintained in a healthy condition. Trash and debris will be removed from the basin when observed during inspections. Accumulated sediment will be removed from the basin when it affects capacity. Repairs to embankments will be made when required. Maintenance will be recorded in the Inspection and Maintenance Log included at the end of this document.
Pipe Riprap Outlets	Remove sediment, debris, and woody vegetation. Replace displaced riprap. Maintenance will be recorded in the Inspection and Maintenance Log included at the end of this document.

RECORD KEEPING

Record keeping and inspection/maintenance activity will begin upon completion of all terrain activities that direct storm water to the practices described herein. All records, including records from maintenance subcontractors, will be maintained by New Hampshire Solar Garden, LLC and will be made available to the New Hampshire Department of Environmental Services (NHDES) upon request. Photo documentation of inspections is required.

Should invasive species begin to grow in the infiltration basin (or other areas on site), refer to the guidance regarding "Methods for Disposing of Non-Native Invasive Plants" prepared by the University of New Hampshire Cooperative Extension included at the end of this document. Herbicides will not be applied.

Commerce Drive Solar Inspection Checklist – Franklin, NH

General Information	
Date of Inspection	
Inspector's Name(s)	
Inspector's Title(s)	
Type of Inspection: ❑ Routine (annual) ❑ Post-storm event _____inches	

❑ Inspection of Drainage Swales and Stormwater Basins Performed

❑ No Follow Up Action Required ❑ Follow Up Action Required as Detailed Below

Location	Visible Erosion/Damage?	Maintenance Required?
	❑Yes ❑No	❑Yes ❑No
	❑Yes ❑No	❑Yes ❑No

Corrective Action Needed and Notes

❑ Inspection of Grass Vegetation Under Panels Performed

❑ No Follow Up Action Required (Healthy Vegetation) ❑ Follow Up Action Required as Detailed Below

Location	Visible Erosion/Damage?	Maintenance Required?
	❑Yes ❑No	❑Yes ❑No
	❑Yes ❑No	❑Yes ❑No

Corrective Action Needed and Notes

❑ Inspection of Shade Management Zone Performed

❑ No Follow Up Action Required ❑ Follow Up Action Required as Detailed Below

Location	Visible Erosion/Damage?	Maintenance Required?
	❑Yes ❑No	❑Yes ❑No
	❑Yes ❑No	❑Yes ❑No

Corrective Action Needed and Notes

Commerce Drive Solar Inspection & Maintenance Log – Franklin, NH

Date:				
Performed by:				
Practice:	Grass Drainage Swales ❑Inspection ❑Maintenance	Grass under Solar Panels ❑Inspection ❑Maintenance	Shade Management Zone ❑Inspection ❑Maintenance	Stormwater Detention Pond ❑Inspection ❑Maintenance
Date:				
Performed by:				
Practice:	Grass Drainage Swales ❑Inspection ❑Maintenance	Grass under Solar Panels ❑Inspection ❑Maintenance	Shade Management Zone ❑Inspection ❑Maintenance	Stormwater Detention Pond ❑Inspection ❑Maintenance
Date:				
Performed by:				
Practice:	Grass Drainage Swales ❑Inspection ❑Maintenance	Grass under Solar Panels ❑Inspection ❑Maintenance	Shade Management Zone ❑Inspection ❑Maintenance	Stormwater Detention Pond ❑Inspection ❑Maintenance
Date:				
Performed by:				
Practice:	Grass Drainage Swales ❑Inspection ❑Maintenance	Grass under Solar Panels ❑Inspection ❑Maintenance	Shade Management Zone ❑Inspection ❑Maintenance	Stormwater Detention Pond ❑Inspection ❑Maintenance

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STATE OF NEW HAMPSHIRE
JOHN CHRIS NADEAU
No. 9294
LICENSED PROFESSIONAL ENGINEER

12/8/2025

NOT ISSUED FOR CONSTRUCTION

COMMERCE DRIVE SOLAR, LLC

SOUTH MAIN STREET
FRANKLIN, NH 03235

TAX MAP:
MAP 102 / LOT 009

OWNER(S):
FRANKLIN COMMONS REALTY GROUP, LLC
70 INDUSTRIAL PARK DRIVE, SUITE 7
FRANKLIN, NH 03235

APPLICANT:
COMMERCE DRIVE SOLAR, LLC
530 GAITHER ROAD, SUITE 900
ROCKVILLE, MD 20850

NO.	DATE	DESCRIPTION
1	10/16/25	AOT SUBMISSION

REVISIONS

0 80' 160'
GRAPHIC SCALE

DATE:	MAY 2024
NOBIS PROJECT NO.	100704.000
DRAWN BY:	GS
CHECKED BY:	JCN
CAD DRAWING FILE:	101025.000-C-200-SITE.dwg

SHEET TITLE

BMP PLAN

FIGURE
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