

TAYBRE DRIVE SUBDIVISION PLAN

SB# 03-25

STAFF REPORT

October 22, 2025

SITE: 9 Alvirne Drive & 190 R Derry Road - Map 138 / Lots 088 & 082

ZONING: Residential - Two (R-2)

PURPOSE OF PLAN: to consolidate Map 138/Lots 082 & 088 into one lot, known at map 138/Lot 088, and to depict the subdivision of Map 138/Lot 088 into nine (9) single-family residential lots, with all associated improvements.

PLANS UNDER REVIEW:

Subdivision Plan SB# 03-25, Map 138/Lots 088 & 082, 9 Alvirne Drive, Hudson, New Hampshire; prepared by: Hess Engineering and Construction, 63 West Street, Ashland, NH 03217; prepared for: M.R. Lacasse Homes, LLC, 9 Scenic Lane, Hudson, NH 03051; consisting of 22 sheets and general notes 1-21 on Sheet 6; dated April 24, 2025, last revised September 18, 2025.

ATTACHMENTS:

- 1) Subdivision Application, date received April 22, 2025 – Attachment “A”.
- 2) Stormwater Management Report & Support Materials, prepared by Hess Engineering, dated April 24, 2025, Revised September 15, 2025 – Attachment “B”. (Digital Only)
- 3) Third Peer Review, prepared by Fuss & O’Neill, dated October 6, 2025 – Attachment “C”.
- 4) Applicant response letter, dated September 17, 2025 – Attachment “D”.
- 5) Department Comments, dated September 30, 2025 – Attachment “E”.
- 6) Waiver Requests – Attachment “F”.
- 7) Subdivision Plan dated April 24, 2025, revised September 18, 2025.

WAIVERS REQUESTED:

- 1) 289-20.B.2. – Catch-Basins.
- 2) 289-28.F – Curb Cuts
- 3) 289-28.C – Street Cross-section
- 4) HR 290-5.A.4 – Groundwater Recharge Volume (GRV)
- 5) ETGTD 930.4 – Pipe Slope
- 6) 289-37. A. – Phasing

APPLICATION TRACKING:

- May 14, 2025 – Subdivision Application received.
- May 28, 2025 – Application accepted, public hearing continued.
- June 14, 2025 – Site Walk held.

- October 8, 2025 – Public hearing deferred to October 22, 2025.
- October 22, 2025 – Public hearing scheduled.

COMMENTS & RECOMMENDATIONS:

BACKGROUND

Map 138 / Lots 088 & 082 is a combined 14.92-acre lot within the R-2 zone. The lot is mostly flat, with slopes on the eastern portion of the site. The site is proposed for the development of nine (9) single-family residential homes, to be serviced by town water via easement from Mansfield drive, and by septic systems on site. Currently, both parcels are undeveloped, and have remained so due to a relatively high-water table. Wetlands on site are primarily tucked in to the western corner of the site, over which a utility easement crosses. No portion of the site falls within flood plane boundaries, and no proposed work falls within delineated wetlands.

STORMWATER MANAGEMENT REPORT

The applicant has provided a stormwater management report, prepared by Hess engineering and revised September 15, 2025 (Attachment “B”). In this report, the firm outlines a final conclusion of no adverse effects, with an alleviation of some drainage issues which have been longstanding for some abutters to the site.

PEER REVIEW

Fuss & O'Neill has provided a third round of review, dated October 6, 2025. This review contains primarily items either noted as needing a waiver which has been provided, or items for which the Town Engineer may propose a condition or find acceptable. Full comments may be found in Attachment “C”. The applicant has provided a response letter to peer review comments and department comments detailed below, which may be found in Attachment “D”.

DEPARTMENT COMMENTS

Fire has indicated that their comments are resolved.

Engineering has provided the following comments:

Prior recording the plans, the applicant shall submit to the Planning Department staff a final written summary of all comments received and the applicant’s corresponding responses, to the satisfaction of the Planning Department.

Waiver Request – Project Phasing – No further comment

The status of this request is unclear. It is not evident whether the applicant intends to pursue the project in one phase or multiple phases, and no supporting documentation has been provided in the second submittal.

Waiver Request – Curb Cut – No further comment

The Engineering Department has no objection to this request, provided that the applicant includes an acceptable detail for the curb cut and specifies erosion stone adjacent to it to prevent erosion.

Waiver Request – Grading – This form has been submitted, no further comment

The Engineering Department has no objection to this request, contingent upon the Department of Public Works also having no objection. In addition, the applicant shall add a note to all swales located on private property stating that the homeowner is responsible for their maintenance and upkeep.

Waiver Request – Pipe Slope – No further comment

The applicant meets the 2 ft/s velocity requirement for all but one pipe, due to low flow intake regardless of storm event. After review and discussion, Engineering and Public Works staff have no objections to granting this waiver.

Engineering Department Comments – No further comment

All other engineering comments have been addressed.

Fuss & O'Neill Comments – No further comments for this review.

2. Driveway Review Codes (HR 193-10)

a. Former Fuss & O'Neill Comments: HR 193-10.A. & 193-10.E. The applicant has shown the location of a proposed driveway for each proposed lot on the plan set. The applicant has not provided sight distance information for the driveways on the plan set. / The applicant has stated that driveway sight distance will be provided at the time of driveway permitting. We note that the Town has requested it as part of the subdivision review. It is important to provide this information showing that a driveway at each lot has the ability to meet the Town's requirements.

Current Fuss & O'Neill Comment: The applicant has provided sight-distance information for Lots 88-8 & 88-9. We note that the sight lines for Lot 88-9 crosses Lot 88-1 and could possibly be blocked by future landscaping by the homeowner.

ENG: *The applicant shall introduce a sight distance easement to the lot in question 3. Roadway Design*

h. Former Fuss & O'Neill Comments: HR 289-18.E. The applicant has not provided any sight distance information for the proposed roadway intersection at Alvirne Drive. / The applicant has provided sight distance information. We note that the sight lines to both the east and west are at the edge of existing tree lines and may be obscured by vegetation when constructed and into the future. The applicant should consider additional clearing of vegetation within the Town's right-of-way to ensure sight lines are maintained. Also, the sight distance shown to the west does not meet the 400 feet required by Hudson Engineering Technical Guidelines & Typical Details Section 525.3 (375' is shown).

Current Fuss & O'Neill Comment: The applicant has revised the sight distance plan to show the roadway meets the 400-foot requirement. We continue to note that the sight lines to both the east and west are at the edge of existing tree lines and may be obscured by vegetation when construction is complete and into the future.

ENG: *Department of Public Works will handle the tree clearing and pruning, when necessary, similar to current ongoing pruning operations through Town. No further action required on this comment.*

4. Drainage Design /Stormwater Management (HR 289-20.C. /Chapter 290)

c. Former Fuss & O'Neill Comments: HR 289-20.C.1. The applicant should provide a similar comparison table of runoff volumes to ensure no net increase for all storms analyzed. / The applicant provided comparison tables of only Flow Rates in the Stormwater Management Report dated August 27, 2025, and did not provide the requested runoff volumes comparison tables. The applicant should provide the requested volume comparison tables.

Current Fuss & O'Neill Comment: The applicant has provided the required comparison tables of runoff volumes and illustrated an increase in volume at POI-8R. The applicant should coordinate with the Town if the proposed increases require additional discussion or if a waiver is required.

ENG: *The applicant will show that the total pre vs post run off volumes requirements are met.*

f. Former Fuss & O'Neill Comments: HR 290-5.A.4. The applicant should provide the GRV BMP worksheet illustrating required GRV is met. / The applicant provided only a BMP worksheet for Basin 1(29P) in the Stormwater Management Report dated August 27, 2025, and did not provide the requested GRV worksheet. We note a waiver has been requested by the applicant, who should provide the requested GRV worksheet if a waiver is not granted.

Current Fuss & O'Neill Comment: The applicant should coordinate with the Town for any required GRV waivers.

ENG: *If the applicant has requested a waiver for GRV, no worksheet is required. No further action required.*

y. Former/Current Fuss & O'Neill Comment: HR 290-7.B.5. The applicant should coordinate with the Town if additional documentation is required to establish an HOA for the stormwater long term maintenance and inspection requirements.

ENG: *The stormwater HOA shall be prepared and submitted for approval by the Town Planner, Development Services Director and Public Works Director, prior to the plans getting recoded No further action required.*

z. Former Fuss & O'Neill Comment: Engineering Technical Guidelines and Typical Details (ETGTD) 930.1. We note the applicant has discussed with the Town Engineer to allow 2.0' of cover rather than the required 4.0' of cover for drainage pipe. The applicant should discuss if HDPE is allowed with this reduced cover, or if RCP is required in situations of reduced cover to help reduce heaving and "floating" of pipes from frozen ground and high-water table situations.

Former/Current Fuss & O'Neill Comment: The applicant should coordinate with the Town Engineer on pipe material allowed and reduced cover.

ENG: *The applicant has addressed this comment by replacing HDPE pipe with reinforced concrete pipe (RCP) for drainage infrastructure No further action required.*

6. Sewer/Water Design/Conflicts & Utility Design/Conflicts (HR 276-13.E.)

e. Former Fuss & O'Neill Comments: HR 276-13.G. The applicant has not provided any information about septic systems for the proposed lots. The applicant has noted a NHDES Subdivision Approval number on the plan set. The applicant should provide typical design details on the plan. /The applicant has noted that septic designs will be provided at the time of individual lot development. We continue to note that the Regulation requires a typical detail be provided for the systems.

Current Fuss & O'Neill Comment: The applicant has stated that systems are shown on the plans with tank locations. We continue to recommend a typical detail be provided.

ENG: *This request will be addressed at the time the applicant submits the septic system design plans to the state, which will happen after Planning Board approval, similar to previous projects. No further action required.*

Former Fuss & O'Neill Comment: HR 289-37.A. The applicant has not provided phasing information for the proposed subdivision. We note that per the Regulation 50% of the proposed lots can be given Final Approval in one year.

Current Fuss & O'Neill Comment: The applicant has requested a waiver from this requirement.

ENG: *No further action required.*

4. Drainage Design /Stormwater Management (HR 289-20.C. /Chapter 290)

ag. Former Fuss & O'Neill Comments: We recommend the applicant review the need for fencing around stormwater basins, particularly Basin 1 which is proposed to have standing water. / With the proposed basins possibly becoming Town maintained, the applicant should review with the Town Engineer on the preferred fence height/material/placement. We note that NHDES Regulations will not govern a Town warranted fence.

Current Fuss & O'Neill Comment: The Town should confirm if fencing is necessary.

ENG: *The applicant shall add a note stating that a 4' fence will be installed and the location will be determined in the field by the Development Services Director and Public Works Director.*

Full comments may be found in Attachment "E".

WAIVER REQUESTS

The applicant has submitted six waiver requests:

- 1) **289-20.B.2. – Catch-Basins** – the applicant states that this is required as to comply with changes required by F&O and the Engineering department to other aspects of the design. Water is still conveyed away from the roadway and into culverts and swales.
- 2) **289-28.F – Curb Cuts** – the applicant states that complying with F&O and Engineering Department requirements for other aspects of the design require it. Other alternatives are not viable due to the low elevations involved.
- 3) **289-28.C – Street Cross-section** – the applicant states that a typical cross-section is used for the majority of the site except for the entrance, where the water is designed to flow into the treatment BMPs.
- 4) **290-5.A.4 – GRV** – the applicant states that maintaining groundwater recharge levels at their current rates is not practicable.
- 5) **ETGTD 930.4 – Pipe Slope** – the applicant states that a slope of 1.8% was approved by the Town Engineer so long as they maintain at least 2ft/sec velocity. *(Staff notes that no waiver is required for this, the Town Engineer may simply approve deviations from this, which has already been done)*

- 6) **289-37. A. – Phasing** – the applicant states that due to the small scale of this project, allowing the entire site to be developed at once would be advantageous to minimize total impact to the surrounding area.

Full waiver request letters may be found in attachment “F”. Staff notes that several have typos related to the section of ordinance. The above listings have had said typos corrected for ease of referencing.

STAFF COMMENTS

The plot of land is challenging to develop with the high-water table. The applicant is proposing a considerable amount of grading and elevation change to make septic systems possible, and for the site to have proper drainage. With multiple rounds of Fuss & O’Neill review and Engineering Staff review issues related to the drainage and road design have been brought to an acceptable compromise. The applicant will be establishing water access via a pipe extending from Mansfield Drive through 194 Derry Road, Map 138 Lot 089, which is owned by the Town.

RECOMMENDATIONS

Staff recommends consideration of the revised materials submitted and comments provided by F&O and departments. Careful consideration of the waivers requests is recommended prior to granting. Presuming all of the required waivers are granted, staff recommends consideration of conditional approval. Additional stipulations in line with comments from the Town Engineer have been provided.

DRAFT MOTIONS:

MOTION TO CONTINUE:

I move to continue the Taybre Drive Subdivision Plan application SB# 03-25, Map 138/Lots 088 & 082, 9 Alvirne Drive & 190 R Derry Road, Hudson, New Hampshire, 03051, to date specific, _____, 2025.

Motion by: _____ Second: _____ Carried/Failed: _____

MOTION TO GRANT A WAIVER:

I move to grant a waiver from **§289-20.B.2. – Catch-Basins**, in accordance with recommendation by the Town Engineer, based on the Board’s discussion, the testimony of the Applicant’s representative, and in accordance with the language included in the submitted Waiver Request Form for said waiver.

Motion by: _____ Second: _____ Carried/Failed: _____

I move to grant a waiver from **§289-28.F – Curb Cuts**, in accordance with recommendation by the Town Engineer, based on the Board’s discussion, the testimony of the Applicant’s representative, and in accordance with the language included in the submitted Waiver Request Form for said waiver.

Motion by: _____ Second: _____ Carried/Failed: _____

I move to grant a waiver from **§289-28.C – Street Cross-section**, in accordance with recommendation by the Town Engineer, based on the Board's discussion, the testimony of the Applicant's representative, and in accordance with the language included in the submitted Waiver Request Form for said waiver.

Motion by: _____ Second: _____ Carried/Failed: _____

I move to grant a waiver from **§290-5.A.4 – GRV**, in accordance with recommendation by the Town Engineer, based on the Board's discussion, the testimony of the Applicant's representative, and in accordance with the language included in the submitted Waiver Request Form for said waiver.

Motion by: _____ Second: _____ Carried/Failed: _____

I move to grant a waiver from **§289-37. A. – Phasing**, in accordance with recommendation by the Town Engineer, based on the Board's discussion, the testimony of the Applicant's representative, and in accordance with the language included in the submitted Waiver Request Form for said waiver.

Motion by: _____ Second: _____ Carried/Failed: _____

MOTION TO APPROVE:

I move to approve the Taybre Drive Subdivision Application SB# 03-25, Map 138/Lots 088 & 082, 9 Alvirne Drive, Hudson, New Hampshire 03051; prepared by: Hess Engineering and Construction, 63 West Street, Ashland, NH 03217; prepared for: M.R. Lacasse Homes, LLC, 9 Scenic Lane, Hudson, NH 03051; consisting of 22 sheets and general notes 1-21 on Sheet 6; dated April 24, 2025, last revised September 18, 2025; and:

That the Planning Board finds that this application complies with the Zoning Ordinance, and with the Land Use Regulations and for the reasons set forth in the written submissions, together with the testimony and factual representations made by the applicant during the public hearing;

Subject to, and revised per, the following stipulations:

1. All stipulations of approval shall be incorporated into the Subdivision Development Agreement, which shall be recorded at the HCRD along with the site plan.
2. Prior to endorsement of the Plan, the Subdivision Development Agreement and water easement depicted to the favor of the Town, shall be subject to final administrative review by the Town Planner and Town Engineer.
3. Prior to the Planning Board endorsement of the Plan, it shall be subject to final administrative review by Town Planner and Town Engineer.

4. All monumentation shall be set or bonded for prior to the Planning Board endorsing the Plan-of-Record.
5. Prior to application for a building permit, the Applicant shall schedule a pre-construction meeting with the Town Engineer.
6. A cost allocation procedure (CAP) amount of \$6,230.00 per unit shall be paid prior to issuance of a Certificate of Occupancy.
7. Construction activities involving the subject lot shall be limited to the hours between 7:00 A.M. and 7:00 P.M., Monday through Saturday. No exterior construction activities shall be allowed on Sundays.
8. Prior recording the plans, the applicant shall submit to the Planning Department staff, a final written summary of all comments received and the applicant's corresponding responses, to the satisfaction of the Planning Department.

Motion by: _____ Second: _____ Carried/Failed: _____



*Town of Hudson
12 School Street
Hudson, NH 03501*

SUBDIVISION APPLICATION

Revised August 2024

The following information must be filed with the Planning Department *at the time of filing a site plan application*:

1. One (1) original completed application with original signatures.
2. One (1) full plan set *folded* (sheet size: 22" x 34").
3. One (1) original copy of the project narrative.
4. A list of direct abutters and a list of indirect abutters, and two (2) sets of mailing labels for abutter notifications.
5. Subdivision Plan Review Checklist.
6. All of the above application materials, including plans, shall also be submitted in electronic form as a PDF.
7. ***All plans shall be folded*** and all pertinent data shall be attached to the plans with an elastic band or other enclosure.

Revised plans and other application material must be filed with the Planning Department ***no later than 10:00 A.M., Tuesday ONE WEEK prior to the scheduled Planning meeting. The purpose of these materials is hardcopy distribution to Planning Board members, not review.***

Any plan revisions that require staff review must be submitted no later than 10:00A.M., Tuesday TWO WEEKS prior to the scheduled Planning meeting. Depending on the complexity of changes, more time may be required for review. Please contact the Town Planner if you have any questions on this matter.

1. Submission of fifteen (15) 11" X 17" plan sets *folded*, revised if applicable.
2. Submission of one (1) full plan set *folded* (sheet size: 22" x 34"), if revised.
3. All of the above application materials, including plans, shall also be submitted in electronic form as a PDF.

Note: Prior to filing an application, it is recommended to schedule an appointment with the Town Planner.

SUBDIVISION APPLICATION

Date of Application: April 22, 2025 Tax Map #: 138 Lot #: 82&88

Site Address: 9 Alvirne Drive, Hudson

Name of Project: Taybre Drive, Hudson

Zoning District: R1&R2 General SB#: _____
(For Town Use Only)

Z.B.A. Action: _____

PROPERTY OWNER:

Name: M.R. Lacasse Homes LLC

Address: 9 Scenic Lane

Address: Hudson, NH 03051

Telephone # 603-321-8374

Email: michelrlacasse@gmail.com

DEVELOPER:

M.R. Lacasse Homes LLC

9 Scenic Lane

Hudson, NH 03051

603-321-8374

michelrlacasse@gmail.com

PROJECT ENGINEER:

Name: Hess Engineering and Construction Consultants

Address: 63 West Street, Ashland NH 03217

Address: P.O Box 991, Ashland NH 03217

Telephone # 603-968-5664

Email: whess@hessengineeringllc.com;
idesmarais@hessengineeringllc.com

SURVEYOR:

Maynard & Paquette Engineering Associates LLC
C/O John Yule

31 Quincy Street

Nashua NH 03060

603-883-7227

PURPOSE OF PLAN:

This application is for a 9 lot subdivision on Alvirne Drive.

(For Town Use Only)

Routing Date: _____ Deadline Date: _____ Meeting Date: _____

_____ I have no comments _____ I have comments (attach to form)

_____ Title: _____ Date: _____
(Initials)

Department: _____

Zoning: ____ Engineering: ____ Assessor: ____ Police: ____ Fire: ____ DPW: ____ Consultant: ____

SUBDIVISION PLAN DATA SHEETPLAN NAME: Taybre Drive SubdivisionPLAN TYPE: Conventional Subdivision Plan or Open Space Development (Circle One)LEGAL DESCRIPTION: MAP 138 LOT 82/88DATE: April 22nd, 2025-----
Address: 9 Alvirne DriveTotal Area: Lot82- 30,014 S.F. Lot 82-0.69 A.C
S.F. Lot 88- 619,783 S.F Acres: Lot 88- 14.23 A.CZoning: R1& R2Required Lot Area: 43,560SFRequired Lot Frontage: 120FTNumber of Lots Proposed: 9Water and Waste System
Proposed: SepticArea in Wetlands: 40,305 sf - no wetland impactExisting Buildings
To Be Removed: 0Flood Zone Reference: N.F.I.P F.I.R.M Community Panel 330092 0005BProposed Linear Feet
Of New Roadway: 1155.64LF

SUBDIVISION PLAN DATA SHEET

Dates/Case #/Description/
Stipulations of ZBA,
Conservation Commission,
NH Wetlands Board Action:

(Attach Stipulations on
Separate Sheet)

List Permits Required: NHDES Alteration of Terrain
NHDES State Subdivision Approval - See eSA2021110407
SWPPP per AoT regulations

<i><u>*Waivers Requested:</u></i>	Hudson Town Code <u>Reference</u>	<u>Regulation Description</u>
	1.	
	2.	
	3.	
	4.	
	5.	
	6.	
	7.	

**(Left Column for Town Use)*

(For Town Use Only)

Data Sheets Checked By: _____ Date: _____

SUBDIVISION PLAN APPLICATION AUTHORIZATION

I hereby apply for *Subdivision Plan* Review and acknowledge I will comply with all of the Ordinances of the Town of Hudson, New Hampshire State Laws, as well as any stipulations of the Planning Board, in development and construction of this project. I understand that if any of the items listed under the *Subdivision Plan* specifications or application form are incomplete, the application will be considered rejected.

Pursuant to RSA 674:1-IV, the owner(s) by the filing of this application as indicated above, hereby given permission for any member of the Hudson Planning Board, the Town Planner, the Town Engineer, and such agents or employees of the Town or other persons as the Planning Board may authorize, to enter upon the property which is the subject of this application at all reasonable times for the purpose of such examinations, surveys, tests and inspections as may be appropriate. The owner(s) release(s) any claim to or right he/she (they) may now or hereafter possess against any of the above individuals as a result of any examinations, surveys, tests and/or inspections conducted on his/her (their) property in connection with this applications.

Signature of Owner: _____ Date: _____

Print Name of Owner: M.R. LACASSE

- ❖ If other than an individual, indicate name of organization and its principal owner, partners, or corporate officers.

Signature of Developer: _____ Date: _____

Print Name of Developer: M.R. LACASSE

- ❖ The developer/individual in charge must have control over all project work and be available to the Code Enforcement Officer/Building Inspector during the construction phase of the project. The individual in charge of the project must notify the Code Enforcement Officer/Building Inspector within two (2) working days of any change.

WAIVER REQUEST FORM

Name of Subdivision/Site Plan: _____

Street Address: _____

I _____ hereby request that the Planning Board
waive the requirements of item _____ of the Hudson Land Use Regulations
in reference to a plan presented by _____
_____ (name of surveyor and engineer) dated _____ for
property tax map(s) _____ and lot(s) _____ in the Town of Hudson, NH.

As the aforementioned applicant, I, herein, acknowledge that this waiver is requested in accordance with the provisions set forth in RSA 674:36, II (n), i.e., without the Planning Board granting said waiver, it would pose an unnecessary hardship upon me (the applicant), and the granting of this waiver would not be contrary to the spirit and intent of the Land Use Regulations.

Hardship reason(s) for granting this waiver (if additional space is needed please attach the appropriate documentation hereto):

Reason(s) for granting this waiver, relative to not being contrary to the spirit and intent of the Land Use Regulations: (if additional space is needed please attach the appropriate documentation hereto):

Signed:

Applicant or Authorized Agent

SCHEDULE OF FEES

A. REVIEW FEES:

1. \$170.00 per proposed lot \$ 1,530

CONSULTANT REVIEW FEE: (Separate Check)

Total 14.917 acres @ \$600.00 per acre, or \$1,250.00, \$ 8,950.20
whichever is greater.

This is an estimate for cost of consultant review. The fee is expected to cover the amount. A complex project may require additional funds. A simple project may result in a refund.

LEGAL FEE:

The applicant shall be charged attorney costs billed to the Town for the Town’s attorney review of any application plan set documents.

B. POSTAGE:

17 Direct Abutters Applicant, Professionals, etc. as required \$ 94.86
by RSA 676:4.1.d @\$5.58 (or Current Certified Mail Rate)

6 Indirect Abutters (property owners within 200 feet) \$ 4.38
@\$0.73 (or Current First Class Rate)

C. TAX MAP UPDATE FEE

2 to 7 lots (# of lots x \$30.00) + \$25.00 (min. \$85.00) \$ -
8 lots or more (min. \$325.00) \$ 325

TOTAL \$ 10,904.44

(For Town Use Only)	
AMOUNT RECEIVED: \$ _____	DATE RECEIVED: _____
RECEIPT NO.: _____	RECEIVED BY: _____

NOTE: fees below apply only upon plan approval, NOT collected at time of application.

D. RECORDING:

*****The applicant shall be responsible for the recording of the approved plan, and all documents as required by an approval, at the Hillsborough County Registry of Deeds (HCRD), located at 19 Temple Street, Nashua, NH 03061. Additional fees associated with recording can be found at HCRD.*****

E. COST ALLOCATION PROCEDURE AMOUNT CONTRIBUTION AND OTHER IMPACT FEE PAYMENTS:

To be determined by the Planning Board at time of plan approval and shall be paid by the applicant at the time of submittal of the Certificate of Occupancy Permit requests.

*****The applicant shall be responsible for all fees incurred by the town for processing and review of the applicant's application, plan and related materials.*****

**TOWN OF HUDSON
SUBDIVISION PLAN REVIEW CHECKLIST**

This checklist is intended to help the applicant and staff to ensure application completeness. Please refer to the regulations on the exact language of each requirement.

Key: *Y=Yes P=Pending W=Waiver Request NA=Not Applicable*

§ 276-11.1 General Plan Requirements

- | <u>Y</u> | <u>P</u> | <u>W</u> | <u>NA</u> | | |
|-----------------|-------------------------------------|--------------------------|--------------------------|--------------------------|--|
| 1. | ☒ | ☐ | ☐ | ☐ | - A list of the names and addresses of the owner(s) of the property, the applicant(s), and all abutters as indicated in the office of the Town Assessor records not more than five (5) days prior to the day of filing [§ 276-11.1.A.] |
| 2. | ☒ | ☐ | ☐ | ☐ | - One (1) set of Plans on size 22" x 34" sheet [§ 276-11.1.B.(1)] |
| 3. | ☒ | ☐ | ☐ | ☐ | - Scale no smaller than 50 feet to the inch (1" = 50') [§ 276-11.1.B.(2)] |
| 4. | ☒ | ☐ | ☐ | ☐ | - Title block in the lower right-hand corner of the plan, containing: [§ 276-11.1.B.(3)] |
| 5. | ☒ | ☐ | ☐ | ☐ | -Title, including the term "site plan" or "subdivision plan" |
| 6. | ☒ | ☐ | ☐ | ☐ | - The name for whom the plan was prepared |
| 7. | ☒ | ☐ | ☐ | ☐ | - Preparer of the plan |
| 8. | ☒ | ☐ | ☐ | ☐ | - The scale(s) of the plan |
| 9. | ☒ | ☐ | ☐ | ☐ | - Date of the plan |
| 10. | ☒ | ☐ | ☐ | ☐ | - Appropriate revision block |
| 11. | ☒ | ☐ | ☐ | ☐ | - Approval block located on the lower left corner of each sheet, with the require language and signature lines [§ 276-11.1.B.(4)] |
| 12. | ☒ | ☐ | ☐ | ☐ | - Owner's printed name and address and signature [§ 276-11.1.B.(6)] |
| 13. | ☒ | ☐ | ☐ | ☐ | - Name and address of all abutting property owners [§ 276-11.1.B.(7)] |
| 14. | ☒ | ☐ | ☐ | ☐ | - A locus plan at one inch equals 1,000 feet (1" = 1,000') [§ 276-11.1.B.(8)] |
| 15. | ☒ | ☐ | ☐ | ☐ | -Boundary of the entire parcel held in single ownership with boundary dimensions and bearings [§ 276-11.1.B.(9)] |
| 16. | ☒ | ☐ | ☐ | ☐ | - Error of closure shown and certified by a licensed land surveyor |
| 17. | ☒ | ☐ | ☐ | ☐ | - North point arrow |

Notes

18. ☒ ☐ ☐ ☐ - Zoning classification note of the tract and location of the zoning district boundaries if the property is located in two or more zoning district [§ 276-11.1.B.(10)]
19. ☒ ☐ ☐ ☐ - The location of all building setback lines as required by Chapter 334, Zoning, or as listed under § 276-11.1.B.(12), whichever is more stringent [§ 276-11.1.B.(12)].
20. ☒ ☐ ☐ ☐ - The location size and character of all signs or a note* stating "All signs are subject to approval by the Hudson Zoning Administrator prior to installation thereof." [§ 276-11.1.B.(13)] *The discrepancy on the note language is correct – reference to the Planning Board in the regulations is outdated.
21. ☒ ☐ ☐ ☐ - The location, detail and character of all exterior lighting or a note stating: "There will be no exterior lighting." [§ 276-11.1.B.(14)]
22. ☒ ☐ ☐ ☐ - The location of all buildings within 50 feet of the tract [§ 276-11.1.B.(15)]
23. ☒ ☐ ☐ ☐ - The location of roadways, driveways, travel areas or parking areas within 200 feet of the tract, with the use of an additional sheet, aerial photography, or Town topographic mapping as necessary [§ 276-11.1.B.(16)]
24. ☒ ☐ ☐ ☐ - Existing topography at two-foot contour intervals of that portion of the tract being proposed for development from a topographic survey and contours on the remainder of the tract from a reliable plan source [§ 276-11.1.B.(17)]
25. ☒ ☐ ☐ ☐ - Proposed topography at two-foot contour intervals [§ 276-11.1.B.(18)]
26. ☒ ☐ ☐ ☐ - A note identifying the Tax Map and Lot Number of the tract [§ 276-11.1.B.(19)]
27. ☒ ☐ ☐ ☐ - The location of all existing buildings (including size and height), driveways, sidewalks, parking spaces, loading area, open spaces, large trees, open drainage courses, signs, exterior lighting, service areas, easements landscaping and other pertinent items. [§ 276-11.1.B.(20)]

See sheet P-1

See sheet P-1

See sheets P-1, P-2

- | | <u>Y</u> | <u>P</u> | <u>W</u> | <u>NA</u> | |
|-----|-------------------------------------|--------------------------|--------------------------|-------------------------------------|---|
| 28. | ☒ | ☐ | ☐ | ☐ | - The location of all proposed construction, buildings, structures, pavement, etc.
[§ 276-11.1.B.(21)] |
| 29. | ☒ | ☐ | ☐ | ☐ | - A green area shown between the right-of-way line and any pavement, gravel or structure meeting the required minimum width
[§ 276-11.1.B.(22)] |
| 30. | ☒ | ☐ | ☐ | ☐ | - Highway protects listed on the transportation improvement program adopted by the Nashua Regional Planning Commission, shown in the Hudson Master Plan, or listed in the Corridor Study adopted by the Hudson Planning Board [§ 276-11.1.B.(23)] |
| 31. | ☐ | ☐ | ☐ | ☒ | - Required open space, including the calculation showing the requirement is met
[§ 276-11.1.B.(24)] |

Notes

See sheets P-1,
P-2

§§ 275-8 – 275-9 Site Plan Requirements

(If this checklist is for a subdivision plan application, skip to the next section on page 5)

- | | <u>Y</u> | <u>P</u> | <u>W</u> | <u>NA</u> | |
|-----|--------------------------|--------------------------|--------------------------|--------------------------|---|
| 33. | ☐ | ☐ | ☐ | ☐ | - Parking space calculation showing and a statement stating the required parking spaces are provided
[§ 275-8.C.(2) & (3)] |
| 34. | ☐ | ☐ | ☐ | ☐ | - Required dimensions for parking space
[§ 275-8.C.(4)] |
| 35. | ☐ | ☐ | ☐ | ☐ | - Required dimensions for aisle/access drive
[§ 275-8.C.(5)] |
| 36. | ☐ | ☐ | ☐ | ☐ | - Required off-street loading spaces, including calculation showing the required loading spaces are provided [§ 275-8.C.(6)] |
| 37. | ☐ | ☐ | ☐ | ☐ | - Required landscaping for the parking lot, including calculation shown the planting requirement is met [§ 275-8.C.(7)] |
| 38. | ☐ | ☐ | ☐ | ☐ | - Required screening for visual separation of incompatible uses [§ 275-8.C.(8)] |

Notes

Attachment "A"

- | | <u>Y</u> | <u>P</u> | <u>W</u> | <u>NA</u> | |
|-----|--------------------------|--------------------------|--------------------------|--------------------------|--|
| 39. | ☐ | ☐ | ☐ | ☐ | - Handicap accessibility provided in accordance with the latest ADA Regulations
[§ 275-8.C.(11)] |
| 40. | ☐ | ☐ | ☐ | ☐ | - Stormwater Management Plan [§ 275-9.A] |
| 41. | ☐ | ☐ | ☐ | ☐ | - Traffic Study, if required [§ 275-9.B] |
| 42. | ☐ | ☐ | ☐ | ☐ | - Noise Study, if required [§ 275-9.C] |
| 43. | ☐ | ☐ | ☐ | ☐ | - Fiscal Impact Study, if required [§ 275-9.D] |
| 44. | ☐ | ☐ | ☐ | ☐ | - Utility Study [§ 275-9.E] |
| 45. | ☐ | ☐ | ☐ | ☐ | - Copies of any proposed or existing easements, covenants, deed restrictions or any other similar document pertinent to the Site Plan
[§ 275-9.F] |
| 45. | ☐ | ☐ | ☐ | ☐ | - A copy of all applicable Town, state, county or federal approvals or permits [§ 275-9.G] |
| 46. | ☐ | ☐ | ☐ | ☐ | - Chapter 270, Sewers |
| 47. | ☐ | ☐ | ☐ | ☐ | - Floodplain permit |
| 48. | ☐ | ☐ | ☐ | ☐ | - Special exception to the Wetland Ordinance |
| 49. | ☐ | ☐ | ☐ | ☐ | - Septic system construction approval from the New Hampshire Water Supply and Pollution Control Commission |
| 50. | ☐ | ☐ | ☐ | ☐ | - Approval of the New Hampshire Wetland Bureau for relocation, filling, dredging or rechanneling |
| 51. | ☐ | ☐ | ☐ | ☐ | - Approval of the New Hampshire Department of Public Works and Highways for any required driveway permits or curb cuts |
| 52. | ☐ | ☐ | ☐ | ☐ | - NH RSA 149:9-a Permit |
| 53. | ☐ | ☐ | ☐ | ☐ | - Environmental Impact Study, if required
[§ 275-9.I] |

Notes

(End here if this checklist is for a site plan application).

TOWN OF HUDSON
SUBDIVISION PLAN REVIEW CHECKLIST

This checklist is intended to help the applicant and staff to ensure application completeness. Please refer to the regulations on the exact language of each requirement.

Key: *Y=Yes P =Pending W=Waiver Request NA=Not Applicable*

§§ 289-26 – 289-27 Subdivision Plan Requirements
(Not applicable if this checklist is for a site plan application)

- | | <u>Y</u> | <u>P</u> | <u>W</u> | <u>NA</u> | |
|-----|-------------------------------------|--------------------------|--------------------------|--------------------------|---|
| 54. | ☒ | ☐ | ☐ | ☐ | - Proposed subdivision name [§ 289-26.B.(1)] |
| 55. | ☒ | ☐ | ☐ | ☐ | - Abutting subdivision names, streets, easements, setbacks, alleys, parks and public open spaces and similar facts regarding abutting property [§ 289-26.B.(2)] |

Notes



63 West Street – P.O. Box 991, Ashland, NH, 03217

Phone: (603) 968-5664

www.hessengineeringllc.com

STORMWATER MANAGEMENT REPORT

TAYBRE DRIVE

Tax Map 138 Lot 82+88

9 Alvirne Drive, Hudson, New Hampshire, 03051

Date: August 27th, 2025

Latest Revision: September 15th, 2025

**Prepared For:
M. R. Lacasse Homes, LLC
9 Scenic Lane
Hudson, New Hampshire 03051**

STORMWATER MANAGEMENT REPORT

Job 24009 – Taybre Subdivision – Alvirne Drive, Hudson, NH - Map: 138 Lot: 82 + 88

Overview of the Project:

This project proposes a 9 lot subdivision off Alvirne Drive in Hudson, New Hampshire. A roughly 927' road, Taybre Drive, will service the new subdivision with a drainage system comprised of 1 basin, 8 catch basins, 2 manholes, and a wet pond. The existing conditions are two vacant forested lots. There is a large slope of HSG A soil that will be cut to create the proposed subdivision, with the majority of the site to be raised.

Methodology

In order to take various characteristics and physical properties into account when preparing a model of actual conditions, and to better manage the numerous values and specific information for each watershed, computer aided design software was used. HydroCAD (v10.20-6a) software was used to model specific watershed areas and provide a complete set of calculations to demonstrate the performance of these areas under a variety of conditions. The software is based on the widely accepted and practiced SCS TR-20 model and is used to develop peak rates of runoff, perform stage-storage-discharge calculations, and other hydraulic analysis for various rainfall events. All calculations are carried to the control points, which are intended to simulate a positive outfall in order to accurately compare and account for project impacts.

The analysis was performed using the 2-, 10-, 25-, and 50-year storm frequencies over rainfall data retrieved from Northeast Regional Climate Center for the location at 9 Alvirne Drive, Hudson, NH.

Typically, the storm rainfall amounts would be derived using the Northeast Regional Climate Center, Extreme Precipitation Tables (attached herewith) provided by Cornell University.

Evaluation of Existing Conditions

An on-ground survey was conducted by LLS John Yule of Maynard and Paquette Engineering Associates, LLC in 2024. The contours are based on these surveys and supplemental LiDAR from NHGRANIT with some spot elevations from said survey. The Site-Specific Soil Survey was based on the delineations by Luke Powell, CSS, CWS, with portions using the web soil survey when outside of the limits of delineation. The wetlands were mapped by Luke Powell as well. The main slope is HSG A with several test pits not finding any evidence of ESHWT. As the slope eased, the water table changed from 24" to about 15" below the surface. In some locations, test pits indicated that the water table was about 9" below the surface in the somewhat poorly drained soils approaching the wetlands.

The site consists of 2 parcels on Alvirne Drive in Hudson, NH. The site was classified as mainly Pipestone loamy sand and Hinckley loamy sand per Web Soil Survey, however, Luke Powell classified the Hinckley area as Windsor and the Pipestone as a combination of Sudbury and two Deerfield variants. Web soil lists the wetlands as Scarboro mucky fine sandy loam and Wareham but Luke Powell delineated them as all Wareham. The current flood plain map does not show that the proposed project will be in the 100-year flood plain. The Town of Hudson requires a 50' buffer around all wetlands, which are shown on the attached plans. Luke Powell delineated both wetlands as PSS1E. The test pits used to conduct this drainage analysis and design calculations were all done under the supervision of Luke Powell, CSS. The test pits shown on the Maynard & Paquette subdivision plan were not used and are separate from those done by or in conjunction with this office.

STORMWATER MANAGEMENT REPORT

Job 24009 – Taybre Subdivision – Alvirne Drive, Hudson, NH - Map: 138 Lot: 82 + 88

Monitoring wells have been established by Danna Truslow, PG of Truslow Resource Consulting, LLC. They have confirmed the data regarding the water table and ESHWT from the Site Specific Soil Survey by Luke Powell, CSS.

Evaluation of Proposed Conditions

The proposed work will raise the site in all areas outside the main slope and basins. All drainage lines will have at least 2' of cover and a minimum slope of at least 1.8%. Catch basins will receive most of the stormwater from the impermeable surfaces created, with some running directly into the sediment forebays. They will then go into the best management practices. A wet pond is used due to the extremely restrictive water table on the site. This will allow for adequate treatment of all runoff leaving the disturbed areas. The wet pond will provide treatment for all runoff generated from the proposed development. The wetland buffer zone required by the Town of Hudson will be maintained for both wetlands.

The assumed impervious area is based on the driveway length and the building. While Hudson does not have a specific lot coverage amount, the area depicted in the plans is representative of what will be developed. The current design shows an average impervious area of ~2,750 sf per lot. The 1 acre Residential CN determination in TR-55 assumes 20% impervious or ~8,700 sf per lot. This is a significant increase in impervious area than what is proposed.

Tables 1-2: Summary of Flow Rates

POI – POINT OF INTEREST

Table 1: 2R

Storm Frequency	Pre-development Peak Flow (c.f.s)	Post-development Peak Flow (c.f.s)
2-Year	0.04	0.03
10-Year	0.44	0.32
25-Year	0.98	0.68
50-Year	1.58	1.07

POI – POINT OF INTEREST

Table 2: 4R

Storm Frequency	Pre-development Peak Flow (c.f.s)	Post-development Peak Flow (c.f.s)
2-Year	0.00	0.00
10-Year	0.00	0.00
25-Year	0.00	0.00
50-Year	0.01	0.01

POI – POINT OF INTEREST

Table 3: 6R

Storm Frequency	Pre-development Peak Flow (c.f.s)	Post-development Peak Flow (c.f.s)
2-Year	0.00	0.00
10-Year	0.00	0.00

STORMWATER MANAGEMENT REPORT

Job 24009 – Taybre Subdivision – Alvirne Drive, Hudson, NH - Map: 138 Lot: 82 + 88

25-Year	0.01	0.01
50-Year	0.05	0.05

POI – POINT OF INTEREST

Table 4: 8R

Storm Frequency	Pre-development Peak Flow (c.f.s)	Post-development Peak Flow (c.f.s)
2-Year	0.39	0.38
10-Year	2.29	1.98
25-Year	4.68	4.23
50-Year	7.32	7.02

Summary

Basins:

The drainage system will treat stormwater runoff produced by the proposed conditions. This system reduces or maintains the peak flow generated by the site for all storm events. Test pits have been conducted to determine the required depth of the permanent pool based on the water table elevation.

The pretreatment required is fulfilled by a series of sediment forebays that feed into the main wet pond (Basin 1). Runoff that goes directly into the basin will not require any pretreatment as it is not from any developed impervious surface.

CONCLUSION:

The Taybre Drive development that is proposed will not create any adverse effects downstream in storm water quantity or quality. It will not adversely effect the quality or quantity of groundwater in the region. The proposed conditions reduce peak runoff to all abutters and wetlands, which should help allievate current drainage issues experienced in the the vicinity of the proposed development.

Do not hesitate to contact me or the Hess Engineering & Construction Consultants office at my email, whess@hessengineeringllc.com, or via phone: (603) 968-5664.

Best,

Will Hess, P.E.
Principal
Hess Engineering & Construction Consultants

STORMWATER POND DESIGN CRITERIA

Env-Wq 1508.03

Type/Node Name: **Wet Pond/ Basin 1 (29P)**

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

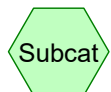
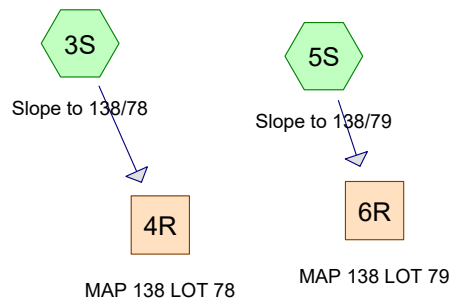
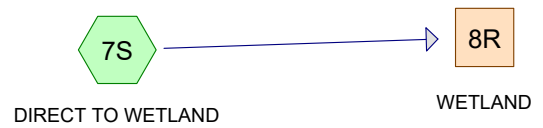
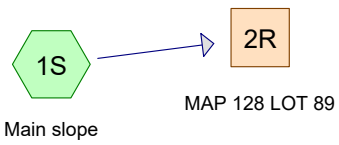
9.74	ac	A = Area draining to the practice	
1.45	ac	A _i = Impervious area draining to the practice	
0.15	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.18	unitless	R _v = Runoff coefficient = 0.05 + (0.9 x I)	
1.79	ac-in	WQV = 1" x R _v x A	
6,504	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
650	cf	10% x WQV (check calc for sediment forebay and micropool volume)	
3,252	cf	50% x WQV (check calc for extended detention volume)	
899	cf	V _{SED} = Sediment forebay volume	≥ 10%WQV
34,065	cf	V _{PP} = Permanent pool volume (volume below the lowest invert of the outlet structure) Attach stage-storage table.	
no	cf	Extended Detention? ¹	≤ 50% WQV
-		V _{ED} = Volume of extended detention (if "yes" is given in box above)	
		E _{ED} = Elevation of WQV if "yes" is given in box above ⁴	
-	cfs	2Q _{avg} = 2 * V _{ED} / 24 hrs * (1hr / 3600 sec) (used to check against Q _{EDmax} below)	
	cfs	Q _{EDmax} = Discharge at the E _{ED} (attach stage-discharge table)	< 2Q _{avg}
-	hours	T _{ED} = Drawdown time of extended detention = 2V _{ED} /Q _{EDmax}	≥ 24-hrs
3.00	:1	Pond side slopes	≥ 3:1
155.25	ft	Elevation of seasonal high water table	
155.00	ft	Elevation of lowest pond outlet	
150.25	ft	Max floor = Maximum elevation of pond bottom (ft)	
147.00	ft	Minimum floor (to maintain depth at less than 8')	≤ 8 ft
150.25	ft	Elevation of pond floor ³	≤ Max floor and > Min floor
400.00	ft	Length of the flow path between the inlet and outlet at mid-depth	
71.00	ft	Average width ([average of the top width + average bottom width]/2)	
5.63	:1	Length to average width ratio	≥ 3:1
YES	Yes/No	Is the perimeter curvilinear.	← Yes
YES	Yes/No	Are the inlet and outlet located as far apart as possible.	← Yes
NO	Yes/No	Is there a manually-controlled drain to dewater the pond over a 24hr period?	
If no state why: No elevation for mechanism			
Weir/Earthen Berm		What mechanism is proposed to prevent the outlet structure from clogging (applicable for orifices/weirs with a dimension of <6")?	
156.50	ft	Peak elevation of the 50-year storm event	
157.50	ft	Berm elevation of the pond	
YES		50 peak elevation ≤ the berm elevation?	← yes

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

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

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

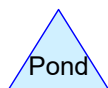
Designer's Notes:



Subcat



Reach



Pond



Link

Routing Diagram for 24009 HUDSON Pre

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24009 HUDSON Pre

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Page 2

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	NRCC 24-hr	D	Default	24.00	1	2.93	2
2	10-Year	NRCC 24-hr	D	Default	24.00	1	4.42	2
3	25-Year	NRCC 24-hr	D	Default	24.00	1	5.59	2
4	50-Year	NRCC 24-hr	D	Default	24.00	1	6.68	2

24009 HUDSON Pre

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Page 3

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.197	39	>75% Grass cover, Good, HSG A (3S, 5S)
0.669	61	>75% Grass cover, Good, HSG B (7S)
0.222	98	IMP (7S)
3.878	30	Woods, Good, HSG A (1S, 3S, 5S, 7S)
11.358	55	Woods, Good, HSG B (1S, 7S)
0.002	70	Woods, Good, HSG C (7S)
16.326	50	TOTAL AREA

24009 HUDSON Pre

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Page 4

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
4.075	HSG A	1S, 3S, 5S, 7S
12.027	HSG B	1S, 7S
0.002	HSG C	7S
0.000	HSG D	
0.222	Other	7S
16.326		TOTAL AREA

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Page 5

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.197	0.669	0.000	0.000	0.000	0.866	>75% Grass cover, Good	3S, 5S, 7S
0.000	0.000	0.000	0.000	0.222	0.222	IMP	7S
3.878	11.358	0.002	0.000	0.000	15.238	Woods, Good	1S, 3S, 5S, 7S
4.075	12.027	0.002	0.000	0.222	16.326	TOTAL AREA	

24009 HUDSON Pre*NRCC 24-hr D 2-Year Rainfall=2.93"*

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Page 6

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Main slope

Runoff Area=86,925 sf 0.00% Impervious Runoff Depth>0.10"
Flow Length=805' Tc=32.4 min CN=WQ Runoff=0.04 cfs 0.017 af

Subcatchment 3S: Slope to 138/78

Runoff Area=1,354 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=WQ Runoff=0.00 cfs 0.000 af

Subcatchment 5S: Slope to 138/79

Runoff Area=18,895 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=WQ Runoff=0.00 cfs 0.000 af

Subcatchment 7S: DIRECT TO WETLAND

Runoff Area=604,005 sf 1.60% Impervious Runoff Depth>0.13"
Flow Length=1,442' Tc=64.7 min CN=WQ Runoff=0.39 cfs 0.156 af

Reach 2R: MAP 128 LOT 89

Inflow=0.04 cfs 0.017 af
Outflow=0.04 cfs 0.017 af

Reach 4R: MAP 138 LOT 78

Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach 6R: MAP 138 LOT 79

Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach 8R: WETLAND

Inflow=0.39 cfs 0.156 af
Outflow=0.39 cfs 0.156 af

Total Runoff Area = 16.326 ac Runoff Volume = 0.173 af Average Runoff Depth = 0.13"
98.64% Pervious = 16.104 ac 1.36% Impervious = 0.222 ac

24009 HUDSON Pre

NRCC 24-hr D 10-Year Rainfall=4.42"

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Page 7

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Main slope

Runoff Area=86,925 sf 0.00% Impervious Runoff Depth>0.47"
Flow Length=805' Tc=32.4 min CN=WQ Runoff=0.44 cfs 0.077 af

Subcatchment 3S: Slope to 138/78

Runoff Area=1,354 sf 0.00% Impervious Runoff Depth>0.05"
Tc=6.0 min CN=WQ Runoff=0.00 cfs 0.000 af

Subcatchment 5S: Slope to 138/79

Runoff Area=18,895 sf 0.00% Impervious Runoff Depth>0.02"
Tc=6.0 min CN=WQ Runoff=0.00 cfs 0.001 af

Subcatchment 7S: DIRECT TO WETLAND

Runoff Area=604,005 sf 1.60% Impervious Runoff Depth>0.49"
Flow Length=1,442' Tc=64.7 min CN=WQ Runoff=2.29 cfs 0.562 af

Reach 2R: MAP 128 LOT 89

Inflow=0.44 cfs 0.077 af
Outflow=0.44 cfs 0.077 af

Reach 4R: MAP 138 LOT 78

Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach 6R: MAP 138 LOT 79

Inflow=0.00 cfs 0.001 af
Outflow=0.00 cfs 0.001 af

Reach 8R: WETLAND

Inflow=2.29 cfs 0.562 af
Outflow=2.29 cfs 0.562 af

Total Runoff Area = 16.326 ac Runoff Volume = 0.641 af Average Runoff Depth = 0.47"
98.64% Pervious = 16.104 ac 1.36% Impervious = 0.222 ac

24009 HUDSON Pre

NRCC 24-hr D 25-Year Rainfall=5.59"

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Page 8

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Main slope

Runoff Area=86,925 sf 0.00% Impervious Runoff Depth>0.88"
Flow Length=805' Tc=32.4 min CN=WQ Runoff=0.98 cfs 0.146 af

Subcatchment 3S: Slope to 138/78

Runoff Area=1,354 sf 0.00% Impervious Runoff Depth>0.21"
Tc=6.0 min CN=WQ Runoff=0.00 cfs 0.001 af

Subcatchment 5S: Slope to 138/79

Runoff Area=18,895 sf 0.00% Impervious Runoff Depth>0.11"
Tc=6.0 min CN=WQ Runoff=0.01 cfs 0.004 af

Subcatchment 7S: DIRECT TO WETLAND

Runoff Area=604,005 sf 1.60% Impervious Runoff Depth>0.88"
Flow Length=1,442' Tc=64.7 min CN=WQ Runoff=4.68 cfs 1.016 af

Reach 2R: MAP 128 LOT 89

Inflow=0.98 cfs 0.146 af
Outflow=0.98 cfs 0.146 af

Reach 4R: MAP 138 LOT 78

Inflow=0.00 cfs 0.001 af
Outflow=0.00 cfs 0.001 af

Reach 6R: MAP 138 LOT 79

Inflow=0.01 cfs 0.004 af
Outflow=0.01 cfs 0.004 af

Reach 8R: WETLAND

Inflow=4.68 cfs 1.016 af
Outflow=4.68 cfs 1.016 af

Total Runoff Area = 16.326 ac Runoff Volume = 1.167 af Average Runoff Depth = 0.86"
98.64% Pervious = 16.104 ac 1.36% Impervious = 0.222 ac

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NRCC 24-hr D 50-Year Rainfall=6.68"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Main slope

Runoff Area=86,925 sf 0.00% Impervious Runoff Depth>1.35"
Flow Length=805' Tc=32.4 min CN=WQ Runoff=1.58 cfs 0.224 af

Subcatchment 3S: Slope to 138/78

Runoff Area=1,354 sf 0.00% Impervious Runoff Depth>0.46"
Tc=6.0 min CN=WQ Runoff=0.01 cfs 0.001 af

Subcatchment 5S: Slope to 138/79

Runoff Area=18,895 sf 0.00% Impervious Runoff Depth>0.26"
Tc=6.0 min CN=WQ Runoff=0.05 cfs 0.010 af

Subcatchment 7S: DIRECT TO WETLAND

Runoff Area=604,005 sf 1.60% Impervious Runoff Depth>1.33"
Flow Length=1,442' Tc=64.7 min CN=WQ Runoff=7.32 cfs 1.534 af

Reach 2R: MAP 128 LOT 89

Inflow=1.58 cfs 0.224 af
Outflow=1.58 cfs 0.224 af

Reach 4R: MAP 138 LOT 78

Inflow=0.01 cfs 0.001 af
Outflow=0.01 cfs 0.001 af

Reach 6R: MAP 138 LOT 79

Inflow=0.05 cfs 0.010 af
Outflow=0.05 cfs 0.010 af

Reach 8R: WETLAND

Inflow=7.32 cfs 1.534 af
Outflow=7.32 cfs 1.534 af

Total Runoff Area = 16.326 ac Runoff Volume = 1.769 af Average Runoff Depth = 1.30"
98.64% Pervious = 16.104 ac 1.36% Impervious = 0.222 ac

Events for Subcatchment 1S: Main slope

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.04	0.017	0.10
10-Year	4.42	0.44	0.077	0.47
25-Year	5.59	0.98	0.146	0.88
50-Year	6.68	1.58	0.224	1.35

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Events for Subcatchment 3S: Slope to 138/78

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.00	0.000	0.00
10-Year	4.42	0.00	0.000	0.05
25-Year	5.59	0.00	0.001	0.21
50-Year	6.68	0.01	0.001	0.46

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Events for Subcatchment 5S: Slope to 138/79

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.00	0.000	0.00
10-Year	4.42	0.00	0.001	0.02
25-Year	5.59	0.01	0.004	0.11
50-Year	6.68	0.05	0.010	0.26

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Events for Subcatchment 7S: DIRECT TO WETLAND

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.39	0.156	0.13
10-Year	4.42	2.29	0.562	0.49
25-Year	5.59	4.68	1.016	0.88
50-Year	6.68	7.32	1.534	1.33

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Events for Reach 2R: MAP 128 LOT 89

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.04	0.04	0.00	0
10-Year	0.44	0.44	0.00	0
25-Year	0.98	0.98	0.00	0
50-Year	1.58	1.58	0.00	0

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Events for Reach 4R: MAP 138 LOT 78

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.00	0.00	0.00	0
10-Year	0.00	0.00	0.00	0
25-Year	0.00	0.00	0.00	0
50-Year	0.01	0.01	0.00	0

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Events for Reach 6R: MAP 138 LOT 79

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.00	0.00	0.00	0
10-Year	0.00	0.00	0.00	0
25-Year	0.01	0.01	0.00	0
50-Year	0.05	0.05	0.00	0

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Events for Reach 8R: WETLAND

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.39	0.39	0.00	0
10-Year	2.29	2.29	0.00	0
25-Year	4.68	4.68	0.00	0
50-Year	7.32	7.32	0.00	0

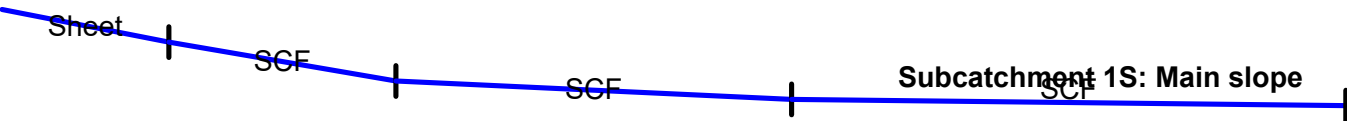
Summary for Subcatchment 1S: Main slope

Runoff = 0.44 cfs @ 12.54 hrs, Volume= 0.077 af, Depth> 0.47"
Routed to Reach 2R : MAP 128 LOT 89

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.42"

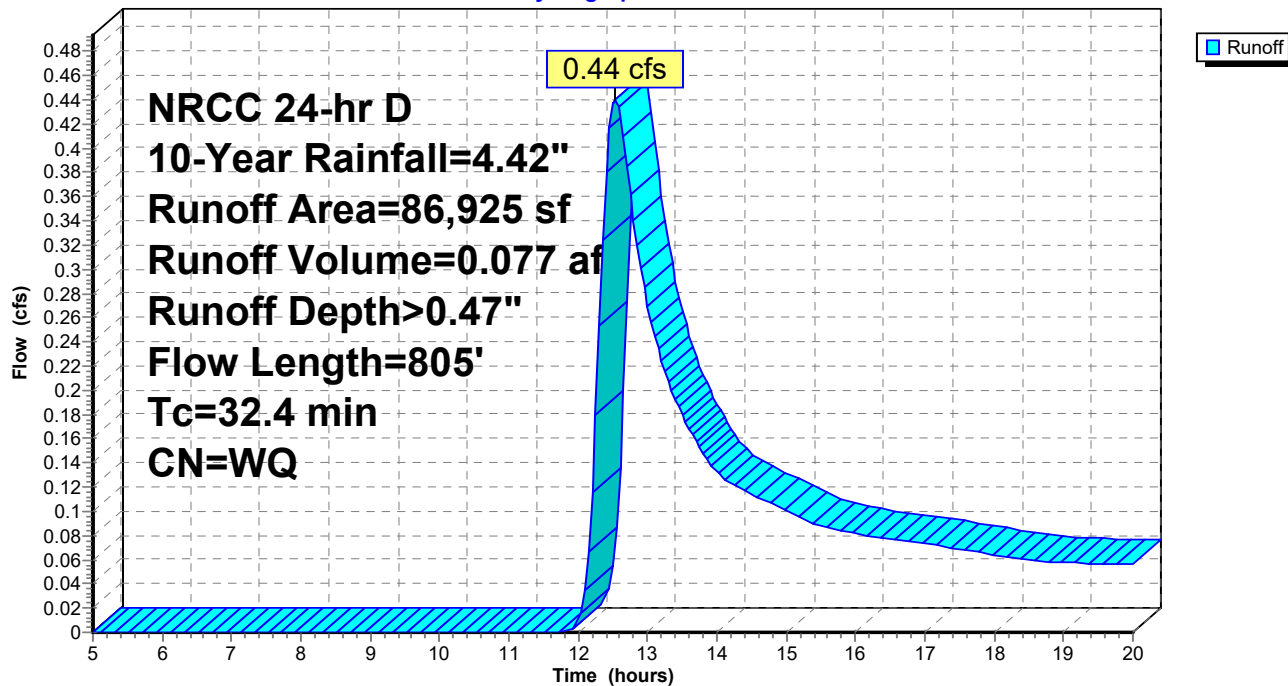
Area (sf)	CN	Description
15,835	30	Woods, Good, HSG A
71,090	55	Woods, Good, HSG B
86,925		Weighted Average
86,925		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.1050	0.14		Sheet Flow, Sheet Woods: Light underbrush n= 0.400 P2= 2.93"
1.5	136	0.0920	1.52		Shallow Concentrated Flow, SCF Woodland Kv= 5.0 fps
5.0	237	0.0250	0.79		Shallow Concentrated Flow, SCF Woodland Kv= 5.0 fps
14.3	332	0.0060	0.39		Shallow Concentrated Flow, SCF Woodland Kv= 5.0 fps
32.4	805	Total			



Subcatchment 1S: Main slope

Hydrograph



Summary for Subcatchment 3S: Slope to 138/78

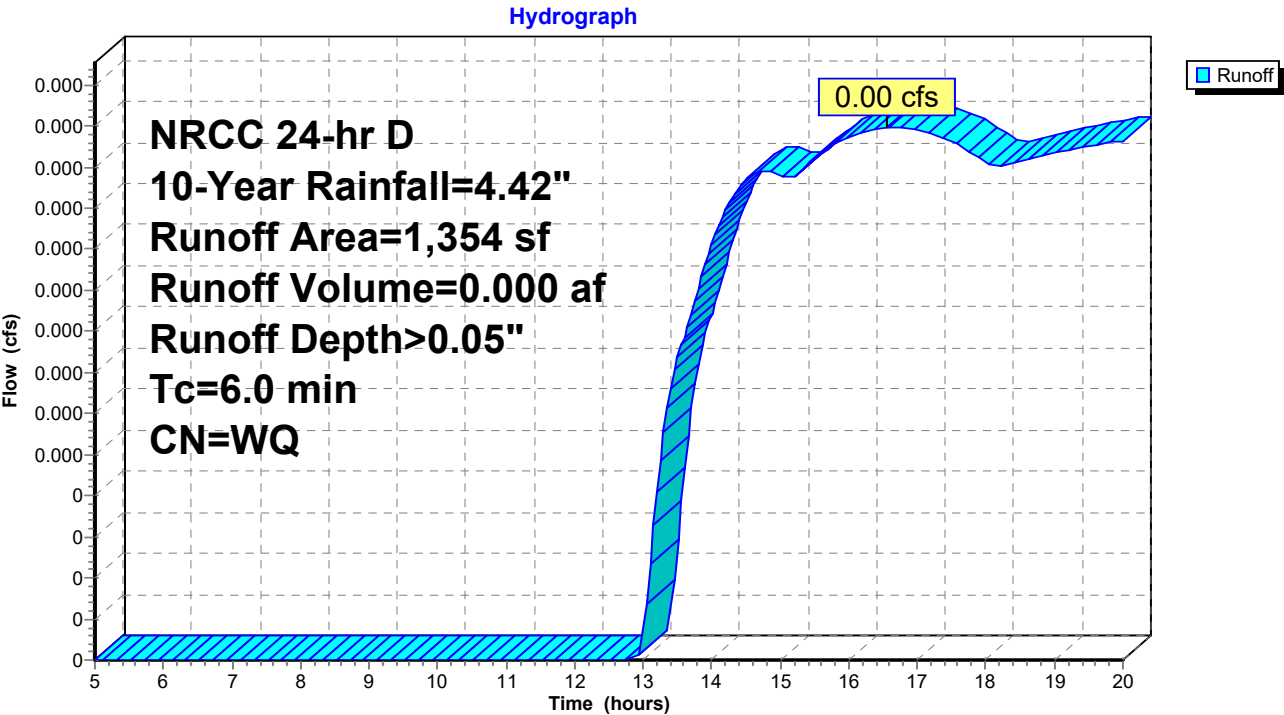
Runoff = 0.00 cfs @ 16.55 hrs, Volume= 0.000 af, Depth> 0.05"
Routed to Reach 4R : MAP 138 LOT 78

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
1,158	39	>75% Grass cover, Good, HSG A
196	30	Woods, Good, HSG A
1,354		Weighted Average
1,354		100.00% Pervious Area

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

Subcatchment 3S: Slope to 138/78



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NRCC 24-hr D 10-Year Rainfall=4.42"

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Summary for Subcatchment 5S: Slope to 138/79

Runoff = 0.00 cfs @ 16.55 hrs, Volume= 0.001 af, Depth> 0.02"
Routed to Reach 6R : MAP 138 LOT 79

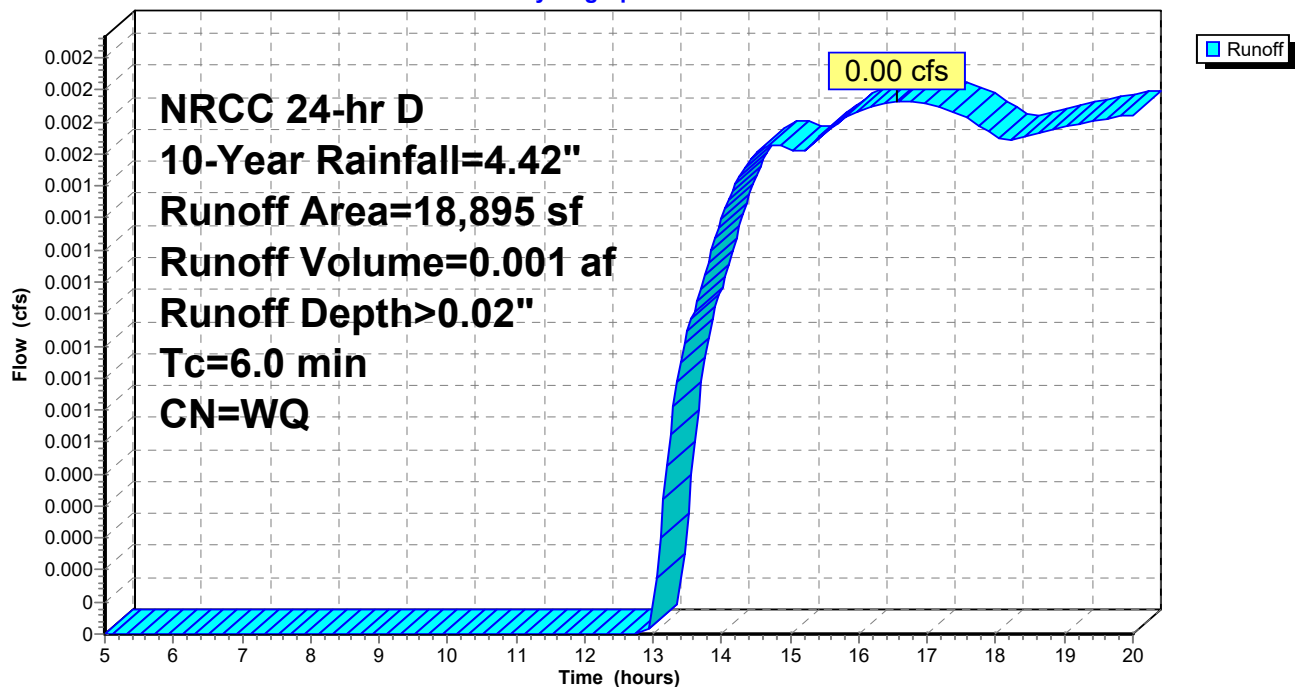
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
7,432	39	>75% Grass cover, Good, HSG A
11,463	30	Woods, Good, HSG A
18,895		Weighted Average
18,895		100.00% Pervious Area

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

Subcatchment 5S: Slope to 138/79

Hydrograph



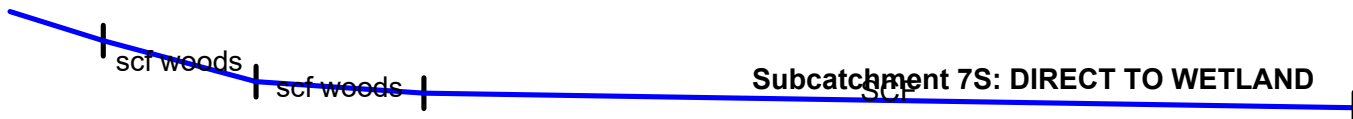
Summary for Subcatchment 7S: DIRECT TO WETLAND

Runoff = 2.29 cfs @ 13.02 hrs, Volume= 0.562 af, Depth> 0.49"
 Routed to Reach 8R : WETLAND

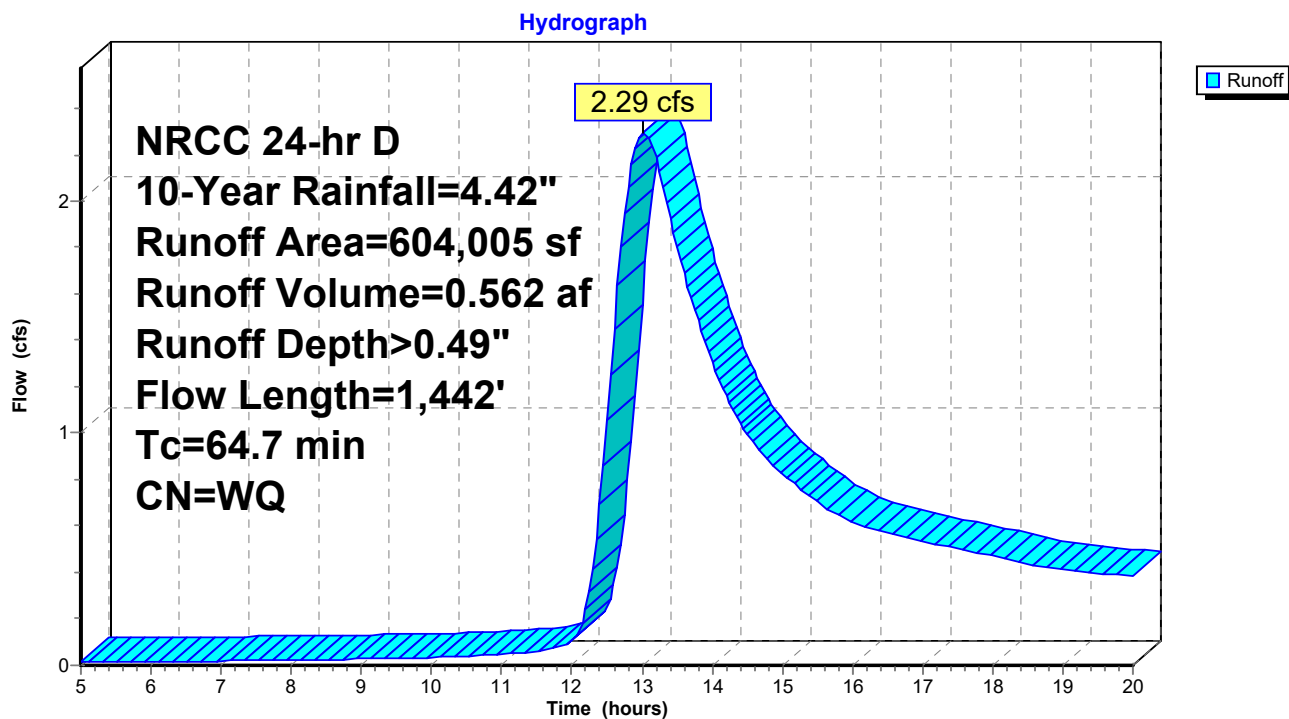
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
141,437	30	Woods, Good, HSG A
270,770	55	Woods, Good, HSG B
95	70	Woods, Good, HSG C
* 3,322	98	IMP
* 6,347	98	IMP
29,133	61	>75% Grass cover, Good, HSG B
152,901	55	Woods, Good, HSG B
604,005		Weighted Average
594,336		98.40% Pervious Area
9,669		1.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	100	0.1000	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.93"
1.9	164	0.0860	1.47		Shallow Concentrated Flow, scf woods Woodland Kv= 5.0 fps
4.0	180	0.0220	0.74		Shallow Concentrated Flow, scf woods Woodland Kv= 5.0 fps
47.0	998	0.0050	0.35		Shallow Concentrated Flow, SCF Woodland Kv= 5.0 fps
64.7	1,442	Total			



Subcatchment 7S: DIRECT TO WETLAND



Summary for Reach 2R: MAP 128 LOT 89

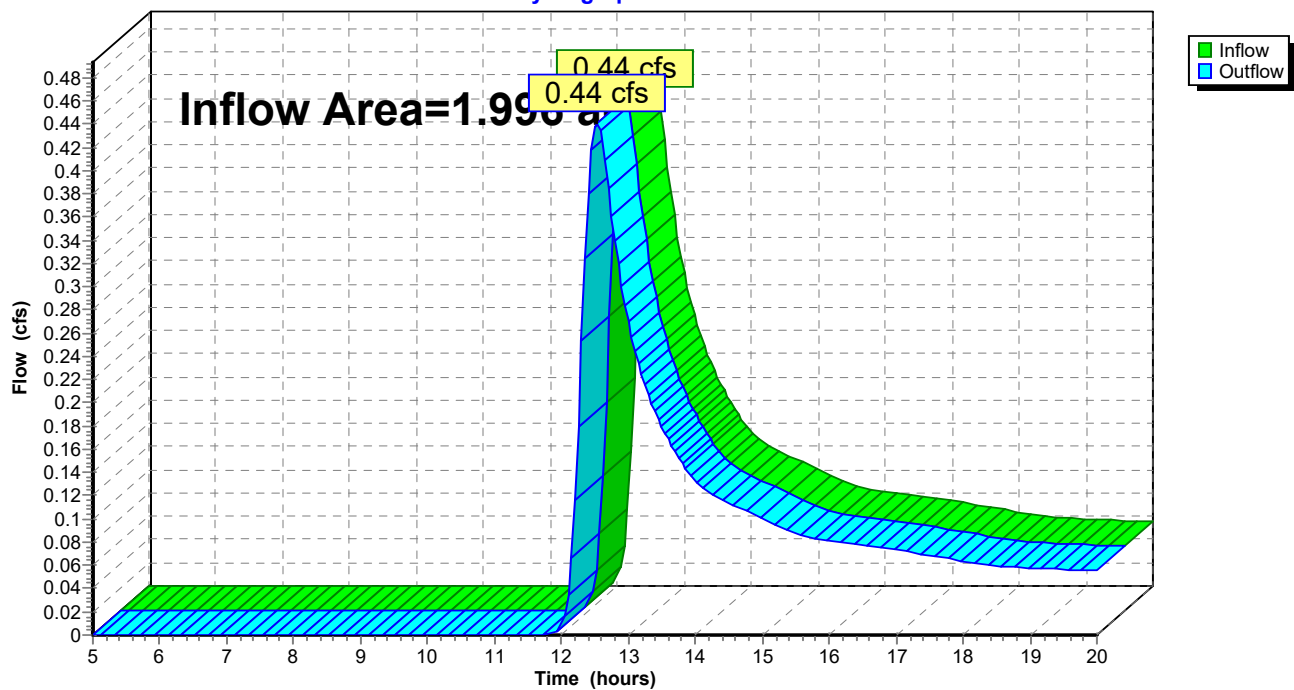
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.996 ac, 0.00% Impervious, Inflow Depth > 0.47" for 10-Year event
Inflow = 0.44 cfs @ 12.54 hrs, Volume= 0.077 af
Outflow = 0.44 cfs @ 12.54 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 2R: MAP 128 LOT 89

Hydrograph



Summary for Reach 4R: MAP 138 LOT 78

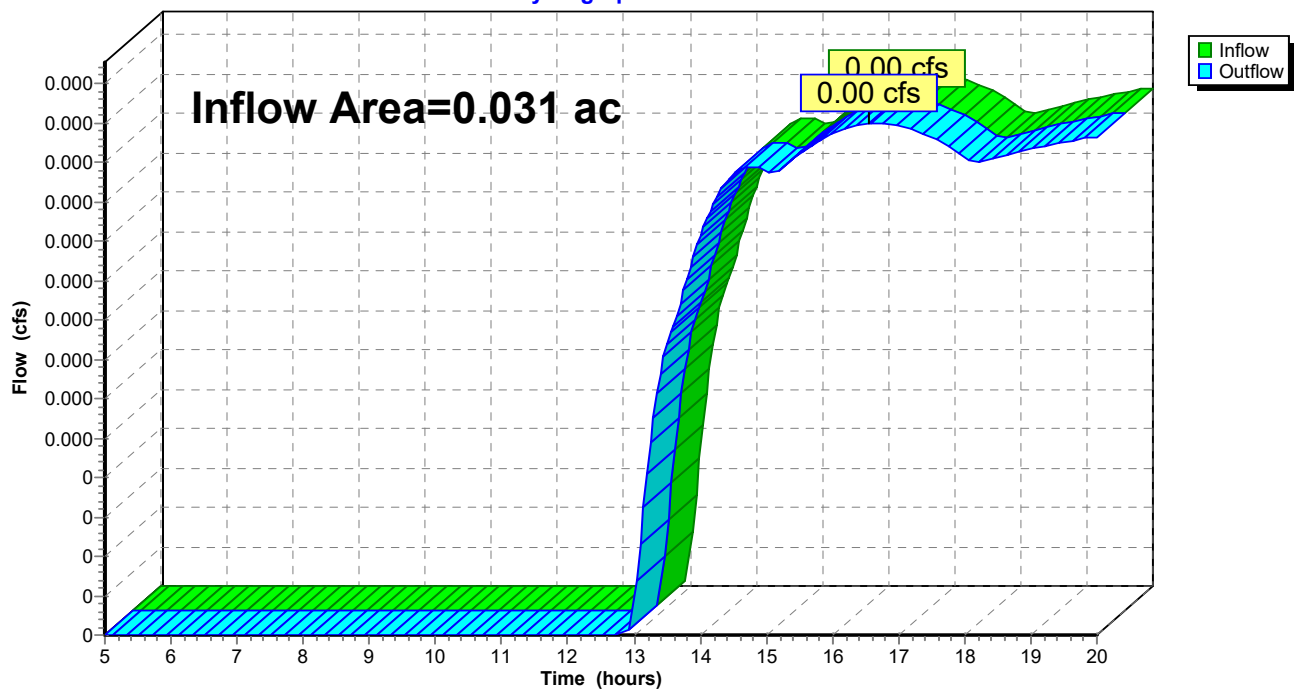
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.031 ac, 0.00% Impervious, Inflow Depth > 0.05" for 10-Year event
Inflow = 0.00 cfs @ 16.55 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 16.55 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 4R: MAP 138 LOT 78

Hydrograph

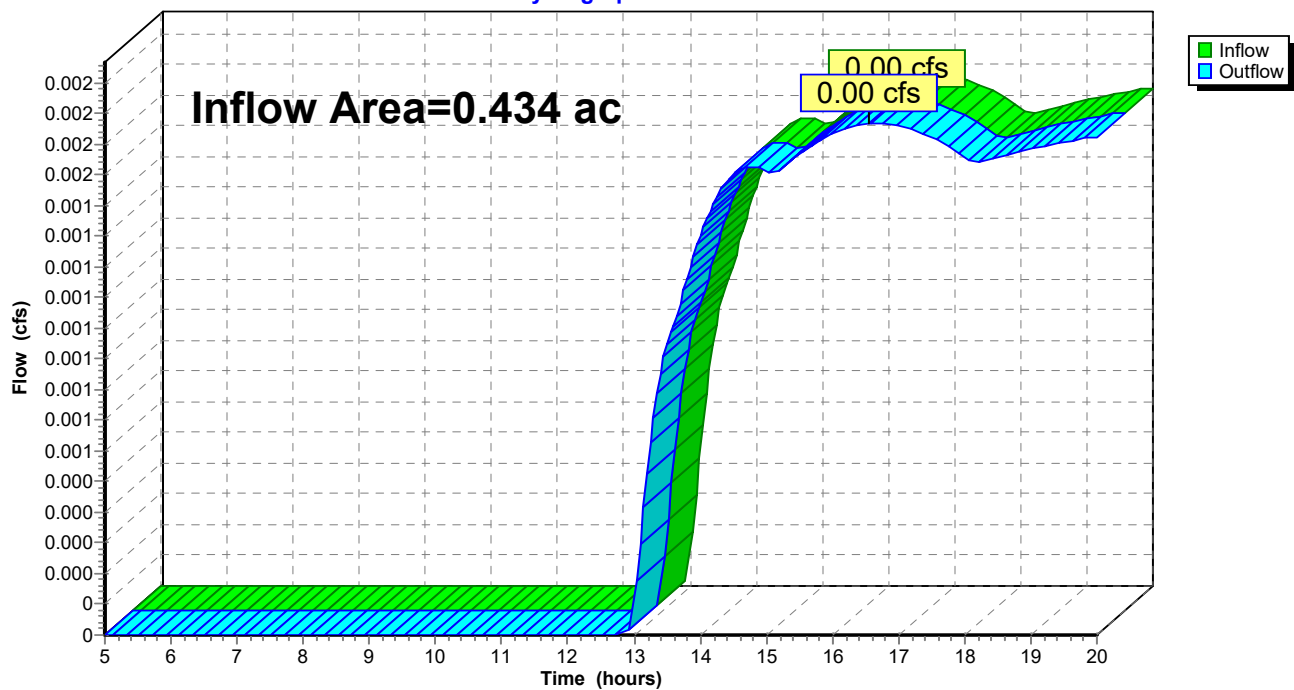


Summary for Reach 6R: MAP 138 LOT 79

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

Inflow Area = 0.434 ac, 0.00% Impervious, Inflow Depth > 0.02" for 10-Year event
Inflow = 0.00 cfs @ 16.55 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 16.55 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

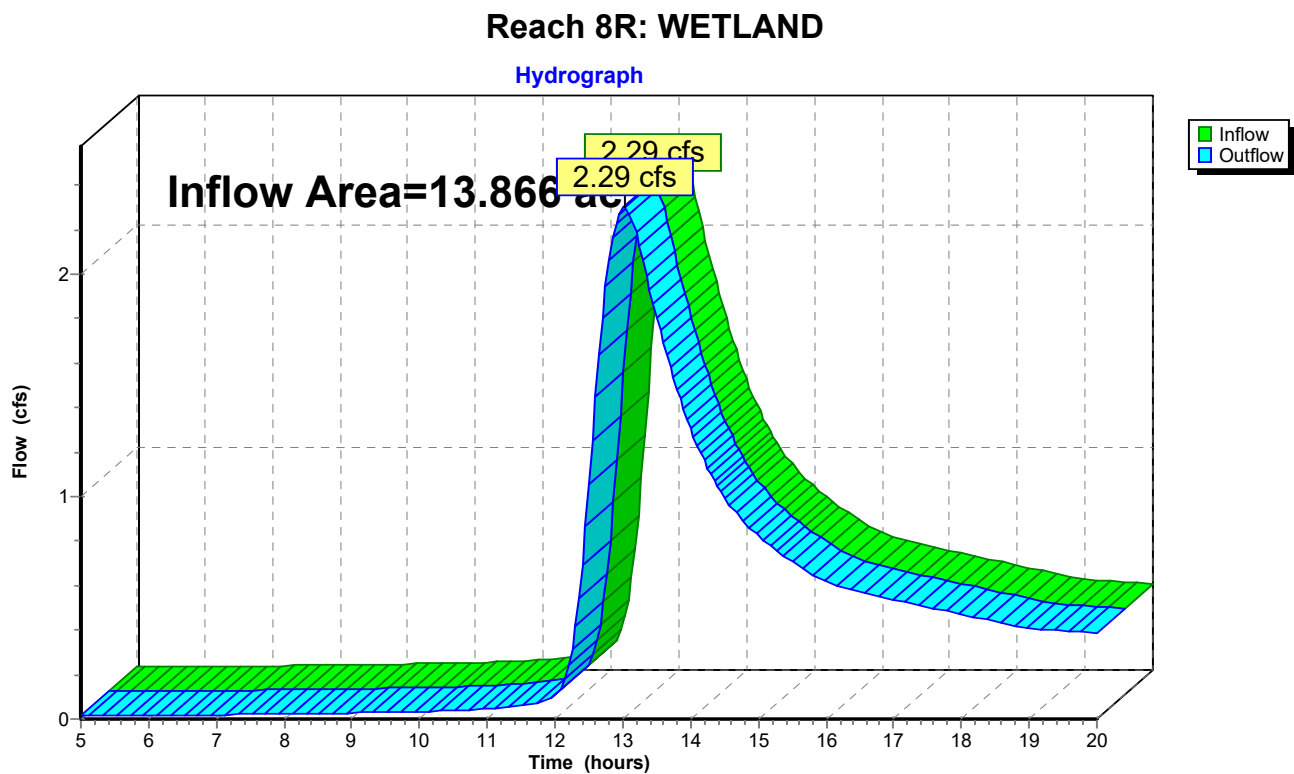
Reach 6R: MAP 138 LOT 79**Hydrograph**

Summary for Reach 8R: WETLAND

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

Inflow Area = 13.866 ac, 1.60% Impervious, Inflow Depth > 0.49" for 10-Year event
Inflow = 2.29 cfs @ 13.02 hrs, Volume= 0.562 af
Outflow = 2.29 cfs @ 13.02 hrs, Volume= 0.562 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



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Multi-Event Tables

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Events for Subcatchment 1S: Main slope

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	0.44	0.077	0.47

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Events for Subcatchment 3S: Slope to 138/78

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	0.00	0.000	0.05

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Events for Subcatchment 5S: Slope to 138/79

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	0.00	0.001	0.02

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Events for Subcatchment 7S: DIRECT TO WETLAND

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	2.29	0.562	0.49

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Events for Reach 2R: MAP 128 LOT 89

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	0.44	0.44	0.00	0

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Events for Reach 4R: MAP 138 LOT 78

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	0.00	0.00	0.00	0

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Events for Reach 6R: MAP 138 LOT 79

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	0.00	0.00	0.00	0

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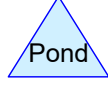
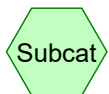
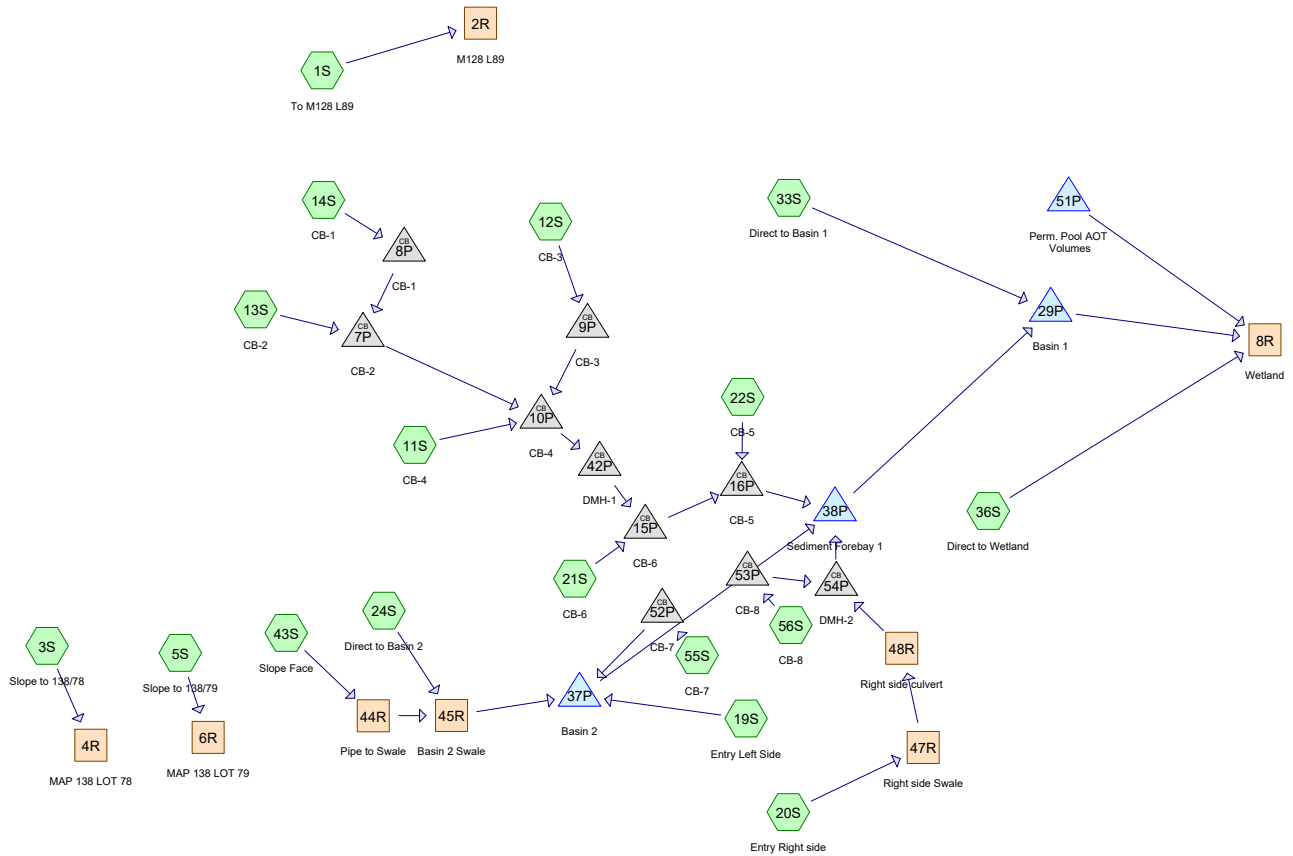
Multi-Event Tables

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Events for Reach 8R: WETLAND

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	2.29	2.29	0.00	0



Routing Diagram for 24009 Hudson Post Town Rev 8.4.25
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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	NRCC 24-hr	D	Default	24.00	1	2.93	2
2	10-Year	NRCC 24-hr	D	Default	24.00	1	4.42	2
3	25-Year	NRCC 24-hr	D	Default	24.00	1	5.59	2
4	50-Year	NRCC 24-hr	D	Default	24.00	1	6.68	2

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.141	39	>75% Grass cover, Good, HSG A (3S, 5S, 11S, 12S, 13S, 14S, 24S, 33S, 43S)
5.549	61	>75% Grass cover, Good, HSG B (1S, 11S, 12S, 14S, 19S, 20S, 21S, 22S, 24S, 33S, 36S, 55S, 56S)
1.526	98	IMP (11S, 12S, 13S, 14S, 19S, 20S, 21S, 22S, 24S, 36S, 55S, 56S)
1.492	30	Woods, Good, HSG A (1S, 3S, 5S, 14S, 24S, 33S, 43S)
5.615	55	Woods, Good, HSG B (1S, 24S, 33S, 36S)
0.002	70	Woods, Good, HSG C (36S)
16.326	57	TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
3.633	HSG A	1S, 3S, 5S, 11S, 12S, 13S, 14S, 24S, 33S, 43S
11.165	HSG B	1S, 11S, 12S, 14S, 19S, 20S, 21S, 22S, 24S, 33S, 36S, 55S, 56S
0.002	HSG C	36S
0.000	HSG D	
1.526	Other	11S, 12S, 13S, 14S, 19S, 20S, 21S, 22S, 24S, 36S, 55S, 56S
16.326		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
2.141	5.549	0.000	0.000	0.000	7.690	>75% Grass cover, Good	1S, 3S, 5S, 11S, 12S, 13S, 14S, 19S, 20S, 21S, 22S, 24S, 33S, 36S, 43S, 55S, 56S
0.000	0.000	0.000	0.000	1.526	1.526	IMP	11S, 12S, 13S, 14S, 19S, 20S, 21S, 22S, 24S, 36S, 55S, 56S
1.492	5.615	0.002	0.000	0.000	7.110	Woods, Good	1S, 3S, 5S, 14S, 24S, 33S, 36S, 43S
3.633	11.165	0.002	0.000	1.526	16.326	TOTAL AREA	

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	44R	170.50	162.00	134.0	0.0634	0.013	0.0	6.0	0.0	
2	48R	157.20	156.18	56.7	0.0180	0.012	0.0	12.0	0.0	
3	7P	164.60	159.00	245.1	0.0228	0.012	0.0	18.0	0.0	
4	8P	165.64	165.30	17.2	0.0198	0.012	0.0	12.0	0.0	
5	9P	160.61	160.27	17.1	0.0199	0.012	0.0	12.0	0.0	
6	10P	158.92	157.60	73.2	0.0180	0.012	0.0	18.0	0.0	
7	15P	156.11	155.80	17.0	0.0182	0.012	0.0	24.0	0.0	
8	16P	155.69	155.30	21.8	0.0179	0.012	0.0	24.0	0.0	
9	37P	156.50	155.44	71.0	0.0149	0.012	0.0	12.0	0.0	
10	42P	157.50	156.20	72.0	0.0181	0.012	0.0	18.0	0.0	
11	52P	156.95	156.56	16.5	0.0236	0.012	0.0	12.0	0.0	
12	53P	156.90	156.39	25.5	0.0200	0.012	0.0	12.0	0.0	
13	54P	156.08	155.40	37.7	0.0180	0.012	0.0	12.0	0.0	

24009 Hudson Post Town Rev 8.4.25

Prepared by Hess Engineering & Construction

Printed 9/15/2025

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Notes Listing (all nodes)

Line#	Node Number	Notes
1	Project	Rainfall events imported from "NRCS-Rain.txt" for 6514 NH Hillsborough East
2		Rainfall events imported from "24009 HUDSON Pre.hcp"
3		Rainfall events imported from "24009 HUDSON Pre.hcp"

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To M128 L89	Runoff Area=61,921 sf 0.00% Impervious Runoff Depth>0.11" Flow Length=805' Tc=32.4 min CN=WQ Runoff=0.03 cfs 0.013 af
Subcatchment 3S: Slope to 138/78	Runoff Area=1,354 sf 0.00% Impervious Runoff Depth=0.00" Tc=6.0 min CN=WQ Runoff=0.00 cfs 0.000 af
Subcatchment 5S: Slope to 138/79	Runoff Area=18,895 sf 0.00% Impervious Runoff Depth=0.00" Tc=6.0 min CN=WQ Runoff=0.00 cfs 0.000 af
Subcatchment 11S: CB-4	Runoff Area=10,954 sf 79.72% Impervious Runoff Depth>1.97" Tc=6.0 min CN=WQ Runoff=0.52 cfs 0.041 af
Subcatchment 12S: CB-3	Runoff Area=12,913 sf 60.06% Impervious Runoff Depth>1.55" Tc=6.0 min CN=WQ Runoff=0.47 cfs 0.038 af
Subcatchment 13S: CB-2	Runoff Area=19,704 sf 36.19% Impervious Runoff Depth>0.87" Flow Length=293' Tc=11.8 min CN=WQ Runoff=0.35 cfs 0.033 af
Subcatchment 14S: CB-1	Runoff Area=30,956 sf 34.62% Impervious Runoff Depth>0.84" Flow Length=376' Tc=15.2 min CN=WQ Runoff=0.47 cfs 0.050 af
Subcatchment 19S: Entry Left Side	Runoff Area=6,885 sf 75.31% Impervious Runoff Depth>1.88" Tc=6.0 min CN=WQ Runoff=0.31 cfs 0.025 af
Subcatchment 20S: Entry Right side	Runoff Area=14,604 sf 48.77% Impervious Runoff Depth>1.31" Tc=6.0 min CN=WQ Runoff=0.45 cfs 0.037 af
Subcatchment 21S: CB-6	Runoff Area=4,084 sf 70.52% Impervious Runoff Depth>1.78" Tc=6.0 min CN=WQ Runoff=0.17 cfs 0.014 af
Subcatchment 22S: CB-5	Runoff Area=9,623 sf 68.59% Impervious Runoff Depth>1.74" Tc=6.0 min CN=WQ Runoff=0.40 cfs 0.032 af
Subcatchment 24S: Direct to Basin 2	Runoff Area=140,061 sf 2.61% Impervious Runoff Depth>0.23" Flow Length=671' Tc=25.0 min CN=WQ Runoff=0.31 cfs 0.061 af
Subcatchment 33S: Direct to Basin 1	Runoff Area=138,692 sf 0.00% Impervious Runoff Depth>0.20" Flow Length=867' Tc=34.0 min CN=WQ Runoff=0.21 cfs 0.052 af
Subcatchment 36S: Direct to Wetland	Runoff Area=204,166 sf 1.59% Impervious Runoff Depth>0.19" Flow Length=597' Tc=50.9 min CN=WQ Runoff=0.21 cfs 0.074 af
Subcatchment 43S: Slope Face	Runoff Area=30,117 sf 0.00% Impervious Runoff Depth=0.00" Tc=6.0 min CN=WQ Runoff=0.00 cfs 0.000 af
Subcatchment 55S: CB-7	Runoff Area=2,212 sf 70.07% Impervious Runoff Depth>1.77" Tc=6.0 min CN=WQ Runoff=0.09 cfs 0.007 af

Subcatchment 56S: CB-8	Runoff Area=4,025 sf 47.33% Impervious Runoff Depth>1.28" Tc=6.0 min CN=WQ Runoff=0.12 cfs 0.010 af
Reach 2R: M128 L89	Inflow=0.03 cfs 0.013 af Outflow=0.03 cfs 0.013 af
Reach 4R: MAP 138 LOT 78	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
Reach 6R: MAP 138 LOT 79	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
Reach 8R: Wetland	Inflow=0.38 cfs 0.223 af Outflow=0.38 cfs 0.223 af
Reach 44R: Pipe to Swale	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af 6.0" Round Pipe n=0.013 L=134.0' S=0.0634 ' Capacity=1.41 cfs Outflow=0.00 cfs 0.000 af
Reach 45R: Basin 2 Swale	Avg. Flow Depth=0.10' Max Vel=1.41 fps Inflow=0.31 cfs 0.061 af n=0.022 L=251.0' S=0.0120 ' Capacity=26.28 cfs Outflow=0.31 cfs 0.060 af
Reach 47R: Right side Swale	Avg. Flow Depth=0.05' Max Vel=0.46 fps Inflow=0.45 cfs 0.037 af n=0.022 L=98.0' S=0.0027 ' Capacity=71.45 cfs Outflow=0.40 cfs 0.036 af
Reach 48R: Right side culvert	Avg. Flow Depth=0.19' Max Vel=3.87 fps Inflow=0.40 cfs 0.036 af 12.0" Round Pipe n=0.012 L=56.7' S=0.0180 ' Capacity=5.18 cfs Outflow=0.39 cfs 0.036 af
Pond 7P: CB-2	Peak Elev=165.00' Inflow=0.81 cfs 0.082 af 18.0" Round Culvert n=0.012 L=245.1' S=0.0228 ' Outflow=0.81 cfs 0.082 af
Pond 8P: CB-1	Peak Elev=165.98' Inflow=0.47 cfs 0.050 af 12.0" Round Culvert n=0.012 L=17.2' S=0.0198 ' Outflow=0.47 cfs 0.050 af
Pond 9P: CB-3	Peak Elev=160.95' Inflow=0.47 cfs 0.038 af 12.0" Round Culvert n=0.012 L=17.1' S=0.0199 ' Outflow=0.47 cfs 0.038 af
Pond 10P: CB-4	Peak Elev=159.51' Inflow=1.68 cfs 0.162 af 18.0" Round Culvert n=0.012 L=73.2' S=0.0180 ' Outflow=1.68 cfs 0.162 af
Pond 15P: CB-6	Peak Elev=156.67' Inflow=1.85 cfs 0.176 af 24.0" Round Culvert n=0.012 L=17.0' S=0.0182 ' Outflow=1.85 cfs 0.176 af
Pond 16P: CB-5	Peak Elev=156.31' Inflow=2.24 cfs 0.208 af 24.0" Round Culvert n=0.012 L=21.8' S=0.0179 ' Outflow=2.24 cfs 0.208 af
Pond 29P: Basin 1	Peak Elev=155.53' Storage=9,248 cf Inflow=2.64 cfs 0.348 af Outflow=0.27 cfs 0.149 af
Pond 37P: Basin 2	Peak Elev=156.71' Storage=1,617 cf Inflow=0.45 cfs 0.092 af 12.0" Round Culvert n=0.012 L=71.0' S=0.0149 ' Outflow=0.19 cfs 0.063 af
Pond 38P: Sediment Forebay 1	Peak Elev=155.51' Storage=1,061 cf Inflow=2.65 cfs 0.317 af Outflow=2.63 cfs 0.296 af

Pond 42P: DMH-1

Peak Elev=158.09' Inflow=1.68 cfs 0.162 af
18.0" Round Culvert n=0.012 L=72.0' S=0.0181 '/' Outflow=1.68 cfs 0.162 af

Pond 51P: Perm. Pool AOT Volumes

Peak Elev=0.00' Storage=0 cf
Primary=0.00 cfs 0.000 af

Pond 52P: CB-7

Peak Elev=157.10' Inflow=0.09 cfs 0.007 af
12.0" Round Culvert n=0.012 L=16.5' S=0.0236 '/' Outflow=0.09 cfs 0.007 af

Pond 53P: CB-8

Peak Elev=157.07' Inflow=0.12 cfs 0.010 af
12.0" Round Culvert n=0.012 L=25.5' S=0.0200 '/' Outflow=0.12 cfs 0.010 af

Pond 54P: DMH-2

Peak Elev=156.42' Inflow=0.46 cfs 0.046 af
12.0" Round Culvert n=0.012 L=37.7' S=0.0180 '/' Outflow=0.46 cfs 0.046 af

Total Runoff Area = 16.326 ac Runoff Volume = 0.486 af Average Runoff Depth = 0.36"
90.65% Pervious = 14.800 ac 9.35% Impervious = 1.526 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To M128 L89	Runoff Area=61,921 sf 0.00% Impervious Runoff Depth>0.45" Flow Length=805' Tc=32.4 min CN=WQ Runoff=0.32 cfs 0.054 af
Subcatchment 3S: Slope to 138/78	Runoff Area=1,354 sf 0.00% Impervious Runoff Depth>0.05" Tc=6.0 min CN=WQ Runoff=0.00 cfs 0.000 af
Subcatchment 5S: Slope to 138/79	Runoff Area=18,895 sf 0.00% Impervious Runoff Depth>0.02" Tc=6.0 min CN=WQ Runoff=0.00 cfs 0.001 af
Subcatchment 11S: CB-4	Runoff Area=10,954 sf 79.72% Impervious Runoff Depth>3.11" Tc=6.0 min CN=WQ Runoff=0.82 cfs 0.065 af
Subcatchment 12S: CB-3	Runoff Area=12,913 sf 60.06% Impervious Runoff Depth>2.55" Tc=6.0 min CN=WQ Runoff=0.80 cfs 0.063 af
Subcatchment 13S: CB-2	Runoff Area=19,704 sf 36.19% Impervious Runoff Depth>1.38" Flow Length=293' Tc=11.8 min CN=WQ Runoff=0.53 cfs 0.052 af
Subcatchment 14S: CB-1	Runoff Area=30,956 sf 34.62% Impervious Runoff Depth>1.33" Flow Length=376' Tc=15.2 min CN=WQ Runoff=0.72 cfs 0.078 af
Subcatchment 19S: Entry Left Side	Runoff Area=6,885 sf 75.31% Impervious Runoff Depth>3.00" Tc=6.0 min CN=WQ Runoff=0.50 cfs 0.040 af
Subcatchment 20S: Entry Right side	Runoff Area=14,604 sf 48.77% Impervious Runoff Depth>2.26" Tc=6.0 min CN=WQ Runoff=0.80 cfs 0.063 af
Subcatchment 21S: CB-6	Runoff Area=4,084 sf 70.52% Impervious Runoff Depth>2.87" Tc=6.0 min CN=WQ Runoff=0.28 cfs 0.022 af
Subcatchment 22S: CB-5	Runoff Area=9,623 sf 68.59% Impervious Runoff Depth>2.82" Tc=6.0 min CN=WQ Runoff=0.65 cfs 0.052 af
Subcatchment 24S: Direct to Basin 2	Runoff Area=140,061 sf 2.61% Impervious Runoff Depth>0.67" Flow Length=671' Tc=25.0 min CN=WQ Runoff=1.32 cfs 0.180 af
Subcatchment 33S: Direct to Basin 1	Runoff Area=138,692 sf 0.00% Impervious Runoff Depth>0.67" Flow Length=867' Tc=34.0 min CN=WQ Runoff=1.15 cfs 0.178 af
Subcatchment 36S: Direct to Wetland	Runoff Area=204,166 sf 1.59% Impervious Runoff Depth>0.68" Flow Length=597' Tc=50.9 min CN=WQ Runoff=1.26 cfs 0.264 af
Subcatchment 43S: Slope Face	Runoff Area=30,117 sf 0.00% Impervious Runoff Depth>0.04" Tc=6.0 min CN=WQ Runoff=0.00 cfs 0.002 af
Subcatchment 55S: CB-7	Runoff Area=2,212 sf 70.07% Impervious Runoff Depth>2.86" Tc=6.0 min CN=WQ Runoff=0.15 cfs 0.012 af

Subcatchment 56S: CB-8	Runoff Area=4,025 sf 47.33% Impervious Runoff Depth>2.22" Tc=6.0 min CN=WQ Runoff=0.22 cfs 0.017 af
Reach 2R: M128 L89	Inflow=0.32 cfs 0.054 af Outflow=0.32 cfs 0.054 af
Reach 4R: MAP 138 LOT 78	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
Reach 6R: MAP 138 LOT 79	Inflow=0.00 cfs 0.001 af Outflow=0.00 cfs 0.001 af
Reach 8R: Wetland	Inflow=1.98 cfs 0.754 af Outflow=1.98 cfs 0.754 af
Reach 44R: Pipe to Swale	Avg. Flow Depth=0.02' Max Vel=1.64 fps Inflow=0.00 cfs 0.002 af 6.0" Round Pipe n=0.013 L=134.0' S=0.0634 ' Capacity=1.41 cfs Outflow=0.00 cfs 0.002 af
Reach 45R: Basin 2 Swale	Avg. Flow Depth=0.22' Max Vel=2.28 fps Inflow=1.32 cfs 0.182 af n=0.022 L=251.0' S=0.0120 ' Capacity=26.28 cfs Outflow=1.31 cfs 0.181 af
Reach 47R: Right side Swale	Avg. Flow Depth=0.08' Max Vel=0.57 fps Inflow=0.80 cfs 0.063 af n=0.022 L=98.0' S=0.0027 ' Capacity=71.45 cfs Outflow=0.74 cfs 0.063 af
Reach 48R: Right side culvert	Avg. Flow Depth=0.26' Max Vel=4.68 fps Inflow=0.74 cfs 0.063 af 12.0" Round Pipe n=0.012 L=56.7' S=0.0180 ' Capacity=5.18 cfs Outflow=0.74 cfs 0.063 af
Pond 7P: CB-2	Peak Elev=165.10' Inflow=1.23 cfs 0.130 af 18.0" Round Culvert n=0.012 L=245.1' S=0.0228 ' Outflow=1.23 cfs 0.130 af
Pond 8P: CB-1	Peak Elev=166.07' Inflow=0.72 cfs 0.078 af 12.0" Round Culvert n=0.012 L=17.2' S=0.0198 ' Outflow=0.72 cfs 0.078 af
Pond 9P: CB-3	Peak Elev=161.07' Inflow=0.80 cfs 0.063 af 12.0" Round Culvert n=0.012 L=17.1' S=0.0199 ' Outflow=0.80 cfs 0.063 af
Pond 10P: CB-4	Peak Elev=159.68' Inflow=2.67 cfs 0.259 af 18.0" Round Culvert n=0.012 L=73.2' S=0.0180 ' Outflow=2.67 cfs 0.259 af
Pond 15P: CB-6	Peak Elev=156.85' Inflow=2.94 cfs 0.281 af 24.0" Round Culvert n=0.012 L=17.0' S=0.0182 ' Outflow=2.94 cfs 0.281 af
Pond 16P: CB-5	Peak Elev=156.49' Inflow=3.59 cfs 0.333 af 24.0" Round Culvert n=0.012 L=21.8' S=0.0179 ' Outflow=3.59 cfs 0.333 af
Pond 29P: Basin 1	Peak Elev=155.91' Storage=16,502 cf Inflow=4.86 cfs 0.768 af Outflow=1.04 cfs 0.490 af
Pond 37P: Basin 2	Peak Elev=157.00' Storage=2,762 cf Inflow=1.44 cfs 0.233 af 12.0" Round Culvert n=0.012 L=71.0' S=0.0149 ' Outflow=0.94 cfs 0.199 af
Pond 38P: Sediment Forebay 1	Peak Elev=155.60' Storage=1,136 cf Inflow=4.56 cfs 0.611 af Outflow=4.53 cfs 0.590 af

Pond 42P: DMH-1

Peak Elev=158.26' Inflow=2.67 cfs 0.259 af
18.0" Round Culvert n=0.012 L=72.0' S=0.0181 '/' Outflow=2.67 cfs 0.259 af

Pond 51P: Perm. Pool AOT Volumes

Peak Elev=0.00' Storage=0 cf
Primary=0.00 cfs 0.000 af

Pond 52P: CB-7

Peak Elev=157.14' Inflow=0.15 cfs 0.012 af
12.0" Round Culvert n=0.012 L=16.5' S=0.0236 '/' Outflow=0.15 cfs 0.012 af

Pond 53P: CB-8

Peak Elev=157.13' Inflow=0.22 cfs 0.017 af
12.0" Round Culvert n=0.012 L=25.5' S=0.0200 '/' Outflow=0.22 cfs 0.017 af

Pond 54P: DMH-2

Peak Elev=156.56' Inflow=0.88 cfs 0.080 af
12.0" Round Culvert n=0.012 L=37.7' S=0.0180 '/' Outflow=0.88 cfs 0.080 af

Total Runoff Area = 16.326 ac Runoff Volume = 1.144 af Average Runoff Depth = 0.84"
90.65% Pervious = 14.800 ac 9.35% Impervious = 1.526 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To M128 L89	Runoff Area=61,921 sf 0.00% Impervious Runoff Depth>0.84" Flow Length=805' Tc=32.4 min CN=WQ Runoff=0.68 cfs 0.100 af
Subcatchment 3S: Slope to 138/78	Runoff Area=1,354 sf 0.00% Impervious Runoff Depth>0.21" Tc=6.0 min CN=WQ Runoff=0.00 cfs 0.001 af
Subcatchment 5S: Slope to 138/79	Runoff Area=18,895 sf 0.00% Impervious Runoff Depth>0.11" Tc=6.0 min CN=WQ Runoff=0.01 cfs 0.004 af
Subcatchment 11S: CB-4	Runoff Area=10,954 sf 79.72% Impervious Runoff Depth>4.03" Tc=6.0 min CN=WQ Runoff=1.06 cfs 0.084 af
Subcatchment 12S: CB-3	Runoff Area=12,913 sf 60.06% Impervious Runoff Depth>3.40" Tc=6.0 min CN=WQ Runoff=1.07 cfs 0.084 af
Subcatchment 13S: CB-2	Runoff Area=19,704 sf 36.19% Impervious Runoff Depth>1.86" Flow Length=293' Tc=11.8 min CN=WQ Runoff=0.67 cfs 0.070 af
Subcatchment 14S: CB-1	Runoff Area=30,956 sf 34.62% Impervious Runoff Depth>1.79" Flow Length=376' Tc=15.2 min CN=WQ Runoff=0.92 cfs 0.106 af
Subcatchment 19S: Entry Left Side	Runoff Area=6,885 sf 75.31% Impervious Runoff Depth>3.92" Tc=6.0 min CN=WQ Runoff=0.65 cfs 0.052 af
Subcatchment 20S: Entry Right side	Runoff Area=14,604 sf 48.77% Impervious Runoff Depth>3.07" Tc=6.0 min CN=WQ Runoff=1.11 cfs 0.086 af
Subcatchment 21S: CB-6	Runoff Area=4,084 sf 70.52% Impervious Runoff Depth>3.77" Tc=6.0 min CN=WQ Runoff=0.37 cfs 0.029 af
Subcatchment 22S: CB-5	Runoff Area=9,623 sf 68.59% Impervious Runoff Depth>3.70" Tc=6.0 min CN=WQ Runoff=0.87 cfs 0.068 af
Subcatchment 24S: Direct to Basin 2	Runoff Area=140,061 sf 2.61% Impervious Runoff Depth>1.16" Flow Length=671' Tc=25.0 min CN=WQ Runoff=2.41 cfs 0.310 af
Subcatchment 33S: Direct to Basin 1	Runoff Area=138,692 sf 0.00% Impervious Runoff Depth>1.18" Flow Length=867' Tc=34.0 min CN=WQ Runoff=2.16 cfs 0.312 af
Subcatchment 36S: Direct to Wetland	Runoff Area=204,166 sf 1.59% Impervious Runoff Depth>1.21" Flow Length=597' Tc=50.9 min CN=WQ Runoff=2.53 cfs 0.471 af
Subcatchment 43S: Slope Face	Runoff Area=30,117 sf 0.00% Impervious Runoff Depth>0.17" Tc=6.0 min CN=WQ Runoff=0.03 cfs 0.010 af
Subcatchment 55S: CB-7	Runoff Area=2,212 sf 70.07% Impervious Runoff Depth>3.75" Tc=6.0 min CN=WQ Runoff=0.20 cfs 0.016 af

Subcatchment 56S: CB-8	Runoff Area=4,025 sf 47.33% Impervious Runoff Depth>3.02" Tc=6.0 min CN=WQ Runoff=0.30 cfs 0.023 af
Reach 2R: M128 L89	Inflow=0.68 cfs 0.100 af Outflow=0.68 cfs 0.100 af
Reach 4R: MAP 138 LOT 78	Inflow=0.00 cfs 0.001 af Outflow=0.00 cfs 0.001 af
Reach 6R: MAP 138 LOT 79	Inflow=0.01 cfs 0.004 af Outflow=0.01 cfs 0.004 af
Reach 8R: Wetland	Inflow=4.23 cfs 1.337 af Outflow=4.23 cfs 1.337 af
Reach 44R: Pipe to Swale 6.0" Round Pipe n=0.013 L=134.0' S=0.0634 '/' Capacity=1.41 cfs	Avg. Flow Depth=0.05' Max Vel=2.77 fps Inflow=0.03 cfs 0.010 af Outflow=0.03 cfs 0.010 af
Reach 45R: Basin 2 Swale n=0.022 L=251.0' S=0.0120 '/' Capacity=26.28 cfs	Avg. Flow Depth=0.30' Max Vel=2.74 fps Inflow=2.43 cfs 0.320 af Outflow=2.41 cfs 0.318 af
Reach 47R: Right side Swale n=0.022 L=98.0' S=0.0027 '/' Capacity=71.45 cfs	Avg. Flow Depth=0.09' Max Vel=0.64 fps Inflow=1.11 cfs 0.086 af Outflow=1.03 cfs 0.085 af
Reach 48R: Right side culvert 12.0" Round Pipe n=0.012 L=56.7' S=0.0180 '/' Capacity=5.18 cfs	Avg. Flow Depth=0.30' Max Vel=5.13 fps Inflow=1.03 cfs 0.085 af Outflow=1.02 cfs 0.085 af
Pond 7P: CB-2 18.0" Round Culvert n=0.012 L=245.1' S=0.0228 '/'	Peak Elev=165.17' Inflow=1.57 cfs 0.176 af Outflow=1.57 cfs 0.176 af
Pond 8P: CB-1 12.0" Round Culvert n=0.012 L=17.2' S=0.0198 '/'	Peak Elev=166.13' Inflow=0.92 cfs 0.106 af Outflow=0.92 cfs 0.106 af
Pond 9P: CB-3 12.0" Round Culvert n=0.012 L=17.1' S=0.0199 '/'	Peak Elev=161.15' Inflow=1.07 cfs 0.084 af Outflow=1.07 cfs 0.084 af
Pond 10P: CB-4 18.0" Round Culvert n=0.012 L=73.2' S=0.0180 '/'	Peak Elev=159.80' Inflow=3.46 cfs 0.344 af Outflow=3.46 cfs 0.344 af
Pond 15P: CB-6 24.0" Round Culvert n=0.012 L=17.0' S=0.0182 '/'	Peak Elev=156.97' Inflow=3.83 cfs 0.374 af Outflow=3.83 cfs 0.374 af
Pond 16P: CB-5 24.0" Round Culvert n=0.012 L=21.8' S=0.0179 '/'	Peak Elev=156.63' Inflow=4.69 cfs 0.442 af Outflow=4.69 cfs 0.442 af
Pond 29P: Basin 1	Peak Elev=156.23' Storage=22,856 cf Inflow=7.14 cfs 1.189 af Outflow=2.20 cfs 0.866 af
Pond 37P: Basin 2 12.0" Round Culvert n=0.012 L=71.0' S=0.0149 '/'	Peak Elev=157.22' Storage=3,901 cf Inflow=2.59 cfs 0.386 af Outflow=1.75 cfs 0.348 af
Pond 38P: Sediment Forebay 1	Peak Elev=155.68' Storage=1,199 cf Inflow=6.37 cfs 0.899 af Outflow=6.35 cfs 0.877 af

Pond 42P: DMH-1

Peak Elev=158.38' Inflow=3.46 cfs 0.344 af
18.0" Round Culvert n=0.012 L=72.0' S=0.0181 '/' Outflow=3.46 cfs 0.344 af

Pond 51P: Perm. Pool AOT Volumes

Peak Elev=0.00' Storage=0 cf
Primary=0.00 cfs 0.000 af

Pond 52P: CB-7

Peak Elev=157.17' Inflow=0.20 cfs 0.016 af
12.0" Round Culvert n=0.012 L=16.5' S=0.0236 '/' Outflow=0.20 cfs 0.016 af

Pond 53P: CB-8

Peak Elev=157.17' Inflow=0.30 cfs 0.023 af
12.0" Round Culvert n=0.012 L=25.5' S=0.0200 '/' Outflow=0.30 cfs 0.023 af

Pond 54P: DMH-2

Peak Elev=156.66' Inflow=1.22 cfs 0.108 af
12.0" Round Culvert n=0.012 L=37.7' S=0.0180 '/' Outflow=1.22 cfs 0.108 af

Total Runoff Area = 16.326 ac Runoff Volume = 1.825 af Average Runoff Depth = 1.34"
90.65% Pervious = 14.800 ac 9.35% Impervious = 1.526 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To M128 L89	Runoff Area=61,921 sf 0.00% Impervious Runoff Depth>1.29" Flow Length=805' Tc=32.4 min CN=WQ Runoff=1.07 cfs 0.152 af
Subcatchment 3S: Slope to 138/78	Runoff Area=1,354 sf 0.00% Impervious Runoff Depth>0.46" Tc=6.0 min CN=WQ Runoff=0.01 cfs 0.001 af
Subcatchment 5S: Slope to 138/79	Runoff Area=18,895 sf 0.00% Impervious Runoff Depth>0.26" Tc=6.0 min CN=WQ Runoff=0.05 cfs 0.010 af
Subcatchment 11S: CB-4	Runoff Area=10,954 sf 79.72% Impervious Runoff Depth>4.90" Tc=6.0 min CN=WQ Runoff=1.29 cfs 0.103 af
Subcatchment 12S: CB-3	Runoff Area=12,913 sf 60.06% Impervious Runoff Depth>4.22" Tc=6.0 min CN=WQ Runoff=1.34 cfs 0.104 af
Subcatchment 13S: CB-2	Runoff Area=19,704 sf 36.19% Impervious Runoff Depth>2.37" Flow Length=293' Tc=11.8 min CN=WQ Runoff=0.85 cfs 0.089 af
Subcatchment 14S: CB-1	Runoff Area=30,956 sf 34.62% Impervious Runoff Depth>2.28" Flow Length=376' Tc=15.2 min CN=WQ Runoff=1.17 cfs 0.135 af
Subcatchment 19S: Entry Left Side	Runoff Area=6,885 sf 75.31% Impervious Runoff Depth>4.79" Tc=6.0 min CN=WQ Runoff=0.80 cfs 0.063 af
Subcatchment 20S: Entry Right side	Runoff Area=14,604 sf 48.77% Impervious Runoff Depth>3.87" Tc=6.0 min CN=WQ Runoff=1.41 cfs 0.108 af
Subcatchment 21S: CB-6	Runoff Area=4,084 sf 70.52% Impervious Runoff Depth>4.62" Tc=6.0 min CN=WQ Runoff=0.46 cfs 0.036 af
Subcatchment 22S: CB-5	Runoff Area=9,623 sf 68.59% Impervious Runoff Depth>4.55" Tc=6.0 min CN=WQ Runoff=1.07 cfs 0.084 af
Subcatchment 24S: Direct to Basin 2	Runoff Area=140,061 sf 2.61% Impervious Runoff Depth>1.69" Flow Length=671' Tc=25.0 min CN=WQ Runoff=3.62 cfs 0.453 af
Subcatchment 33S: Direct to Basin 1	Runoff Area=138,692 sf 0.00% Impervious Runoff Depth>1.73" Flow Length=867' Tc=34.0 min CN=WQ Runoff=3.24 cfs 0.458 af
Subcatchment 36S: Direct to Wetland	Runoff Area=204,166 sf 1.59% Impervious Runoff Depth>1.79" Flow Length=597' Tc=50.9 min CN=WQ Runoff=3.92 cfs 0.698 af
Subcatchment 43S: Slope Face	Runoff Area=30,117 sf 0.00% Impervious Runoff Depth>0.38" Tc=6.0 min CN=WQ Runoff=0.15 cfs 0.022 af
Subcatchment 55S: CB-7	Runoff Area=2,212 sf 70.07% Impervious Runoff Depth>4.61" Tc=6.0 min CN=WQ Runoff=0.25 cfs 0.019 af

Subcatchment 56S: CB-8	Runoff Area=4,025 sf 47.33% Impervious Runoff Depth>3.82" Tc=6.0 min CN=WQ Runoff=0.38 cfs 0.029 af
Reach 2R: M128 L89	Inflow=1.07 cfs 0.152 af Outflow=1.07 cfs 0.152 af
Reach 4R: MAP 138 LOT 78	Inflow=0.01 cfs 0.001 af Outflow=0.01 cfs 0.001 af
Reach 6R: MAP 138 LOT 79	Inflow=0.05 cfs 0.010 af Outflow=0.05 cfs 0.010 af
Reach 8R: Wetland	Inflow=7.02 cfs 1.978 af Outflow=7.02 cfs 1.978 af
Reach 44R: Pipe to Swale	Avg. Flow Depth=0.11' Max Vel=4.56 fps Inflow=0.15 cfs 0.022 af 6.0" Round Pipe n=0.013 L=134.0' S=0.0634 ' Capacity=1.41 cfs Outflow=0.13 cfs 0.022 af
Reach 45R: Basin 2 Swale	Avg. Flow Depth=0.38' Max Vel=3.09 fps Inflow=3.70 cfs 0.475 af n=0.022 L=251.0' S=0.0120 ' Capacity=26.28 cfs Outflow=3.67 cfs 0.473 af
Reach 47R: Right side Swale	Avg. Flow Depth=0.10' Max Vel=0.69 fps Inflow=1.41 cfs 0.108 af n=0.022 L=98.0' S=0.0027 ' Capacity=71.45 cfs Outflow=1.30 cfs 0.107 af
Reach 48R: Right side culvert	Avg. Flow Depth=0.34' Max Vel=5.48 fps Inflow=1.30 cfs 0.107 af 12.0" Round Pipe n=0.012 L=56.7' S=0.0180 ' Capacity=5.18 cfs Outflow=1.29 cfs 0.107 af
Pond 7P: CB-2	Peak Elev=165.25' Inflow=2.00 cfs 0.224 af 18.0" Round Culvert n=0.012 L=245.1' S=0.0228 ' Outflow=2.00 cfs 0.224 af
Pond 8P: CB-1	Peak Elev=166.20' Inflow=1.17 cfs 0.135 af 12.0" Round Culvert n=0.012 L=17.2' S=0.0198 ' Outflow=1.17 cfs 0.135 af
Pond 9P: CB-3	Peak Elev=161.22' Inflow=1.34 cfs 0.104 af 12.0" Round Culvert n=0.012 L=17.1' S=0.0199 ' Outflow=1.34 cfs 0.104 af
Pond 10P: CB-4	Peak Elev=159.92' Inflow=4.27 cfs 0.431 af 18.0" Round Culvert n=0.012 L=73.2' S=0.0180 ' Outflow=4.27 cfs 0.431 af
Pond 15P: CB-6	Peak Elev=157.09' Inflow=4.72 cfs 0.467 af 24.0" Round Culvert n=0.012 L=17.0' S=0.0182 ' Outflow=4.72 cfs 0.467 af
Pond 16P: CB-5	Peak Elev=156.76' Inflow=5.78 cfs 0.551 af 24.0" Round Culvert n=0.012 L=21.8' S=0.0179 ' Outflow=5.78 cfs 0.551 af
Pond 29P: Basin 1	Peak Elev=156.51' Storage=28,780 cf Inflow=9.51 cfs 1.639 af Outflow=3.76 cfs 1.280 af
Pond 37P: Basin 2	Peak Elev=157.44' Storage=5,269 cf Inflow=3.89 cfs 0.556 af 12.0" Round Culvert n=0.012 L=71.0' S=0.0149 ' Outflow=2.53 cfs 0.515 af
Pond 38P: Sediment Forebay 1	Peak Elev=155.75' Storage=1,260 cf Inflow=8.23 cfs 1.203 af Outflow=8.21 cfs 1.181 af

Pond 42P: DMH-1

Peak Elev=158.50' Inflow=4.27 cfs 0.431 af
18.0" Round Culvert n=0.012 L=72.0' S=0.0181 '/' Outflow=4.27 cfs 0.431 af

Pond 51P: Perm. Pool AOT Volumes

Peak Elev=0.00' Storage=0 cf
Primary=0.00 cfs 0.000 af

Pond 52P: CB-7

Peak Elev=157.19' Inflow=0.25 cfs 0.019 af
12.0" Round Culvert n=0.012 L=16.5' S=0.0236 '/' Outflow=0.25 cfs 0.019 af

Pond 53P: CB-8

Peak Elev=157.21' Inflow=0.38 cfs 0.029 af
12.0" Round Culvert n=0.012 L=25.5' S=0.0200 '/' Outflow=0.38 cfs 0.029 af

Pond 54P: DMH-2

Peak Elev=156.75' Inflow=1.56 cfs 0.137 af
12.0" Round Culvert n=0.012 L=37.7' S=0.0180 '/' Outflow=1.56 cfs 0.137 af

Total Runoff Area = 16.326 ac Runoff Volume = 2.565 af Average Runoff Depth = 1.89"
90.65% Pervious = 14.800 ac 9.35% Impervious = 1.526 ac

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Events for Subcatchment 1S: To M128 L89

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.03	0.013	0.11
10-Year	4.42	0.32	0.054	0.45
25-Year	5.59	0.68	0.100	0.84
50-Year	6.68	1.07	0.152	1.29

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Events for Subcatchment 3S: Slope to 138/78

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.00	0.000	0.00
10-Year	4.42	0.00	0.000	0.05
25-Year	5.59	0.00	0.001	0.21
50-Year	6.68	0.01	0.001	0.46

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Events for Subcatchment 5S: Slope to 138/79

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.00	0.000	0.00
10-Year	4.42	0.00	0.001	0.02
25-Year	5.59	0.01	0.004	0.11
50-Year	6.68	0.05	0.010	0.26

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Events for Subcatchment 11S: CB-4

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.52	0.041	1.97
10-Year	4.42	0.82	0.065	3.11
25-Year	5.59	1.06	0.084	4.03
50-Year	6.68	1.29	0.103	4.90

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Events for Subcatchment 12S: CB-3

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.47	0.038	1.55
10-Year	4.42	0.80	0.063	2.55
25-Year	5.59	1.07	0.084	3.40
50-Year	6.68	1.34	0.104	4.22

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Events for Subcatchment 13S: CB-2

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.35	0.033	0.87
10-Year	4.42	0.53	0.052	1.38
25-Year	5.59	0.67	0.070	1.86
50-Year	6.68	0.85	0.089	2.37

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Events for Subcatchment 14S: CB-1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.47	0.050	0.84
10-Year	4.42	0.72	0.078	1.33
25-Year	5.59	0.92	0.106	1.79
50-Year	6.68	1.17	0.135	2.28

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Events for Subcatchment 19S: Entry Left Side

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.31	0.025	1.88
10-Year	4.42	0.50	0.040	3.00
25-Year	5.59	0.65	0.052	3.92
50-Year	6.68	0.80	0.063	4.79

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Events for Subcatchment 20S: Entry Right side

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.45	0.037	1.31
10-Year	4.42	0.80	0.063	2.26
25-Year	5.59	1.11	0.086	3.07
50-Year	6.68	1.41	0.108	3.87

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Events for Subcatchment 21S: CB-6

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.17	0.014	1.78
10-Year	4.42	0.28	0.022	2.87
25-Year	5.59	0.37	0.029	3.77
50-Year	6.68	0.46	0.036	4.62

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Events for Subcatchment 22S: CB-5

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.40	0.032	1.74
10-Year	4.42	0.65	0.052	2.82
25-Year	5.59	0.87	0.068	3.70
50-Year	6.68	1.07	0.084	4.55

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Events for Subcatchment 24S: Direct to Basin 2

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.31	0.061	0.23
10-Year	4.42	1.32	0.180	0.67
25-Year	5.59	2.41	0.310	1.16
50-Year	6.68	3.62	0.453	1.69

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Events for Subcatchment 33S: Direct to Basin 1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.21	0.052	0.20
10-Year	4.42	1.15	0.178	0.67
25-Year	5.59	2.16	0.312	1.18
50-Year	6.68	3.24	0.458	1.73

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Events for Subcatchment 36S: Direct to Wetland

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.21	0.074	0.19
10-Year	4.42	1.26	0.264	0.68
25-Year	5.59	2.53	0.471	1.21
50-Year	6.68	3.92	0.698	1.79

Events for Subcatchment 43S: Slope Face

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.00	0.000	0.00
10-Year	4.42	0.00	0.002	0.04
25-Year	5.59	0.03	0.010	0.17
50-Year	6.68	0.15	0.022	0.38

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Events for Subcatchment 55S: CB-7

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.09	0.007	1.77
10-Year	4.42	0.15	0.012	2.86
25-Year	5.59	0.20	0.016	3.75
50-Year	6.68	0.25	0.019	4.61

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Events for Subcatchment 56S: CB-8

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.93	0.12	0.010	1.28
10-Year	4.42	0.22	0.017	2.22
25-Year	5.59	0.30	0.023	3.02
50-Year	6.68	0.38	0.029	3.82

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Events for Reach 2R: M128 L89

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.03	0.03	0.00	0
10-Year	0.32	0.32	0.00	0
25-Year	0.68	0.68	0.00	0
50-Year	1.07	1.07	0.00	0

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Events for Reach 4R: MAP 138 LOT 78

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.00	0.00	0.00	0
10-Year	0.00	0.00	0.00	0
25-Year	0.00	0.00	0.00	0
50-Year	0.01	0.01	0.00	0

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Events for Reach 6R: MAP 138 LOT 79

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.00	0.00	0.00	0
10-Year	0.00	0.00	0.00	0
25-Year	0.01	0.01	0.00	0
50-Year	0.05	0.05	0.00	0

Events for Reach 8R: Wetland

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.38	0.38	0.00	0
10-Year	1.98	1.98	0.00	0
25-Year	4.23	4.23	0.00	0
50-Year	7.02	7.02	0.00	0

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Events for Reach 44R: Pipe to Swale

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.00	0.00	170.50	0
10-Year	0.00	0.00	170.52	0
25-Year	0.03	0.03	170.55	1
50-Year	0.15	0.13	170.61	4

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Events for Reach 45R: Basin 2 Swale

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.31	0.31	160.10	55
10-Year	1.32	1.31	160.22	145
25-Year	2.43	2.41	160.30	222
50-Year	3.70	3.67	160.38	299

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Events for Reach 47R: Right side Swale

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.45	0.40	157.51	87
10-Year	0.80	0.74	157.54	129
25-Year	1.11	1.03	157.55	161
50-Year	1.41	1.30	157.56	190

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Events for Reach 48R: Right side culvert

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.40	0.39	157.39	6
10-Year	0.74	0.74	157.46	9
25-Year	1.03	1.02	157.50	11
50-Year	1.30	1.29	157.54	13

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Events for Pond 7P: CB-2

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	0.81	0.81	165.00	0.000
10-Year	1.23	1.23	165.10	0.000
25-Year	1.57	1.57	165.17	0.000
50-Year	2.00	2.00	165.25	0.000

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Events for Pond 8P: CB-1

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	0.47	0.47	165.98	0.000
10-Year	0.72	0.72	166.07	0.000
25-Year	0.92	0.92	166.13	0.000
50-Year	1.17	1.17	166.20	0.000

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Events for Pond 9P: CB-3

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	0.47	0.47	160.95	0.000
10-Year	0.80	0.80	161.07	0.000
25-Year	1.07	1.07	161.15	0.000
50-Year	1.34	1.34	161.22	0.000

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Events for Pond 10P: CB-4

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	1.68	1.68	159.51	0.000
10-Year	2.67	2.67	159.68	0.000
25-Year	3.46	3.46	159.80	0.000
50-Year	4.27	4.27	159.92	0.000

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Events for Pond 15P: CB-6

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	1.85	1.85	156.67	0.000
10-Year	2.94	2.94	156.85	0.000
25-Year	3.83	3.83	156.97	0.000
50-Year	4.72	4.72	157.09	0.000

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Events for Pond 16P: CB-5

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	2.24	2.24	156.31	0.000
10-Year	3.59	3.59	156.49	0.000
25-Year	4.69	4.69	156.63	0.000
50-Year	5.78	5.78	156.76	0.000

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Multi-Event Tables

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Events for Pond 29P: Basin 1

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	2.64	0.27	155.53	9,248
10-Year	4.86	1.04	155.91	16,502
25-Year	7.14	2.20	156.23	22,856
50-Year	9.51	3.76	156.51	28,780

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Multi-Event Tables

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Events for Pond 37P: Basin 2

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.45	0.19	156.71	1,617
10-Year	1.44	0.94	157.00	2,762
25-Year	2.59	1.75	157.22	3,901
50-Year	3.89	2.53	157.44	5,269

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Multi-Event Tables

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Events for Pond 38P: Sediment Forebay 1

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	2.65	2.63	155.51	1,061
10-Year	4.56	4.53	155.60	1,136
25-Year	6.37	6.35	155.68	1,199
50-Year	8.23	8.21	155.75	1,260

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Events for Pond 42P: DMH-1

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	1.68	1.68	158.09	0.000
10-Year	2.67	2.67	158.26	0.000
25-Year	3.46	3.46	158.38	0.000
50-Year	4.27	4.27	158.50	0.000

Events for Pond 51P: Perm. Pool AOT Volumes

Event	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.00	0.00	0
10-Year	0.00	0.00	0
25-Year	0.00	0.00	0
50-Year	0.00	0.00	0

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Multi-Event Tables

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Events for Pond 52P: CB-7

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	0.09	0.09	157.10	0.000
10-Year	0.15	0.15	157.14	0.000
25-Year	0.20	0.20	157.17	0.000
50-Year	0.25	0.25	157.19	0.000

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Multi-Event Tables

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Events for Pond 53P: CB-8

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	0.12	0.12	157.07	0.000
10-Year	0.22	0.22	157.13	0.000
25-Year	0.30	0.30	157.17	0.000
50-Year	0.38	0.38	157.21	0.000

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Multi-Event Tables

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Events for Pond 54P: DMH-2

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	0.46	0.46	156.42	0.000
10-Year	0.88	0.88	156.56	0.000
25-Year	1.22	1.22	156.66	0.000
50-Year	1.56	1.56	156.75	0.000

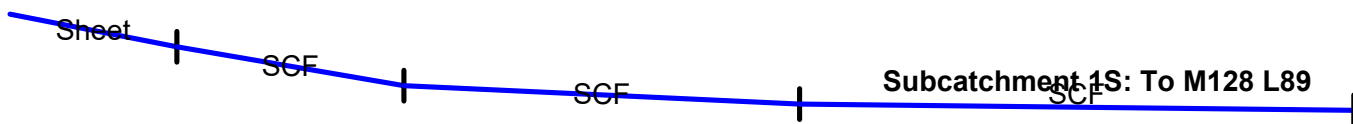
Summary for Subcatchment 1S: To M128 L89

Runoff = 0.32 cfs @ 12.52 hrs, Volume= 0.054 af, Depth> 0.45"
 Routed to Reach 2R : M128 L89

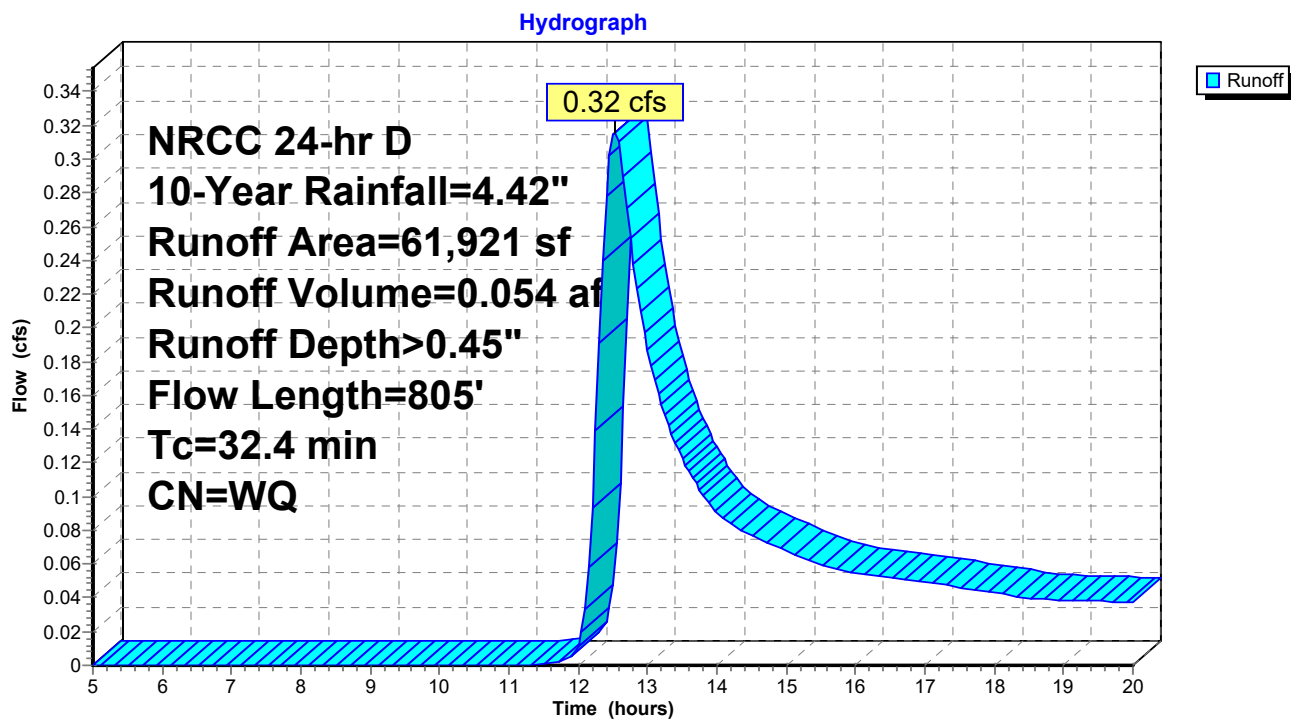
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
15,835	30	Woods, Good, HSG A
6,175	61	>75% Grass cover, Good, HSG B
39,911	55	Woods, Good, HSG B
61,921		Weighted Average
61,921		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.1050	0.14		Sheet Flow, Sheet Woods: Light underbrush n= 0.400 P2= 2.93"
1.5	136	0.0920	1.52		Shallow Concentrated Flow, SCF Woodland Kv= 5.0 fps
5.0	237	0.0250	0.79		Shallow Concentrated Flow, SCF Woodland Kv= 5.0 fps
14.3	332	0.0060	0.39		Shallow Concentrated Flow, SCF Woodland Kv= 5.0 fps
32.4	805	Total			



Subcatchment 1S: To M128 L89



Summary for Subcatchment 3S: Slope to 138/78

Runoff = 0.00 cfs @ 16.55 hrs, Volume= 0.000 af, Depth> 0.05"
 Routed to Reach 4R : MAP 138 LOT 78

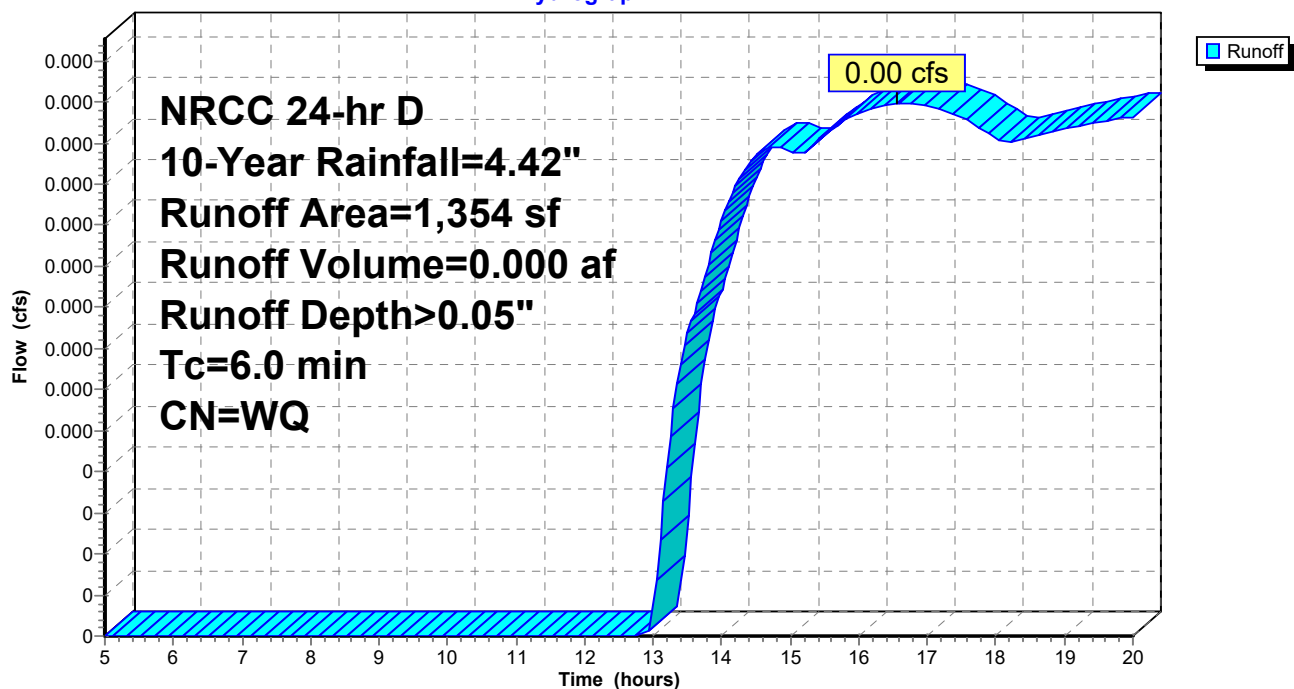
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
1,158	39	>75% Grass cover, Good, HSG A
196	30	Woods, Good, HSG A
1,354		Weighted Average
1,354		100.00% Pervious Area

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

Subcatchment 3S: Slope to 138/78

Hydrograph



Summary for Subcatchment 5S: Slope to 138/79

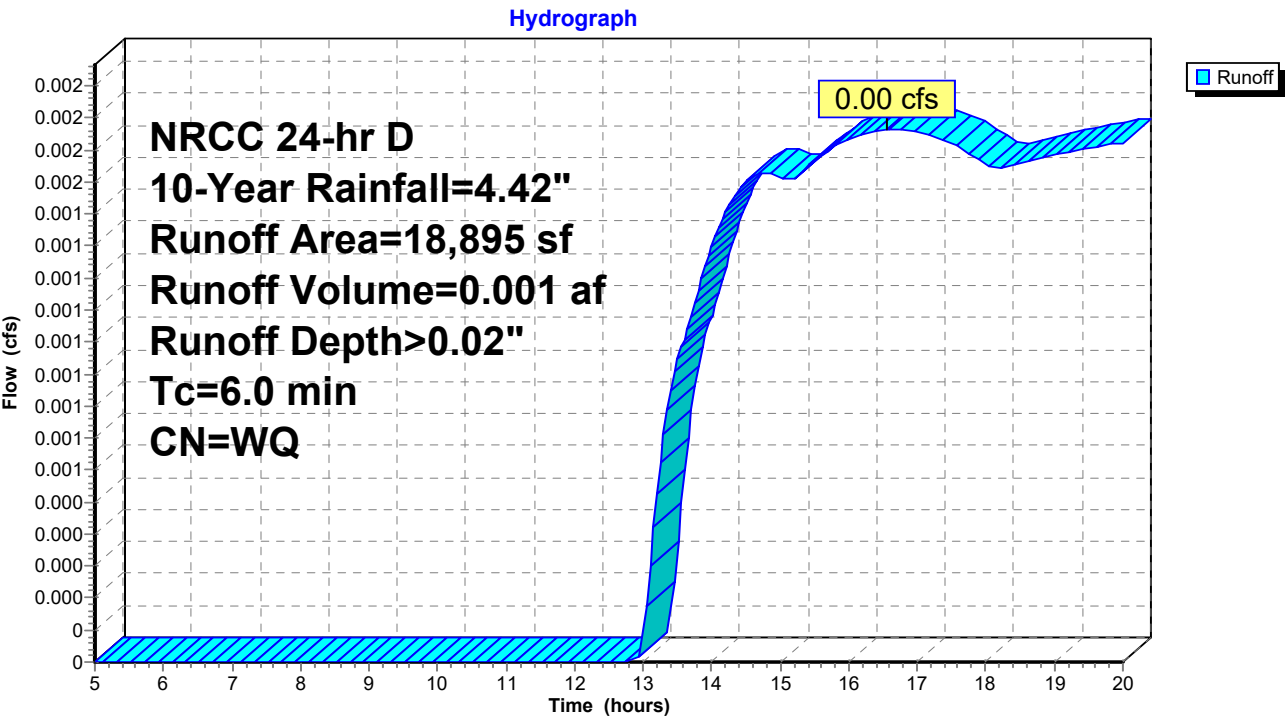
Runoff = 0.00 cfs @ 16.55 hrs, Volume= 0.001 af, Depth> 0.02"
Routed to Reach 6R : MAP 138 LOT 79

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
7,432	39	>75% Grass cover, Good, HSG A
11,463	30	Woods, Good, HSG A
18,895		Weighted Average
18,895		100.00% Pervious Area

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

Subcatchment 5S: Slope to 138/79



Summary for Subcatchment 11S: CB-4

Runoff = 0.82 cfs @ 12.13 hrs, Volume= 0.065 af, Depth> 3.11"
 Routed to Pond 10P : CB-4

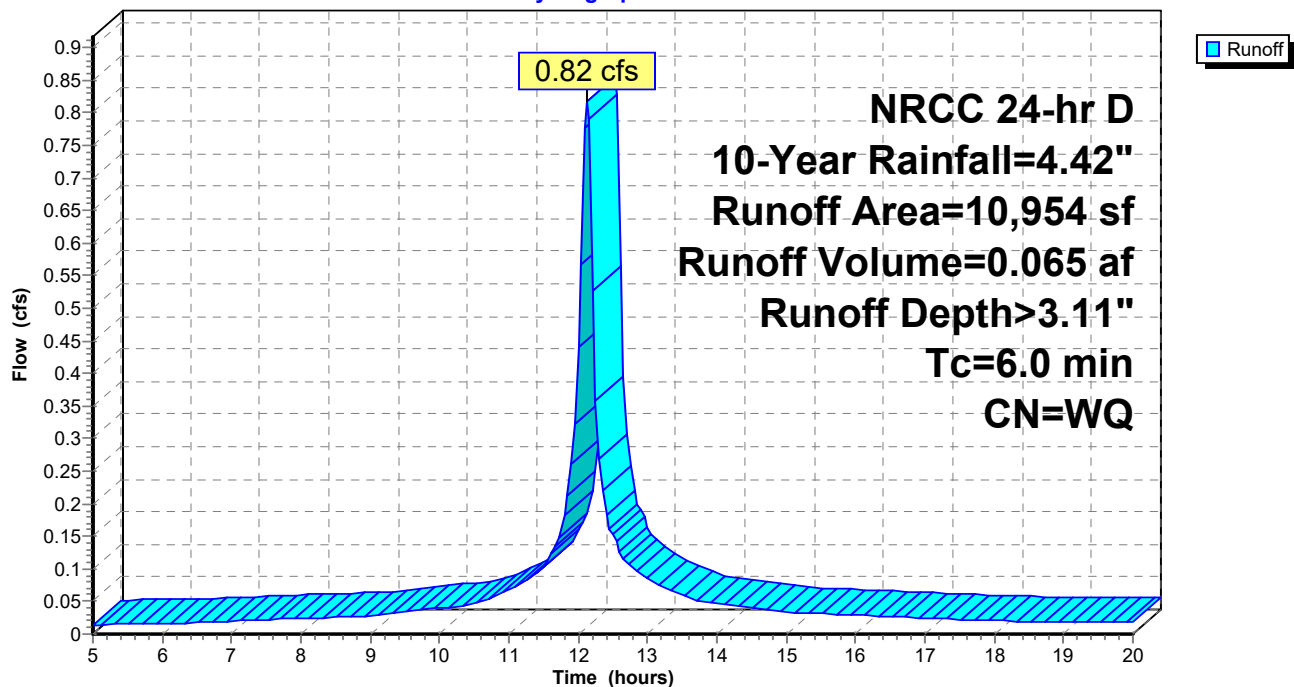
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
292	39	>75% Grass cover, Good, HSG A
1,929	61	>75% Grass cover, Good, HSG B
* 8,733	98	IMP
10,954		Weighted Average
2,221		20.28% Pervious Area
8,733		79.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 Minute Min

Subcatchment 11S: CB-4

Hydrograph



Summary for Subcatchment 12S: CB-3

Runoff = 0.80 cfs @ 12.13 hrs, Volume= 0.063 af, Depth> 2.55"
 Routed to Pond 9P : CB-3

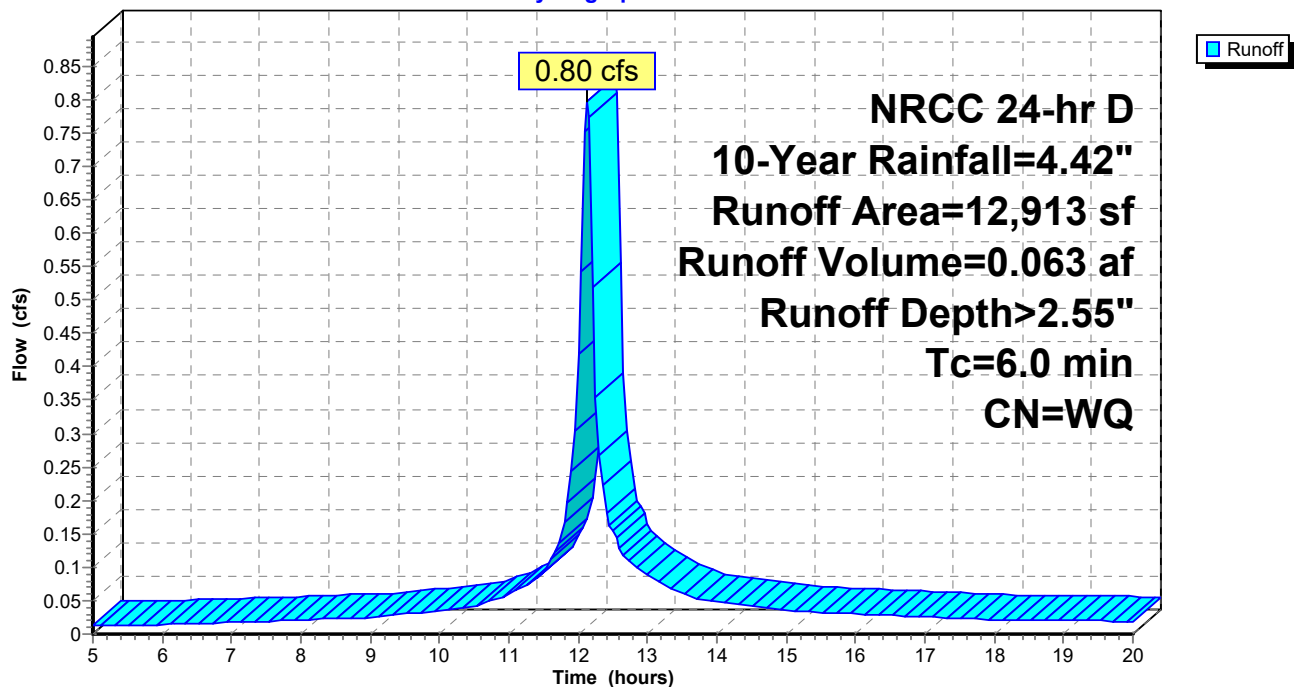
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
336	39	>75% Grass cover, Good, HSG A
4,822	61	>75% Grass cover, Good, HSG B
* 7,755	98	IMP
12,913		Weighted Average
5,158		39.94% Pervious Area
7,755		60.06% Impervious Area

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

Subcatchment 12S: CB-3

Hydrograph



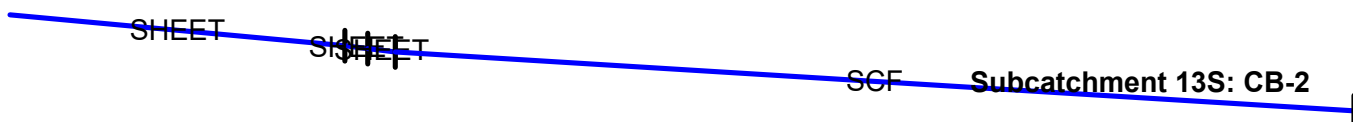
Summary for Subcatchment 13S: CB-2

Runoff = 0.53 cfs @ 12.19 hrs, Volume= 0.052 af, Depth> 1.38"
 Routed to Pond 7P : CB-2

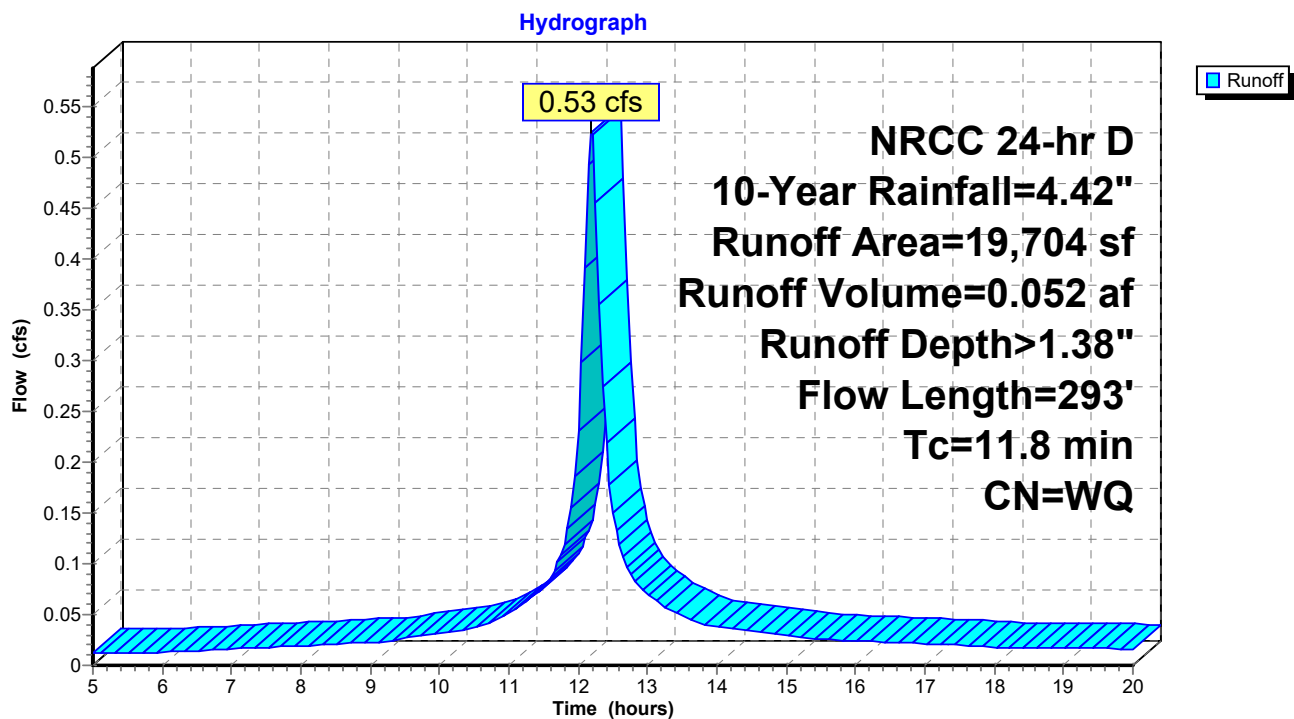
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
0	30	Woods, Good, HSG A
12,574	39	>75% Grass cover, Good, HSG A
* 7,130	98	IMP
19,704		Weighted Average
12,574		63.81% Pervious Area
7,130		36.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	73	0.0150	0.14		Sheet Flow, SHEET Grass: Short n= 0.150 P2= 2.93"
0.1	5	0.0200	0.72		Sheet Flow, SHEET Smooth surfaces n= 0.011 P2= 2.93"
1.1	6	0.0200	0.09		Sheet Flow, SHEET Grass: Short n= 0.150 P2= 2.93"
1.7	209	0.0100	2.03		Shallow Concentrated Flow, SCF Paved Kv= 20.3 fps
11.8	293	Total			



Subcatchment 13S: CB-2



Summary for Subcatchment 14S: CB-1

Runoff = 0.72 cfs @ 12.23 hrs, Volume= 0.078 af, Depth> 1.33"
 Routed to Pond 8P : CB-1

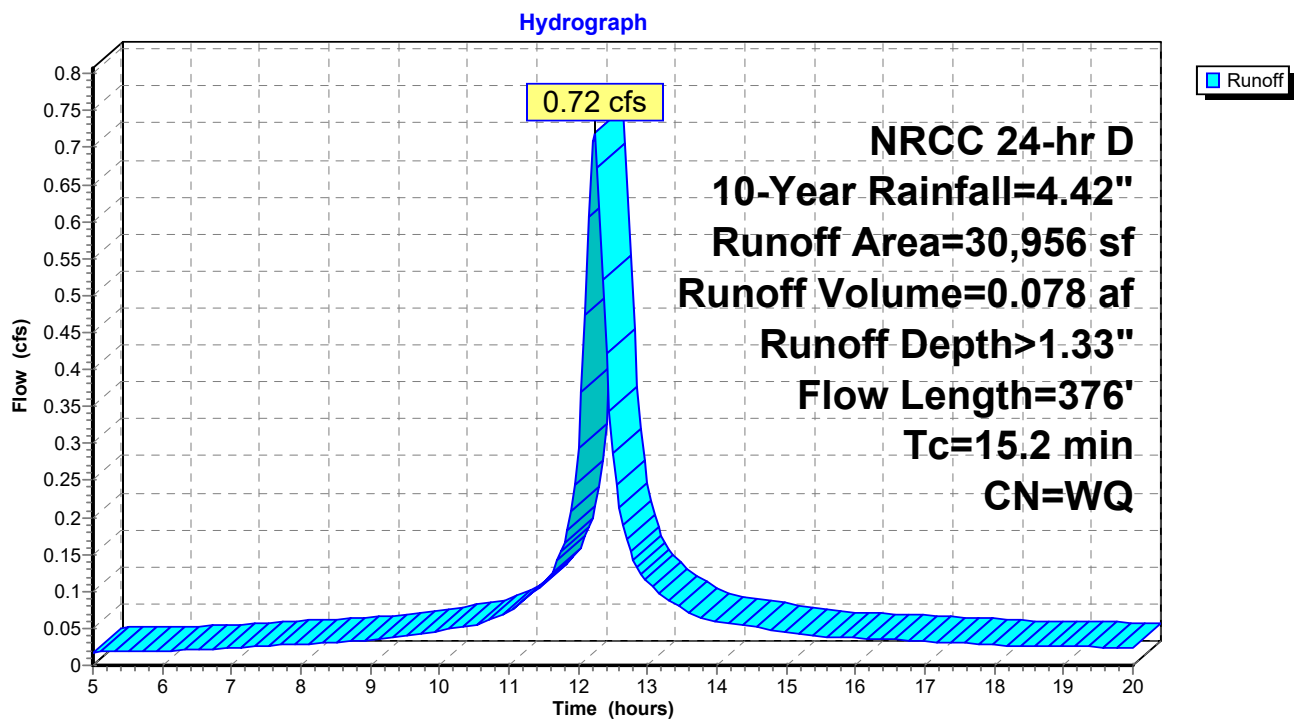
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
2,372	30	Woods, Good, HSG A
17,479	39	>75% Grass cover, Good, HSG A
389	61	>75% Grass cover, Good, HSG B
* 10,716	98	IMP
30,956		Weighted Average
20,240		65.38% Pervious Area
10,716		34.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0850	0.13		Sheet Flow, SHEET Woods: Light underbrush n= 0.400 P2= 2.93"
0.7	65	0.1080	1.64		Shallow Concentrated Flow, SCF Woodland Kv= 5.0 fps
0.6	55	0.0550	1.64		Shallow Concentrated Flow, SCF Short Grass Pasture Kv= 7.0 fps
1.3	156	0.0100	2.03		Shallow Concentrated Flow, SCF Paved Kv= 20.3 fps
15.2	376	Total			



Subcatchment 14S: CB-1



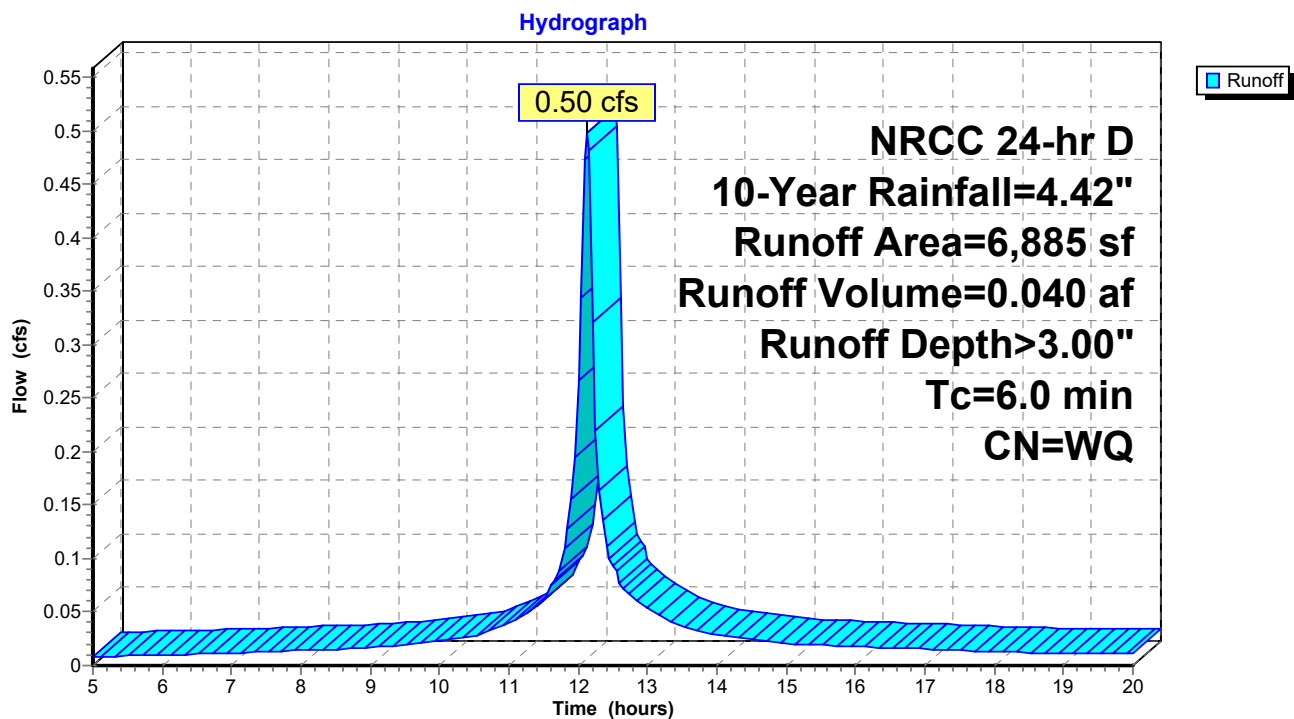
Summary for Subcatchment 19S: Entry Left Side

Runoff = 0.50 cfs @ 12.13 hrs, Volume= 0.040 af, Depth> 3.00"
 Routed to Pond 37P : Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
1,700	61	>75% Grass cover, Good, HSG B
* 5,185	98	IMP
6,885		Weighted Average
1,700		24.69% Pervious Area
5,185		75.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 MINUTE MINIMUM

Subcatchment 19S: Entry Left Side

Summary for Subcatchment 20S: Entry Right side

Runoff = 0.80 cfs @ 12.13 hrs, Volume= 0.063 af, Depth> 2.26"
 Routed to Reach 47R : Right side Swale

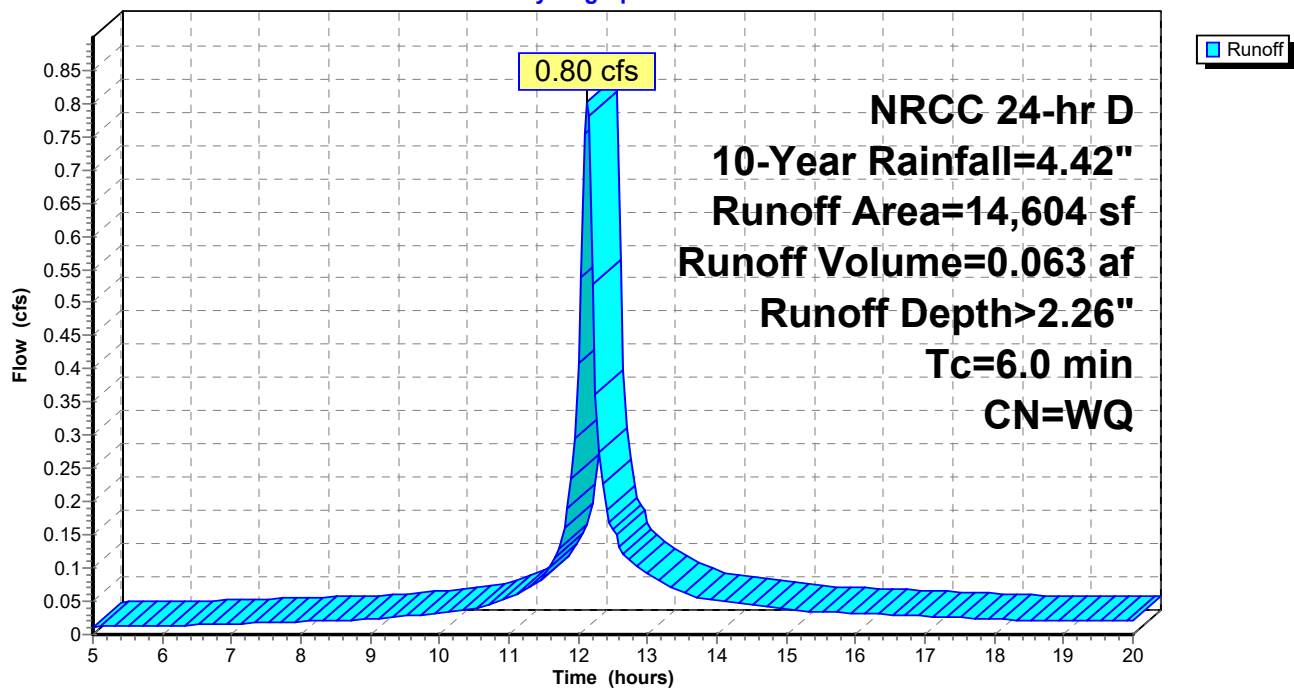
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
7,482	61	>75% Grass cover, Good, HSG B
* 7,122	98	IMP
14,604		Weighted Average
7,482		51.23% Pervious Area
7,122		48.77% Impervious Area

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

Subcatchment 20S: Entry Right side

Hydrograph



Summary for Subcatchment 21S: CB-6

Runoff = 0.28 cfs @ 12.13 hrs, Volume= 0.022 af, Depth> 2.87"
 Routed to Pond 15P : CB-6

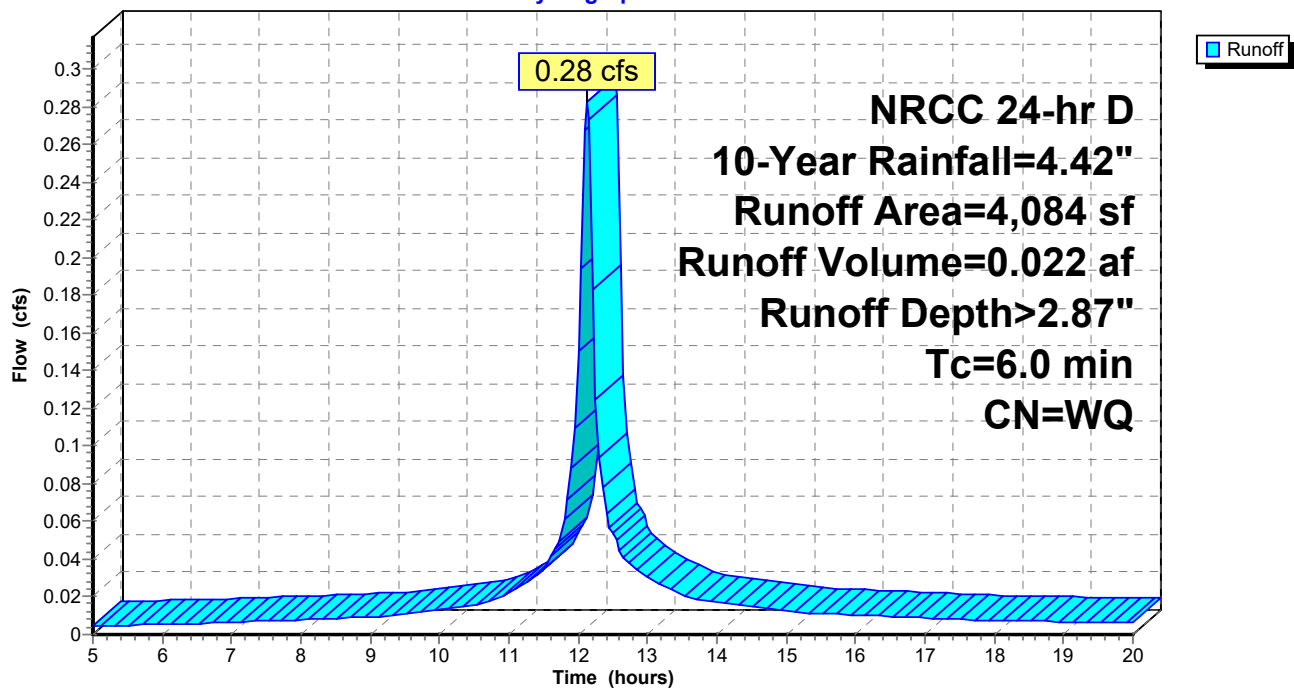
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
1,204	61	>75% Grass cover, Good, HSG B
* 2,880	98	IMP
4,084		Weighted Average
1,204		29.48% Pervious Area
2,880		70.52% Impervious Area

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

Subcatchment 21S: CB-6

Hydrograph



Summary for Subcatchment 22S: CB-5

Runoff = 0.65 cfs @ 12.13 hrs, Volume= 0.052 af, Depth> 2.82"
 Routed to Pond 16P : CB-5

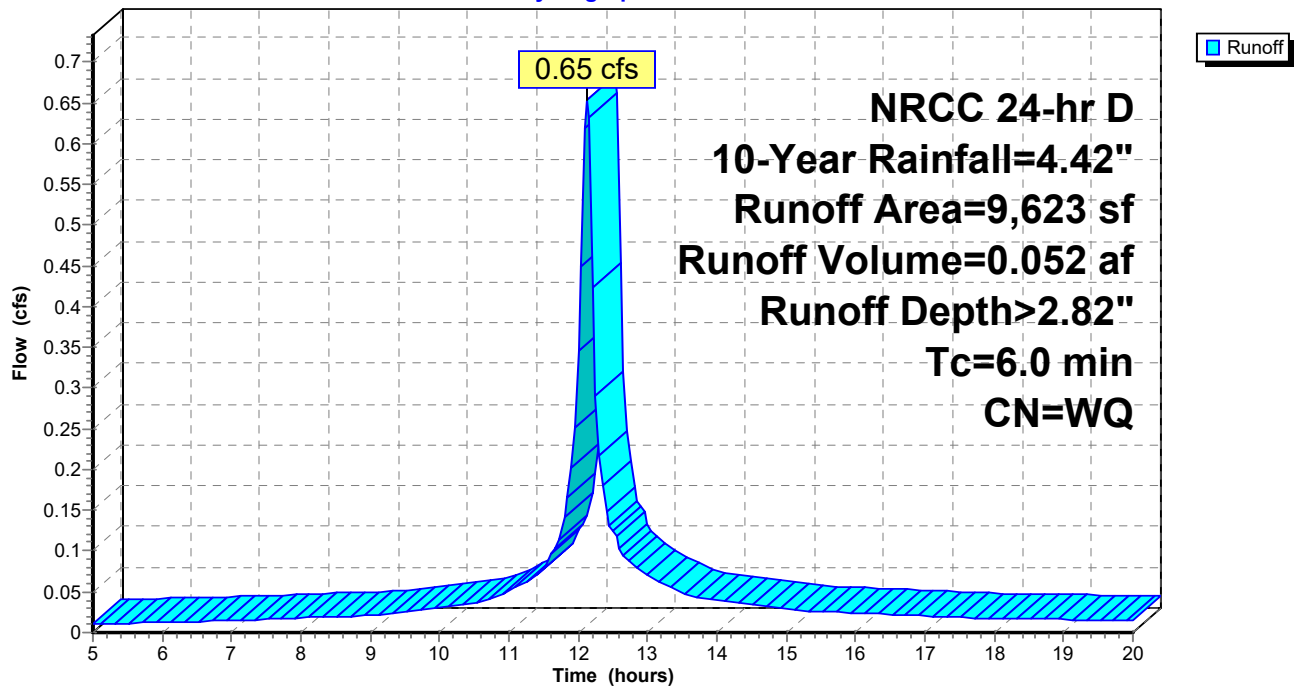
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
3,023	61	>75% Grass cover, Good, HSG B
* 6,600	98	IMP
9,623		Weighted Average
3,023		31.41% Pervious Area
6,600		68.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 Minute Min

Subcatchment 22S: CB-5

Hydrograph



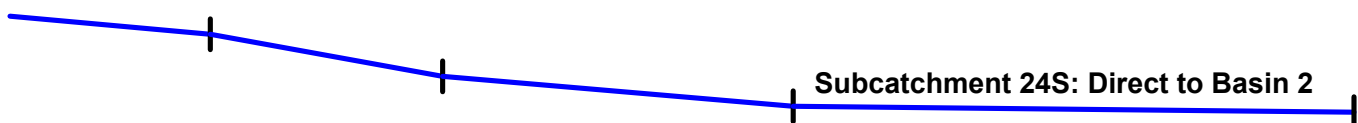
Summary for Subcatchment 24S: Direct to Basin 2

Runoff = 1.32 cfs @ 12.39 hrs, Volume= 0.180 af, Depth> 0.67"
 Routed to Reach 45R : Basin 2 Swale

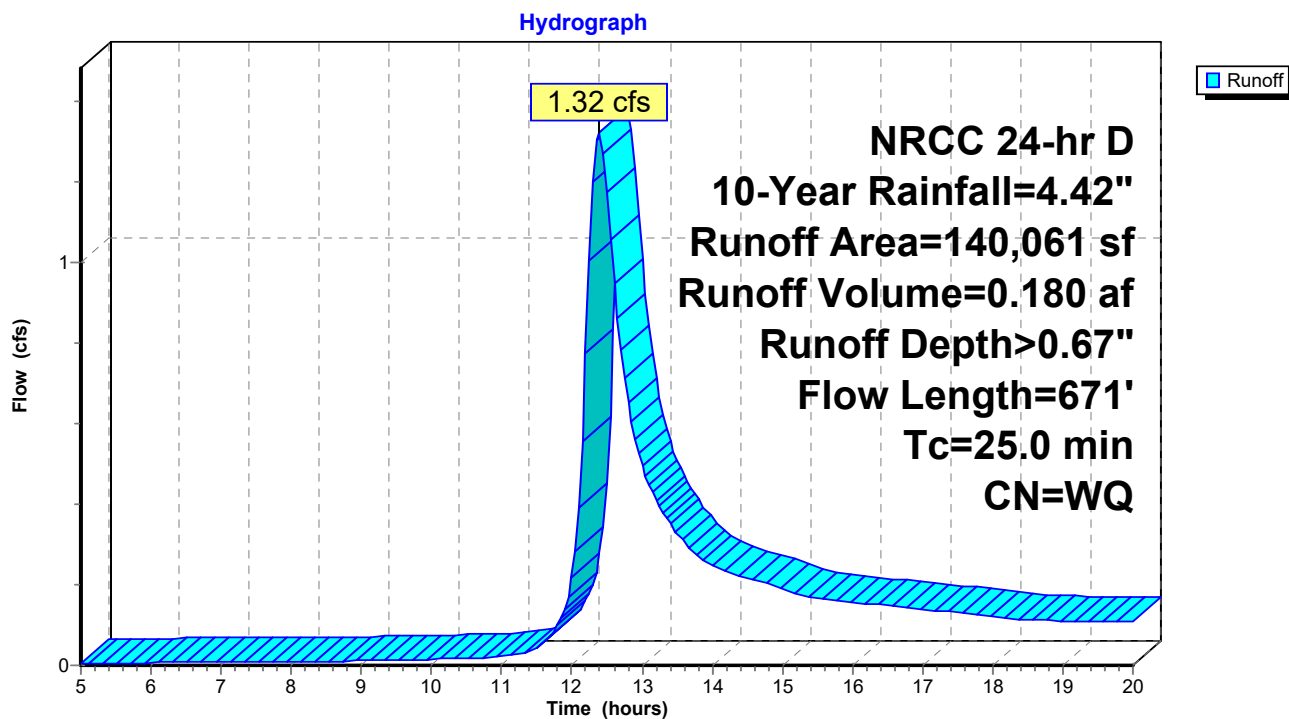
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
6,947	30	Woods, Good, HSG A
29,575	39	>75% Grass cover, Good, HSG A
26,549	55	Woods, Good, HSG B
73,329	61	>75% Grass cover, Good, HSG B
* 3,661	98	IMP
140,061		Weighted Average
136,400		97.39% Pervious Area
3,661		2.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0600	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.93"
0.8	116	0.1210	2.43		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.7	175	0.0570	1.67		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
8.0	280	0.0070	0.59		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
25.0	671	Total			



Subcatchment 24S: Direct to Basin 2



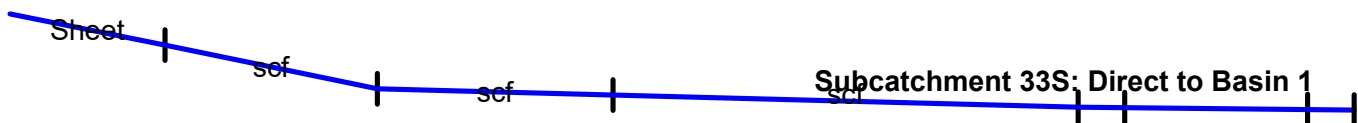
Summary for Subcatchment 33S: Direct to Basin 1

Runoff = 1.15 cfs @ 12.52 hrs, Volume= 0.178 af, Depth> 0.67"
 Routed to Pond 29P : Basin 1

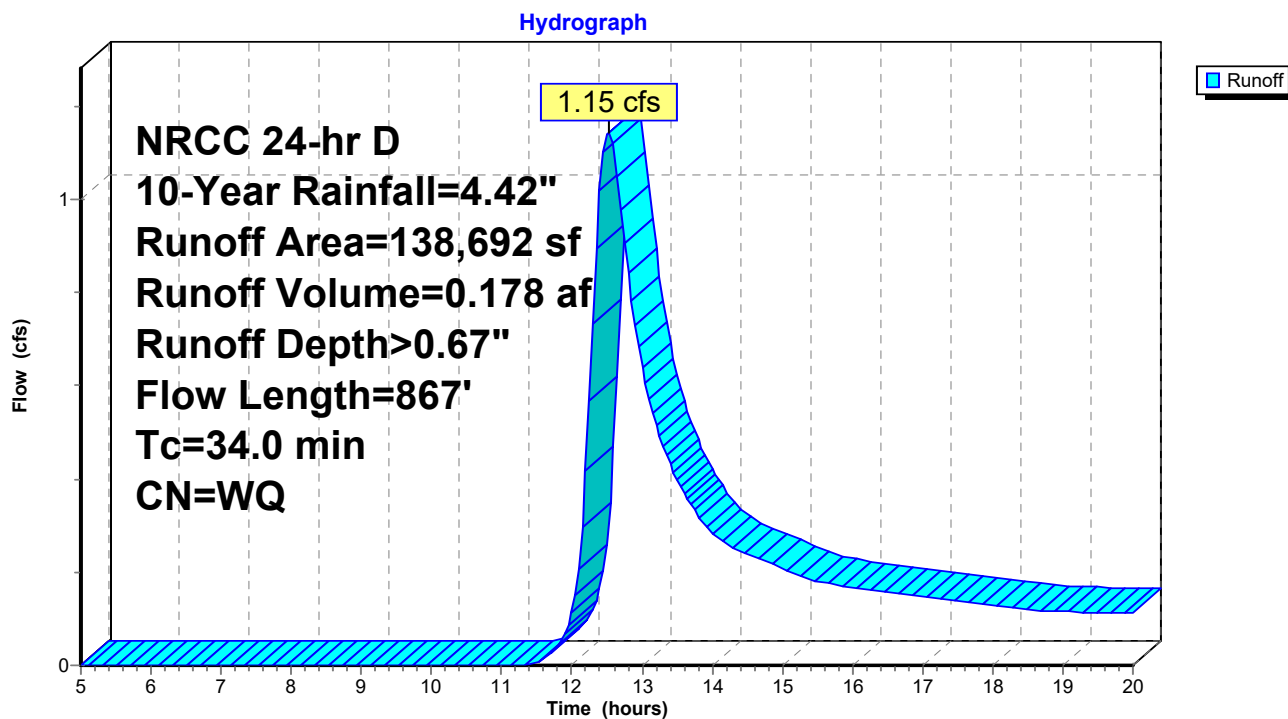
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
18,127	30	Woods, Good, HSG A
4,345	39	>75% Grass cover, Good, HSG A
24,023	55	Woods, Good, HSG B
92,197	61	>75% Grass cover, Good, HSG B
138,692		Weighted Average
138,692		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	100	0.1000	0.14		Sheet Flow, Sheet Woods: Light underbrush n= 0.400 P2= 2.93"
1.4	137	0.1020	1.60		Shallow Concentrated Flow, scf Woodland Kv= 5.0 fps
4.4	152	0.0130	0.57		Shallow Concentrated Flow, scf Woodland Kv= 5.0 fps
8.8	300	0.0130	0.57		Shallow Concentrated Flow, scf Woodland Kv= 5.0 fps
1.0	30	0.0050	0.49		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
5.6	118	0.0050	0.35		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.0	30	0.0050	0.49		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
34.0	867	Total			



Subcatchment 33S: Direct to Basin 1



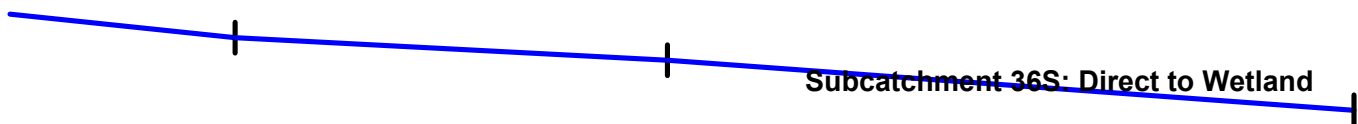
Summary for Subcatchment 36S: Direct to Wetland

Runoff = 1.26 cfs @ 12.79 hrs, Volume= 0.264 af, Depth> 0.68"
 Routed to Reach 8R : Wetland

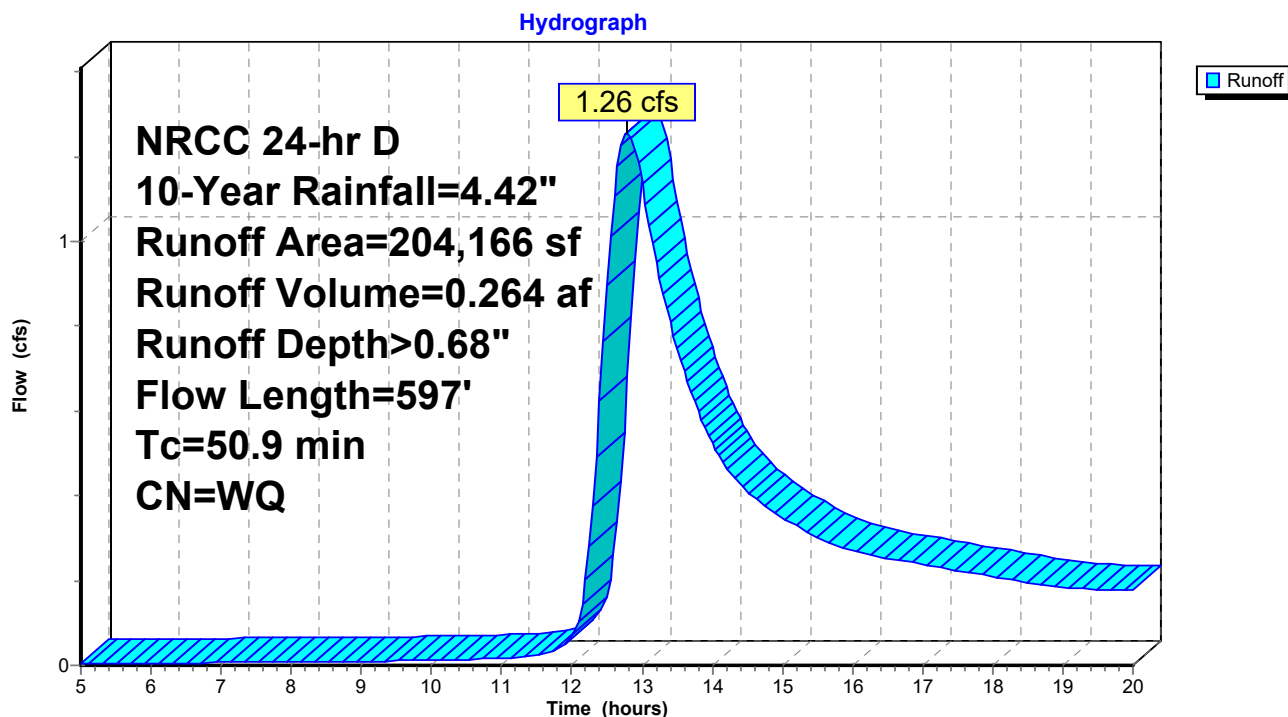
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
154,121	55	Woods, Good, HSG B
46,698	61	>75% Grass cover, Good, HSG B
95	70	Woods, Good, HSG C
* 3,252	98	IMP
204,166		Weighted Average
200,914		98.41% Pervious Area
3,252		1.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.6	100	0.0100	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.93"
9.1	192	0.0050	0.35		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.2	305	0.0070	0.42		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
50.9	597	Total			



Subcatchment 36S: Direct to Wetland



Summary for Subcatchment 43S: Slope Face

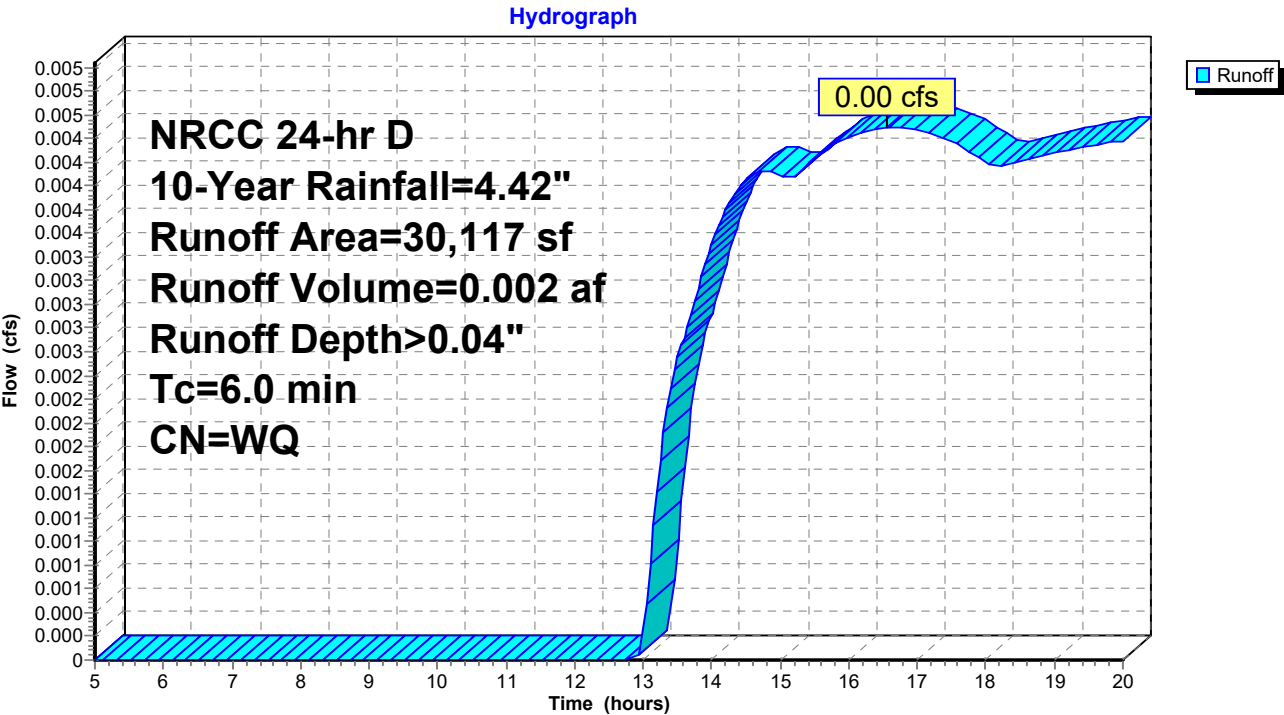
Runoff = 0.00 cfs @ 16.55 hrs, Volume= 0.002 af, Depth> 0.04"
Routed to Reach 44R : Pipe to Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
20,058	39	>75% Grass cover, Good, HSG A
10,059	30	Woods, Good, HSG A
30,117		Weighted Average
30,117		100.00% Pervious Area

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

Subcatchment 43S: Slope Face



Summary for Subcatchment 55S: CB-7

Runoff = 0.15 cfs @ 12.13 hrs, Volume= 0.012 af, Depth> 2.86"
 Routed to Pond 52P : CB-7

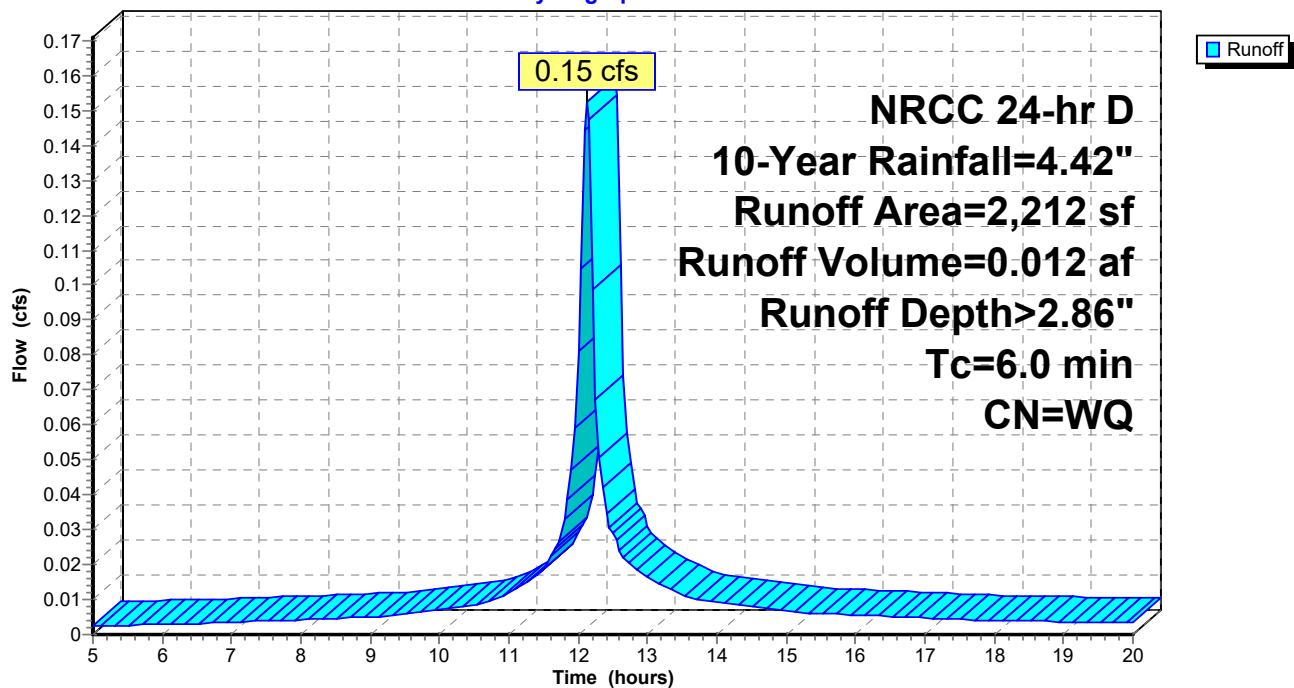
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
662	61	>75% Grass cover, Good, HSG B
* 1,550	98	IMP
2,212		Weighted Average
662		29.93% Pervious Area
1,550		70.07% Impervious Area

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

Subcatchment 55S: CB-7

Hydrograph



Summary for Subcatchment 56S: CB-8

Runoff = 0.22 cfs @ 12.13 hrs, Volume= 0.017 af, Depth> 2.22"
 Routed to Pond 53P : CB-8

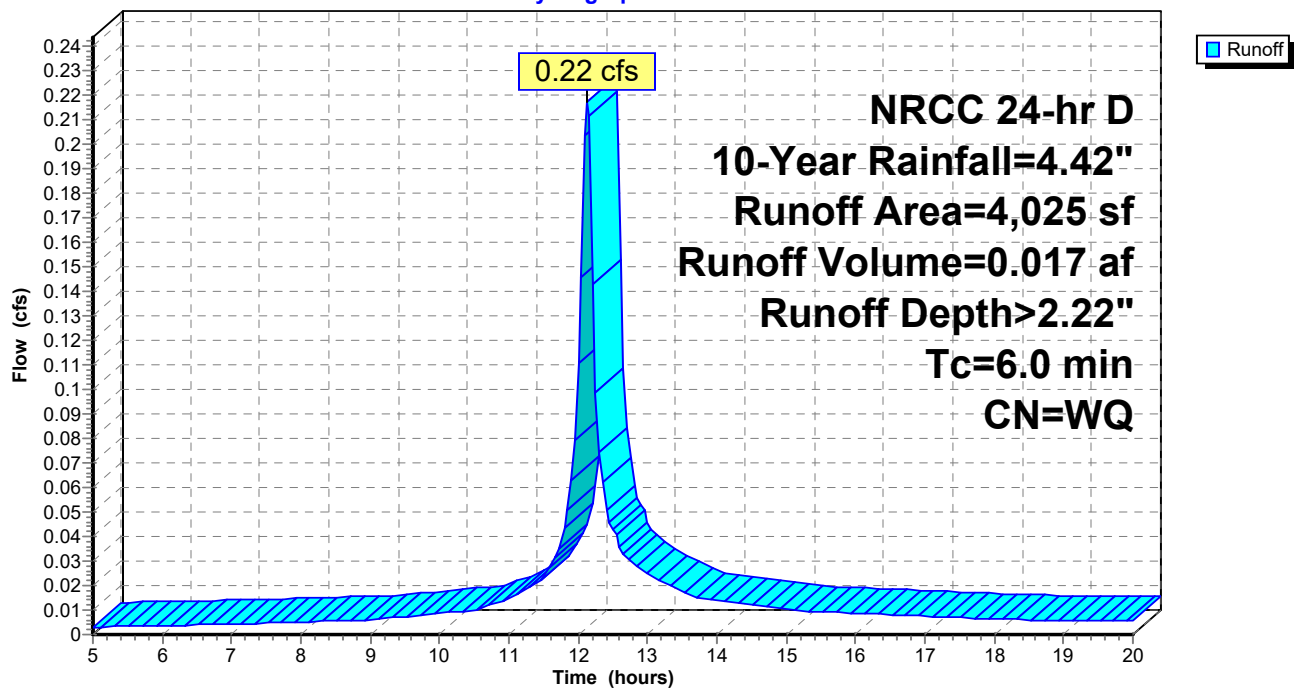
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NRCC 24-hr D 10-Year Rainfall=4.42"

Area (sf)	CN	Description
2,120	61	>75% Grass cover, Good, HSG B
* 1,905	98	IMP
4,025		Weighted Average
2,120		52.67% Pervious Area
1,905		47.33% Impervious Area

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

Subcatchment 56S: CB-8

Hydrograph

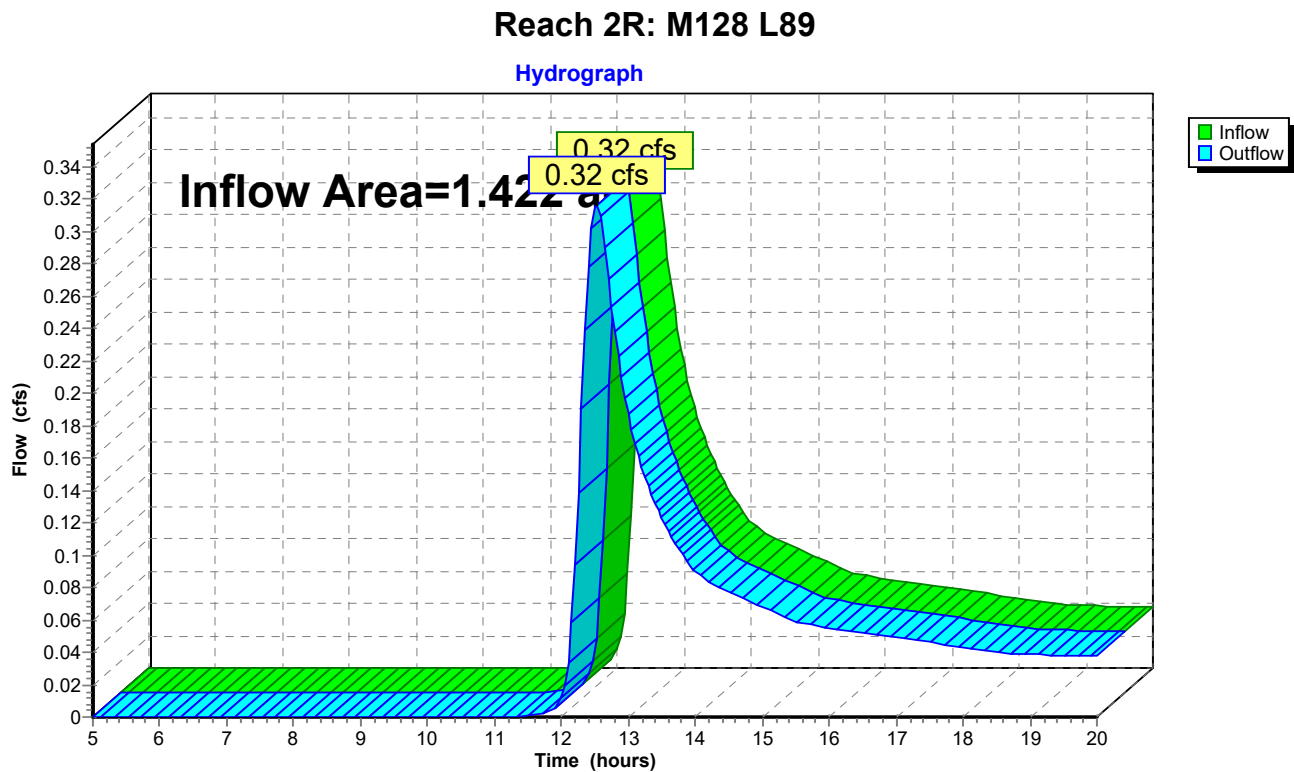


Summary for Reach 2R: M128 L89

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

Inflow Area = 1.422 ac, 0.00% Impervious, Inflow Depth > 0.45" for 10-Year event
Inflow = 0.32 cfs @ 12.52 hrs, Volume= 0.054 af
Outflow = 0.32 cfs @ 12.52 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



Summary for Reach 4R: MAP 138 LOT 78

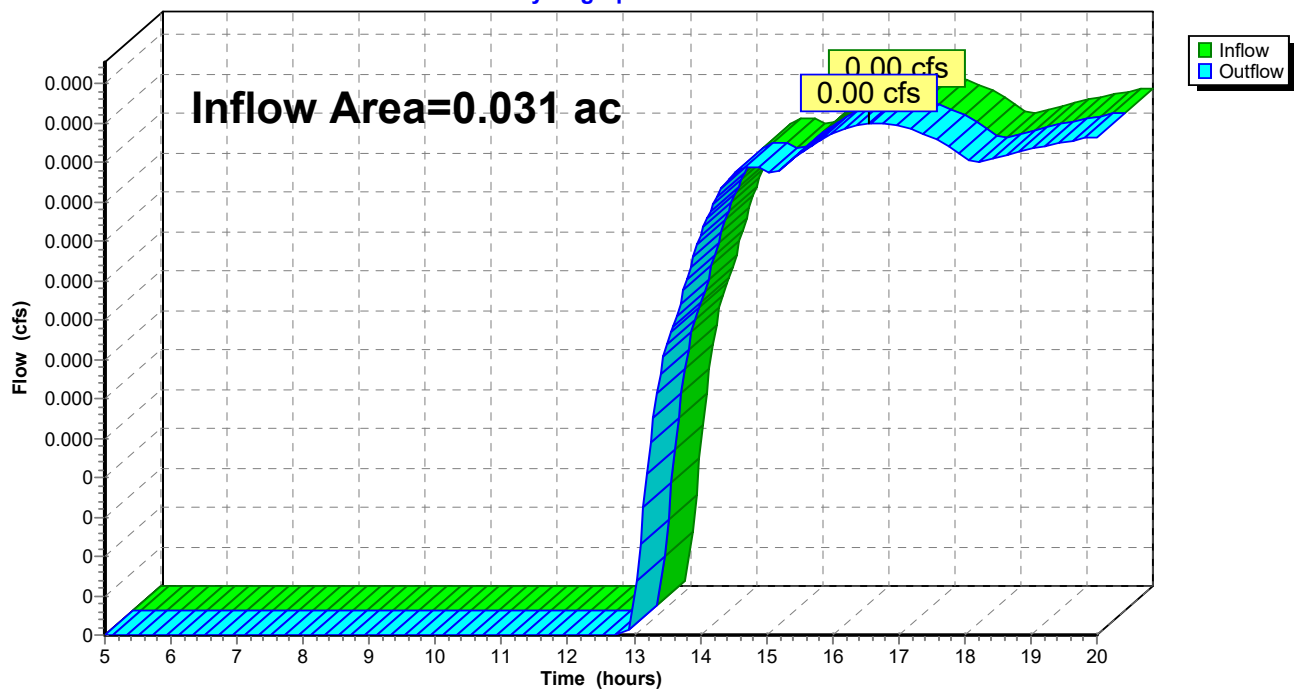
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.031 ac, 0.00% Impervious, Inflow Depth > 0.05" for 10-Year event
Inflow = 0.00 cfs @ 16.55 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 16.55 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 4R: MAP 138 LOT 78

Hydrograph

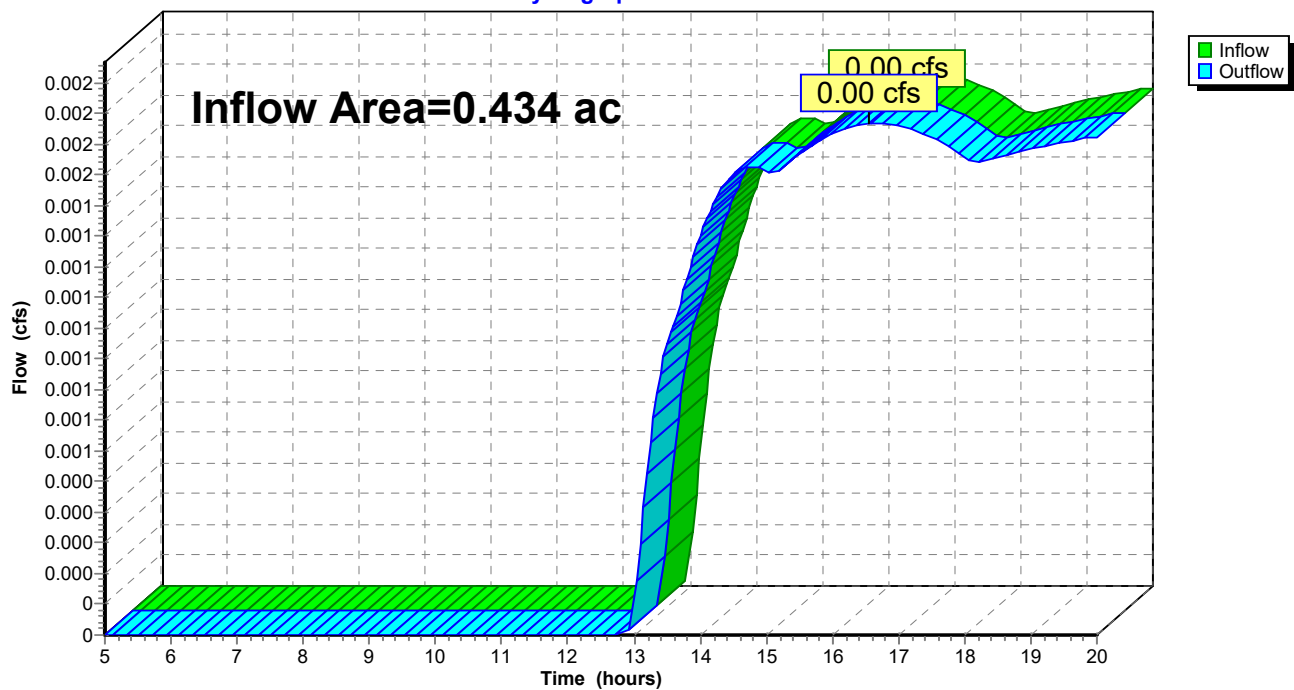


Summary for Reach 6R: MAP 138 LOT 79

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

Inflow Area = 0.434 ac, 0.00% Impervious, Inflow Depth > 0.02" for 10-Year event
Inflow = 0.00 cfs @ 16.55 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 16.55 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

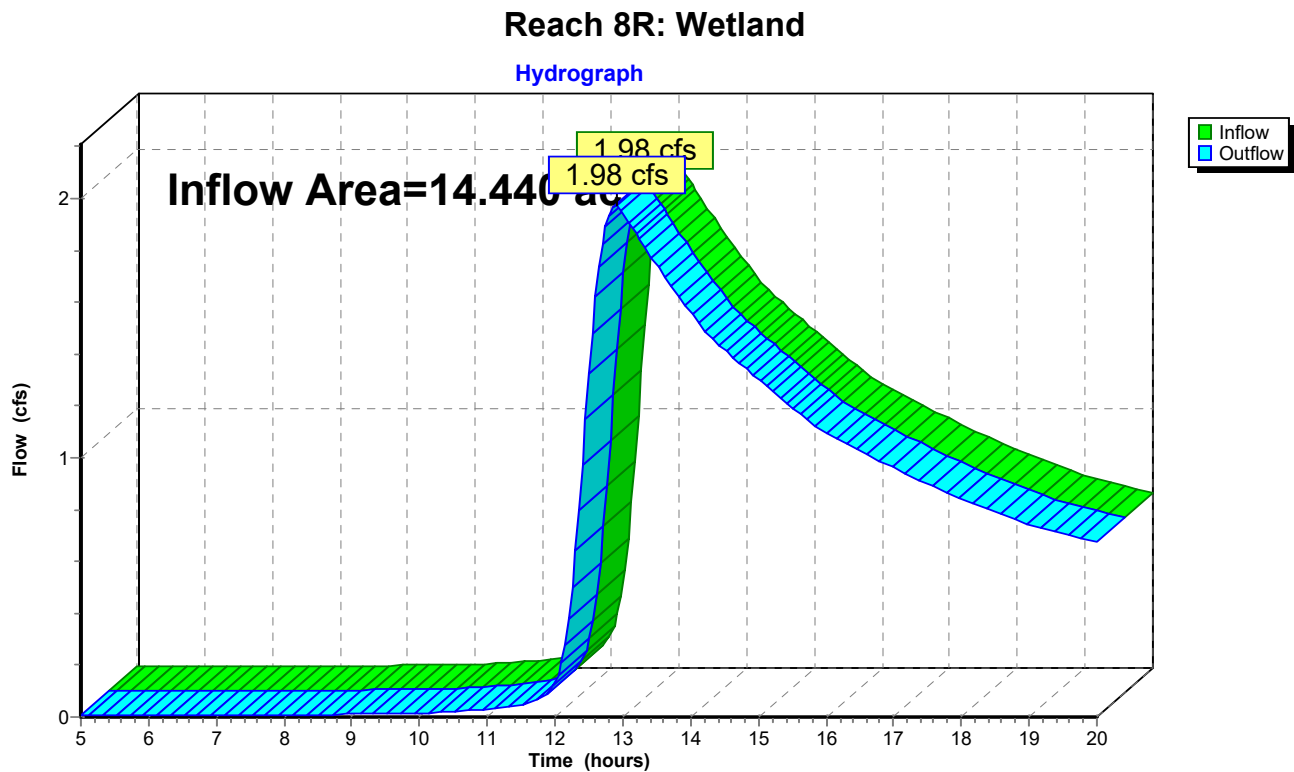
Reach 6R: MAP 138 LOT 79**Hydrograph**

Summary for Reach 8R: Wetland

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

Inflow Area = 14.440 ac, 10.57% Impervious, Inflow Depth > 0.63" for 10-Year event
Inflow = 1.98 cfs @ 12.91 hrs, Volume= 0.754 af
Outflow = 1.98 cfs @ 12.91 hrs, Volume= 0.754 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



Summary for Reach 44R: Pipe to Swale

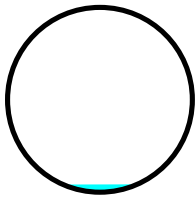
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.691 ac, 0.00% Impervious, Inflow Depth > 0.04" for 10-Year event
Inflow = 0.00 cfs @ 16.55 hrs, Volume= 0.002 af
Outflow = 0.00 cfs @ 16.58 hrs, Volume= 0.002 af, Atten= 0%, Lag= 2.1 min
Routed to Reach 45R : Basin 2 Swale

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.64 fps, Min. Travel Time= 1.4 min
Avg. Velocity= 1.56 fps, Avg. Travel Time= 1.4 min

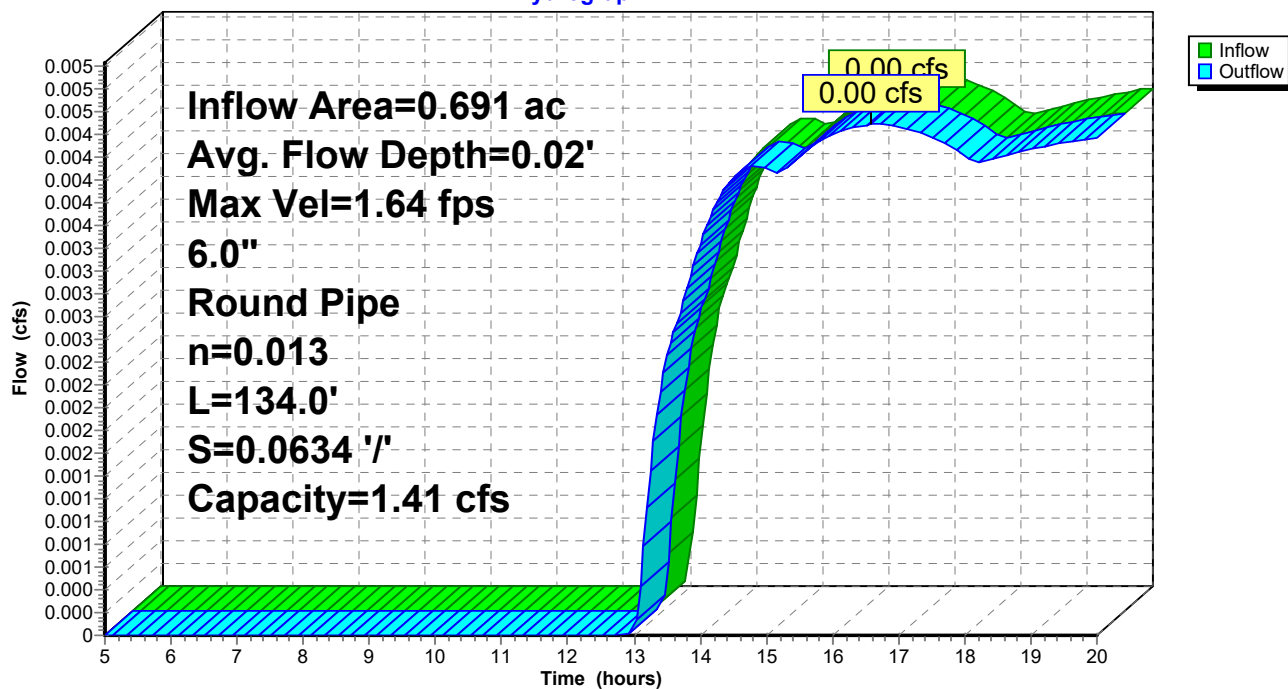
Peak Storage= 0 cf @ 16.56 hrs
Average Depth at Peak Storage= 0.02' , Surface Width= 0.20'
Bank-Full Depth= 0.50' Flow Area= 0.2 sf, Capacity= 1.41 cfs

6.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 134.0' Slope= 0.0634 '/
Inlet Invert= 170.50', Outlet Invert= 162.00'



Reach 44R: Pipe to Swale

Hydrograph



Summary for Reach 45R: Basin 2 Swale

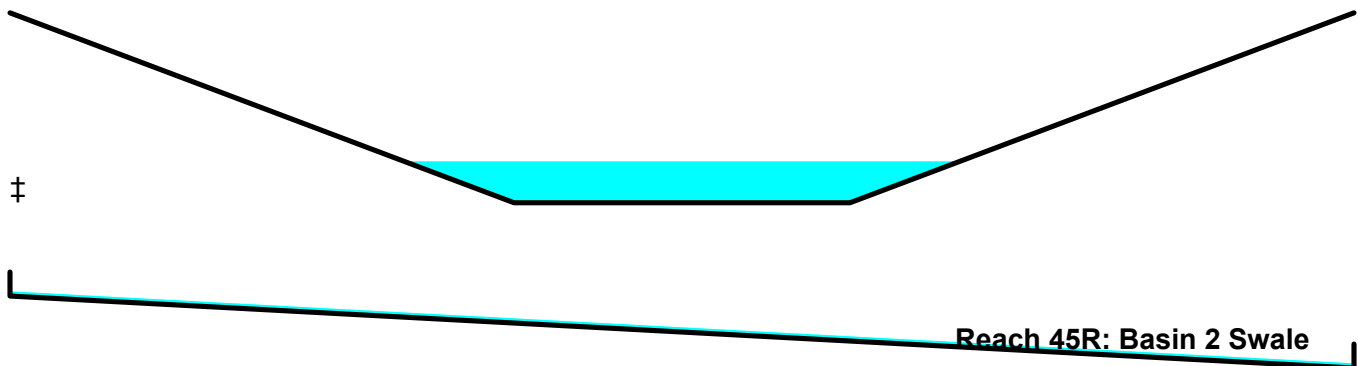
[82] Warning: Early inflow requires earlier time span

Inflow Area = 3.907 ac, 2.15% Impervious, Inflow Depth > 0.56" for 10-Year event
Inflow = 1.32 cfs @ 12.39 hrs, Volume= 0.182 af
Outflow = 1.31 cfs @ 12.44 hrs, Volume= 0.181 af, Atten= 1%, Lag= 3.3 min
Routed to Pond 37P : Basin 2

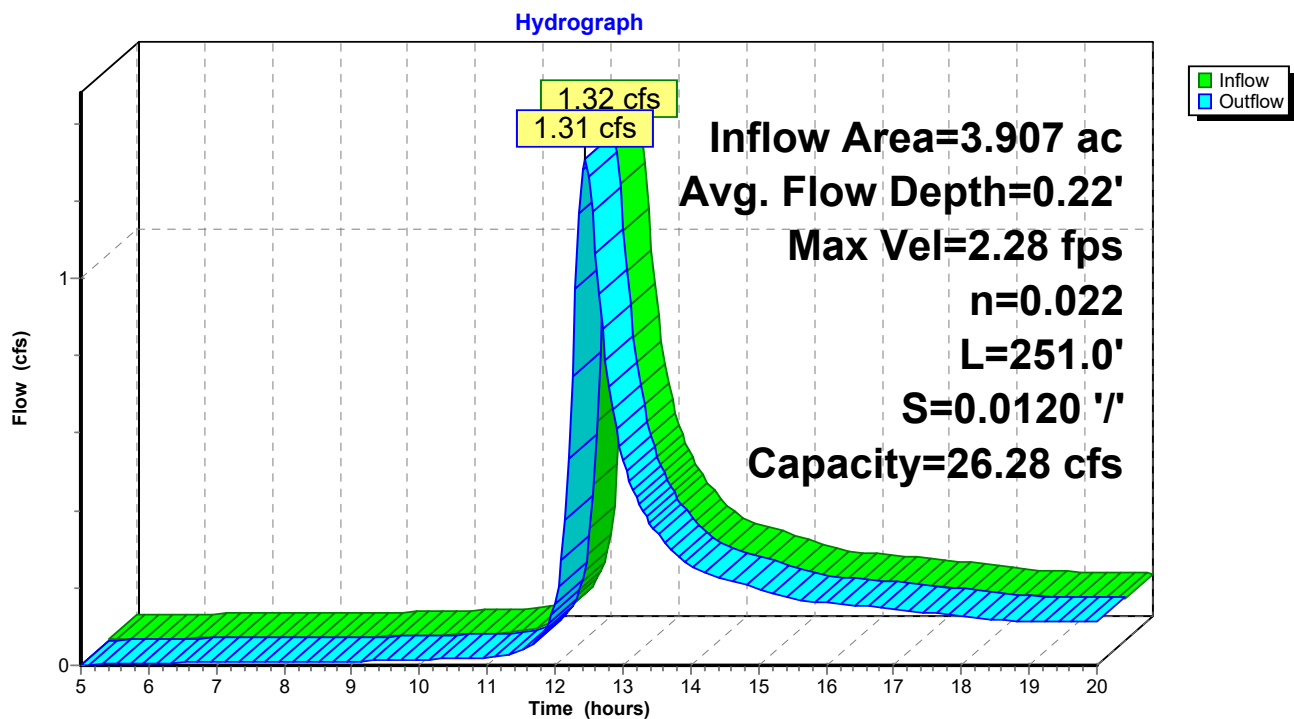
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.28 fps, Min. Travel Time= 1.8 min
Avg. Velocity= 0.87 fps, Avg. Travel Time= 4.8 min

Peak Storage= 145 cf @ 12.41 hrs
Average Depth at Peak Storage= 0.22', Surface Width= 3.31'
Bank-Full Depth= 1.00' Flow Area= 5.0 sf, Capacity= 26.28 cfs

2.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 8.00'
Length= 251.0' Slope= 0.0120 '/'
Inlet Invert= 160.00', Outlet Invert= 157.00'



Reach 45R: Basin 2 Swale



Summary for Reach 47R: Right side Swale

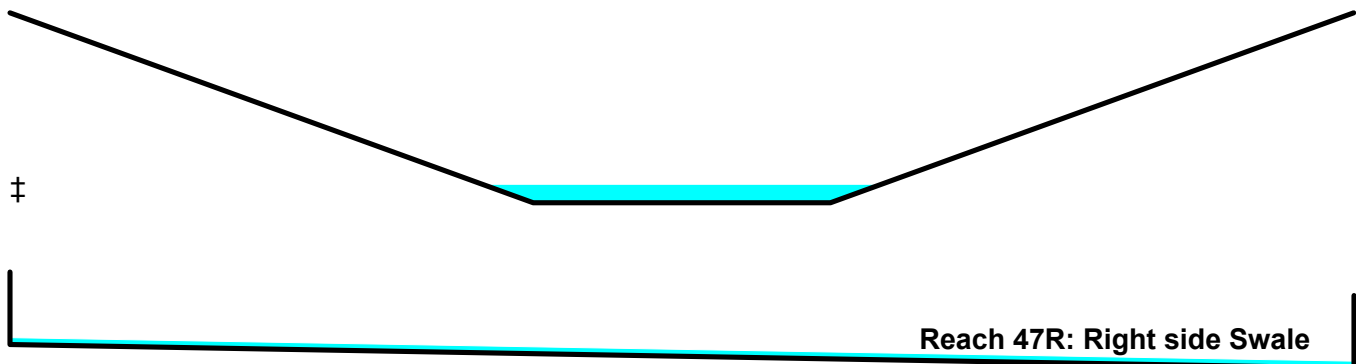
[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.335 ac, 48.77% Impervious, Inflow Depth > 2.26" for 10-Year event
Inflow = 0.80 cfs @ 12.13 hrs, Volume= 0.063 af
Outflow = 0.74 cfs @ 12.20 hrs, Volume= 0.063 af, Atten= 7%, Lag= 4.5 min
Routed to Reach 48R : Right side culvert

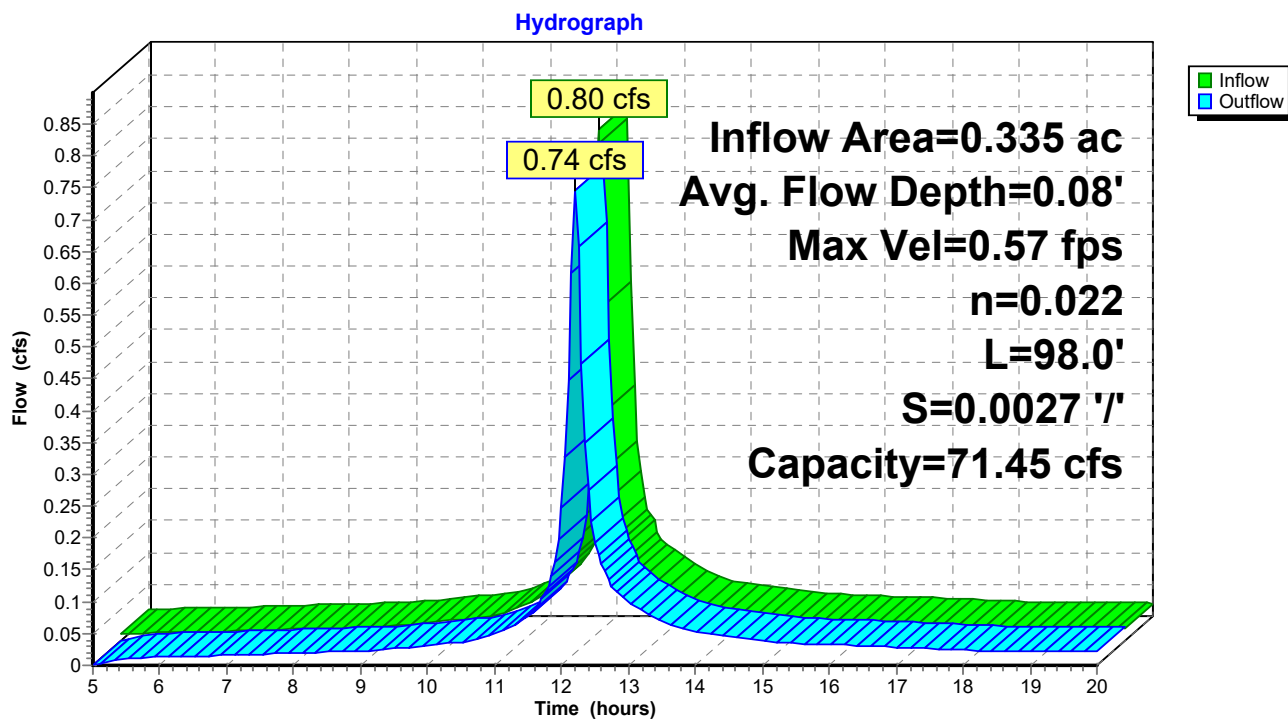
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.57 fps, Min. Travel Time= 2.9 min
Avg. Velocity= 0.19 fps, Avg. Travel Time= 8.5 min

Peak Storage= 129 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 19.97'
Bank-Full Depth= 0.80' Flow Area= 33.1 sf, Capacity= 71.45 cfs

15.00' x 0.80' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 33.0 '/' Top Width= 67.80'
Length= 98.0' Slope= 0.0027 '/'
Inlet Invert= 157.46', Outlet Invert= 157.20'



Reach 47R: Right side Swale



Summary for Reach 48R: Right side culvert

[52] Hint: Inlet/Outlet conditions not evaluated

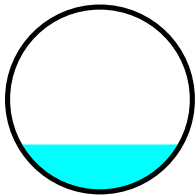
[62] Hint: Exceeded Reach 47R OUTLET depth by 0.19' @ 12.20 hrs

Inflow Area = 0.335 ac, 48.77% Impervious, Inflow Depth > 2.24" for 10-Year event
Inflow = 0.74 cfs @ 12.20 hrs, Volume= 0.063 af
Outflow = 0.74 cfs @ 12.21 hrs, Volume= 0.063 af, Atten= 1%, Lag= 0.3 min
Routed to Pond 54P : DMH-2

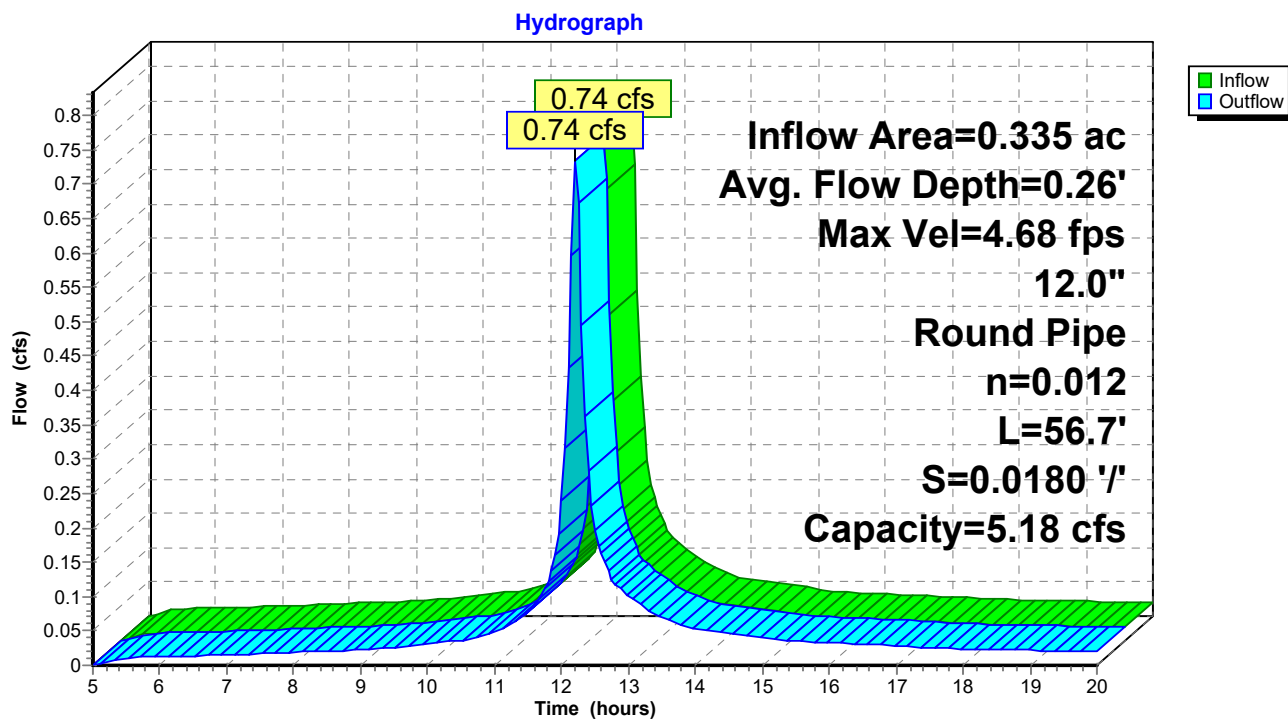
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.68 fps, Min. Travel Time= 0.2 min
Avg. Velocity= 1.90 fps, Avg. Travel Time= 0.5 min

Peak Storage= 9 cf @ 12.21 hrs
Average Depth at Peak Storage= 0.26' , Surface Width= 0.87'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 5.18 cfs

12.0" Round Pipe
n= 0.012 Concrete pipe, finished
Length= 56.7' Slope= 0.0180 '/'
Inlet Invert= 157.20', Outlet Invert= 156.18'



Reach 48R: Right side culvert



Summary for Pond 7P: CB-2

[82] Warning: Early inflow requires earlier time span

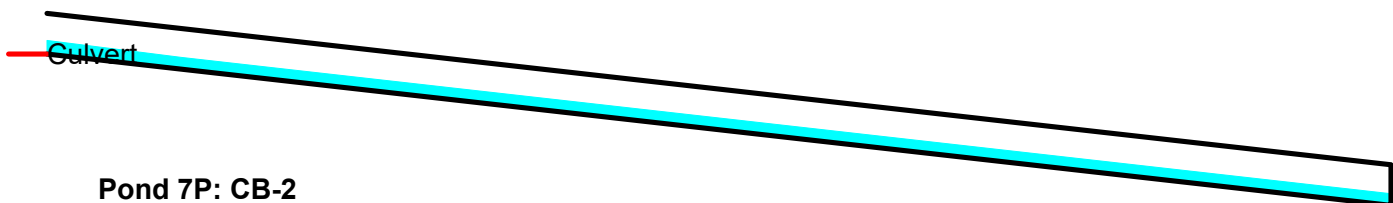
[57] Hint: Peaked at 165.10' (Flood elevation advised)

Inflow Area = 1.163 ac, 35.23% Impervious, Inflow Depth > 1.35" for 10-Year event
 Inflow = 1.23 cfs @ 12.21 hrs, Volume= 0.130 af
 Outflow = 1.23 cfs @ 12.21 hrs, Volume= 0.130 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.23 cfs @ 12.21 hrs, Volume= 0.130 af
 Routed to Pond 10P : CB-4

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

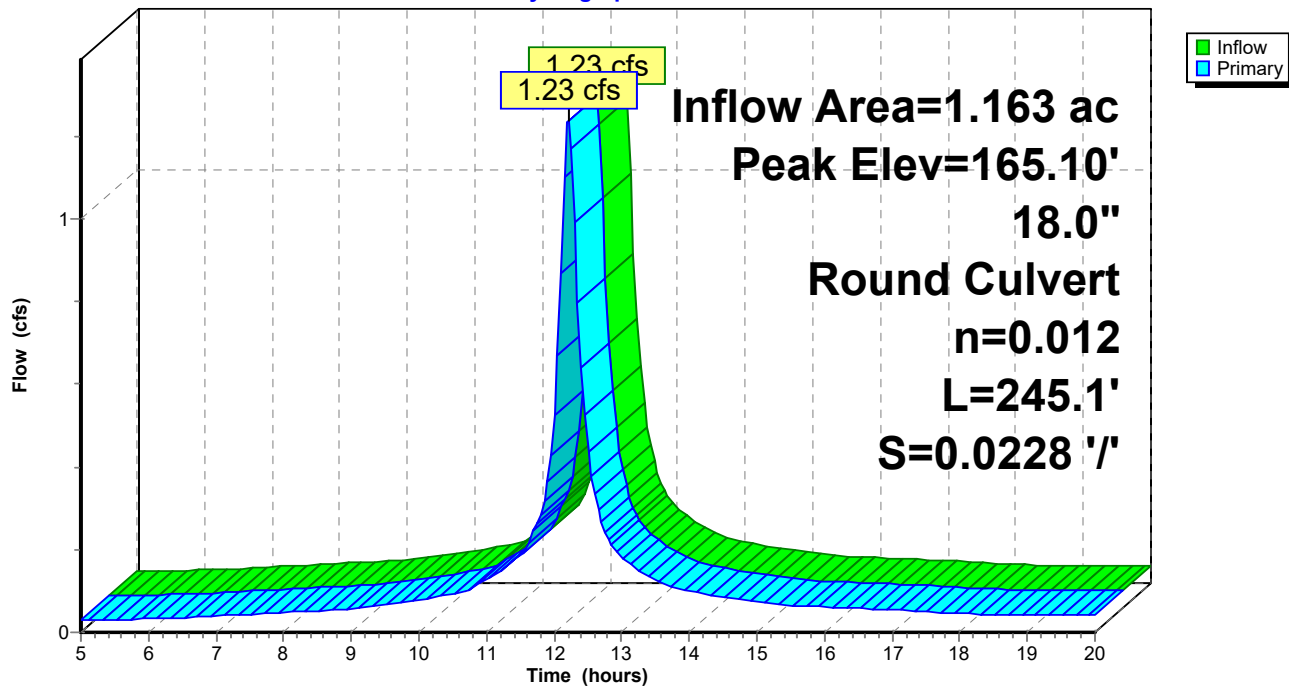
Peak Elev= 165.10' @ 12.21 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	164.60'	18.0" Round Culvert L= 245.1' Ke= 0.500 Inlet / Outlet Invert= 164.60' / 159.00' S= 0.0228 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=1.22 cfs @ 12.21 hrs HW=165.10' (Free Discharge)↑ **1=Culvert** (Inlet Controls 1.22 cfs @ 2.40 fps)

Pond 7P: CB-2

Hydrograph



Summary for Pond 8P: CB-1

[82] Warning: Early inflow requires earlier time span

[57] Hint: Peaked at 166.07' (Flood elevation advised)

Inflow Area = 0.711 ac, 34.62% Impervious, Inflow Depth > 1.33" for 10-Year event
 Inflow = 0.72 cfs @ 12.23 hrs, Volume= 0.078 af
 Outflow = 0.72 cfs @ 12.23 hrs, Volume= 0.078 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.72 cfs @ 12.23 hrs, Volume= 0.078 af
 Routed to Pond 7P : CB-2

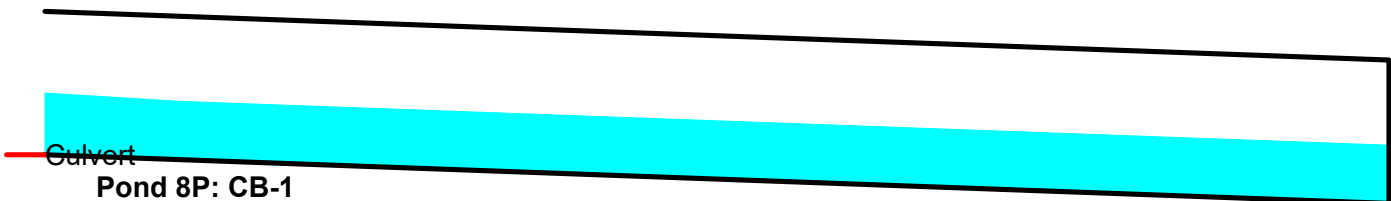
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

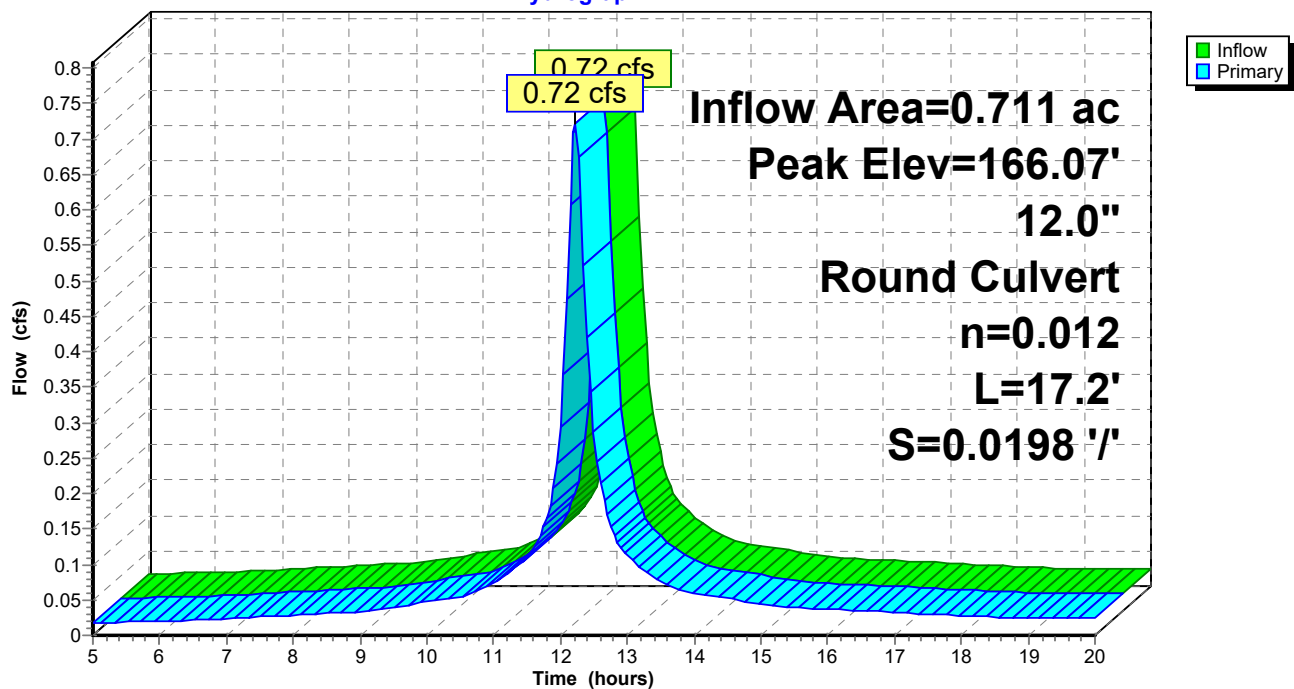
Peak Elev= 166.07' @ 12.23 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	165.64'	12.0" Round Culvert L= 17.2' Ke= 0.500 Inlet / Outlet Invert= 165.64' / 165.30' S= 0.0198 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.71 cfs @ 12.23 hrs HW=166.07' (Free Discharge)↑ **1=Culvert** (Inlet Controls 0.71 cfs @ 2.22 fps)

Culvert

Pond 8P: CB-1

Pond 8P: CB-1**Hydrograph**

Summary for Pond 9P: CB-3

[82] Warning: Early inflow requires earlier time span

[57] Hint: Peaked at 161.07' (Flood elevation advised)

Inflow Area = 0.296 ac, 60.06% Impervious, Inflow Depth > 2.55" for 10-Year event
 Inflow = 0.80 cfs @ 12.13 hrs, Volume= 0.063 af
 Outflow = 0.80 cfs @ 12.13 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.80 cfs @ 12.13 hrs, Volume= 0.063 af
 Routed to Pond 10P : CB-4

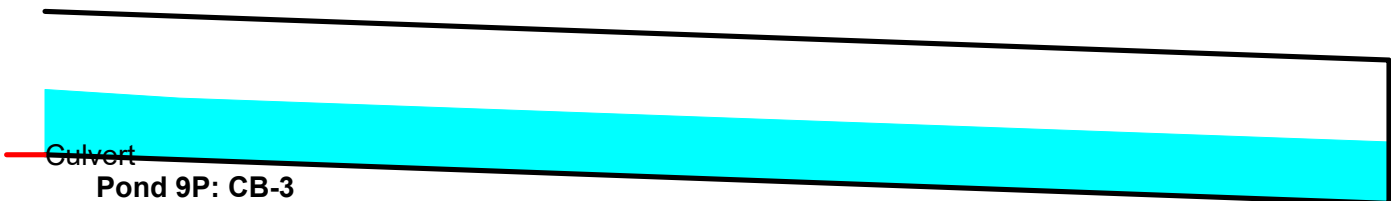
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

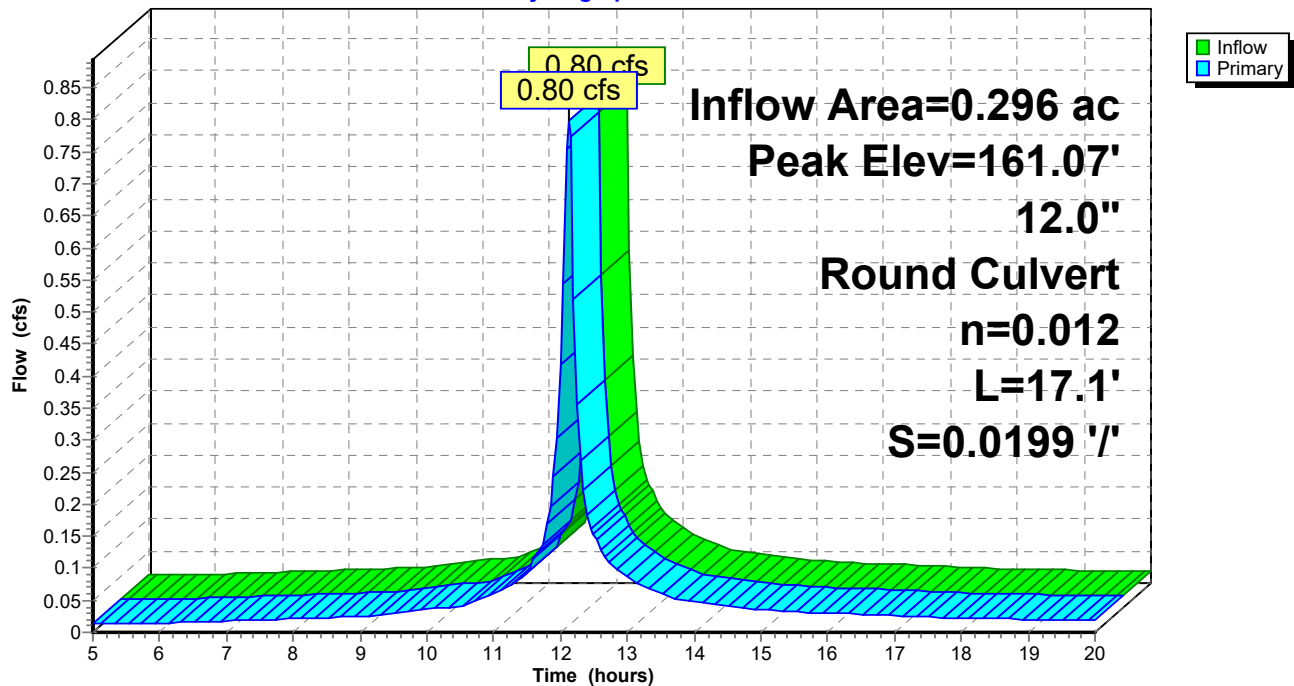
Peak Elev= 161.07' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	160.61'	12.0" Round Culvert L= 17.1' Ke= 0.500 Inlet / Outlet Invert= 160.61' / 160.27' S= 0.0199 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.76 cfs @ 12.13 hrs HW=161.05' (Free Discharge)↑ **1=Culvert** (Inlet Controls 0.76 cfs @ 2.27 fps)

Culvert

Pond 9P: CB-3

Pond 9P: CB-3**Hydrograph**

Summary for Pond 10P: CB-4

[82] Warning: Early inflow requires earlier time span

[57] Hint: Peaked at 159.68' (Flood elevation advised)

[79] Warning: Submerged Pond 7P Primary device # 1 OUTLET by 0.68'

Inflow Area = 1.711 ac, 46.07% Impervious, Inflow Depth > 1.81" for 10-Year event
 Inflow = 2.67 cfs @ 12.15 hrs, Volume= 0.259 af
 Outflow = 2.67 cfs @ 12.15 hrs, Volume= 0.259 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.67 cfs @ 12.15 hrs, Volume= 0.259 af
 Routed to Pond 42P : DMH-1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

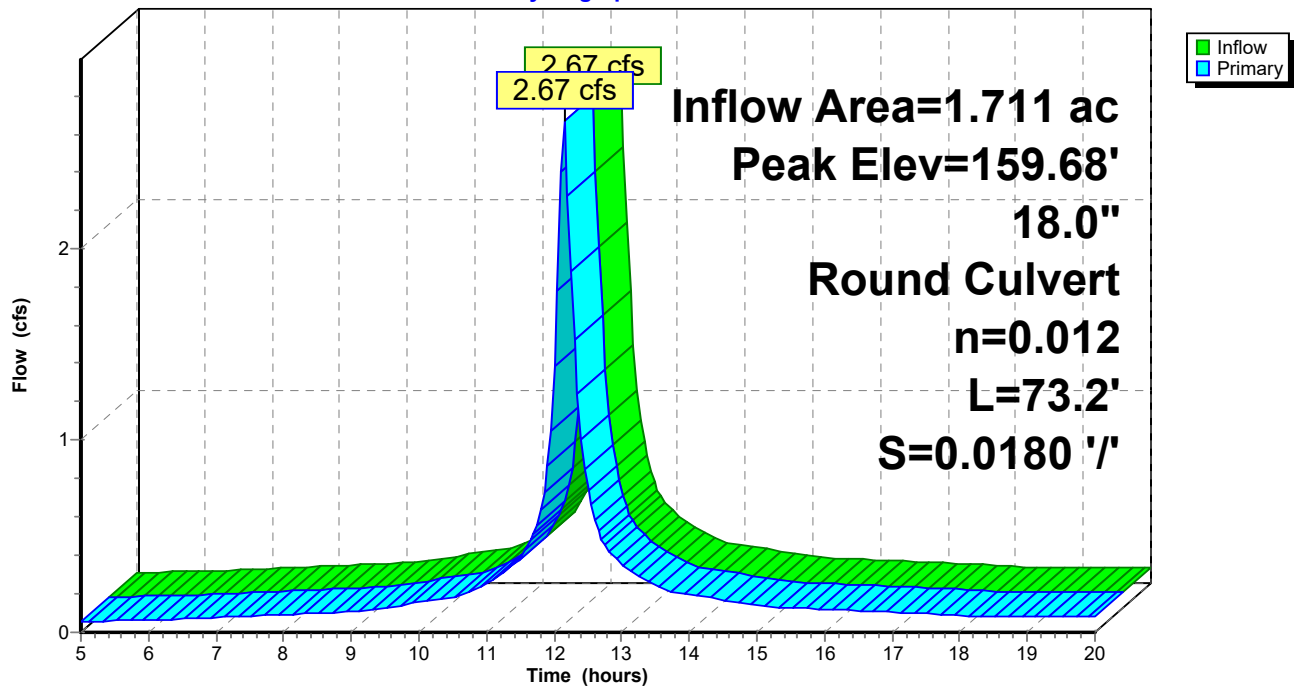
Peak Elev= 159.68' @ 12.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	158.92'	18.0" Round Culvert L= 73.2' Ke= 0.500 Inlet / Outlet Invert= 158.92' / 157.60' S= 0.0180 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=2.64 cfs @ 12.15 hrs HW=159.68' (Free Discharge)↑**1=Culvert** (Inlet Controls 2.64 cfs @ 2.96 fps)

Culvert

Pond 10P: CB-4

Pond 10P: CB-4**Hydrograph**

Summary for Pond 15P: CB-6

[82] Warning: Early inflow requires earlier time span

[57] Hint: Peaked at 156.85' (Flood elevation advised)

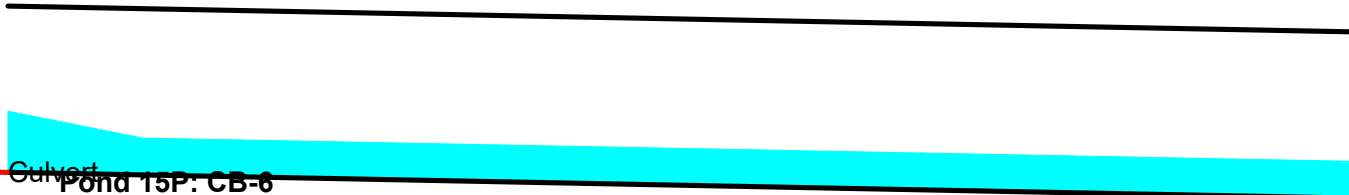
[79] Warning: Submerged Pond 42P Primary device # 1 OUTLET by 0.64'

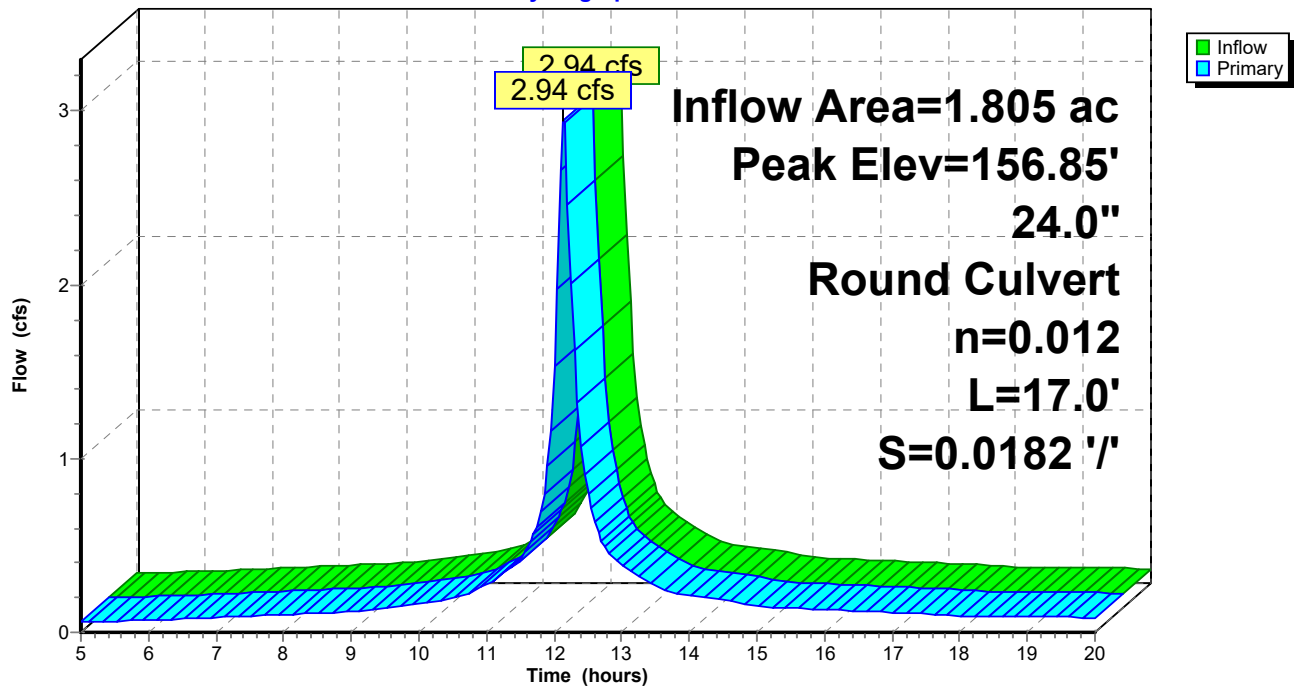
Inflow Area = 1.805 ac, 47.34% Impervious, Inflow Depth > 1.87" for 10-Year event
 Inflow = 2.94 cfs @ 12.14 hrs, Volume= 0.281 af
 Outflow = 2.94 cfs @ 12.14 hrs, Volume= 0.281 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.94 cfs @ 12.14 hrs, Volume= 0.281 af
 Routed to Pond 16P : CB-5

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 156.85' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	156.11'	24.0" Round Culvert L= 17.0' Ke= 0.500 Inlet / Outlet Invert= 156.11' / 155.80' S= 0.0182 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf

Primary OutFlow Max=2.90 cfs @ 12.14 hrs HW=156.84' (Free Discharge)↑ **1=Culvert** (Barrel Controls 2.90 cfs @ 4.16 fps)

 Culvert
Pond 15P: CB-6

Pond 15P: CB-6**Hydrograph**

Summary for Pond 16P: CB-5

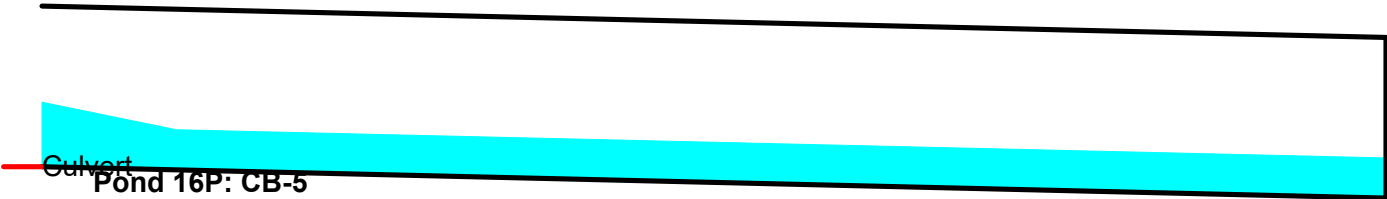
[82] Warning: Early inflow requires earlier time span
[57] Hint: Peaked at 156.49' (Flood elevation advised)
[79] Warning: Submerged Pond 15P Primary device # 1 INLET by 0.38'

Inflow Area = 2.026 ac, 49.66% Impervious, Inflow Depth > 1.97" for 10-Year event
Inflow = 3.59 cfs @ 12.14 hrs, Volume= 0.333 af
Outflow = 3.59 cfs @ 12.14 hrs, Volume= 0.333 af, Atten= 0%, Lag= 0.0 min
Primary = 3.59 cfs @ 12.14 hrs, Volume= 0.333 af
Routed to Pond 38P : Sediment Forebay 1

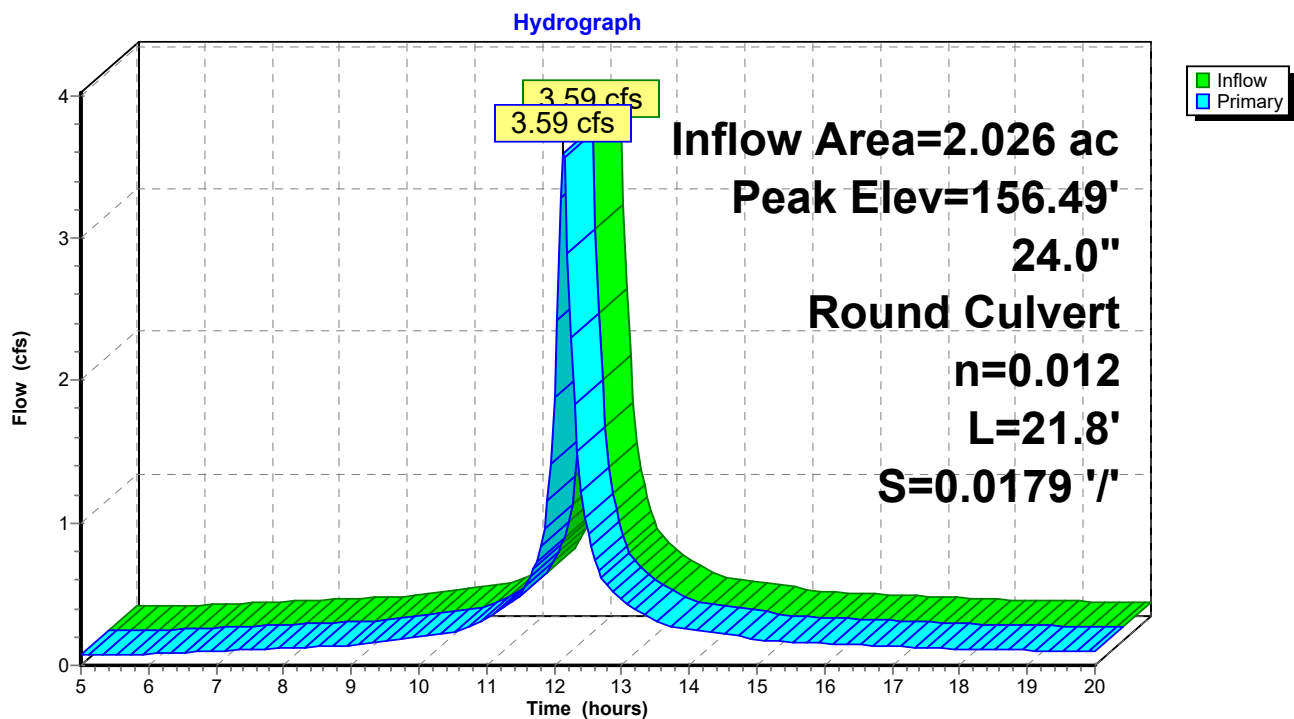
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 156.49' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	155.69'	24.0" Round Culvert L= 21.8' Ke= 0.500 Inlet / Outlet Invert= 155.69' / 155.30' S= 0.0179 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf

Primary OutFlow Max=3.51 cfs @ 12.14 hrs HW=156.48' (Free Discharge)
↑**1=Culvert** (Barrel Controls 3.51 cfs @ 4.48 fps)



Pond 16P: CB-5



Summary for Pond 29P: Basin 1

[81] Warning: Exceeded Pond 38P by 0.52' @ 14.25 hrs

Inflow Area = 9.753 ac, 14.89% Impervious, Inflow Depth > 0.95" for 10-Year event
 Inflow = 4.86 cfs @ 12.17 hrs, Volume= 0.768 af
 Outflow = 1.04 cfs @ 13.95 hrs, Volume= 0.490 af, Atten= 79%, Lag= 107.1 min
 Primary = 1.04 cfs @ 13.95 hrs, Volume= 0.490 af
 Routed to Reach 8R : Wetland

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 155.91' @ 13.95 hrs Surf.Area= 28,890 sf Storage= 16,502 cf

Plug-Flow detention time= 214.3 min calculated for 0.489 af (64% of inflow)
 Center-of-Mass det. time= 123.0 min (947.4 - 824.5)

Volume	Invert	Avail.Storage	Storage Description
#1	150.25'	0 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 34,065 cf Overall x 0.0% Voids
#2	155.00'	51,154 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		51,154 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
150.25	6,056	0	0
152.00	6,205	10,728	10,728
154.00	8,285	14,490	25,218
155.00	9,409	8,847	34,065

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
155.00	16,763	0	0
156.00	19,748	18,256	18,256
157.50	24,117	32,899	51,154

Device	Routing	Invert	Outlet Devices
#1	Primary	155.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.00 1.50 1.50 2.50 Width (feet) 0.00 1.50 8.00 8.00

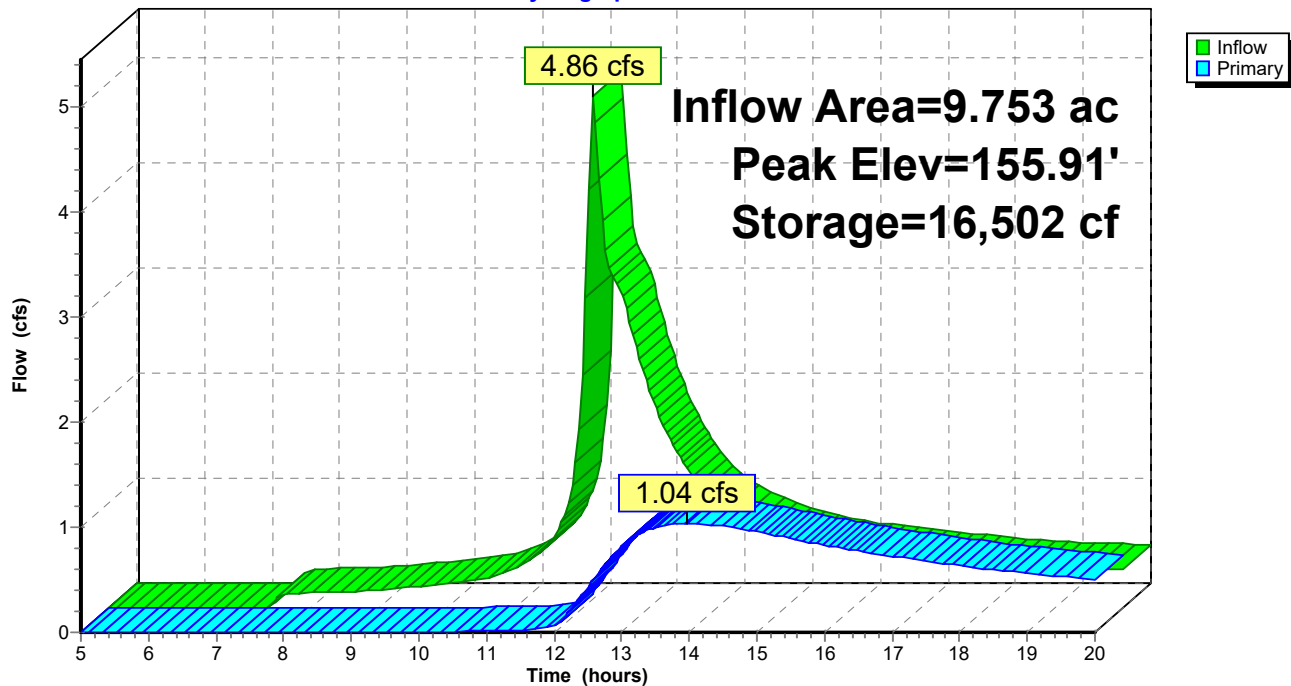
Primary OutFlow Max=1.04 cfs @ 13.95 hrs HW=155.91' (Free Discharge)
 ↑1=Custom Weir/Orifice (Weir Controls 1.04 cfs @ 2.50 fps)

Pond 29P: Basin 1

Custom Weir/Orifice

Pond 29P: Basin 1

Hydrograph



Summary for Pond 37P: Basin 2

[82] Warning: Early inflow requires earlier time span

[79] Warning: Submerged Pond 52P Primary device # 1 INLET by 0.05'

Inflow Area = 4.116 ac, 5.80% Impervious, Inflow Depth > 0.68" for 10-Year event
 Inflow = 1.44 cfs @ 12.43 hrs, Volume= 0.233 af
 Outflow = 0.94 cfs @ 12.72 hrs, Volume= 0.199 af, Atten= 35%, Lag= 17.0 min
 Primary = 0.94 cfs @ 12.72 hrs, Volume= 0.199 af
 Routed to Pond 38P : Sediment Forebay 1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 157.00' @ 12.72 hrs Surf.Area= 4,506 sf Storage= 2,762 cf

Plug-Flow detention time= 100.1 min calculated for 0.198 af (85% of inflow)
 Center-of-Mass det. time= 52.8 min (884.6 - 831.8)

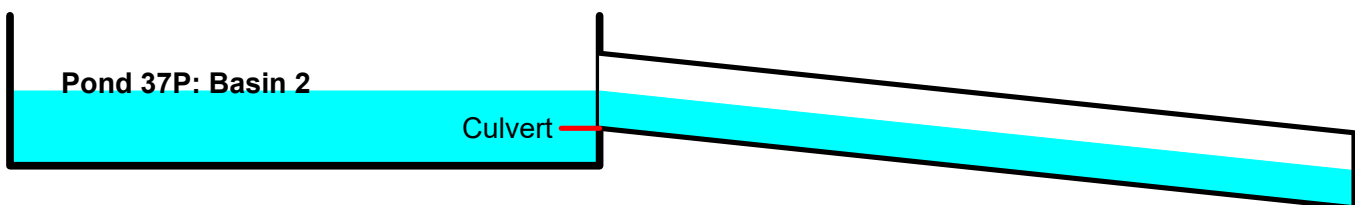
Volume	Invert	Avail.Storage	Storage Description
#1	156.00'	9,871 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
156.00	1,033	0	0
157.00	4,515	2,774	2,774
158.00	9,678	7,097	9,871

Device	Routing	Invert	Outlet Devices
#1	Primary	156.50'	12.0" Round Culvert L= 71.0' Ke= 0.500 Inlet / Outlet Invert= 156.50' / 155.44' S= 0.0149 ' S= 0.0149 ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

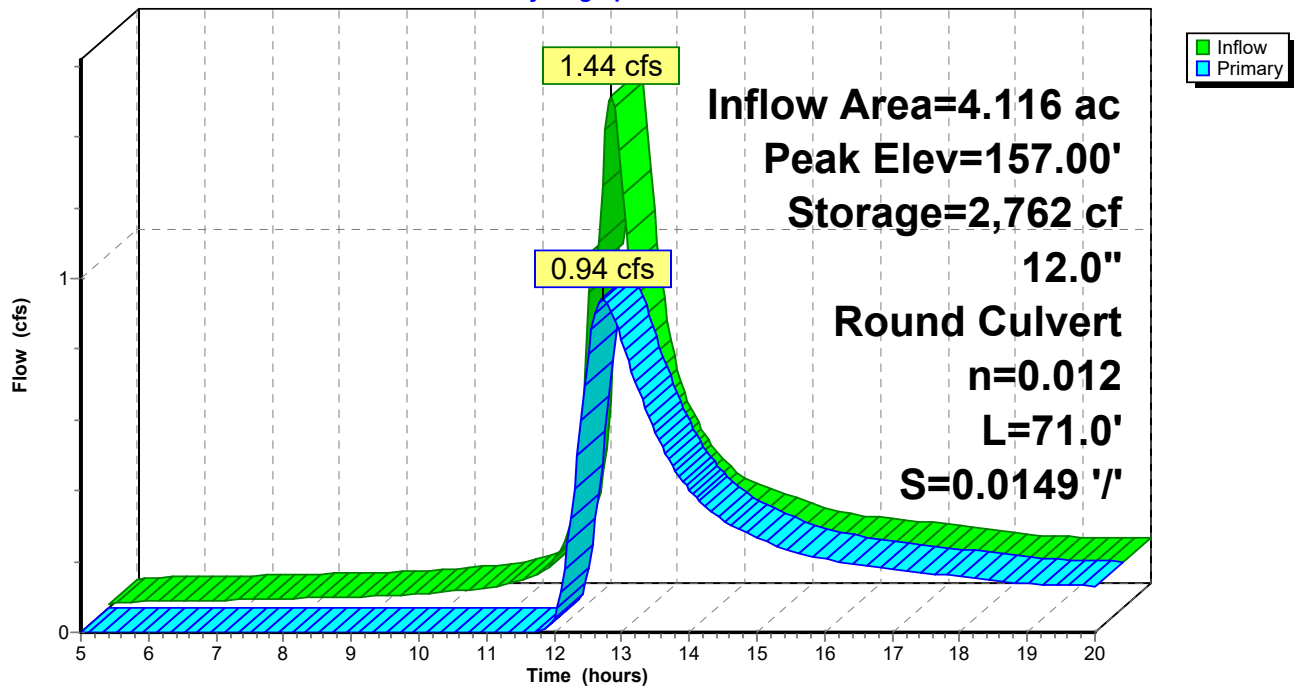
Primary OutFlow Max=0.94 cfs @ 12.72 hrs HW=157.00' (Free Discharge)

↑1=Culvert (Inlet Controls 0.94 cfs @ 2.40 fps)



Pond 37P: Basin 2

Hydrograph



Summary for Pond 38P: Sediment Forebay 1

[82] Warning: Early inflow requires earlier time span

[79] Warning: Submerged Pond 16P Primary device # 1 OUTLET by 0.30'

[79] Warning: Submerged Pond 37P Primary device # 1 OUTLET by 0.16'

[79] Warning: Submerged Pond 54P Primary device # 1 OUTLET by 0.20'

Inflow Area = 6.569 ac, 22.10% Impervious, Inflow Depth > 1.12" for 10-Year event
 Inflow = 4.56 cfs @ 12.15 hrs, Volume= 0.611 af
 Outflow = 4.53 cfs @ 12.16 hrs, Volume= 0.590 af, Atten= 0%, Lag= 0.6 min
 Primary = 4.53 cfs @ 12.16 hrs, Volume= 0.590 af
 Routed to Pond 29P : Basin 1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 155.60' @ 12.16 hrs Surf.Area= 831 sf Storage= 1,136 cf

Plug-Flow detention time= 29.4 min calculated for 0.590 af (96% of inflow)
 Center-of-Mass det. time= 15.6 min (810.6 - 795.0)

Volume	Invert	Avail.Storage	Storage Description
#1	153.30'	1,491 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

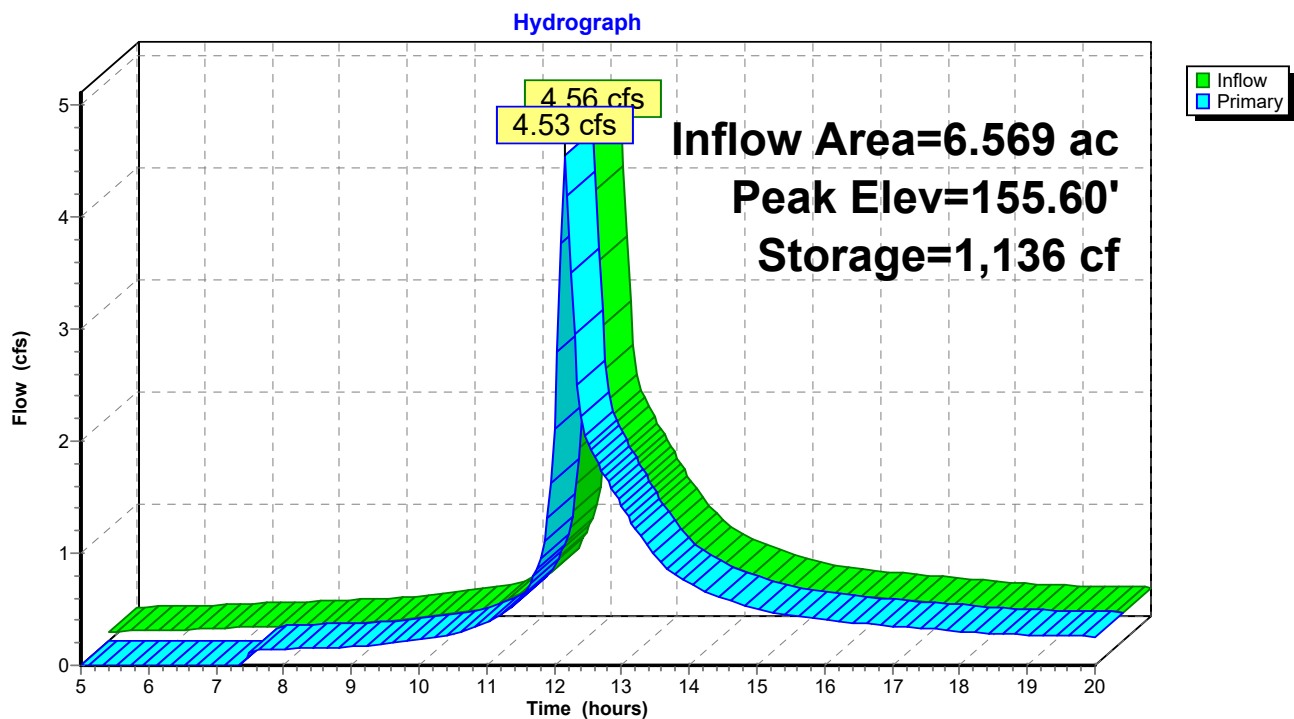
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
153.30	205	0	0
154.00	353	195	195
155.30	729	703	899
156.00	964	593	1,491

Device	Routing	Invert	Outlet Devices
#1	Primary	155.30'	10.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=4.45 cfs @ 12.16 hrs HW=155.60' (Free Discharge)
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 4.45 cfs @ 1.48 fps)

Pond 38P: Sediment Forebay 1

Broad-Crested Rectangular Weir

Pond 38P: Sediment Forebay 1

Summary for Pond 42P: DMH-1

[82] Warning: Early inflow requires earlier time span

[57] Hint: Peaked at 158.26' (Flood elevation advised)

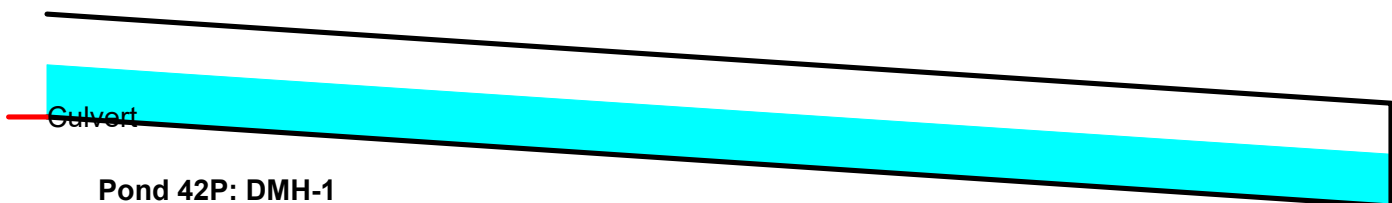
[79] Warning: Submerged Pond 10P Primary device # 1 OUTLET by 0.66'

Inflow Area = 1.711 ac, 46.07% Impervious, Inflow Depth > 1.81" for 10-Year event
 Inflow = 2.67 cfs @ 12.15 hrs, Volume= 0.259 af
 Outflow = 2.67 cfs @ 12.15 hrs, Volume= 0.259 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.67 cfs @ 12.15 hrs, Volume= 0.259 af
 Routed to Pond 15P : CB-6

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

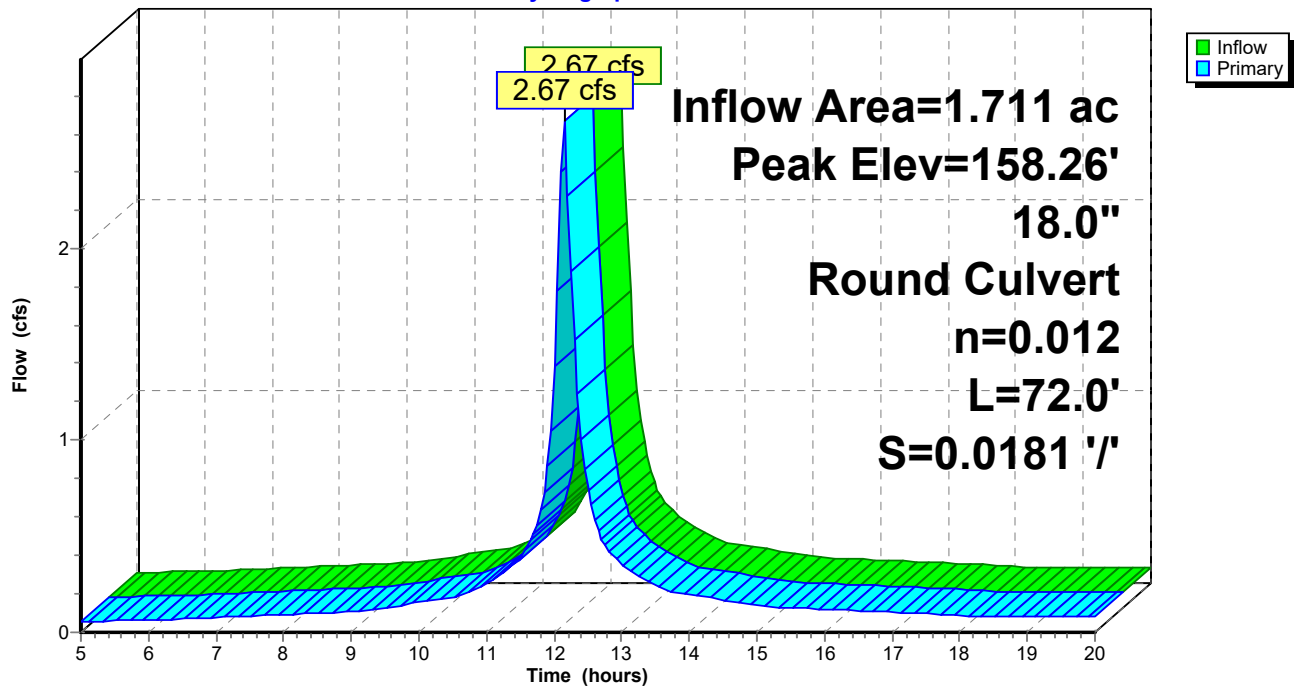
Peak Elev= 158.26' @ 12.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	157.50'	18.0" Round Culvert L= 72.0' Ke= 0.500 Inlet / Outlet Invert= 157.50' / 156.20' S= 0.0181 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=2.64 cfs @ 12.15 hrs HW=158.26' (Free Discharge)↑**1=Culvert** (Inlet Controls 2.64 cfs @ 2.96 fps)

Pond 42P: DMH-1

Hydrograph



Summary for Pond 51P: Perm. Pool AOT Volumes

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1	150.25'	34,065 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

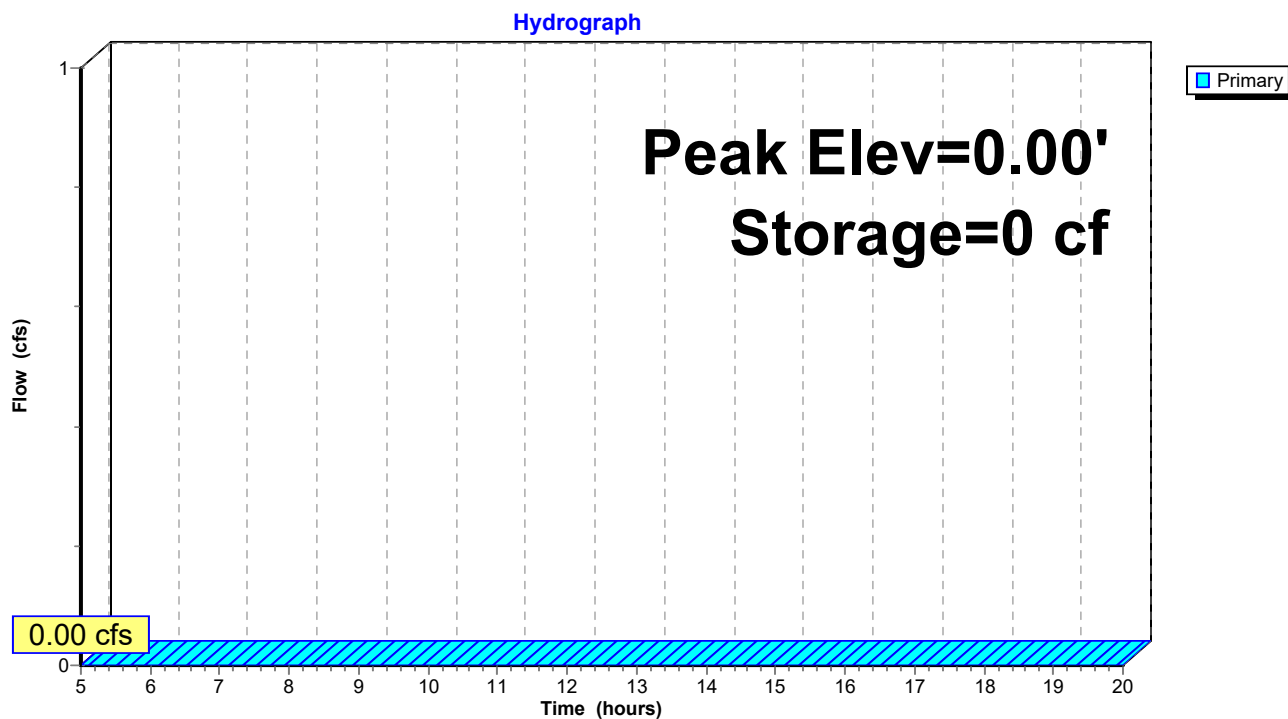
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
150.25	6,056	0	0
152.00	6,205	10,728	10,728
154.00	8,285	14,490	25,218
155.00	9,409	8,847	34,065

Device	Routing	Invert	Outlet Devices
#1	Primary	155.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.00 1.35 1.35 2.50 Width (feet) 0.00 1.75 10.00 10.00

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
1=Custom Weir/Orifice (Controls 0.00 cfs)

Custom Weir/Orifice

Pond 51P: Perm. Pool AOT Volumes

Pond 51P: Perm. Pool AOT Volumes

Summary for Pond 52P: CB-7

[82] Warning: Early inflow requires earlier time span

[57] Hint: Peaked at 157.14' (Flood elevation advised)

Inflow Area = 0.051 ac, 70.07% Impervious, Inflow Depth > 2.86" for 10-Year event
 Inflow = 0.15 cfs @ 12.13 hrs, Volume= 0.012 af
 Outflow = 0.15 cfs @ 12.13 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.15 cfs @ 12.13 hrs, Volume= 0.012 af
 Routed to Pond 37P : Basin 2

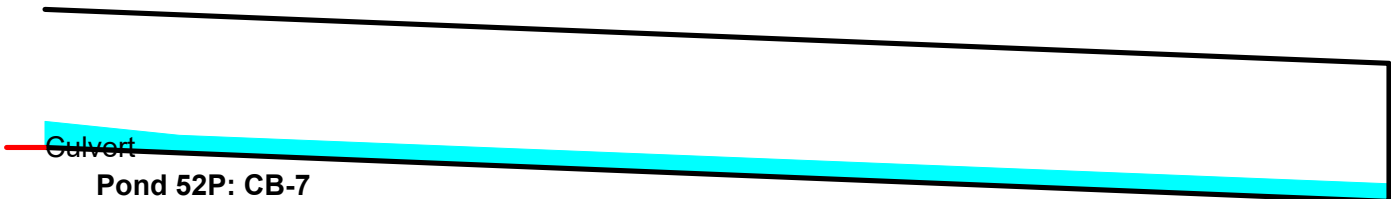
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 157.14' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	156.95'	12.0" Round Culvert L= 16.5' Ke= 0.500 Inlet / Outlet Invert= 156.95' / 156.56' S= 0.0236 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

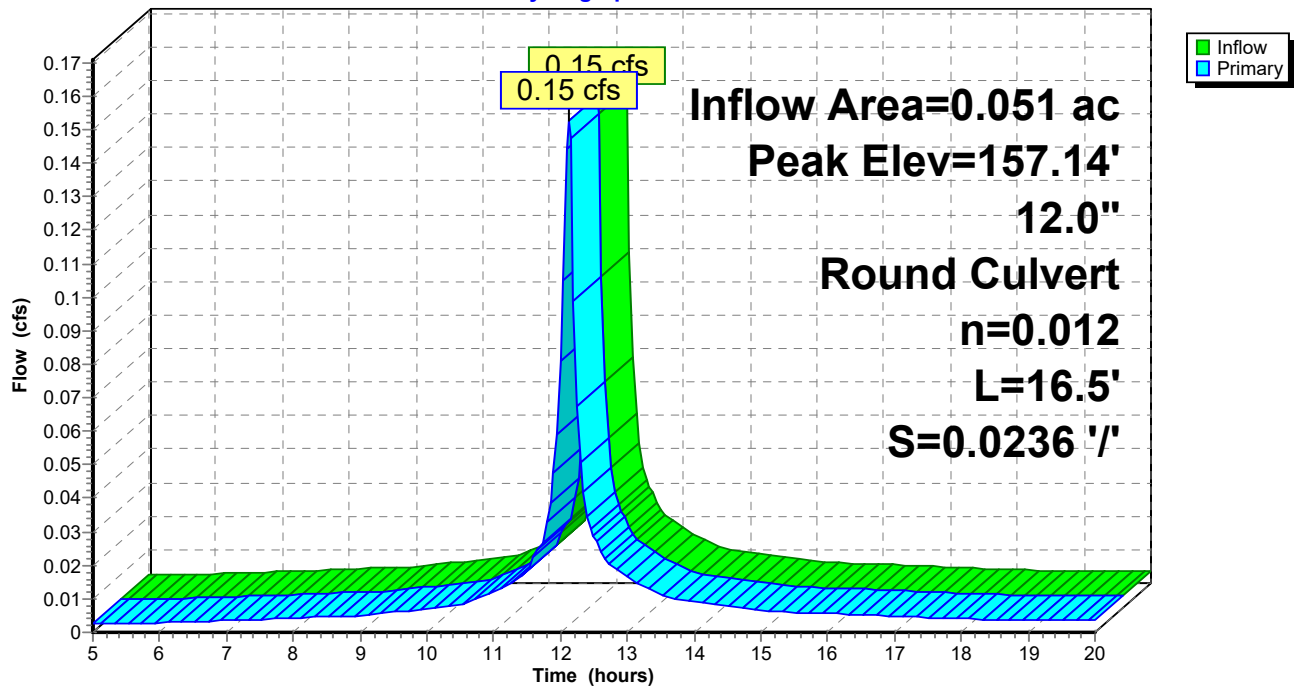
Primary OutFlow Max=0.15 cfs @ 12.13 hrs HW=157.13' (Free Discharge)↑**1=Culvert** (Inlet Controls 0.15 cfs @ 1.46 fps)

Culvert

Pond 52P: CB-7

Pond 52P: CB-7

Hydrograph



Summary for Pond 53P: CB-8

[82] Warning: Early inflow requires earlier time span

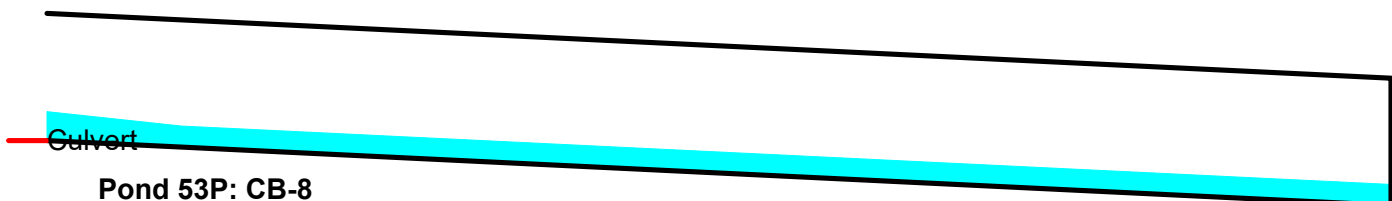
[57] Hint: Peaked at 157.13' (Flood elevation advised)

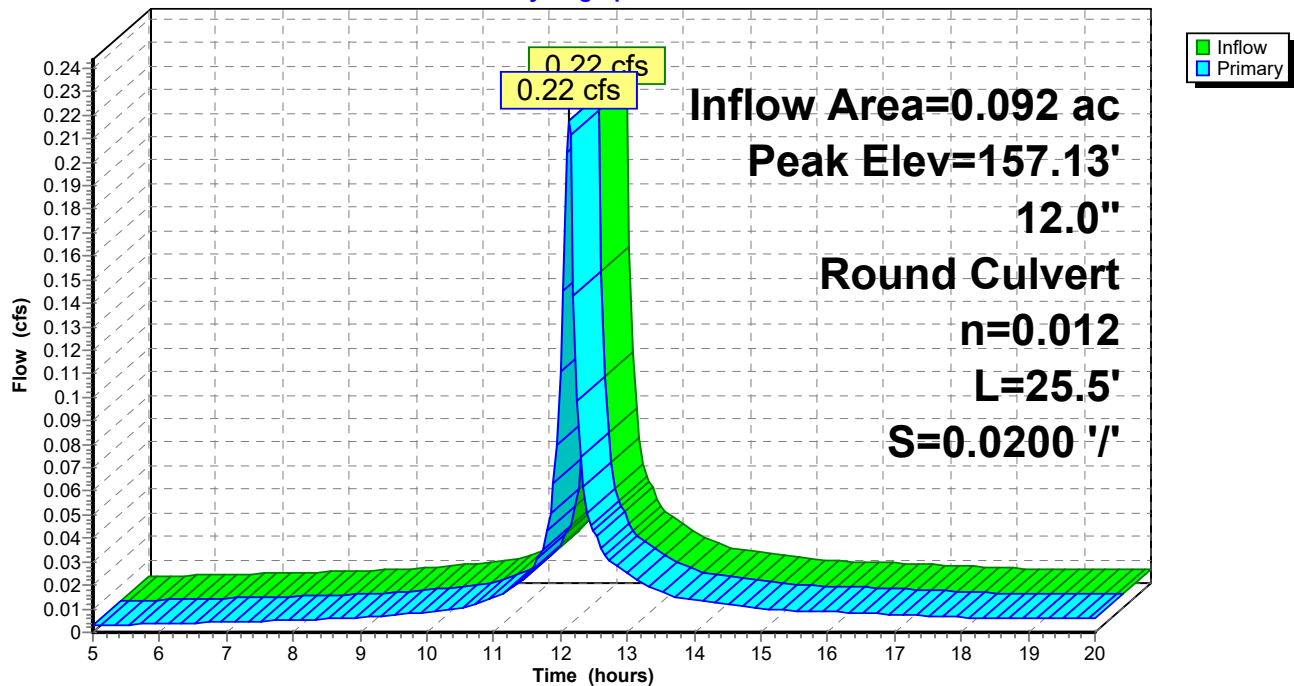
Inflow Area = 0.092 ac, 47.33% Impervious, Inflow Depth > 2.22" for 10-Year event
Inflow = 0.22 cfs @ 12.13 hrs, Volume= 0.017 af
Outflow = 0.22 cfs @ 12.13 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min
Primary = 0.22 cfs @ 12.13 hrs, Volume= 0.017 af
Routed to Pond 54P : DMH-2

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 157.13' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	156.90'	12.0" Round Culvert L= 25.5' Ke= 0.500 Inlet / Outlet Invert= 156.90' / 156.39' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.21 cfs @ 12.13 hrs HW=157.12' (Free Discharge)↑**1=Culvert** (Inlet Controls 0.21 cfs @ 1.60 fps)

Pond 53P: CB-8**Hydrograph**

Summary for Pond 54P: DMH-2

[82] Warning: Early inflow requires earlier time span

[57] Hint: Peaked at 156.56' (Flood elevation advised)

[62] Hint: Exceeded Reach 48R OUTLET depth by 0.13' @ 12.15 hrs

[79] Warning: Submerged Pond 53P Primary device # 1 OUTLET by 0.17'

Inflow Area = 0.428 ac, 48.46% Impervious, Inflow Depth > 2.23" for 10-Year event
 Inflow = 0.88 cfs @ 12.19 hrs, Volume= 0.080 af
 Outflow = 0.88 cfs @ 12.19 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.88 cfs @ 12.19 hrs, Volume= 0.080 af
 Routed to Pond 38P : Sediment Forebay 1

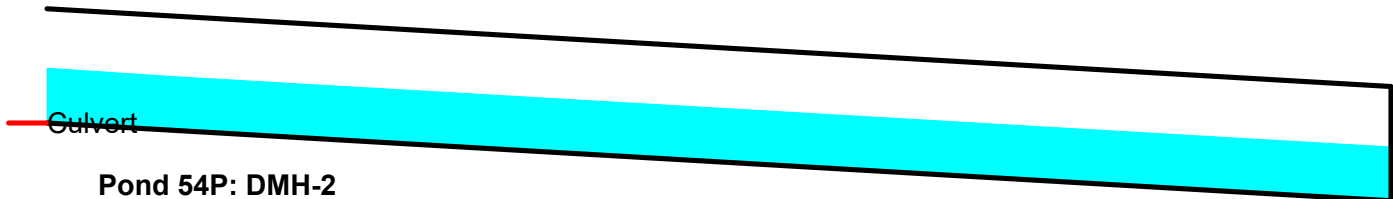
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

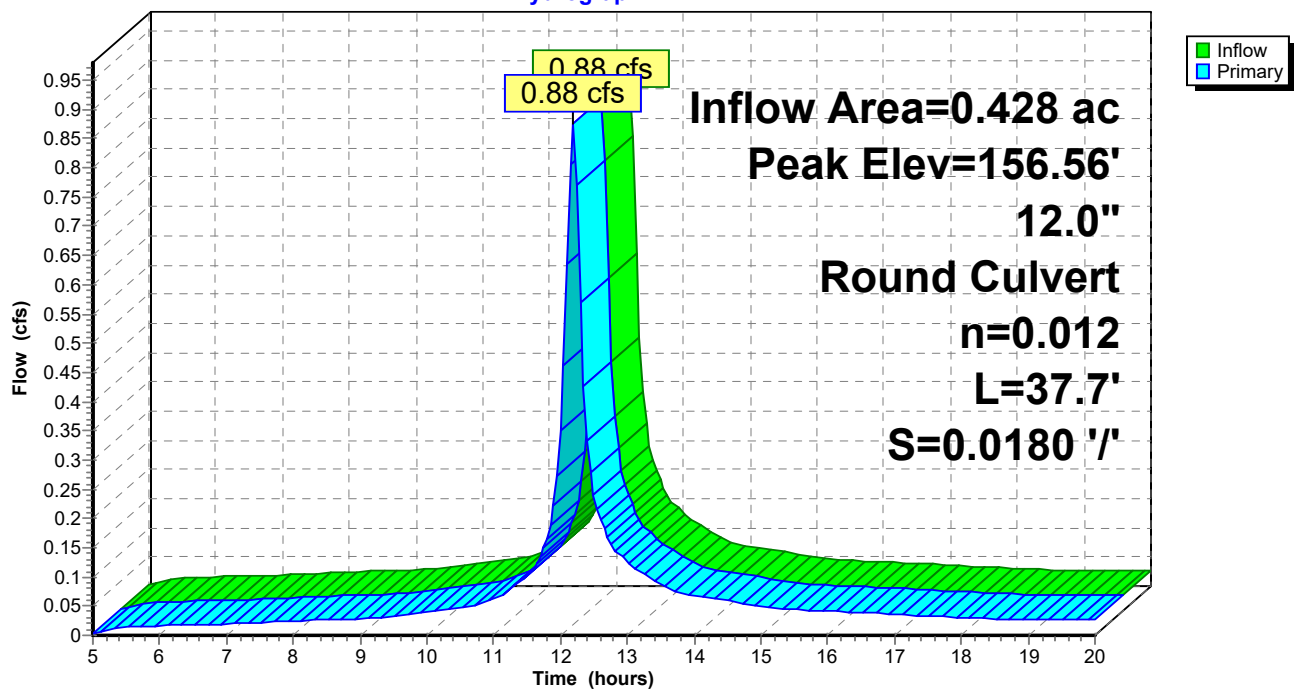
Peak Elev= 156.56' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	156.08'	12.0" Round Culvert L= 37.7' Ke= 0.500 Inlet / Outlet Invert= 156.08' / 155.40' S= 0.0180 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.87 cfs @ 12.19 hrs HW=156.56' (Free Discharge)↑**1=Culvert** (Inlet Controls 0.87 cfs @ 2.35 fps)

Culvert

Pond 54P: DMH-2

Pond 54P: DMH-2**Hydrograph**

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Events for Subcatchment 1S: To M128 L89

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	0.32	0.054	0.45

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Events for Subcatchment 3S: Slope to 138/78

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	0.00	0.000	0.05

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Events for Subcatchment 5S: Slope to 138/79

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	0.00	0.001	0.02

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Events for Subcatchment 11S: CB-4

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	0.82	0.065	3.11

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Events for Subcatchment 12S: CB-3

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	0.80	0.063	2.55

Events for Subcatchment 13S: CB-2

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	0.53	0.052	1.38

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Events for Subcatchment 14S: CB-1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	0.72	0.078	1.33

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Events for Subcatchment 19S: Entry Left Side

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	0.50	0.040	3.00

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Events for Subcatchment 20S: Entry Right side

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	0.80	0.063	2.26

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Events for Subcatchment 21S: CB-6

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	0.28	0.022	2.87

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Events for Subcatchment 22S: CB-5

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	0.65	0.052	2.82

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Events for Subcatchment 24S: Direct to Basin 2

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	1.32	0.180	0.67

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Events for Subcatchment 33S: Direct to Basin 1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	1.15	0.178	0.67

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Events for Subcatchment 36S: Direct to Wetland

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	1.26	0.264	0.68

Events for Subcatchment 43S: Slope Face

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	0.00	0.002	0.04

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Events for Subcatchment 55S: CB-7

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	0.15	0.012	2.86

Events for Subcatchment 56S: CB-8

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
10-Year	4.42	0.22	0.017	2.22

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Events for Reach 2R: M128 L89

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	0.32	0.32	0.00	0

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Events for Reach 4R: MAP 138 LOT 78

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	0.00	0.00	0.00	0

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Events for Reach 6R: MAP 138 LOT 79

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	0.00	0.00	0.00	0

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Events for Reach 8R: Wetland

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	1.98	1.98	0.00	0

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Events for Reach 44R: Pipe to Swale

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	0.00	0.00	170.52	0

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Events for Reach 45R: Basin 2 Swale

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	1.32	1.31	160.22	145

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Events for Reach 47R: Right side Swale

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	0.80	0.74	157.54	129

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Events for Reach 48R: Right side culvert

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	0.74	0.74	157.46	9

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Events for Pond 7P: CB-2

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
10-Year	1.23	1.23	165.10	0.000

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Events for Pond 8P: CB-1

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
10-Year	0.72	0.72	166.07	0.000

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Events for Pond 9P: CB-3

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
10-Year	0.80	0.80	161.07	0.000

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Events for Pond 10P: CB-4

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
10-Year	2.67	2.67	159.68	0.000

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Events for Pond 15P: CB-6

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
10-Year	2.94	2.94	156.85	0.000

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Events for Pond 16P: CB-5

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
10-Year	3.59	3.59	156.49	0.000

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Events for Pond 29P: Basin 1

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	4.86	1.04	155.91	16,502

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Events for Pond 37P: Basin 2

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	1.44	0.94	157.00	2,762

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Events for Pond 38P: Sediment Forebay 1

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	4.56	4.53	155.60	1,136

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Multi-Event Tables

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Events for Pond 42P: DMH-1

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
10-Year	2.67	2.67	158.26	0.000

Events for Pond 51P: Perm. Pool AOT Volumes

Event	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
10-Year	0.00	0.00	0

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Multi-Event Tables

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Events for Pond 52P: CB-7

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
10-Year	0.15	0.15	157.14	0.000

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Events for Pond 53P: CB-8

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
10-Year	0.22	0.22	157.13	0.000

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Events for Pond 54P: DMH-2

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
10-Year	0.88	0.88	156.56	0.000



Site Specific Soils Mapping Report for the Proposed Taybre Drive Subdivision
9 Alvirne Drive, Hudson, NH
Tax parcels 138-82 and 138-88
October 2, 2024

The purpose of this Site Specific Soils Map and report is to support engineering and permitting for a proposed residential 9 lot subdivision off 9 Alvirne Drive in Hudson, NH (tax parcels 138-82, and 138-88). Field work was conducted September 16-17 according to the standards published in *Site-Specific Soil Mapping Standards for New Hampshire and Vermont*, Society of Soil Scientists of Northern New England Special Publication No.3, version 7.0.

Site Description: The site is a 20-acre parcel comprised mostly of woodlands. A power transmission line crosses the property at the westerly end. Hills Garrison Elementary School with associated recreational fields flank the easterly and southeasterly sidelines. There is no development on the site. Google Earth historic photos indicate the site was heavily logged sometime between 2010 and 2011. The Merrimack River is approximately 2,500' to the west.



Preliminary Measures: A Natural Resource Conservation Service (NRCS) Web Soil Survey report was generated for the site (see map below).



Pi – Pipestone loamy sand
(somewhat poorly drained)

Hs – Hinckley loamy sand
(excessively drained)

So – Scarboro mucky fine
sandy loam (very poorly
drained)

Wd – Windsor loamy sand
(excessively drained)

NRCS Web Soil Survey Mapping

The easterly highlands stand out. The majority of the lot is relatively flat. Some slight mounds are visible in the central area which turned out to be moderately well drained soils.

Field Procedures: The site was mapped in September 2024. Seven test pits were dug on September 16 with a tracked excavator. Wetlands were flagged September 17 and the mapping area was traversed with many soil auger samples observed and noted. Test pits were described using the *Field Book for Describing and Sampling Soils* Version 3.0 published by the National Soil Survey Center of the Natural Resource Conservation Service (NRCS). The test pit logs are attached to this report.

Soil Map Unit Purity: Soil map units were assigned using the NH State-Wide Numerical Soil Legend (Issue #10 January 2011). It is important to note that although soil series are used to name soil map units, soil series and map units are not the same thing. A soil map unit is a collection of areas on the landscape having similar soil properties to the soil series used to name the map unit. There is usually more than one soil series within the particular map unit name labeled. The term ‘pedon’ is sporadically used in this report. Think of a pedon as a plug of soil at least 3 feet square at the surface by 40” - 60” deep. Map units will contain at least 75% of the pedons that fit the range of characteristics of the series named or are in a similar taxa. Of the remaining percentage of pedons, no one similar minor component is greater in area than the named series. There can be a few to several dissimilar minor components (soils that do not share limits of some important diagnostic of the named soil unit) but combined they cannot exceed 25% of the area of the map unit. No single dissimilar minor component can make up more than 10% of the map unit area. Limiting dissimilar minor components (soils that differ appreciably in soil properties such that they limit or restrict use and management) cannot exceed 15% of the map unit area.

Hydrologic Soil Groups

Hydrologic Soil Groups (HSG) were assigned using *Ksat Values for New Hampshire Soils*, Society of Soil Scientists of Northern New England Special Publication No. 5, September 2009. A summary of the soil map units found and corresponding HSGs is listed in the following table.

Soil Map Unit Summary

Soil Map Unit	Map Unit Name	Pub. #5 HSG
26	Windsor	A
34	Wareham	C
118	Sudbury	B
313	Deerfield	B
915	Deerfield variant	B

Slope Phases: Slope phases are designated in the following table.

Alpha Slope Symbol	Range
A	0 – 3%
B	3 – 8%
C	8 – 15%
D	15 – 25%
E	25 – 50%
F	50% +

Map Unit Descriptions: Map Unit Descriptions by order of State Numerical Soil Legend Number follow. The term 'solum' is used in different descriptions. A solum (plural, sola) is the portion of the soil profile that is still forming. It includes the A, B, and E horizons. Generally, it is the upper and most weathered part of the soil profile that reflects active pedogenic processes. The C horizon is not part of the solum.

Windsor (26): The Windsor map unit is located on A, B, and C slopes at the higher elevations on the easterly side of the property. This is an excessively drained soil that developed in stream terrace deposits in sandy glaciofluvial parent material. The excessively drained Hinckley soil (test pit 1) is a similar minor component occupying approximately 15 % of the map unit. The percentage of coarse fragments (gravel) is less in the Windsor soil, generally occupying 0 to 10% in the solum and up to 15% in the substratum. The Web Soil Survey showed this area as a Hinckley map unit. Because there were inconsistent pedons reflecting the stratified gravelly sand deposits typical of the Hinckley soil, the Windsor soil was chosen for the map unit. Test pits 2 and 4 document typical soil pedons in the map unit. The hydrologic soil group is A.

Wareham (34): The Wareham map unit consists of poorly drained hydric soils on A slopes. A small pocket is located near the center west portion of the lot and was delineated as a wetland with glo-blue flags labeled WF 1 through WF 3. The remainder of the map unit occupies the flat area on the westerly third of the property. This area was delineated as a wetland with glo-blue flags labeled WF 4 through WF 15. The Web soil Survey shows this area occupied by the Pipestone and Scarboro map units. The soils are not very poorly drained as is typical of the Scarboro. The poorly drained hydric soils are sandy and lack the spodic subsoil diagnostic horizon typical of the somewhat poorly drained Pipestone series. The hydrologic soil group of the Wareham series is C.

Sudbury (118): The Sudbury map unit consists of moderately well drained soils on A and B slopes located at the easterly third of the property. The moderately well drained Deerfield soil map unit is adjacent. Distinctive of the Sudbury soil is the presence of a cambic subsoil diagnostic horizon. Test pits 3 and 5 are reflective of the pedons in the map unit. Though in the same drainage class, the Deerfield soil does not have a cambic horizon. The Deerfield is a similar minor component occupying approximately 5% of the map unit. The hydrologic soil group of the Sudbury series is B. The Web Soil Survey shows this area as part of a Pipestone soil map unit. The pedons present are moderately well drained and do not display the diagnostic subsoil horizons typical of the somewhat poorly drained Pipestone soil (namely albic and spodic horizons).

Deerfield (313): The moderately well drained Deerfield map unit occupies the center portion of the lot on A and B slopes. It is a sandy soil that lacks diagnostic subsoil horizons (albic, spodic, and cambic horizons are lacking). Test pits 6 and 8 are reflective of the pedons in this map unit. Fine gravel generally averages less than 15% in the solum and less than 20% in the substratum. Medium sand with little gravel is dominant in the C horizon. The Web Soil Survey shows this area as a Pipestone map unit. As noted earlier, the Pipestone is a somewhat poorly drained spodosol. There were neither albic nor spodic diagnostic subsurface horizons found in the pedons. The cambic diagnostic subsoil horizon is also lacking due to the sandy textures. The hydrologic soil group of the Deerfield soil series is B.

Deerfield variant - somewhat poorly drained (915): The Deerfield variant is a somewhat poorly drained version of the moderately well drained Deerfield soil. This map unit is located on A slopes on the westerly half of the property, sandwiched between the poorly drained Wareham and moderately well drained Deerfield map units. Test pit 7 is a typical pedon of this map unit. This differs from the moderately well drained version of Deerfield by having common distinct or prominent redoximorphic features at a depth less than 15 inches below the soil surface. This map unit differs from poorly drained soils in that the soils are not hydric. The NRCS Web Soil Survey shows this area within the Pipestone

map unit. The Pipestone is also somewhat poorly drained, but it is a spodosol. The pedons present in this map unit do not display albic, spodic, or cambic diagnostic subsurface horizons. The pedons also lack stratified fine gravels over 15% by volume. The hydrologic soil group of the Deerfield variant is B.

Test pit logs and photos are attached. Please do not hesitate to contact me at (603) 409-1398 (cell) or lpowell@powellmapping.com (email) if you have any questions.

Sincerely,



Luke Powell

NH Certified Soil Scientist No. 81

Nh Certified Wetland Scientist No. 50



Test Pit Logs

The soil was very dry at each pit. Hand samples were sprayed with a water bottle to get moist color samples at each test pit for each horizon.

Test Pit 1 Soil Series: Hinckley (12) Drainage Class: excessively drained HSG: A

Horizon	Depth (in)	Description
Oi	0 – 1	Fibric
Ap	1 – 2	10YR 3/1 fine sandy loam; weak fine granular structure; friable; many medium roots; clear smooth boundary
Bw1	2 – 5	2.5Y 4/2 loamy sand; massive; friable; 2% fine gravel; many medium roots; clear smooth boundary
Bw2	5 – 19	10YR 4/4 loamy coarse sand; massive; friable; many medium roots; 3% cobbles; 2% medium gravel; clear smooth boundary
C	19 -	2.5Y 5/4 very gravelly coarse sand; single grain; loose; few fine roots; 5% cobbles

Depth of hole: 57" - no ledge; ESHWT not observed

This is a similar minor component within the Windsor soil map unit.



9-16-2024: Test Pit 1 (stratified coarse sand with gravel)



9-16-2024: Test Pit 1 spoils

Test Pit 2 Soil Series: Windsor (26) Drainage Class: excessively drained HSG: A

Horizon	Depth (in)	Description
Oi	0 – 1	Fibric
A	1 – 4	10YR 3/2 loamy sand; weak fine granular structure; friable; many fine roots; clear smooth boundary
Bw1	4 – 23	10YR 4/4 loamy sand; massive; friable; many medium roots; 5% fine gravel; clear smooth boundary
Bw2	23 – 45	2.5Y 5/4 coarse gravelly sand; single grain; loose; few medium roots; 15% fine gravel; clear smooth boundary
C	45 -	2.5Y 6/4 fine sand; single grain; loose; few medium roots; no coarse fragments

Depth of hole: 55" - no ledge, ESHWT not observed



9-16-2024: Test Pit 2



9-16-2024: Test Pit 2 spoil pile, note loamy sand with few coarse fragments found at bottom of pit in C horizon (top of pile).

Test Pit 3 Soil Series: Sudbury (118) Drainage Class: moderately well drained HSG: B

Horizon	Depth (in)	Description
Oe	0 – 1	Hemic
A	1 – 6	10YR 2/1 fine sandy loam; weak fine granular structure; friable; many medium roots; clear smooth boundary
E	6 – 8	10YR 5/1 and 10YR 3/1 fine sandy loam; moderate medium subangular blocky structure; friable; many fine roots; clear smooth boundary
Bs	8 – 12	7.5YR 3/2 fine sandy loam; moderate medium subangular blocky structure; friable; many fine roots; clear smooth boundary
Bw1	12 – 17	10YR 3/3 loamy sand; moderate medium subangular blocky structure; friable; many fine roots; clear smooth boundary
Bw2	17 – 24	2.5Y 5/6 medium sand; massive; friable; few fine roots; few medium distinct 10YR 6/8 redox concentrations at 23"; clear smooth boundary
C1	24 – 30	2.5Y 5/4 loamy sand; moderate medium subangular blocky structure; friable; few fine roots; few fine prominent 10YR 6/8 redox concentrations; clear smooth boundary
C2	30 – 48	2.5Y 6/3 fine sand; massive; friable; many fine roots; few fine prominent 10YR 6/8 redox concentrations; clear smooth boundary
2C	48 -	10YR 5/6 gravelly coarse sand; single grain; loose; no roots

Depth of hole: 50" – no ledge, ESHWT observed at 23"



9-16-2024: Test Pit 3



9-16-2024: Test Pit 3 spoil pile

Test Pit 4 Soil Series: Windsor (26) Drainage Class: excessively drained HSG: A

Horizon	Depth (in)	Description
Oe	0 – 1	hemic
A	1 – 6	10YR 3/2 fine sandy loam; weak fine granular structure; friable; many medium roots; clear wavy boundary
Bw1	6 – 25	10YR 4/6 medium sand; single grain; loose; common fine roots; clear smooth boundary
C1	25 – 44	2.5Y 5/6 gravelly medium sand; single grain; loose; 15% fine gravel; clear smooth boundary
C2	44 -	2.5Y 5/4 medium sand; single grain; loose; no roots; no gravel; few medium prominent 10YR 6/8 redox concentrations at 48"

Depth of hole: 57" – no ledge, ESHWT observed at 48"



9-16-2024: Test Pit 4



9-16-2024: Test Pit 4 spoil pile, note nice medium sand

Test Pit 5 Soil Series: Sudbury (118) Drainage Class: moderately well drained HSG: B

Horizon	Depth (in)	Description
Oe	0 – 2	10YR 3/2 hemic material
A	2 – 8	10YR 2/1 fine sandy loam; moderate granular structure; friable; many fine roots; clear smooth boundary
Bw1	8 – 12	10YR 4/4 loamy sand; moderate medium subangular blocky structure; friable; few fine roots; clear smooth boundary
Bw2	12 – 17	7.5YR 3/2 loamy sand; moderate medium subangular blocky structure; friable; few fine roots; clear smooth boundary
C	17 – 33	2.5Y 4/4 fine sand; single grain; loose; few medium distinct 10YR 5/6 redox concentrations at 18"; clear smooth boundary
	33 -	2.5Y 6/3 medium sand; single grain; loose; few fine roots (standing water at 50")

Depth of hole: 55" – no ledge, ESHWT observed at 18"



9-16-2024: Test Pit 5



9-16-2024: Test Pit 5 spoils

Test Pit 6 Soil Series: Deerfield (313) Drainage Class: moderately well drained HSG: B

Horizon	Depth (in)	Description
Oe	0 – 2	10YR 3/2 hemic materials
Ap1	2 – 5	10YR 3/2 (salt & pepper appearance) fine sandy loam; weak fine granular structure; friable; many medium roots; clear smooth boundary
Ap2	5 – 9	10YR 3/2 loamy sand; weak fine granular structure; friable; many fine roots; clear smooth boundary
Bw	9 – 33	10YR 3/6 loamy sand; massive; friable; many fine roots; common medium distinct 7.5YR 5/8 redox concentrations at 17"; clear smooth boundary
C	33 -	2.5Y 5/6 medium sand; single grain; loose; few fine roots

Depth of hole: 51" – no ledge, ESHWT observed at 17"
lacks cambic subsoil diagnostic horizon



9-16-2024: Test Pit 6



9-16-2024: Test Pit 6 spoil pile

Test Pit 7 Soil Series: Deerfield SWPD variant (915) Drainage Class: somewhat poorly drained
HSG:

Horizon	Depth (in)	Description
Oe	0 – 2	10YR 3/2 hemic materials
A	2 – 4	10YR 3/2 fine sandy loam; weak fine granular structure; friable; many fine roots; clear smooth boundary
Bw	4 – 16	10YR 4/6 loamy sand; moderate medium subangular blocky structure; friable; common medium roots; common medium distinct 7.5YR 8/8 redox concentrations at 9"; clear smooth boundary
BC	16 – 35	10YR 4/6 medium sand; moderate medium platy structure; friable; no roots; many coarse distinct 7.5YR 4/8 redox concentrations; clear smooth boundary
C2	35 -	2.5Y 6/4 medium sand; single grain; loose; no roots

Depth of hole: 57" - no ledge, ESHWT observed at 9"
lacks cambic subsoil diagnostic horizon



9-16-2024: Test Pit 7



9-16-2024: Test Pit 7 spoil pile

Test Pit 8 (hand dug) Soil Series: Deerfield (313) Drainage Class: moderately well drained HSG: B

Horizon	Depth (in)	Description
Oi	0 - .5	Fibric materials
A	.5 - 5	10YR 2/2 loam; weak fine granular structure; friable; many fine roots; clear smooth boundary
	5 - 7	10YR 3/2 loamy sand; moderate medium platy structure; friable; few fine roots; thin discontinuous albic horizon was present; clear smooth boundary
	7 - 20	10YR 4/4 medium sand; moderate medium platy structure; friable; few fine roots; common (10%) medium prominent 7.5YR5/8 redox concentrations at 15"; clear smooth boundary
	20 - 34	2.5Y 6/4 medium sand; moderate medium subangular blocky structure; friable; clear smooth boundary
	34 -	2.5Y 6/4 medium sand; moderate thick platy structure; friable

Depth of hole: 40" – no ledge, ESHWT observed at 15"
lacks cambic diagnostic subsoil horizon



9-16-2024: Test Pit 8

Test Pit 9 (hand dug) Soil Series: Wareham (34) Drainage Class: poorly drained HSG: C

Horizon	Depth (in)	Description
A	0 – 16	10YR 2/1 loamy sand with common medium prominent 2.5Y4/6 redox concentrations
Bw	16 -	10YR 4/4 loamy sand; moderate medium subangular blocky structure; friable; common coarse prominent 5YR 4/6 redox concentrations
		Hydric by S7 – New England Hydric Soil Indicators

Depth of hole: 20”

24009 Hudson TEST PIT 10

PRESENT: Ian Desmarais and Mario Focareto
Reviewed by Luke Powell (CSS 81)

May 6th, 2025

LOCATION: 9 Alvirne Drive, Hudson, NH

60 DEG. F; Rain

5:30 PM

Surface moist with rain

Hand dug

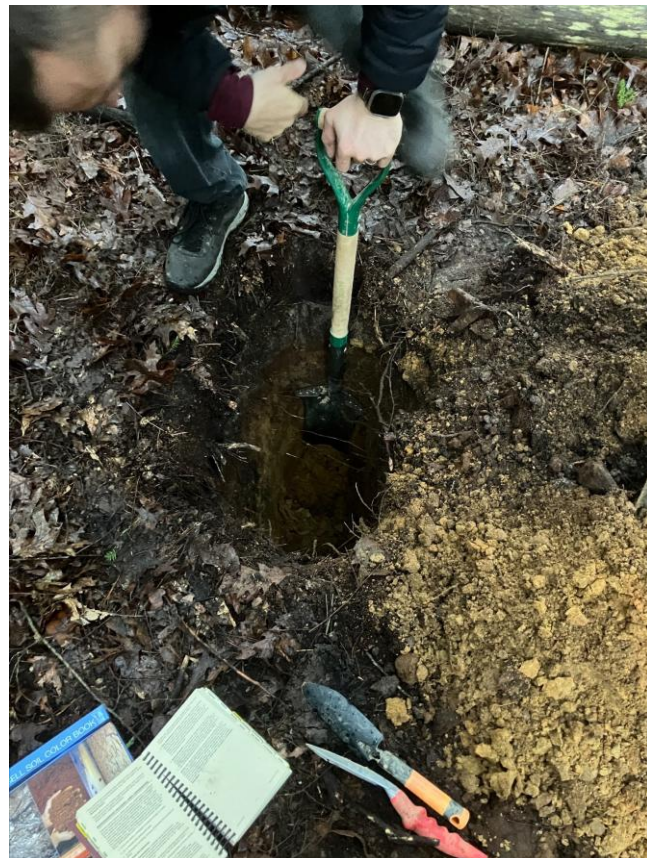
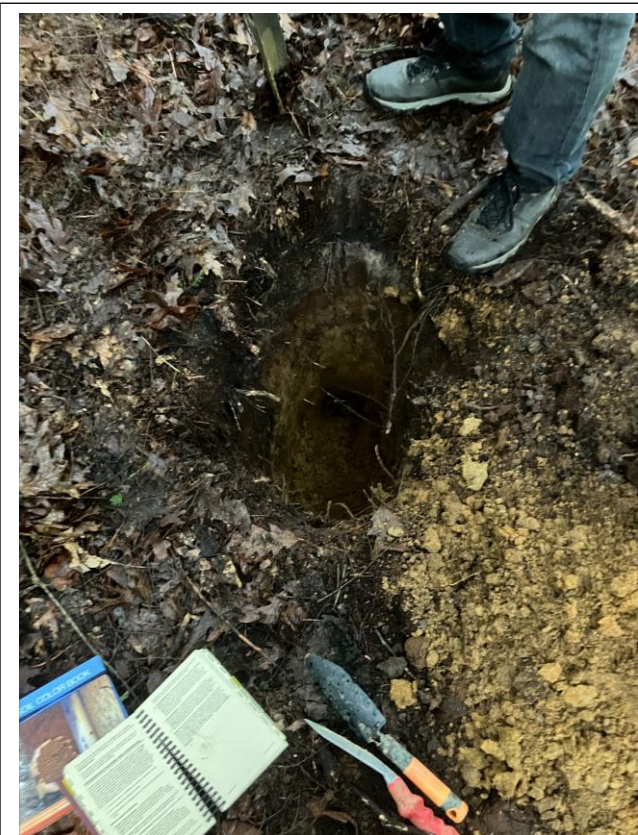
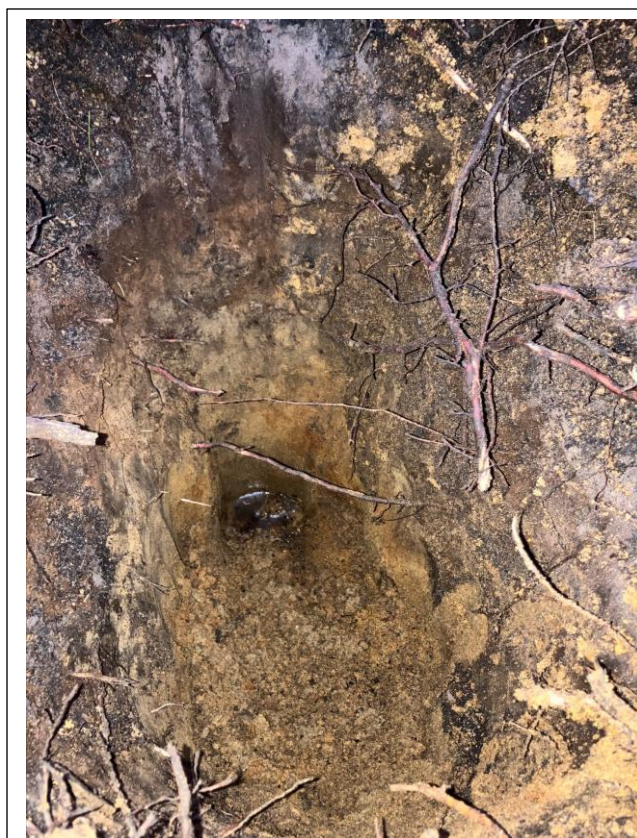
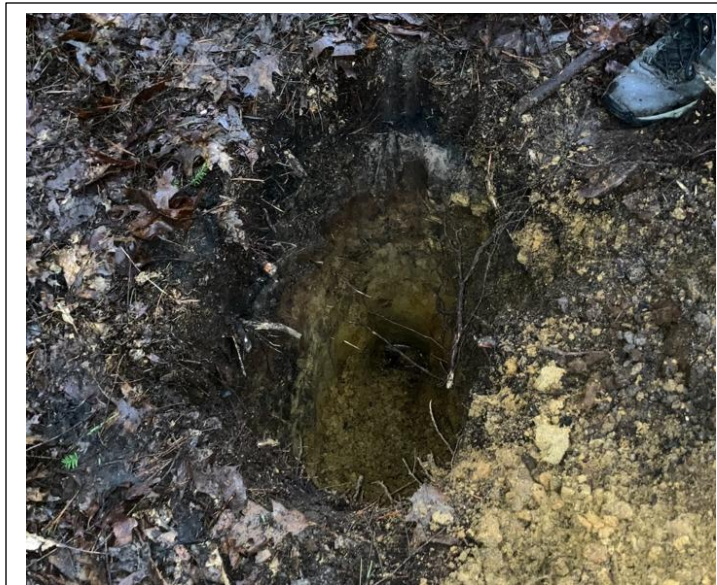
LOG BOOK NOTES: TEST PIT #10

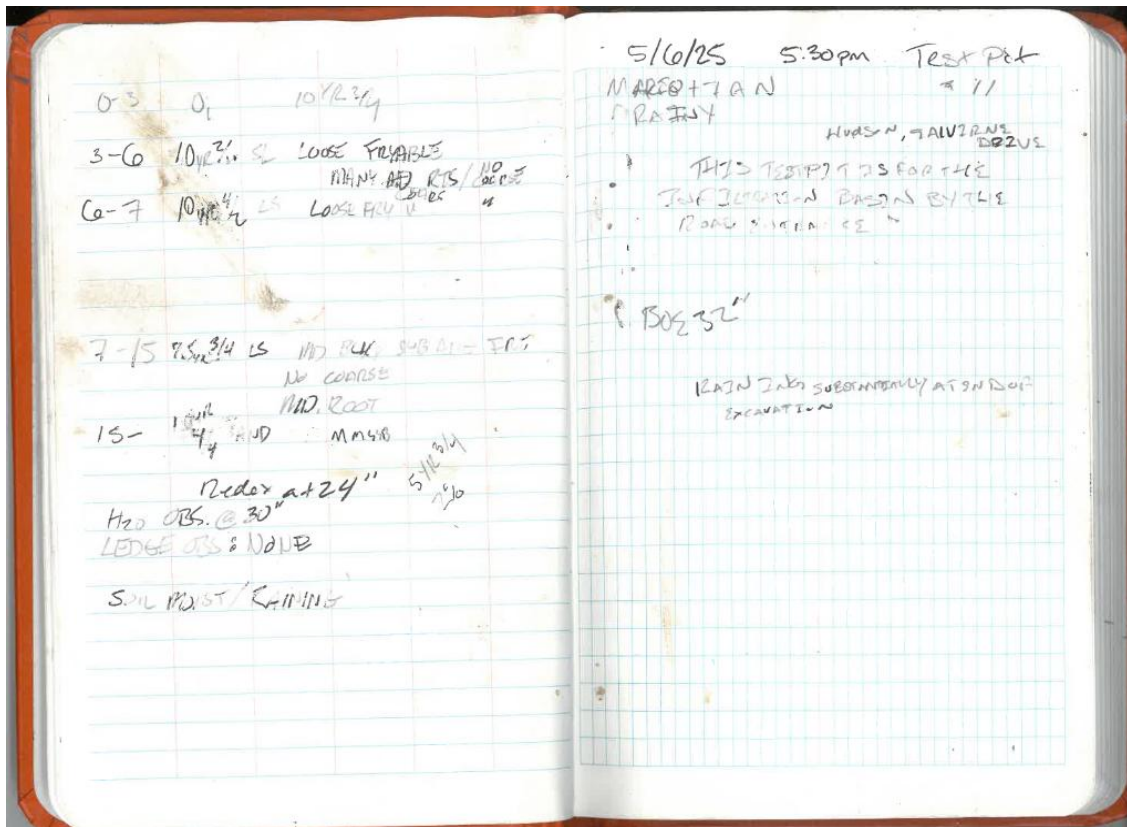
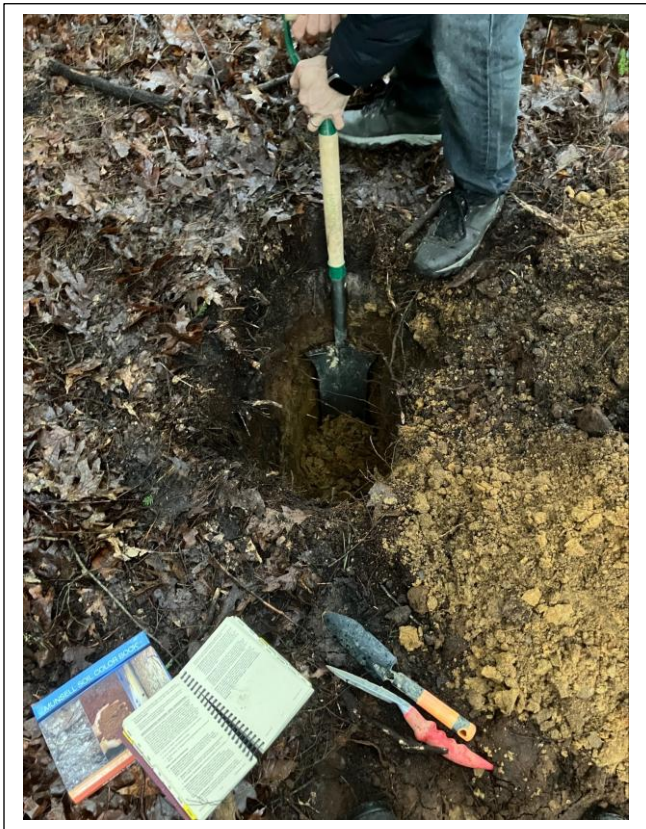
Horizon	Depth (inches)	Description
Oi	0-3	10YR 3/4 Fibric materials
A	3-6	10YR 2/1 sandy loam, weak fine granular structure, friable; many coarse roots, no coarse fragments, clear smooth boundary
E	6-7	10YR 4/2 loamy sand, weak subangular blocky structure, friable, common coarse roots, no coarse fragments, clear smooth boundary
Bw1	7-15	7.5YR 3/4 loamy sand, moderate medium subangular blocky structure, friable, no coarse fragments, no noticeable roots or very few, clear smooth boundary
Bw2	15-32	10YR 4/4 sand, single grain, loose, no coarse fragments, no noticeable roots or very few; clear smooth boundary; common (5%) medium distinct 5YR 3/4 redox concentrations observed at 24". H ₂ O seeping observed at 30", pooled at bottom of excavation.
Cd	32 -	10YR 4/4 sand, single grain, loose
Hardpan found at 32" – Bottom of excavation at 32"		
No ledge, ESHWT at 24"		

NOTE: This pedon most closely fits the range in characteristics of the Scituate soil series. This pedon is a dissimilar minor component of the Deerfield (313) map unit. It is moderately well drained and is in HSG C. The distinctive features are a loamy/loamy sand mantle over a sandy hard pan.

- Hand Dug test pit
- Ian was in pit and took notes; Mario observed, took notes during significant rain
- Raining; began to rain substantially towards the end of the test pit observation.
- Noted as TP 11 in field book, labeled TP10 on plans for clarity.

Images:







Hydrogeologic Evaluation
Proposed Tabrye Drive Development
Tax Parcels 138-82 and 138-88
Hudson, New Hampshire

Prepared for:

Hess Engineering & Construction Consultants, LLC
Ashland, NH

August 2025

Prepared by:

Truslow Resource Consulting LLC

Danna B. Truslow, NH Professional Geologist #571



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INTRODUCTION AND PURPOSE

The following report describes the groundwater characteristics of the project site at 9 Alvirne Road. Hess Engineering & Construction Consultants, LLC (Hess) contracted with Truslow Resource Consulting LLC (TruslowRC) to determine the depth and local direction of flow of groundwater and to determine the impact of fill proposed to contour the site for home development on groundwater levels on the site and surrounding areas.

The project site described in this report is located at 9 Alvirne Road in Hudson, New Hampshire and includes Lots 82 and 88, Hudson Tax Map 138. The total acreage is 14.92 acres. The site owner, M. R. Lacasse Homes, LLC, plans to construct nine homes on one to five acre lots. The water supply for the homes will be from Hudson Water Department and each home will have an individual septic system and leach field. Stormwater will be managed within the boundaries of the site with one large and two smaller stormwater basins. A forested buffer will be maintained between the new homes and existing homes.

Work performed for the hydrogeologic evaluation included

- A review of existing geology and soils mapping,
- Review of test pits and soil mapping completed by Luke Powell Asset Mapping in 2024,
- Installation and measurement of three shallow wells to characterize the subsurface materials and determine the position of the water table beneath the site, and
- Installation of pressure transducers to obtain water levels every half hour from July 5 to August 11, 2025.
- Evaluation of the current and post construction water table and groundwater movement.

The site is located on a former river terrace and slopes from an elevation of 190 feet at the northeast boundary to less than 152 feet near the southwest boundary. A wetland borders the western edge of the property and a power line crosses near the western site boundary as well.

The underlying surficial material is a stream delta and terrace deposit made up of sand and gravel that was left behind by flowing streams as the continental glaciers were melting over 12,000 years ago. These deposits overlie Lake Merrimack deposits, which are made of finer grained material. Bedrock is estimated to be as deep at 70 feet below land surface in this area (Koteff, 1976). The stream terrace deposit continues to the north and south along the east side of the Merrimack River.

The stratified sand and gravel deposits (which include the terrace and stream deposits found at the site) laid down by streams and glacial meltwater are referred to as stratified drift aquifers. These deposits can yield large quantities of groundwater for wells and are generally well drained. A 1987 US Geological Survey study included mapping of these deposits and the water table based on well data collected throughout the region (Toppin, 1987). Figure 1 shows a portion of a map from the Toppin report that includes the project area. The lines of equal groundwater elevation (groundwater contours) illustrate that groundwater flows to the southwest and west towards the Merrimack River and closely follows the topography of the land surface.

The test pits completed by Powell in 2024, and for this study in July 2025 when the wells were installed, all revealed that the material beneath most of the site is made up of fine to medium sands with little silt and no clay. The soils beneath the western edge of the property were finer and had lower permeability just east of the wetland area on the property.

WORK PERFORMED

On July 5, 2025, three wells were installed to obtain the depth to groundwater beneath the site and to estimate the groundwater flow direction. Wells were completed at 8.9 feet to 6.1 feet of depth. The wells installed are two-inch diameter schedule 40 PVC with 5 feet of slotted well screen at the bottom of each well. The well screen allows groundwater to flow into the well and the ground water level is measured within the well.

Groundwater levels at wells were measured by hand with a Solinst electronic water level meter on July 5, July 14, July 25, and August 11, 2025. On July 5, 2025, pressure transducers were calibrated with the measured water levels and placed in Wells MW-1 and MW-3. They were programmed to record water levels every ½ hour. The transducers were removed from the wells on August 11, 2025.

The ground elevation and location of each well were measured by Hess Engineering and are included on the plan set.

RESULTS

Figure 2 shows the location of the wells and groundwater levels measured on July 25, 2025; two weeks after the wells were installed. This information is on Hess Engineering Plan GD-1 and also shows the proposed layout and grading plan for the site.

Also on this figure are estimated groundwater contours based on the water levels in the wells. These contours depict the elevation of the groundwater table beneath the site. Groundwater flows perpendicular to the contours. The groundwater flow direction is similar to that estimated in the USGS Toppin report referred to in a previous section. Groundwater flows in a direction similar to the slope of the land and flows to the wetland on the west end of the property.

Water levels measured in the wells (Table 1) during July were 2.8 to 7.8 feet below land surface depending on location and date. Water levels dropped almost one foot from July 5 to August 11, 2025. Figure 3 illustrates these changes.

The continuous water level data show the same water level change as the hand measured values and illustrate water level changes due to rainfall events.



According to regional weather data from Manchester Airport, 0.12 inches of rain fell on July 10, 0.11 inches fell on July 18, 0.13 inches fell on July 21, and 0.11 inches fell on July 28. Nearly one inch of rain fell on August 1, 2025. This information is included in Figure 3b.

The groundwater level in MW-1 near station 8+50 gradually declined with little short-term variation in water levels over the month. At Well MW-3 in the lower portion of the site near Station 2+25 water levels increased slightly in response to modest rainfall on July 10, 18, 21 and 28th. Nearly one inch of rain fell on August 1st and water levels increased at MW-3 but continued a steady decline after this rainfall event.

DISCUSSION

GROUNDWATER RECHARGE

Figure 4 (Hess plate P-3) shows the profile of the road proposed for the site, the proposed fill elevation, and the existing ground elevation. The project well locations and groundwater table as measured on July 25, 2025 has been superimposed on this profile. The estimated seasonal high water levels from test pits completed by Powell near the road are also shown. The water levels in mid to late summer are typically several feet lower than during spring high so a seasonal increase in the water table is expected above what is shown on the profile.

Groundwater recharge to the aquifer from rainfall and snowmelt at the site currently infiltrates the soil and overburden and flows to the water table. Changes in the water table over the year are driven by variations in recharge and evapotranspiration (water loss due to evaporation and uptake by plants).

Water will continue to recharge to the subsurface after the development is complete through the soil and overburden. Some of runoff near the central portion of the site will likely not recharge directly, but be diverted to catch basins and swales and will ultimately discharge to the wet pond. This will effectively reduce groundwater infiltration over portions of the site and lessen impacts on surrounding homes.

Surface water runoff from the northern portion of the site will also be diverted to an infiltration swale and will runoff to a detention pond and ultimately to the wet pond. This should further assist in minimal impacts on surrounding groundwater levels.

evaluating and resolving land & water resource issues

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danna@truslowRC.com www.truslowRC.com



AQUIFER COMPRESSIBILITY AND IMPACT OF FILL

The groundwater beneath the site flows within an unconfined aquifer in a direction that generally mimics topography. The term unconfined means that there is no low permeability earth material like clay or silt that keeps the groundwater under pressure. The surface of the groundwater (water table) is at atmospheric pressure and is free to rise and fall. Aquifer compressibility is generally low for an unconfined aquifer. Compressibility of sand such as that beneath the site is much less compressible than clay as well (Freeze & Cherry, 1979).

As shown in the design plans, fill will be brought into the site and onsite soils will be regraded to moderate the slope of the road for the development and to raise the ground level around the homes and septic systems. Fill will extend from 50 to 80 feet beyond the centerline of the road and will be graded to meet existing contours.

When the site is developed, the ground will be grubbed to remove vegetation and roots, and fill will be placed in one foot lifts to match the designed grade. The characteristics of the fill will be similar to the sandy material beneath the site and will allow for infiltration through the unsaturated portion of the soil. This infiltration will reach groundwater and increase the height of the water table. As shown in the figure the land surface plus the final filled elevation should more than accommodate any increase in groundwater levels.

SUMMARY AND RECOMMENDATIONS

In summary, this project should minimally impact groundwater flow directions and increases due to the following project and site characteristics:

- The direction of groundwater flow is northeast to southwest across the site. The direction of groundwater flow should not change after development, as the post-development slope of the land is similar to the existing land slope.
- Measured ground water levels are currently about two feet below the estimated seasonal high groundwater levels based on test pits estimates.
- Little rainfall in July has led to a decline in water levels. Some small increases in water levels were noted from periods of rainfall in from mid-July to early August at MW-3 but levels quickly continued to decline as illustrated at MW-1.
- The stormwater management system is designed to collect water along the central portion of the site towards a detention and wet pond for collection and discharge to the wetland in the western portion of the site.
- Runoff from the flanks of the development will be directed to swales and detention ponds, which will direct runoff to the wet pond in periods of high runoff. A significant percent of the runoff from the site will recharge to the wet pond not to the filled area beneath the site.
- The addition of fill above the existing land surface will increase the overlying pore space available and will accommodate any rise in groundwater levels without changing groundwater recharge patterns.
- The grain size distribution of the fill to be used should be similar to the underlying overburden to assure that infiltration and groundwater will flow similarly through the added materials. The fill lifts should also be carefully and consistently compacted to minimize any variations in permeability with depth.

Freeze, R. A., and Cherry, J. A. 1979. "Groundwater," Prentice-Hall Inc., Englewood Cliffs, NJ.

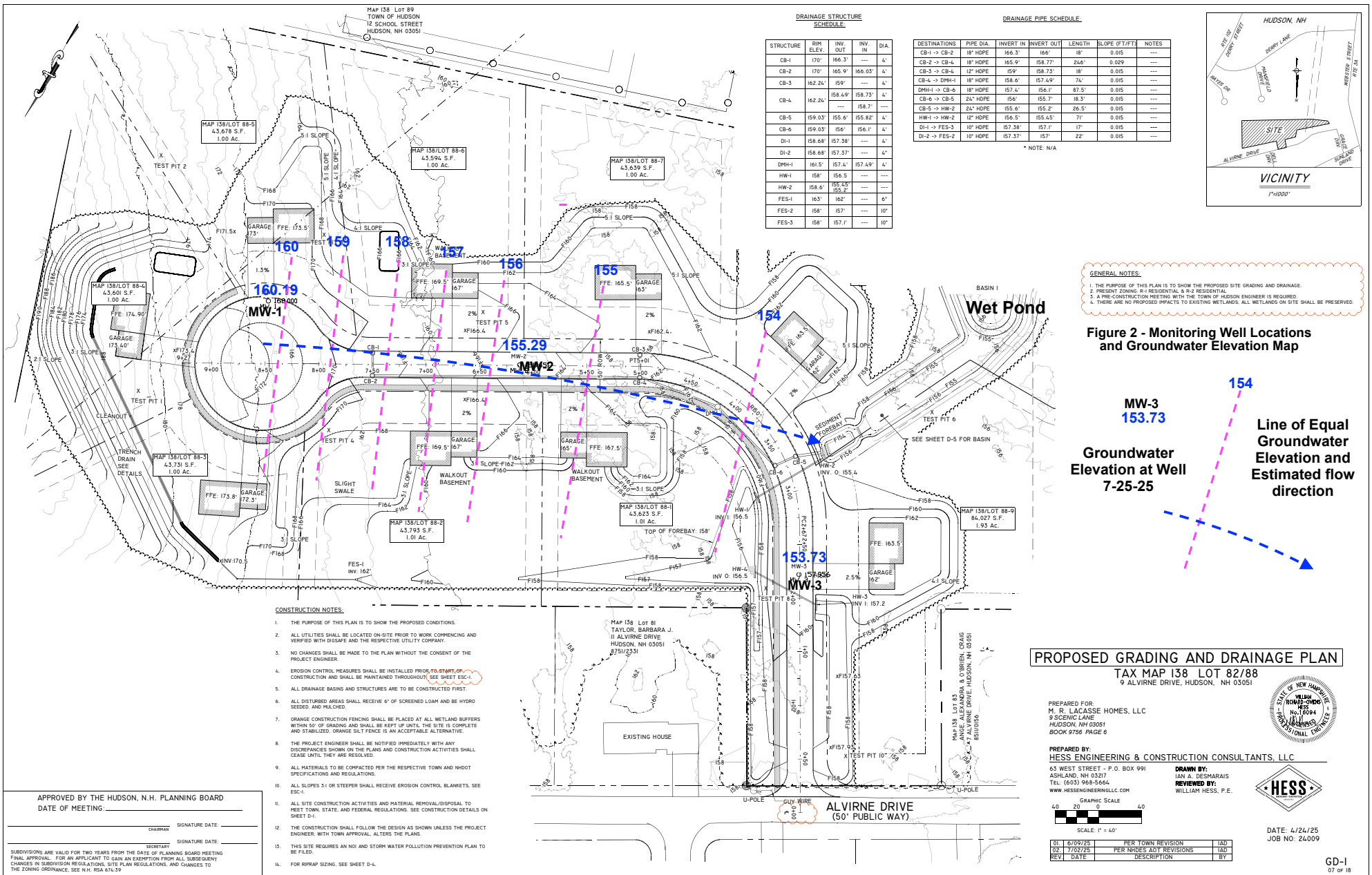
Koteff, Carl, 1976, Surficial Geologic Map Of The Nashua North Quadrangle, Hillsborough And Rockingham Counties, New Hampshire, USGS Map GQ-1290

Powell, Luke, 2024, Site Specific Soils Mapping Report for the Proposed Tabrye Drive Subdivision.

Toppin, Kenneth W., 1987, Hydrogeology of Stratified-Drift Aquifers And Water Quality In The Nashua Regional Planning Commission Area South-Central New Hampshire. USGS Water Resources Investigation Report 86-4358.

Figure 1 - Groundwater Flow in Stratified Drift Aquifer Hudson and Litchfield, NH

The map displays the Hudson and Litchfield, NH area, showing the Merrimack River, Little Ottnanic Pond, and Ottarnic Pond. A callout box labeled 'Project site' points to a specific location. A legend indicates 'estimated groundwater flow direction' with arrows. The map shows the location of the Stratified Drift and Glacial Till and Shallow Bedrock. Various wells (W1, W2, etc.) and monitoring points (A1, A2, etc.) are marked. The map also shows the location of the Merrimack River, Little Ottnanic Pond, and Ottarnic Pond.



DRAINAGE STRUCTURE SCHEDULE				
STRUCTURE	R/W ELEV.	INV. OUT	INV. IN	D.I.A.
CB-1	170'	166.3'	---	4'
CB-2	170'	165.9'	166.03'	4'
CB-3	162.24'	159'	---	4'
CB-4	162.24'	158.49'	158.73'	4'
CB-5	159.03'	155.6'	155.82'	4'
CB-6	159.03'	156'	156.1'	4'
DI-1	158.68'	157.38'	---	4'
DI-2	158.68'	157.37'	---	4'
DHW-1	161.5'	157.4'	157.49'	4'
HW-1	158'	156.5'	---	---
HW-2	158.6'	155.2'	---	---
FES-1	165'	162'	---	6"
FES-2	158'	157'	---	10"
FES-3	156'	157.1'	---	10"

DRAINAGE PIPE SCHEDULE					
DESTINATIONS	PIPE DIA.	INVERT IN	INVERT OUT	LENGTH	SLOPE (F/T/F.T.)
CB-1 -> CB-2	18" HDPE	166.3'	166'	18'	0.015
CB-2 -> CB-4	18" HDPE	165.9'	158.77'	246'	0.029
CB-3 -> CB-4	12" HDPE	159'	158.73'	18'	0.015
CB-3 -> DMH-1	18" HDPE	158.6'	157.49'	74'	0.015
DMH-1 -> CB-6	18" HDPE	157.4'	156.1'	87.5'	0.015
CB-4 -> CB-5	24" HDPE	158'	155.77'	18.3'	0.015
CB-5 -> HW-2	24" HDPE	155.6'	155.2'	26.5'	0.015
HW-1 -> HW-2	12" HDPE	156.5'	155.45'	71'	0.015
DI-1 -> FES-3	10" HDPE	157.38'	157.1'	17'	0.015
DI-2 -> FES-2	10" HDPE	157.37'	157'	22'	0.015

* NOTE: N/A

GENERAL NOTES:

1. THE PURPOSE OF THIS PLAN IS TO SHOW THE PROPOSED SITE GRADING AND DRAINAGE.
2. PRESENT ZONING: R-1 RESIDENTIAL & R-2 RESIDENTIAL.
3. A PRE-CONSTRUCTION MEETING WITH THE TOWN OF HUDSON ENGINEER IS REQUIRED.
4. THERE ARE NO PROPOSED IMPACTS TO EXISTING WETLANDS. ALL WETLANDS ON SITE SHALL BE PRESERVED.

Figure 2 - Monitoring Well Locations and Groundwater Elevation Map

MW-3
153.73

Groundwater Elevation at Well 7-25-25

154

Line of Equal Groundwater Elevation and Estimated flow direction

CONSTRUCTION NOTES:

1. THE PURPOSE OF THIS PLAN IS TO SHOW THE PROPOSED CONDITIONS.
2. ALL UTILITIES SHALL BE LOCATED ON-SITE PRIOR TO WORK COMMENCING AND VERIFIED WITH DISSEAS AND THE RESPECTIVE UTILITY COMPANY.
3. NO CHANGES SHALL BE MADE TO THE PLAN WITHOUT THE CONSENT OF THE PROJECT ENGINEER.
4. EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO START-UP OF CONSTRUCTION AND SHALL BE MAINTAINED THROUGHOUT. (SEE SHEET ESC-4).
5. ALL DRAINAGE BASINS AND STRUCTURES ARE TO BE CONSTRUCTED FIRST.
6. ALL DISTURBED AREAS SHALL RECEIVE 6" OF SCREENED LOAM AND BE HYDRO SEEDED, AND MULCHED.
7. ORANGE CONSTRUCTION FENCING SHALL BE PLACED AT ALL WETLAND BUFFERS WITHIN 50' OF GRADING AND SHALL BE KEPT UP UNTIL THE SITE IS COMPLETE AND STABILIZED. ORANGE SILT FENCE IS AN ACCEPTABLE ALTERNATIVE.
8. THE PROJECT ENGINEER SHALL BE NOTIFIED IMMEDIATELY WITH ANY DISCREPANCIES SHOWN ON THE PLANS AND CONSTRUCTION ACTIVITIES SHALL CEASE UNTIL THEY ARE RESOLVED.
9. ALL MATERIALS TO BE COMPACTED PER THE RESPECTIVE TOWN AND NHDOT SPECIFICATIONS AND REGULATIONS.
10. ALL SLOPES 5:1 OR STEEPER SHALL RECEIVE EROSION CONTROL BLANKETS. SEE ESC-4.
11. ALL SITE CONSTRUCTION ACTIVITIES AND MATERIAL REMOVAL/DISPOSAL TO MEET TOWN, STATE, AND FEDERAL REGULATIONS. SEE CONSTRUCTION DETAILS ON SHEET D-1.
12. THE CONSTRUCTION SHALL FOLLOW THE DESIGN AS SHOWN UNLESS THE PROJECT ENGINEER, WITH TOWN APPROVAL, ALTERS THE PLANS.
13. THIS SITE REQUIRES AN NOI AND STORM WATER POLLUTION PREVENTION PLAN TO BE FILED.
14. FOR RIPRAP SIZING, SEE SHEET D-4.

APPROVED BY THE HUDSON, N.H. PLANNING BOARD
DATE OF MEETING: _____

CHAIRMAN

SIGNATURE DATE:

SECRETARY

SIGNATURE DATE:

SUBDIVISIONS ARE VALID FOR TWO YEARS FROM THE DATE OF PLANNING BOARD MEETING
FINAL APPROVAL, FOR AN APPLICANT TO GAIN AN EXCEPTION FROM ALL SUBSEQUENT
CHANGES IN SUBDIVISION REGULATIONS, SITE PLAN REGULATIONS, AND CHANGES TO
THE ZONING ORDINANCE, SEE N.H. RSA 676:59

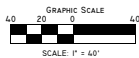
PROPOSED GRADING AND DRAINAGE PLAN

TAX MAP 138, LOT 82/88
9 ALVIRNE DRIVE, HUDSON, NH 03051

PREPARED FOR:
M. R. LACASSE HOMES, LLC
9 SUDWICK LANE
HUDSON, NH 03051
BOOK 9756 PAGE 6

PREPARED BY:
HESS ENGINEERING & CONSTRUCTION CONSULTANTS, LLC
63 WEST STREET - P.O. BOX 991
ASHLAND, NH 03217
TEL: (603) 968-5664
WWW.HESSENGINEERINGLLC.COM

DRAWN BY:
IAN A. DESHARAIS
REVIEWED BY:
WILLIAM HESS, P.E.



SCALE: 1" = 40'

DATE	PER TOWN REVIEW	DATE
01/16/09/25	PER TOWN REVIEW	1/20
02/17/02/25	PER NHDES NOT REVISIONS	1/20
REV. DATE	DESCRIPTION	BY

DATE: 4/24/25
JOB NO: 24009

Figure 3 a

Groundwater Level Change - 9 Alvirne Road Wells

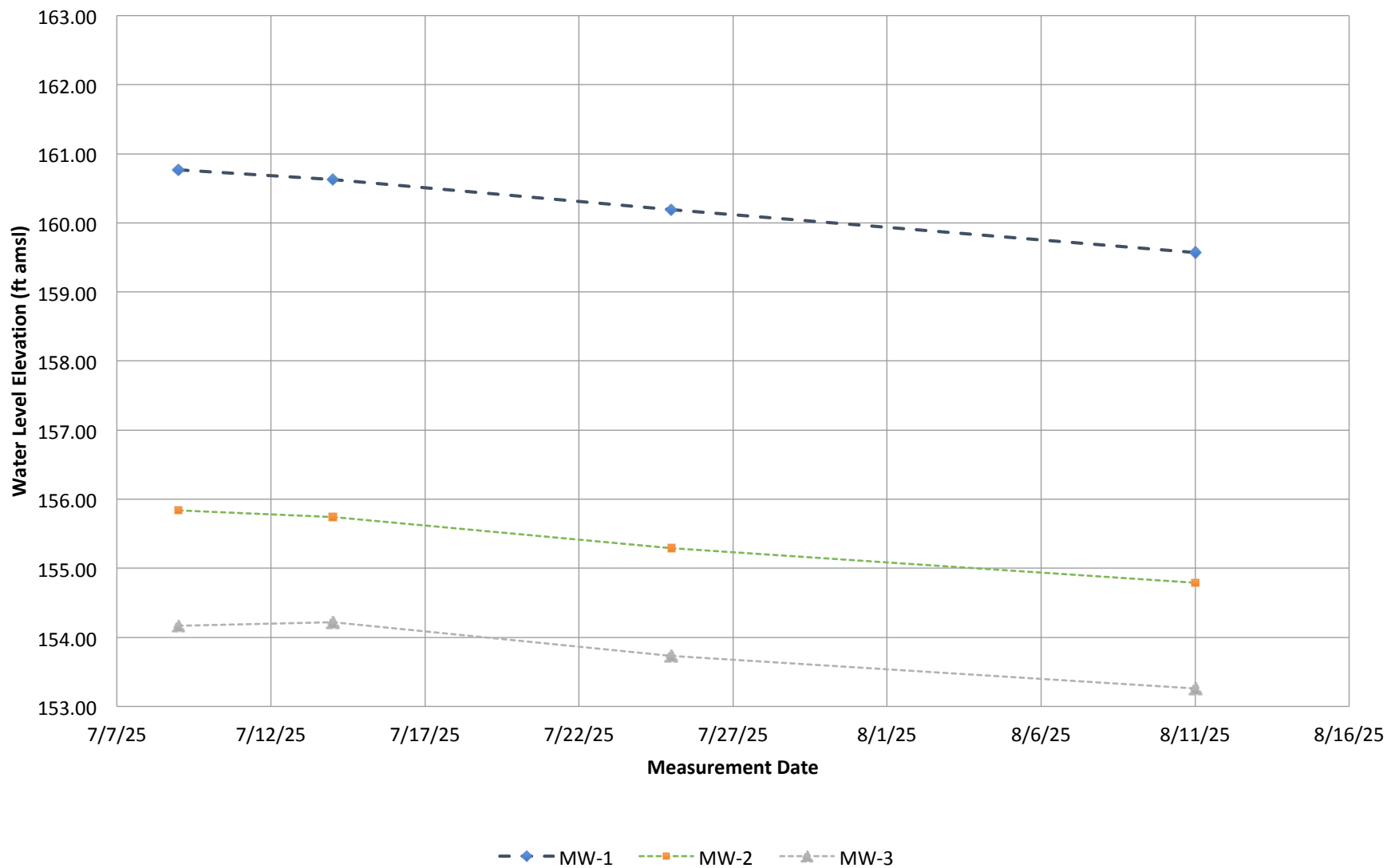
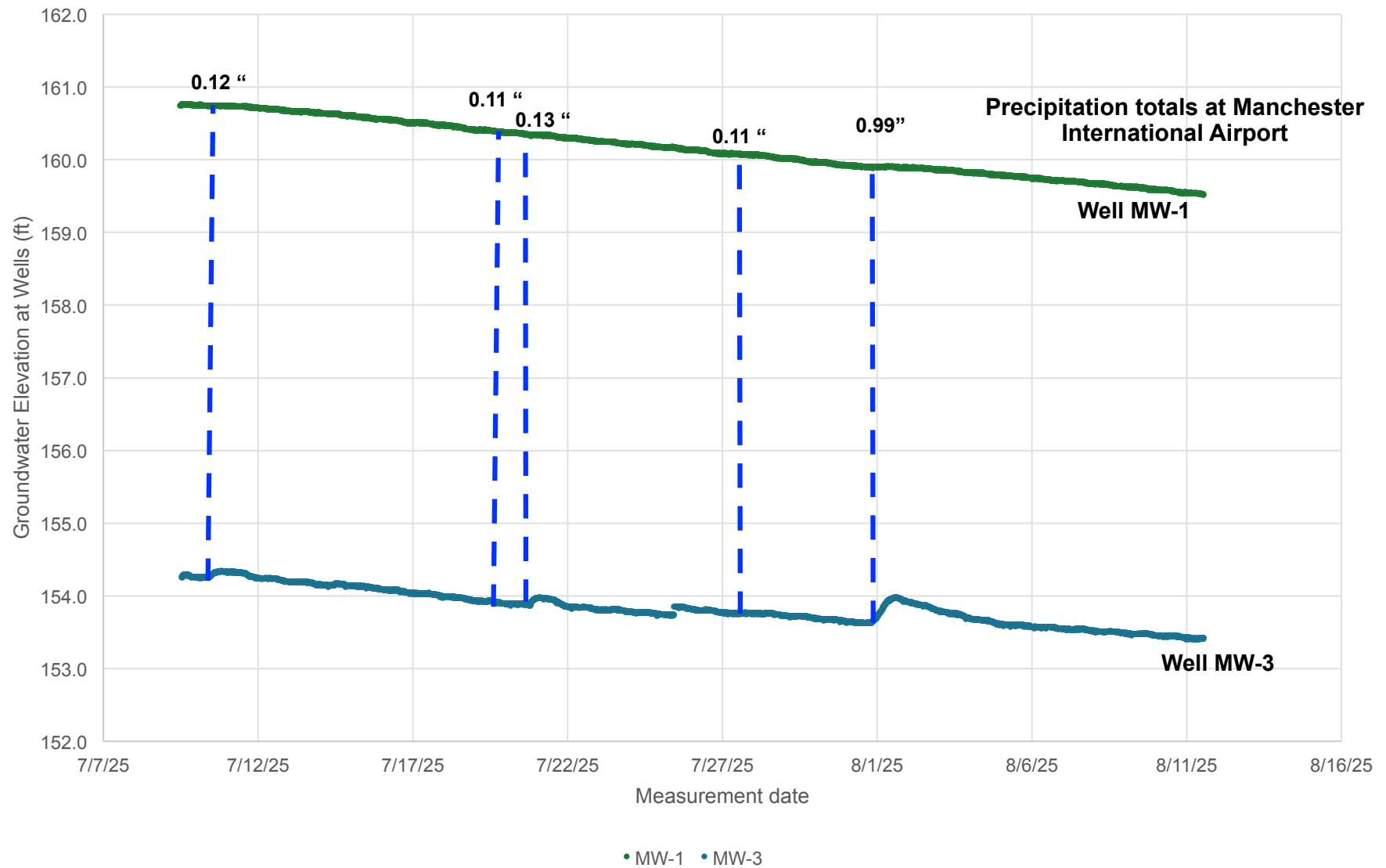


Figure 3 b
Groundwater Levels at Wells
9 Alvirne Road
Hudson, NH



9 Alvirne Drive, Hudson, NH

ft. msl - Feet above mean sea level (NAVD 1988)

Inspection and Maintenance Manual (I&M Manual)

**Comprehensive Environmental Inc. & NHDES. (2008). “NH Stormwater Manual,
Volumes 2 and 3.” New Hampshire Department of Environmental Services.**

Prepared for:

M.R. Lacasse Homes, LLC

9 Scenic Lane
Hudson, NH, 03051
April 29th, 2025

LATEST REVISION

8/27/25

Prepared by:

Hess Engineering and Construction Consultants
P.O. Box 991
Ashland, NH 03217

Introduction:

The purpose of this document is to ensure proper operation and maintenance of installed stormwater systems and BMPs.

“Proper maintenance will:

- Maintain the volume of stormwater treated over the long term;
- Sustain the pollutant removal efficiency of the BMP;
- Reduce the risk of re-suspending sediment and other pollutants captured by the BMP;
- Prevent structural deterioration of the BMP and minimize the need for expensive repairs;
- Decrease the potential for failure of the BMP.”

- Per NHDES Stormwater Manual: Volume 2; Chapter 5

This manual includes the following:

1. The names of the responsible parties who will implement the required reporting, inspection, and maintenance activities identified in the I&M manual;
2. The frequency of inspections;
3. An inspection checklist to be used during each inspection;
4. An inspection and maintenance log to document each inspection and maintenance activity;
5. A deicing log to track the amount and type of deicing materials applied to the site;
6. A plan showing the locations of all the stormwater practices described in the I&M manual; and
7. Actions to be taken if any invasive species begin to grow in the stormwater management practices.

All record keeping required by the I&M manual shall be maintained by the responsible parties, and any transfer of responsibility for I&M activities or transfer in ownership shall be documented to the NHDES in writing.

- Per NHDES Stormwater Manual: Volume 2; Chapter 5

Site Description and Installed BMPs:

The existing site is located off Alvirne Drive in Hudson, NH.

Permanent BMPs installed:

1. 8 Catch basins
2. 2 Manholes
3. 5 Riprap aprons
4. 1 Wet Pond
5. 2 Sediment Forebay
6. 7 Road Culverts

Responsible Parties:

The Homeowners association, will be held responsible for all inspection and maintenance requirements until the Town of Hudson takes ownership of Taybre Drive.

- 1. If the Applicant or its successors or assigns relinquishes responsibility for the inspection, maintenance, and repair of the stormwater BMPs through legal instruments and a homeowners' association has not been created to take on the responsibilities, the individual homeowners shall have joint and several liability for all inspection, maintenance, and repair responsibilities for the stormwater BMPs. The Applicant or its successors or assigns shall make prospective owners aware of this condition prior to transferring any lot, and this condition shall be reflected in a deed restriction for each transferee.*

BMPs I&M:

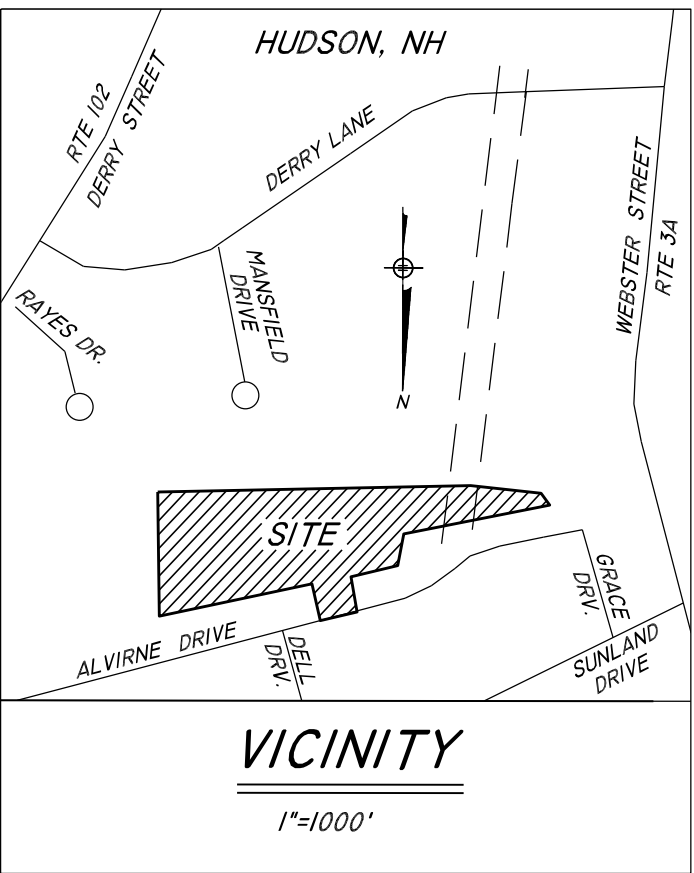
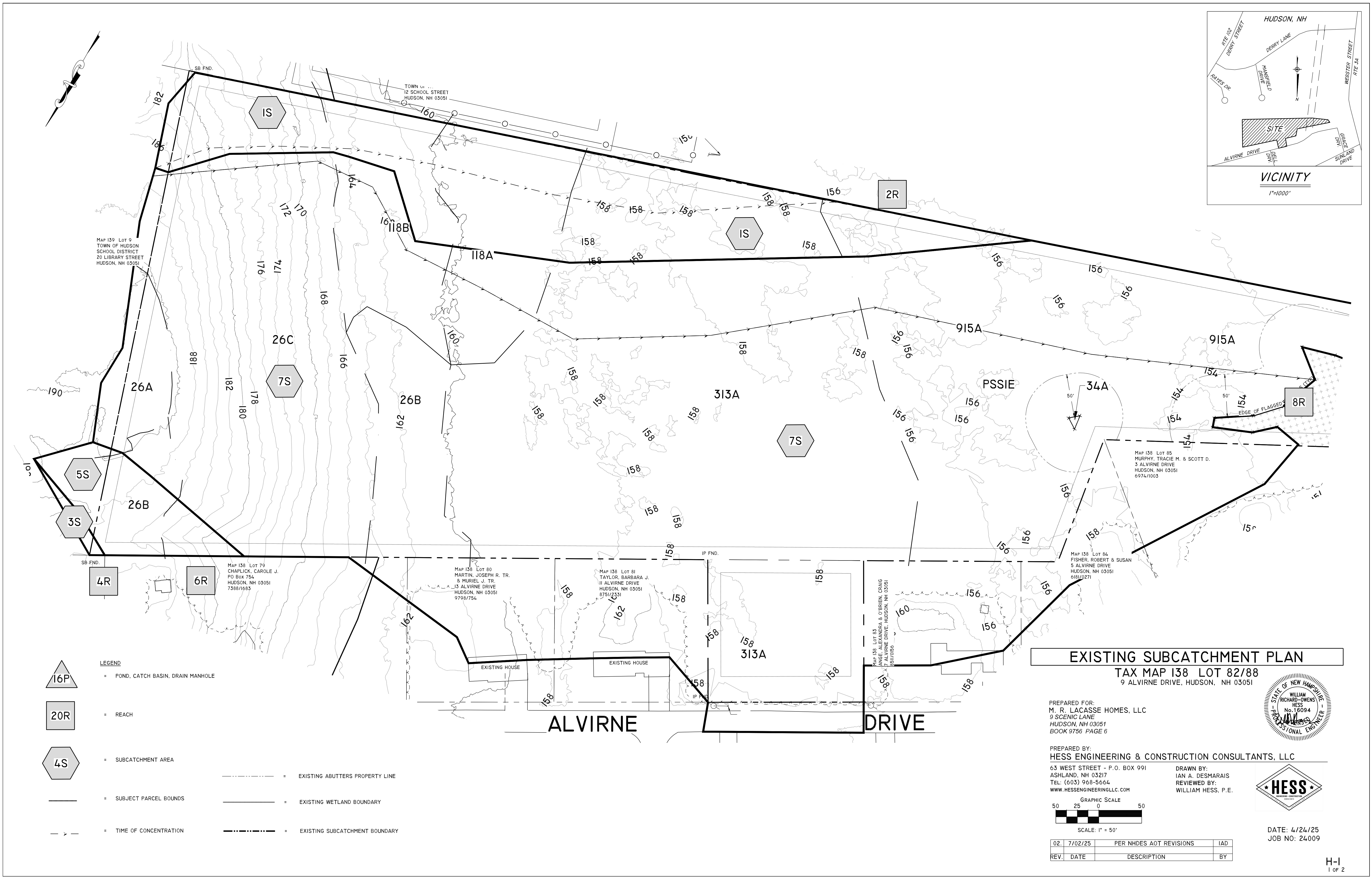
Note that all inspections require photographs of each practice for every inspection conducted. See Section D of Inspection & Maintenance Log.

- **Riprap Aprons**
 - Inspect the outlet protection annually for damage and deterioration.
 - Repair damages immediately.
 - Locations:
 - HW-2
 - On drainage easement of proposed lot 8
 - FES-1
 - By northern abutter
 - HW-4
 - On eastern side of Taybre Drive by STA 2+00
 - HW-5
 - By STA 2+75 near Sediment Forebay 1
 - Concrete Weir

- Outfall of Basin 1
- **Catch Basins**
 - Inspect after large storm events and clear debris.
 - Inspect sumps annually and clear of debris and sediment as needed.
 - Sumps must be cleared if sediment and debris is over 50% of capacity
 - Ensure runoff is able to:
 - Go through the grate;
 - Leave the catch basin.
 - Locations:
 - CB 1-8
 - At edge of pavement on curbed section of Taybre Drive.
- **Road Culverts**
 - Inspect annually and clear debris.
 - Inspect inlets and outlets for signs of scouring annually
 - Inspect embankments above culverts annually for signs of erosion.
 - Ensure runoff is able to:
 - Run between desired locations without blockage
 - Location:
 - Culvert (CB-1 to CB-2) – 12” RCP
 - Near start of cul-de-sac
 - Culvert (CB-2 to CB-4) – 18” RCP
 - STA 7+50 to STA 5+00
 - Culvert (CB-3 to CB-4) – 12” RCP
 - At end of horizontal curve of Taybre Drive
 - Culvert (HW-1 to HW-2) – 12” RCP
 - At horizontal curve of Taybre Drive
 - Culvert (CB-5 to HW-2) – 24” RCP
 - At horizontal curve of Taybre Drive
 - Culvert (CB-6 to CB-5) – 24” RCP
 - At STA 3+27
 - Culvert (CB-4 to DMH-1) – 18” RCP
 - At end of horizontal curve of Taybre Drive
 - Culvert (DMH-1 to CB-6) – 18” RCP
 - Center of horizontal curve of Taybre Drive
 - Culvert (CB-7 to HW-4) – 12” RCP
 - At STA 2+37
 - Culvert (CB-8 to DMH-2) – 12” RCP
 - At STA 2+37
 - Culvert (HW-3 to DMH-2) – 12” RCP
 - Along right side of Taybre Drive
 - Culvert (DMH-2 to HW-5) – 12” RCP
 - Along right side of Taybre Drive

- **Weir**
 - Inspect annually and clear debris.
 - Inspect after large storm events for debris.
 - Ensure runoff is able to:
 - Go through the grate
 - Enter the culvert and leave the basin/structure.
 - Location
 - Concrete weir
 - Outfall of Basin 1
- **Conveyance Swales**
 - NOTE: Swales are stabilized channels designed to convey runoff at non-erosive velocities that are stabilized by vegetation, riprap, a combination, or alternative materials.
 - Grassed channels should be inspected periodically (at least annually) for sediment accumulation, erosion, and condition of surface lining (vegetation or riprap). Repairs, including stone or vegetation replacement, should be made based on this inspection;
 - Remove sediment and debris annually, or more frequently as warranted by inspection;
 - Mow vegetated channels based on frequency specified by design. Mowing at least once per year is required to control establishment of woody vegetation. It is recommended to cut grass no shorter than 4 inches.
 - Locations:
 - Swale for FES-1
 - By northern abutter
 - Swale for Basin 1
 - After outfall of Basin 1
 - Swale for 12" RCP culvert
 - By STA 1+00 to STA 2+00
- **Snow and Ice Management**
 - Establishing a Road Salt and Deicing Minimization Plan is encouraged when creating paved areas (e.g., parking lots, roadways) greater than or equal to 1 acre;
 - The plan should address the policies that the development will keep in place to minimize salt and other deicer use after then project has been completed;
 - A component of the plan should include tracking the use of salt and other deicer for each storm event and compiling salt use data annually;
 - As NH does not provide salt reduction guidance, the state suggests that developers follow Minnesota's Snow and Ice Control Handbook for Snowplow Operators (2022):
https://mdl.mndot.gov/_flysystem/fedora/2023-02/2022ric01.pdf

- **Wet Pond**
 - Periodic mowing of embankments
 - Removal of woody vegetation from fill embankments
 - Removal of debris from outlet structures
 - Removal of accumulated sediment
 - Inspection and repair of embankments, inlet and outlet structures, and appurtenances
 - Location
 - Basin 1
 - By southern abutting soccer field
- **Sediment Forebay**
 - Provide a fixed vertical sediment marker to measure depth of accumulated sediment.
 - Re-stabilize all disturbed areas upon completion of maintenance in accordance with approved plans.
 - Maintenance access must be provided
 - Embankment design must be engineered to meet applicable safety standards (see description of Detention Basins);
 - Exposed earth slopes and bottom of basin should be stabilized using seed mixes appropriate for soils, mowing practices, and exposure to inundation;
 - Exit velocities from the forebay should be non-erosive;
 - As an alternative to an earthen basin, an underground structure may serve as a forebay. However, use of fully enclosed structures must consider accessibility for inspection and cleaning.
 - Forebays help reduce the sediment load to downstream BMPs, and will therefore require more frequent cleaning.
 - Inspect at least annually;
 - Conduct periodic mowing of embankments (generally two times per year) to control growth of woody vegetation on embankments.
 - Remove debris from outlet structures at least once annually
 - Remove and dispose of accumulated sediment based on inspection
 - Install and maintain a staff gage or other measuring device, to indicate depth of sediment accumulation and level at which clean-out is required.
 - Locations
 - Basin 1
 - By HW-2



LEGEND

- 16P = POND, CATCH BASIN, DRAIN MANHOLE
- 20R = REACH
- 4S = SUBCATCHMENT AREA
- = SUBJECT PARCEL BOUNDS
- = TIME OF CONCENTRATION
- = EXISTING ABUTTERS PROPERTY LINE
- = EXISTING WETLAND BOUNDARY
- = EXISTING SUBCATCHMENT BOUNDARY

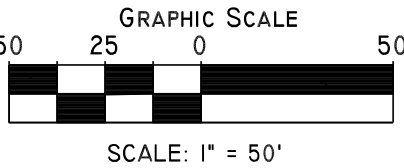
EXISTING SUBCATCHMENT PLAN

TAX MAP 138 LOT 82/88
9 ALVIRNE DRIVE, HUDSON, NH 03051

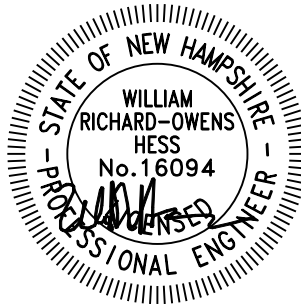
PREPARED FOR:
M. R. LACASSE HOMES, LLC
9 SOEWIC LANE
HUDSON, NH 03051
BOOK 9756 PAGE 6

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ASHLAND, NH 03217
TEL: (603) 968-5664
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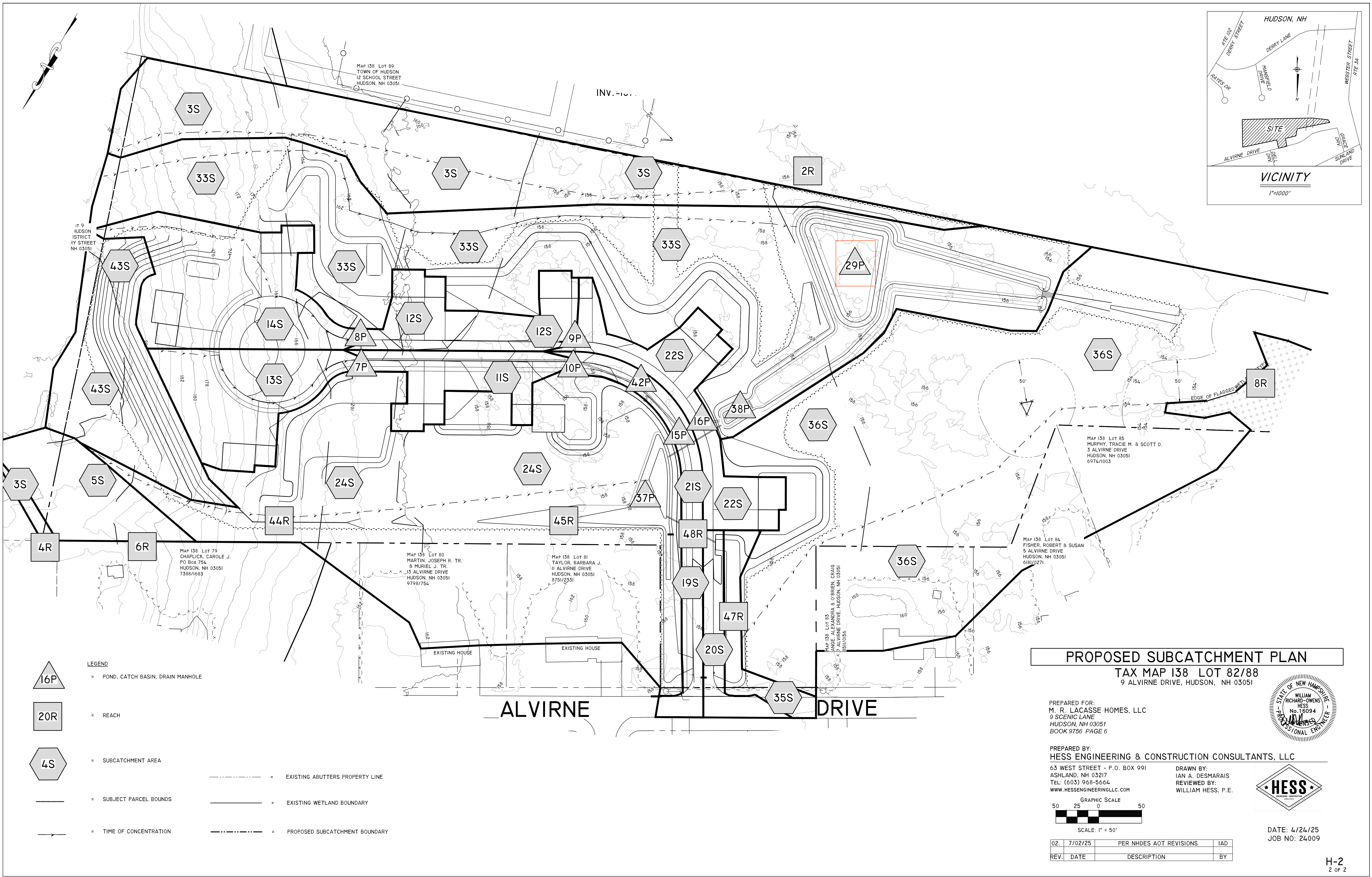
DRAWN BY:
IAN A. DESMARAIS
REVIEWED BY:
WILLIAM HESS, P.E.



02.	7/02/25	PER NHDES AOT REVISIONS	IAD
REV.	DATE	DESCRIPTION	BY



DATE: 4/24/25
JOB NO: 24009





50 Commercial Street, Suite 2S
Manchester, NH 03101
603.668.8223
www.fando.com

October 6, 2025

Ms. Brooke Dubowik
Town Planner
Town of Hudson
12 School Street
Hudson, NH 03051

RE: Town of Hudson Planning Board Review
Taybre Drive Subdivision Plan, 9 Alvirne Drive
Tax Map 138, Lots 82 & 88, Acct. #1350-745
Fuss & O'Neill Reference No. 20030249.2490

Dear Ms. Dubowik:

Fuss & O'Neill, Inc. has reviewed the revised third submission of the materials related to the above-referenced project which was received on September 22, 2025. Authorization to proceed was received on September 23, 2025. A list of items reviewed is enclosed. The scope of our review is based on the Subdivision Plan Review Codes, Stormwater Codes, Driveway Review Codes, Sewer Use Ordinance 77, Zoning Regulations, and criteria outlined in the CLD Consulting Engineers Proposal approved September 16, 2003, revised September 20, 2004, June 4, 2007, September 3, 2008, and October 2015. Note that Fuss & O'Neill began a review of a previous submission of review materials which were received on July 29, 2025.

The project consists of subdividing lots 82 and 88 and creating a nine (9)-lot subdivision out of the 14.92-acre existing lots. A new roadway with a cul-de-sac is also proposed as part of the subdivision. The subject lots are proposed to be serviced by individual subsurface disposal systems and connected to Town water.

Note that comments which had been previously addressed by the applicant as detailed in our letter dated September 17, 2025, have been removed from this letter for brevity and clarity.

The following items have outstanding issues:

2. Driveway Review Codes (HR 193-10)

- a. *Former Fuss & O'Neill Comments: HR 193-10.A. & 193-10.E. The applicant has shown the location of a proposed driveway for each proposed lot on the plan set. The applicant has not provided sight distance information for the driveways on the plan set. / The applicant has stated that driveway sight distance will be provided at the time of driveway permitting. We note that the Town has requested it as part of the subdivision review. It is important to provide this information showing that a driveway at each lot has the ability to meet the Town's requirements.*

Current Fuss & O'Neill Comment: The applicant has provided sight-distance information for Lots 88-8 & 88-9. We note that the sight lines for Lot 88-9 crosses Lot 88-1 and could possibly be blocked by future landscaping by the homeowner.

3. Roadway Design

- h. *Former Fuss & O'Neill Comments: HR 289-18.E. The applicant has not provided any sight distance information for the proposed roadway intersection at Alvirne Drive. / The applicant has provided sight distance information. We note that the sight lines to both the east and west are at the edge of existing tree lines and may be obscured by vegetation when constructed and into the future. The applicant should consider additional clearing of vegetation within the Town's right-of-way to ensure sight lines are maintained. Also, the sight distance shown to the west does not meet the 400 feet required by Hudson Engineering Technical Guidelines & Typical Details Section 525.3 (375' is shown).*

Current Fuss & O'Neill Comment: The applicant has revised the sight distance plan to show the roadway meets the 400-foot requirement. We continue to note that the sight lines to both the east and west are at the edge of existing tree lines and may be obscured by vegetation when construction is complete and into the future.

4. Drainage Design /Stormwater Management (HR 289-20.C. /Chapter 290)

- c. *Former Fuss & O'Neill Comments: HR 289-20.C.1. The applicant should provide a similar comparison table of runoff volumes to ensure no net increase for all storms analyzed. / The applicant provided comparison tables of only Flow Rates in the Stormwater Management Report dated August 27, 2025, and did not provide the requested runoff volumes comparison tables. The applicant should provide the requested volume comparison tables.*

Current Fuss & O'Neill Comment: The applicant has provided the required comparison tables of runoff volumes and illustrated an increase in volume at POI-8R. The applicant should coordinate with the Town if the proposed increases require additional discussion or if a waiver is required.

- f. *Former Fuss & O'Neill Comments: HR 290-5.A.4. The applicant should provide the GRV BMP worksheet illustrating required GRV is met. / The applicant provided only a BMP worksheet for Basin 1 (29P) in the Stormwater Management Report dated August 27, 2025, and did not provide the requested GRV worksheet. We note a waiver has been requested by the applicant, who should provide the requested GRV worksheet if a waiver is not granted.*

Current Fuss & O'Neill Comment: The applicant should coordinate with the Town for any required GRV waivers.

- n. *Former Fuss & O'Neill Comment: HR 290-5.A.11. The applicant should keep the Town informed of all communications with NHDES in relation to the required Alteration of Terrain Permit being requested to ensure NHDES comments/requirements do not alter drainage design/calculations.*

Former/Current Fuss & O'Neill Comment: The Alteration of Terrain Permit is still outstanding.

- y. **Former/Current Fuss & O'Neill Comment:** HR 290-7.B.5. The applicant should coordinate with the Town if additional documentation is required to establish an HOA for the stormwater long term maintenance and inspection requirements.

- z. *Former Fuss & O'Neill Comment: Engineering Technical Guidelines and Typical Details (ETGTD) 930.1. We note the applicant has discussed with the Town Engineer to allow 2.0' of cover rather than the required 4.0' of cover for drainage pipe. The applicant should discuss if HDPE is allowed with this reduced cover, or if RCP is required in situations of reduced cover to help reduce heaving and "floating" of pipes from frozen ground and high-water table situations.*

Former/Current Fuss & O'Neill Comment: The applicant should coordinate with the Town Engineer on pipe material allowed and reduced cover.

6. Sewer/Water Design/Conflicts & Utility Design/Conflicts (HR 276-13.E.)

- e. *Former Fuss & O'Neill Comments: HR 276-13.G. The applicant has not provided any information about septic systems for the proposed lots. The applicant has noted a NHDES Subdivision Approval number on the plan set. The applicant should provide typical design details on the plan. /The applicant has noted that septic designs will be provided at the time of individual lot development. We continue to note that the Regulation requires a typical detail be provided for the systems.*

Current Fuss & O'Neill Comment: The applicant has stated that systems are shown on the plans with tank locations. We continue to recommend a typical detail be provided.

7. Erosion Control/Wetland Impacts

- a. *Former Fuss & O'Neill Comments: ETGTD 920.4.1. & 920.4.2. The applicant should show stockpile and equipment storage locations on the plan. / The applicant has noted that these locations were on a previous submission. We note that they are not provided on the current plan set. The applicant should show the locations on the plan set.*

Current Fuss & O'Neill Comment: The applicant has shown stockpile areas on the plan. We note that an equipment storage location is not shown.

9. Other

- b. *Former Fuss & O'Neill Comments: The applicant has not shown a curb ramp with a detectable warning device at the end of the proposed sidewalk at Alvirne Drive not at the eastern end of the sidewalk at the cul-de-sac. A detail for construction of the sidewalk tip downs was not included in the plans either. / The applicant has added a detail for the curb ramps with detectable warning device. The applicant should label the proposed locations on the plan.*

Current Fuss & O'Neill Comment: The applicant has stated that detectable warning devices are not proposed since the sidewalk locations do not lead to any crosswalks. We note that the applicant should review with the Town is detectable warning devices should be provided and if not then the detail should be removed from the plans.

The following items require Town evaluation or input:

1. Administrative and Subdivision Review Codes (HR 276 & HR 289)

- l. *Former Fuss & O'Neill Comment: HR 289-37.A. The applicant has not provided phasing information for the proposed subdivision. We note that per the Regulation 50% of the proposed lots can be given Final Approval in one year.*

Current Fuss & O'Neill Comment: The applicant has requested a waiver from this requirement.

4. Drainage Design /Stormwater Management (HR 289-20.C. /Chapter 290)

- ag. *Former Fuss & O'Neill Comments: We recommend the applicant review the need for fencing around stormwater basins, particularly Basin 1 which is proposed to have standing water. / With the proposed basins possibly becoming Town maintained, the applicant should review with the Town Engineer on the preferred fence height/material/placement. We note that NHDES Regulations will not govern a Town warranted fence.*

Current Fuss & O'Neill Comment: The Town should confirm if fencing is necessary.

The following items are resolved or have no further Fuss & O'Neill input:

1. Administrative and Subdivision Review Codes (HR 276 & HR 289)

- a. *Former Fuss & O'Neill Comment: Hudson Regulation (HR) 276-7. The applicant has not noted any waivers requested on the plan set. /The applicant has provided waiver request letters. The applicant should note the waivers on the plan set.*
Current Fuss & O'Neill Comment: The applicant has added the requested waiver list to the plan. No further Fuss & O'Neill comment.
- b. *Former Fuss & O'Neill Comment: HR 276-11.B.(2). The applicant has provided multiple plans at a scale of 1"=100' where the maximum scale allowed is 1"=50'. / The applicant has stated that the Existing Conditions Plan will remain at 1"=100'. The applicant should review the need for a waiver.*
Current Fuss & O'Neill Comment: The applicant has confirmed that they believe that a wavier is not required. No further Fuss & O'Neill comment.
- h. *Former Fuss & O'Neill Comment: HR 289-22. The applicant has not proposed any specific open spaces on the plan set. Per the Regulation the Planning Board shall review the plan for open space requirements, which shall generally consist of 10% or less of the total area, and if required this open space shall be deeded to the Town of Hudson and be so indicated on the final subdivision plan.*
Current Fuss & O'Neill Comment: The applicant has confirmed that less than 10% open space is required. No further Fuss & O'Neill comment.
- i. *Former Fuss & O'Neill Comments: HR 289-23. We note that the applicant has not noted any natural features to be preserved on the plan set. / The applicant has added a note to the plans noting that there are no proposed impacts to the wetlands. The applicant should provide additional information related to tree lines and natural buffers for the site.*
Current Fuss & O'Neill Comment: The applicant has revised the plan to more clearly show the proposed tree line and has also shown a 15-foot vegetative buffer on the north side of the site. No further Fuss & O'Neill comment.
- j. *Former Fuss & O'Neill Comment: HR 289-26.B.(3). The applicant has shown an existing utility easement at the end of the Mansfield Drive cul-de-sac which connects to proposed utility easements extending through to Taybre Drive. Copies of the existing and proposed easements were not included in the review package.*
Current Fuss & O'Neill Comment: The applicant has provided a copy of the existing deed. No further Fuss & O'Neill comment.

3. Roadway Design

- d. *Former Fuss & O'Neill Comments: HR 289-18.A.4. The applicant should provide more information regarding drainage within the center of the cul-de-sac, and review with the Planning Board for any required landscaping for this area as well. / The applicant has shown grading for the cul-de-sac. We note that no landscaping has been proposed.*
Current Fuss & O'Neill Comment: The applicant has noted on the plan that cul-de-sac island will be grassed. No further Fuss & O'Neill comment.
- m. *Former Fuss & O'Neill Comment: HR 289-18.Y. The applicant has not proposed a 2% slope from the edge of pavement at the Alvirne Drive intersection for the first 100 feet of the roadway as required by the Regulation.*

Current Fuss & O'Neill Comment: The applicant has provided a slope of 2% to the first vertical curve as required. No further Fuss & O'Neill comment.

4. Drainage Design /Stormwater Management (HR 289-20.C. /Chapter 290)

- b. *Former Fuss & O'Neill Comments: HR 289-20.A.2. The design plans illustrate positive drainage away from the proposed residence at lot 88-4. Plans show the cul-de-sac stormwater sheet-flowing north, and the driveway pitching south, with a vertical separation of only 0.6'. We note most lot grades provide a difference of 1.0' to 2.0' from pavement grade to garage grade. Due to the potentially large amount of runoff from the cul-de-sac directed toward lot 88-4 garage, the applicant should provide a greater separation than the 0.6' designed. /The garage is designed to be at 174.4' and the profile plan scales to be an elevation if 174.0' at the driveway. The grading plan illustrates the 50'± long driveway is to be graded at 1.0%, resulting in an approximate 0.5' elevation difference. There is less elevation change in the latest design than the initial design. The applicant should review the original comment and provide a greater separation than the 0.5' designed.*

Current Fuss & O'Neill Comment: The applicant has revised grading to provide 1.0' separation from road to garage grade. No further Fuss & O'Neill comment.

- d. *Former Fuss & O'Neill Comments: HR 289-20.C.3. The applicant should provide test pit locations upon the Proposed Grading and Drainage Plans P-1 and P-2. / The applicant has provided test pit locations upon the plan set. We note that the applicant has marked the locations with an "x", we recommend that a more specific symbol be used and added to the legend.*

Current Fuss & O'Neill Comment: The applicant has revised the test pit symbol to a more typical symbol. No further Fuss & O'Neill comment.

- g. *Former Fuss & O'Neill Comments: HR 290-5.A.11. The applicant should coordinate the pre- and post-development areas within HydroCAD to be exactly the same. / The applicant has not provided a routing diagram or area/cover summary provided within the Stormwater Management Report dated August 27, 2025. We are unable to confirm whether areas provided in the Stormwater Management Report dated August 27, 2025, match from pre- to post-development. We note the pre- and post-development areas within HydroCAD should match. The applicant should review with NHDES AoT if the previously noted discrepancy is acceptable and meets NHDES Stormwater Review regulations.*

Current Fuss & O'Neill Comment: The applicant has matched pre- to post- areas. No Further Fuss & O'Neill comment.

- j. *Former Fuss & O'Neill Comments: HR 290-5.A.11. The applicant should provide elevations for the Basin 1 weir elevations on Plan Sheet D-5. / The applicant has provided a weir detail on Plan Sheet D-5. The HydroCAD notes a "V Notch" to have a 1.5' height with a 1.5' width, while the Concrete Weir Outlet on Plan Sheet D-5 depicts the "V Notch" to have a 1.35' height and 1.75 width. The applicant should coordinate the HydroCAD and detail accordingly.*

Current Fuss & O'Neill Comment: The applicant has matched the outlet weir detail sheet in plans to the HydroCAD design. No further Fuss & O'Neill comment.

- m. *Former Fuss & O'Neill Comments: HR 290-5.A.11. The applicant should provide landscaping/seeding information for the floor and side slopes of the basins. Plantings and grass mix must be able to be inundated by stormwater for up to 72 hours. / The applicant should ensure the note is on Detail Sheet D-5.*

Current Fuss & O'Neill Comment: The applicant has added a note on D-5. No further Fuss & O'Neill comment.

Ms. Brooke Dubowik

October 6, 2025

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- p. *Former Fuss & O'Neill Comments: HR 290-5.B.1.b. The applicant should provide support material or calculations showing the required 80% TSS and 50% TP pollutant removals. / The applicant should provide the discussed graphs from UNHSC, in the previously submitted AoT RMFI dated 7/24/2025. Current Fuss & O'Neill Comment: The applicant has provided the UNHSC graphs. No Further Fuss & O'Neill comment.*
- s. *Former Fuss & O'Neill Comments: HR 290-7.A.6. The applicant should provide information for the project accounting for frozen ground conditions. / The applicant removed infiltration, thus reducing impacts due to frozen ground conditions. The applicant should coordinate with the Town Engineer to confirm if the installation of a small diameter vertical pipe to allow infiltration is needed to address these conditions.*
Current Fuss & O'Neill Comment: The applicant has removed infiltration from the design and confirmed that a vertical pipe is not needed. No further Fuss & O'Neill comment.
- v. *Former Fuss & O'Neill Comments: HR 290-7.B.13. The applicant should provide certified soils and wetland scientist stamps upon Plan Sheet SS-1, Sheet 4./ The latest plans received have not been stamped.*
Current Fuss & O'Neill Comment: The applicant has provided soils and wetland stamps on the appropriate plans. No further Fuss & O'Neill comment.
- aa. *Former Fuss & O'Neill Comments: ETGTD 930.1. The applicant should provide a trench detail for the proposed drainage in relation to the reduced cover./ Once the applicant coordinates with the Town Engineer on required pipe material and cover, the applicant should note the pipe material within the trench detail on Plan Sheet D-4.*
Current Fuss & O'Neill Comment: The applicant has provided a trench detail on Plan Sheet D-4 that shows RCP with 2.5' min cover. No further Fuss & O'Neill comment.
- ab. *Former Fuss & O'Neill Comments: ETGTD 930.7. We note the Town requirement of cascade (high capacity) grates on all slopes greater than 5.0%. With the roadway design at 4.6%, the applicant should consider implementing cascade grates in CB-1 and CB-2 as to help collect stormwater early in the flow path and potentially reduce gutter bypass from CB-1 and CB-2. / The applicant notes "High-capacity grates will be used where the Town/NHDES deems necessary." The applicant should coordinate with the Town on the exact location of the high-capacity grates and implement the locations into the plan set.*
Current Fuss & O'Neill Comment: The applicant has revised site to be 2.0% road grade, high-capacity grates are not required. No further Fuss & O'Neill comment.
- ae. *Former Fuss & O'Neill Comments: ETGTD 930.11. The applicant should review roadway spread calculations at the low point of CB-5 and CB-6 and review with the Town Engineer. If calculations determine additional grate area is necessary for stormwater collection, the applicant should review with the Town Engineer if a double catch basin is warranted in this particular situation. / The applicant notes "Double grate catch basins will be used where the Town/NHDES deems necessary." The applicant should coordinate with the Town on the exact location of the double grate catch basins and implement the locations into the plan set. The applicant should provide roadway spread calculations if required by the Town.*
Current Fuss & O'Neill Comment: The applicant has provided calculations, and we note with the grade changes, double grate catch basins are no longer needed. No further Fuss & O'Neill comment.
- aj. *Former Fuss & O'Neill Comment: HR 290.7.B. We note the latest plan set does not show the full site/property in regard to the eastern portion of the site near Basin 1 and the downstream information on the Site Plan and Grading Plan. The Erosion and Sediment Control Plan Sheet ESC-1 illustrates Basin 1 but does not note proposed contours or dimensions of the downstream swale. Detail Plan Sheet D-5*

Ms. Brooke Dubowik

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illustrates Basin 1 but does not provide information on the downstream swale. The applicant should provide additional illustrations of site and grading information for Basin 1, the downstream swale, and any other design features.

Current Fuss & O'Neill Comment: The applicant has provided downstream information. No further Fuss & O'Neill comment.

6. Sewer/Water Design/Conflicts & Utility Design/Conflicts (HR 276-13.E.)

- i. *Former Fuss & O'Neill Comments: ETGTD Section 830.1.1. The applicant is proposing ¾" diameter water service pipe. The standard requires 1" minimum. Also, the service connection detail shows a 2" water service pipe. / The applicant has revised the service size in the plan notes. We continue to recommend the labeling of the detail be revised from 1¼ - 2" service to say 1" service.*

Current Fuss & O'Neill Comment: The applicant has revised the details. No further Fuss & O'Neill comment.

Please feel free to call if you have any questions.

Very truly yours,



Steven W. Reichert, PE

SWR:elc

Enclosure

cc: Town of Hudson Engineering Division – File
Hess Engineering & Construction Consultants - whess@hessengineeringllc.com



Town of Hudson Planning Board Review Taybre Drive Subdivision Plan, 9 Alvirne Drive

Prepared For:

M.R. LACASSE HOMES, LLC
9 Scenic Lane
Hudson, NH 03051

Project:

Taybre Drive Subdivision
9 Alvirne Drive
Hudson, NH 03051

Date:

08/27/2025

Revised:

09/19/2025

Prepared By:

Hess Engineering & Construction Consultants
P.O. Box 991
Ashland, NH 03217



September 17th, 2025

Mr. Jay Minkarah
Acting Town Planner
Town of Hudson
12 School Street
Hudson, NH 03051

RE: **Town of Hudson Planning Board Review
Taybre Drive Subdivision Plan, 9 Alvirne Drive
Tax Map 128, Lots 82 & 88
Fuss & O'Neill Memo #2 Response**

Dear Mr. Jay Minkarah,

Hess Engineering & Construction Consultants has reviewed and responded to the comments made by Fuss & O'Neill dated September 17th, 2025 regarding the Taybre Drive Subdivision on 9 Alvirne Drive. Below, you will find the comments made by Fuss & O'Neill followed by our response in red. Comments from the Town of Hudson Engineering and Public Works Departments, dated September 2, 2025, have been addressed in a similar fashion.

If you have any further questions, do not hesitate to contact Will Hess or the Hess Engineering & Construction Consultants office. We can be reached at (603) 968-5664 or by email at whess@hessengineeringllc.com.

Best,

Will Hess, PE
Principal
Hess Engineering & Construction Consultants, LLC
63 West Street
P.O. Box 991
Ashland, NH 03217



September 17, 2025

Mr. Jay Minkarah
Acting Town Planner
Town of Hudson
12 School Street
Hudson, NH 03051

RE: Town of Hudson Planning Board Review
Taybre Drive Subdivision Plan, 9 Alvirne Drive
Tax Map 138, Lots 82 & 88, Acct. #1350-745
Fuss & O'Neill Reference No. 20030249.2490

Dear Mr. Minkarah:

Fuss & O'Neill, Inc. has reviewed the revised second submission of the materials related to the above-referenced project which was received on September 3, 2025. Authorization to proceed was received on September 3, 2025. A list of items reviewed is enclosed. The scope of our review is based on the Subdivision Plan Review Codes, Stormwater Codes, Driveway Review Codes, Sewer Use Ordinance 77, Zoning Regulations, and criteria outlined in the CLD Consulting Engineers Proposal approved September 16, 2003, revised September 20, 2004, June 4, 2007, September 3, 2008, and October 2015. Note that Fuss & O'Neill began a review of a previous submission of review materials which were received on July 29, 2025. At the request of the applicant we suspended that review, and the comments below reflect our review of the materials received on September 3.

The project consists of subdividing lots 82 and 88 and creating a nine (9)-lot subdivision out of the 14.92-acre existing lots. A new roadway with a cul-de-sac is also proposed as part of the subdivision. The subject lots are proposed to be serviced by individual subsurface disposal systems and connected to Town water.

The following items have outstanding issues:

1. Administrative and Subdivision Review Codes (HR 276 & HR 289)

- a. *Former Fuss & O'Neill Comment: Hudson Regulation (HR) 276-7. The applicant has not noted any waivers requested on the plan set.*

Current Fuss & O'Neill Comment: The applicant has provided waiver request letters. The applicant should note the waivers on the plan set.

The waiver requests have been put on the Site Plan.

- b. *Former Fuss & O'Neill Comment: HR 276-11.B.(2). The applicant has provided multiple plans at a scale of 1"=100' where the maximum scale allowed is 1"=50'.*

Current Fuss & O'Neill Comment: The applicant has stated that the Existing Conditions Plan will remain at 1"=100'. The applicant should review the need for a waiver.

The applicant has reviewed the need for a waiver and does not believe that one is warranted. The intention behind the regulation is for portions of the tract being proposed for development – per HR 276-



11B.2(2). The plans detailing the development and subdivision are all at the required scale. The larger scale is required to show the entire subject parcel on one sheet for the boundary survey.

- h. **Former/Current Fuss & O'Neill Comment:** HR 289-22. The applicant has not proposed any specific open spaces on the plan set. Per the Regulation the Planning Board shall review the plan for open space requirements, which shall generally consist of 10% or less of the total area, and if required this open space shall be deeded to the Town of Hudson and be so indicated on the final subdivision plan.

This is correct. This is not the applicant's decision. Open spaces are currently proposed on the cul-de-sac island. This area is less than 10% as stated above.

- i. *Former Fuss & O'Neill Comment: HR 289-23. We note that the applicant has not noted any natural features to be preserved on the plan set.*

Current Fuss & O'Neill Comment: The applicant has added a note to the plans noting that there are no proposed impacts to the wetlands. The applicant should provide additional information related to tree lines and natural buffers for the site.

The proposed treeline line type has been revised to better distinguish it from the existing tree line. Additionally, a 15' vegetative buffer has been shown on the northern property bound. This can be seen in the site plan.

- j. **Former/Current Fuss & O'Neill Comment:** HR 289-26.B.(3). The applicant has shown an existing utility easement at the end of the Mansfield Drive cul-de-sac which connects to proposed utility easements extending through to Taybre Drive. Copies of the existing and proposed easements were not included in the review package.

A copy of the existing easement has been added to the associated Dropbox folder. This link has been shared with Fuss & O'Neill by the Town of Hudson. The proposed easement will be written by the applicant's attorney.

2. Driveway Review Codes (HR 193-10)

- a. *Former Fuss & O'Neill Comment: HR 193-10.A. & 193-10.E. The applicant has shown the location of a proposed driveway for each proposed lot on the plan set. The applicant has not provided sight distance information for the driveways on the plan set.*

Current Fuss & O'Neill Comment: The applicant has stated that driveway sight distance will be provided at the time of driveway permitting. We note that the Town has requested it as part of the subdivision review. It is important to provide this information showing that a driveway at each lot has the ability to meet the Town's requirements.

At a meeting on September 8th, 2025 in the B.O.S. room between the applicant, applicant's agent, and the town engineer and staff, it was established that the sight distance would be verified for the first two properties. This has been addressed in the new sheets SD-2 and SD-3.

3. Roadway Design



- d. *Former Fuss & O'Neill Comment: HR 289-18.A.4. The applicant should provide more information regarding drainage within the center of the cul-de-sac, and review with the Planning Board for any required landscaping for this area as well.*

Current Fuss & O'Neill Comment: The applicant has shown grading for the cul-da-sac. We note that no landscaping has been proposed.

We note that the landscaping has been proposed on sheet xsct-1 as shown with 6" of loam and seed.

- h. *Former Fuss & O'Neill Comment: HR 289-18.E. The applicant has not provided any sight distance information for the proposed roadway intersection at Alvirne Drive.*

Current Fuss & O'Neill Comment: The applicant has provided sight distance information. We note that the sight lines to both the east and west are at the edge of existing tree lines and may be obscured by vegetation when constructed and into the future. The applicant should consider additional clearing of vegetation within the Town's right-of-way to ensure sight lines are maintained. Also, the sight distance shown to the west does not meet the 400 feet required by Hudson Engineering Technical Guidelines & Typical Details Section 525.3 (375' is shown).

Sheet SD-1 and the proposed tree line has been adjusted to meet the 400' sight distance requirement.

- m. **Former/Current Fuss & O'Neill Comment:** HR 289-18.Y. The applicant has not proposed a 2% slope from the edge of pavement at the Alvirne Drive intersection for the first 100 feet of the roadway as required by the Regulation.

We disagree with the interpretation of HR 289-18.Y. stating that the first 100' of roadway must be a constant 2% slope from the edge of pavement.

*HR 289-18.Y: All proposed streets shall be designed with **intersections of not more than two-percent slope for a distance of 100 feet from the edge of pavement of the intersection to the first point of vertical curvature**. The center line of the intersecting streets shall intersect one another as near to a ninety-degree angle as possible but not less than 60°.*

*The bold portion is the 2% that is being referenced. This regulation clearly states that 2% is the **maximum** percent slope that the roadway can be for the first 100 feet from the edge of pavement of the intersection to the first point of vertical curvature. We have modified the previous design to meet the request for the initial intersection to be 2% but find this reading of the regulation to be counter to the intended design.*

4. **Drainage Design /Stormwater** Management (HR 289-20.C. /Chapter 290)

- b. *Former Fuss & O'Neill Comment: HR 289-20.A.2. The design plans illustrate positive drainage away from the proposed residence at lot 88-4. Plans show the cut-de-sac stormwater sheet-flowing north, and the driveway pitching south, with a vertical separation of only 0.6'. We note most lot grades provide a difference of 1.0' to 2.0' from pavement grade to garage grade. Due to the potentially large amount of runoff from the cut-de-sac directed toward lot 88-4 garage, the applicant should provide a greater separation than the 0.6' designed.*



Current Fuss & O'Neill Comment: The garage is designed to be at 174.4' and the profile plan scales to be an elevation of 174.0' at the driveway. The grading plan illustrates the 50'+ long driveway is to be graded at 1.0%, resulting in an approximate 0.5' elevation difference. There is less elevation change in the latest design than the initial design. The applicant should review the original comment and provide a greater separation than the 0.5' designed.

It should be noted that the house in question is the highest house in the entire proposed subdivision. Furthermore, the roadway is sloped 2% perpendicular to the driveway crossing. This means that water would flow away from the driveway intersection. We have amended the driveway to be 2% and have 1' of vertical separation from the roadway intersection.

- C. *Former Fuss & O'Neill Comment: HR 289-20.C.1. The applicant should provide a similar comparison table of runoff volumes to ensure no net increase for all storms analyzed.*

Current Fuss & O'Neill Comment: The applicant provided comparison tables of only Flow Rates in the Stormwater Management Report dated August 27, 2025, and did not provide the requested runoff volumes comparison tables. The applicant should provide the requested volume comparison tables.

Tables 1-2: Summary of Volumes

POI – POINT OF INTEREST

Table 1: 2R

Storm Frequency	Pre-development Volume (af)	Post-development Volume (af)
2-Year	0.017	0.013
10-Year	0.077	0.054
25-Year	0.146	0.100
50-Year	0.224	0.152

POI – POINT OF INTEREST

Table 2: 4R

Storm Frequency	Pre-development Volume (af)	Post-development Volume (af)
2-Year	0.00	0.00
10-Year	0.00	0.00
25-Year	0.001	0.001
50-Year	0.001	0.001

POI – POINT OF INTEREST

Table 3: 6R

Storm Frequency	Pre-development Volume (af)	Post-development Volume (af)
2-Year	0.00	0.00
10-Year	0.001	0.001
25-Year	0.004	0.004
50-Year	0.01	0.01



POI – POINT OF INTEREST

Table 4: 8R

Storm Frequency	Pre-development Volume (af)	Post-development Volume (af)
2-Year	0.156	0.223
10-Year	0.562	0.754
25-Year	1.016	1.337
50-Year	1.534	1.978

- d. *Former Fuss & O'Neill Comment: HR 289-20.C.3. The applicant should provide test pit locations upon the Proposed Grading and Drainage Plans P-1 and P-2.*

Current Fuss & O'Neill Comment: The applicant has provided test pit locations upon the plan set. We note that the applicant has marked the locations with an "x", we recommend that a more specific symbol be used and added to the legend.

A new test pit symbol has replaced the "X" seen on the plans. It has been incorporated into the cover sheet legend as well.

- f. *Former Fuss & O'Neill Comment: HR 290-5.A.4. The applicant should provide the GRV BMP worksheet illustrating required GRV is met.*

Current Fuss & O'Neill Comment: The applicant provided only a BMP worksheet for Basin 1 (29P) in the Stormwater Management Report dated August 27, 2025, and did not provide the requested GRV worksheet. We note a waiver has been requested by the applicant, who should provide the requested GRV worksheet if a waiver is not granted.

We have not provided a GRV worksheet as we are not currently proposing any formal infiltration practices.

- g. *Former Fuss & O'Neill Comment: HR 290-5.A.11. The applicant should coordinate the pre- and post-development areas within HydroCAD to be exactly the same.*

Current Fuss & O'Neill Comment: The applicant has not provided a routing diagram or area/cover summary provided within the Stormwater Management Report dated August 27, 2025. We are unable to confirm whether areas provided in the Stormwater Management Report dated August 27, 2025, match from pre- to post-development. We note the pre- and post-development areas within HydroCAD should match. The applicant should review with NHDES AoT if the previously noted discrepancy is acceptable and meets NHDES Stormwater Review regulations.

The areas have been altered to match exactly. It should be reiterated that this was not commented on by the NHDES AOT review. The area changes did not impact the flows or volumes.

- j. *Former Fuss & O'Neill Comment: HR 290-5.A.11. The applicant should provide elevations for the Basin 1 weir elevations on Plan Sheet D-5.*

Current Fuss & O'Neill Comment: The applicant has provided a weir detail on Plan Sheet D-5. The HydroCAD notes a "V Notch" to have a 1.5' height with a 1.5' width, while the Concrete Weir Outlet on



Plan Sheet D-5 depicts the "V Notch" to have a 1.35' height and 1.75 width. The applicant should coordinate the HydroCAD and detail accordingly.

The detail has been adjusted to match the dimensions used in HydroCAD.

- m. *Former Fuss & O'Neill Comment: HR 290-5.A.11. The applicant should provide landscaping/seeding information for the floor and side slopes of the basins. Plantings and grass mix must be able to be inundated by stormwater for up to 72 hours.*

Current Fuss & O'Neill Comment: The applicant should ensure the note is on Detail Sheet D-5.

This note has been added to D-5.

- n. *Former Fuss & O'Neill Comment: HR 290-5.A.11. The applicant should keep the Town informed of all communications with NHDES in relation to the required Alteration of Terrain Permit being requested to ensure NHDES comments/requirements do not alter drainage design/calculations.*

Current Fuss & O'Neill Comment: The Alteration of Terrain Permit is still outstanding.

All correspondence with NHDES has been shared with the Town of Hudson and will continue to be shared with the Town of Hudson.

- p. *Former Fuss & O'Neill Comment: HR 290-5.B.1.b. The applicant should provide support material or calculations showing the required 80% TSS and 50% TP pollutant removals.*

Current Fuss & O'Neill Comment: The applicant should provide the discussed graphs from UNHSC, in the previously submitted AoT RMFI dated 7/24/2025.

The UNHSC graphs have been submitted. As we are no longer proposing an infiltration basin, only one graph for the wet pond has been provided.

- s. *Former Fuss & O'Neill Comment: HR 290-7.A.6. The applicant should provide information for the project accounting for frozen ground conditions.*

Current Fuss & O'Neill Comment: The applicant removed infiltration, thus reducing impacts due to frozen ground conditions. The applicant should coordinate with the Town Engineer to confirm if the installation of a small diameter vertical pipe to allow infiltration is needed to address these conditions.

There are no currently proposed infiltration basins as noted in the above comment. Therefore, there would not be any locations to install a small diameter vertical pipe to allow infiltration as we are not proposing any systems reliant on infiltration to function.

- v. *Former Fuss & O'Neill Comment: HR 290-7.B.13. The applicant should provide certified soils and wetland scientist stamps upon Plan Sheet SS-1, Sheet 4.*

Current Fuss & O'Neill Comment: The latest plans received have not been stamped.

Stamps have been added to sheets SS-1 and SS-2. Please note that these are not part of the plan set and have not been included in the cover sheet. Additionally, H-1 and H-2 have been removed as SS-1 and SS-2 provide the same information.

- y. **Former/Current Fuss & O'Neill Comment:** HR 290-7.B.5. The applicant should coordinate with the Town if additional documentation is required to establish an HOA for the stormwater long term



maintenance and inspection requirements.

There is no proposition to establish an HOA for the stormwater long term maintenance and inspection. The Town of Hudson will be responsible for the BMPs on the Town property and easements. The individual homeowners will be responsible for the maintenance of any other drainage BMPs on their property.

- z. *Former Fuss & O'Neill Comment: Engineering Technical Guidelines and Typical Details (ETGTD) 930.1. We note the applicant has discussed with the Town Engineer to allow 2.0' of cover rather than the required 4.0' of cover for drainage pipe. The applicant should discuss if HDPE is allowed with this reduced cover, or if RCP is required in situations of reduced cover to help reduce heaving and 'floating' of pipes from frozen ground and high-water table situations.*
Current Fuss & O'Neill Comment: The applicant should coordinate with the Town Engineer on pipe material allowed and reduced cover.

The Town Engineer has rescinded the previously agreed upon depth of cover. All pipes have been made RCP including those with over 4' of cover.

- aa. *Former Fuss & O'Neill Comment: ETGTD 930.1. The applicant should provide a trench detail for the proposed drainage in relation to the reduced cover.*
Current Fuss & O'Neill Comment: Once the applicant coordinates with the Town Engineer on required pipe material and cover, the applicant should note the pipe material within the trench detail on Plan Sheet D-4.

The pipe material (RCP) has been noted on D-4.

- ab. *Former Fuss & O'Neill Comment: ETGTD 930.7. We note the Town requirement of cascade (high capacity) grates on all slopes greater than 5.0%. With the roadway design at 4.6%, the applicant should consider implementing cascade grates in CB-1 and CB-2 as to help collect stormwater early in the flow path and potentially reduce gutter bypass from CB-1 and CB-2.*
Current Fuss & O'Neill Comment: The applicant notes "High-capacity grates will be used where the Town/NHDES deems necessary." The applicant should coordinate with the Town on the exact location of the high-capacity grates and implement the locations into the plan set.

The roadway has been revised to be a constant 2%. There is no bypass based on the flows to each catch basin even on the larger storm events.

- ae. *Former Fuss & O'Neill Comment: ETGTD 930.11. The applicant should review roadway spread calculations at the low point of CB-5 and CB-6 and review with the Town Engineer. If calculations determine additional grate area is necessary for stormwater collection, the applicant should review with the Town Engineer if a double catch basin is warranted in this particular situation.*
Current Fuss & O'Neill Comment: The applicant notes "Double grate catch basins will be used where the Town/NHDES deems necessary." The applicant should coordinate with the Town on the exact location of the double grate catch basins and implement the locations into the plan set. The applicant should provide roadway spread calculations if required by the Town.



$$T = \left[\frac{nQ}{0.56S_x^{1.67} \sqrt{S_L}} \right]^{0.375}$$

Where,

T = Spread, feet

Q = Total gutter flow, ft³/s

n = Manning's coefficient

S_x = Cross slope of gutter, ft/ft

S_L = Longitudinal slope of gutter, ft/ft

$$T = \left[\frac{0.013(1.07 \text{ ft}^3/\text{s})}{0.56(0.03 \frac{\text{ft}}{\text{ft}})^{1.67} \sqrt{(0.02 \frac{\text{ft}}{\text{ft}})}} \right]^{0.375}, T = 4.68'$$

As all catch basins are at 2% longitudinal slope with 3% cross slope, only the catch basin with the highest Q was computed. The highest Q was found at CB-3 with a flow of 1.07 ft³/s Manning's n value was pulled from the HEC No. 22 Table 4-3 Asphalt Pavement: Smooth texture (0.013). The calculated value is well within the acceptable range.

It should be noted that the regulation being cited specifies that double catch basin grates are not typically allowed.

ag. *Former Fuss & O'Neill Comment: We recommend the applicant review the need for fencing around stormwater basins, particularly Basin 1 which is proposed to have standing water.*

Current Fuss & O'Neill Comment: With the proposed basins possibly becoming Town maintained, the applicant should review with the Town Engineer on the preferred fence height/material/placement. We note that NHDES Regulations will not govern a Town warranted fence.

Planning board or Town engineer has not requested fencing, if planning board does request fencing – it can be a condition of approval and material/dimensions can be discussed with the Town Engineer and DPW director.

aj. **New Fuss & O'Neill Comment:** HR 290.7.B. We note the latest plan set does not show the full site/property in regard to the eastern portion of the site near Basin 1 and the downstream information on the Site Plan and Grading Plan. The Erosion and Sediment Control Plan Sheet ESC-1 illustrates Basin 1 but does not note proposed contours or dimensions of the downstream swale. Detail Plan Sheet D-5 illustrates Basin 1 but does not provide information on the downstream swale. The applicant should provide additional illustrations of site and grading information for Basin 1, the downstream swale, and any other design features.

D-5 has been amended to include the downstream swale. Spot grades and proposed contours



provide grading information about the swale.

6. Sewer/Water Design/Conflicts & Utility Design/Conflicts (HR 276-13.E.)

- e. Former Fuss & O'Neill Comment: HR 276-13.G. The applicant has not provided any information about septic systems for the proposed lots. The applicant has noted a NHDES Subdivision Approval number on the plan set. The applicant should provide typical design details on the plan.

Current Fuss & O'Neill Comment: The applicant has noted that septic designs will be provided at the time of individual lot development. We continue to note that the Regulation requires a typical detail be provided for the systems.

Shown on the plans is an enviro septic with a sized field and tank. Further design will be done at the time of applying for the state septic approval.

- i. Former Fuss & O'Neill Comment: ETGTD Section 830.1.1. The applicant is proposing " diameter water service pipe. The standard requires 1" minimum. Also, the service connection detail shows a 2" water service pipe.

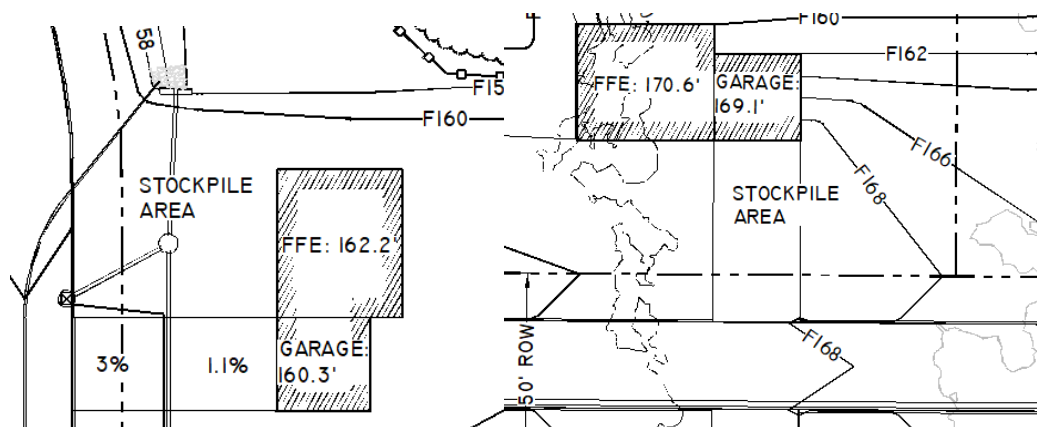
Current Fuss & O'Neill Comment: The applicant has revised the service size in the plan notes. We continue to recommend the labeling of the detail be revised from 1 - 2" service to say 1" service.

This has been changed to be 1".

7. Erosion Control/Wetland Impacts

- a. Former Fuss & O'Neill Comment: ETGTD 920.4.1. & 920.4.2. The applicant should show stockpile and equipment storage locations on the plan.

Current Fuss & O'Neill Comment: The applicant has noted that these locations were on a previous submission. We note that they are not provided on the current plan set. The applicant should show the locations on the plan set.



The stockpile locations are located on ESC-1. Please note the above images.

9. Other

- b. Former Fuss & O'Neill Comment: The applicant has not shown a curb ramp with a detectable warning device at the end of the proposed sidewalk at Alvirne Drive not at the eastern end of the sidewalk at the



cut-de-sac. A detail for construction of the sidewalk tip downs was not included in the plans either.

Current Fuss & O'Neill Comment: The applicant has added a detail for the curb ramps with detectable warning device. The applicant should label the proposed locations on the plan.

There is no proposed crosswalk or crossing for the ADA detectable warning device. A detail was provided upon request – however as the sidewalk notably does not lead anywhere, it would be malicious compliance to place a device signifying a destination to go to.



The following items require Town evaluation or input:

1. Administrative and Subdivision Review Codes (HR 276 & HR 289)

- I. *Former Fuss & O'Neill Comment: HR 289-37.A. The applicant has not provided phasing information for the proposed subdivision. We note that per the Regulation 50% of the proposed lots can be given Final Approval in one year.*

Current Fuss & O'Neill Comment: The applicant has requested a waiver from this requirement.

All other items Fuss & O'Neill said have been resolved or have no further comments.

From: Dubowik, Brooke <bdubowik@hudsonnh.gov>
Sent: Tuesday, September 2, 2025 4:26 PM
To: Ian Desmarais
Cc: William Hess
Subject: FW: August 13th Planning Board Meeting - Alvirne Drive Subdivision.

Hi Ian,
Below are the comments from DPW.
Please let me know if you have any questions.
Thank you,



TOWN OF HUDSON NH

Brooke Dubowik – Administrative Aide II
Planning Division
12 School Street
Hudson, NH 03051
(603) 886-6008

From: Twardosky, Jason <jtwardosky@hudsonnh.gov>
Sent: Tuesday, September 2, 2025 3:58 PM
To: Dhima, Elvis <edhima@hudsonnh.gov>; Dubowik, Brooke <bdubowik@hudsonnh.gov>
Cc: 'sreichert@fando.com' <sreichert@fando.com>; Gradert Benjamin <bgradert@hudsonnh.gov>; Kirkland, Donald <dkirkland@hudsonnh.gov>
Subject: RE: August 13th Planning Board Meeting - Alvirne Drive Subdivision.

Waiver Request Comments

Waiver Requests #1 s #2

Public Works does not recommend approval of these waivers and concurs with the Town Engineers comments.

Please see Engineering comments.

Waiver Request #3

Public Works does not recommend approval of this waiver unless there is a maintenance easement provided AND waivers #1 C #2 are granted.

Please see Fuss & O'Neill comments, responses, and amended waivers.

Waiver Request #4

Public Works has no objection as long as NHDES grants a corresponding waiver.

See Engineering comments.

Waiver Request #5

Public Works has no objection to this waiver.

Public Works has no interest in maintaining open swales when closed drainage is the best, most

efficient option. Open Swales and a lack of curbing have historically lead to excessive maintenance issues for Public Works. We believe, from our own experience, and abutter's comments, that due to the tendency for this site to have unusually high groundwater levels and no underdrain, deleting any curbing or storm drains, would accelerate deterioration of the roadway. We believe a fully enclosed system is attainable at this site.

Public Works Concurs with the Engineering Departments comments

See Engineering comments.



TOWN OF HUDSON NH

Jason Twardosky - DPW Director
2 Constitution Dr.
Hudson, NH 03051
(603) 886-6018

From: Dhima, Elvis <edhima@hudsonnh.gov>
Sent: Tuesday, September 2, 2025 2:42 PM
To: Dubowik, Brooke <bdubowik@hudsonnh.gov>
Cc: 'sreichert@fando.com' <sreichert@fando.com>; Twardosky, Jason <jtwardosky@hudsonnh.gov>; Gradert Benjamin <bgradert@hudsonnh.gov>; Kirkland, Donald <dkirkland@hudsonnh.gov>
Subject: RE: August 13th Planning Board Meeting - Alvirne Drive Subdivision.

Brooke

Below are my comments related to the items on their transmittal

1h. Applicant's response does not appear to address this item.

HR 289-22 Open Spaces.

Before approval of a SUBDIVISION PLAN, the BOARD shall review said PLAN for open space requirements to consist of parks, playgrounds or permanently reserved open space. The open space shall not be unreasonable in area and generally shall consist of 10% or less of the total area. Open space areas shall be deeded to the TOWN OF HUDSON and shall be so indicated on the final SUBDIVISION PLAN.

This regulation specifically calls for the *BOARD* to review the plan – the board has not mentioned or specified the necessity of an open space requirement thus far.

- h. **Former/Current Fuss & O'Neill Comment:** HR 289-22. The applicant has not proposed any specific open spaces on the plan set. Per the Regulation the Planning Board shall review the plan for open space requirements, which shall generally consist of 10% or less of the total area, and if required this open space shall be deeded to the Town of Hudson and be so indicated on the final subdivision plan.

This is correct. This is not the applicant's decision. Open spaces are currently proposed on the cul-de-sac island. This area is less than 10% as stated above.

1i. This comment has not been addressed. Please note, this comment relates to the existing tree line and natural buffer, not to wetlands or wetland buffers.

§ 289-23 Natural features.

Due regard shall be shown for all natural features, such as large trees, watercourses, scenic points, historic spots and similar community assets which, if preserved, shall add attractiveness and value to the SUBDIVISION.

As this site has been logged previously, there is a noticeable absence of large trees. The wetlands would be the closest ecological asset to a water course. There are no scenic points or known historic spots or similar community assets outside of the aforementioned land to be preserved. We therefore believe that we have properly responded to this comment. We would also argue that this regulation is pertaining to the preservation of important ecological features (i.e. watercourses, which are wetlands).

Former Fuss & O'Neill Comment: HR 289-23. We note that the applicant has not noted any natural features to be preserved on the plan set.

Current Fuss & O'Neill Comment: The applicant has added a note to the plans noting that there are no proposed impacts to the wetlands. The applicant should provide additional information related to tree lines and natural buffers for the site.

The proposed treeline line type has been revised to better distinguish it from the existing tree line. Additionally, a 15' vegetative buffer has been shown on the northern property bound. This can be seen in the site plan.

2a. Applicant shall provide driveway sight distance at this time, not at a later stage.

The safe site distance for the lots agreed upon in the 9/8/25 meeting was incorporated into the plan set. However, it should be noted that the regulation cited in comment 2a specifically states this be done at the time of the driveway permit.

3l. Applicant shall refer to staff by title, not by name. The sidewalk layout appears adequate and consistent with past practices.

The Planning Board may consider accepting an equal value contribution, in lieu of construction, to be deposited into the pre-established sidewalk account for repairs, maintenance, and new sidewalks.

The Engineering Department does not support removal of sidewalks on the basis of being unnecessary or aesthetically displeasing.

In addition, the applicant shall provide a mailbox detail.

Fuss & O'Neill have marked this comment as being addressed. If the account is set up, then an equal value contribution is acceptable.

4g. Applicant has not addressed this item. Please revise and resubmit the drainage report so that pre- and post-development areas match 100%.

The areas have been corrected. Please see the revised drainage report.

4n. Applicant shall add a stipulation requiring that plans be recorded only after the AOT permit is issued. A stipulation shall also be added requiring the applicant to return to the Planning Board if the AOT permitting process results in significant changes.

This stipulation can be added; however, the applicant **MUST** follow the requirements set by the NHDES AOT permit and cannot alter them without permission from the NHDES. This is a state statute, which takes precedence (unless the town's requirements are more restrictive, in which case, the NHDES would have no issue with them.)

4s. This item has not been addressed. Applicant shall consider adding a small-diameter vertical pipe to allow infiltration during frozen ground conditions.

Former Fuss & O'Neill Comment: HR 290-7.A.6. The applicant should provide information for the project accounting for frozen ground conditions.

Current Fuss & O'Neill Comment: The applicant removed infiltration, thus reducing impacts due to frozen ground conditions. The applicant should coordinate with the Town Engineer to confirm if the installation of a small diameter vertical pipe to allow infiltration is needed to address these conditions.

There are no currently proposed infiltration basins as noted in the above comment. Therefore, there would not be any locations to install a small diameter vertical pipe to allow infiltration as we are not proposing any systems reliant on infiltration to function.

4y, 4ab, 4ae, 6e. Applicant shall refer to staff by title, not by name.

These have been amended.

4ae. The applicant shall also provide calculations, as requested by FCO, to demonstrate that double catch basins are adequate.

Former Fuss & O'Neill Comment: ETGTD 930.11. The applicant should review roadway spread calculations

at the low point of CB-5 and CB-6 and review with the Town Engineer. If calculations determine additional grate area is necessary for stormwater collection, the applicant should review with the Town Engineer if a double catch basin is warranted in this particular situation.

Current Fuss & O'Neill Comment: The applicant notes "Double grate catch basins will be used where the Town/NHDES deems necessary." The applicant should coordinate with the Town on the exact location of the double grate catch basins and implement the locations into the plan set. The applicant should provide roadway spread calculations if required by the Town.

$$T = \left[\frac{nQ}{0.56S_x^{1.67} \sqrt{S_L}} \right]^{0.375}$$

Where,

T = Spread, feet

Q = Total gutter flow, ft³/s

n = Manning's coefficient

S_x = Cross slope of gutter, ft/ft

S_L = Longitudinal slope of gutter, ft/ft

$$T = \left[\frac{0.013(1.07 \text{ ft}^3/\text{s})}{0.56(0.03 \frac{\text{ft}}{\text{ft}})^{1.67} \sqrt{(0.02 \frac{\text{ft}}{\text{ft}})}} \right]^{0.375}, T = 4.68'$$

As all catch basins are at 2% longitudinal slope with 3% cross slope, only the catch basin with the highest Q was computed. The highest Q was found at CB-3 with a flow of 1.07 ft³/s Manning's n value was pulled from the HEC No. 22 Table 4-3 Asphalt Pavement: Smooth texture (0.013). The calculated value is well within the acceptable range.

It should be noted that the regulation being cited specifies that double catch basin grates are not typically allowed.

Waiver Request Comments

Waiver Requests #1 s #2

The Engineering Department does not recommend approval of these waivers. Approval would result in significant long-term maintenance costs for the Town and reduced pedestrian safety due to the absence of required curbing.

The waivers have been amended to incorporate all of the issues discussed during the

9/8/25 meeting.

Waiver Request #3

The Engineering Department does not recommend approval of this waiver unless the applicant provides an access/maintenance easement and the Department of Public Works has no objections.

Given that this is in the Town ROW, no easement would be necessary. Swales are outside of the Town ROW.

Waiver Request #4

The Engineering Department has no objection to this waiver, provided the applicant receives the corresponding waiver from NHDES.

We agree with this assessment. This is dependent on the NHDES response.

Waiver Request #5

The Engineering Department has no objection to this waiver.

No comment.

Engineering Department Comments

3. Applicant shall revise the drainage pipe design to achieve a minimum slope of 1.8% and a velocity of 2 feet per second. The Engineering Department will not support designs below these thresholds.

All pipes have been amended to comply with the new requirements. See the attached table.

5. The road profile indicates a cut within the first 125 feet of the road envelope. Considering the high water table on site, adjacent wet areas in the back, and abutters' testimony regarding groundwater, the applicant shall reevaluate this design.

A combination of high water table and lack of underdrain typically results in early road failures and unnecessary long-term costs for the Town.

Underdrains have been placed to comply with the town's request.

6. This item remains unaddressed. The Town has had repeated issues in the past with developers failing to hand over roads in a timely manner. Residents who pay property taxes reasonably expect the Town to plow and maintain their roads once developed.

The applicant agrees to the request.

Additional Comment: Applicant shall install wetland conservation markers, at 50-foot intervals, along lots 88-8 and 88-9.

These will be placed upon approval.

Summary

This plan set is in significantly better shape than the first submittal. However, based on the outstanding comments above, the Engineering Department does not recommend approval of this plan set at this time.

E



TOWN OF HUDSON NH

Elvis Dhima, P.E. – Town Engineer
12 School Street
Hudson, NH 03051
(603) 886-6008

From: Dubowik, Brooke <bdubowik@hudsonnh.gov>

Sent: Wednesday, August 27, 2025 3:43 PM

To: Dhima, Elvis <edhima@hudsonnh.gov>; Twardosky, Jason <jtwardosky@hudsonnh.gov>

Subject: FW: August 13th Planning Board Meeting - Alvirne Drive Subdivision.

Elvis/Jay,
Please see Ian's email below.
Thank you,



TOWN OF HUDSON NH

Brooke Dubowik – Administrative Aide II
Planning Division
12 School Street
Hudson, NH 03051
(603) 886-6008

From: Ian Desmarais <idesmarais@hessengineeringllc.com>

Attachment "D"

Sent: Wednesday, August 27, 2025 3:20 PM

To: Dubowik, Brooke <bdubowik@hudsonnh.gov>; Gradert Benjamin <bgradert@hudsonnh.gov>

Attachment "D"

Cc: michelrlacasse@gmail.com; William Hess <whess@hessengineeringllc.com>; Danielle Seufert <dseufert@hessengineeringllc.com>; 'Jay Minkarah' <JayM@nashuarpc.org>; Mario Focareto <mario@hessengineeringllc.com>

Subject: RE: August 13th Planning Board Meeting - Alvirne Drive Subdivision.

EXTERNAL: Do not open attachments or click links unless you recognize and trust the sender.

Hi Brooke,

Please see the Dropbox link below for the Engineering C DPW to review.

<https://www.dropbox.com/scl/fo/0ogr70doizqjsxpp84l3r/AAQGcMwXt1iXae1mkU3V95o?rlkey=jedpcy568dtrre9cc2g7c1b7aCst=dbiif1wwCdl=0>

The necessary documents are in the "Third Party Review Response and Revisions" folder.

Best,

Ian Desmarais

Project Engineer



603-968-5664

63 West St

P.O. Box 991

Ashland, NH 03217

<http://hessengineeringllc.com>

From: Dubowik, Brooke <bdubowik@hudsonnh.gov>

Sent: Friday, August 15, 2025 4:08 PM

To: Ian Desmarais <idesmarais@hessengineeringllc.com>; Gradert Benjamin <bgradert@hudsonnh.gov>

Cc: michelrlacasse@gmail.com; William Hess <whess@hessengineeringllc.com>; Danielle Seufert <dseufert@hessengineeringllc.com>; Dhima, Elvis <edhima@hudsonnh.gov>; 'Jay Minkarah' <JayM@nashuarpc.org>

Subject: RE: August 13th Planning Board Meeting - Alvirne Drive Subdivision.

Hi Ian,

Those deadlines are correct, but please keep in mind that we will need to review the new material before submittal.

Engineering C DPW will need to give the ok before this goes back to the board due to the changes.

Thank you,



TOWN OF HUDSON NH

Brooke Dubowik – Administrative Aide II
Planning Division
12 School Street
Hudson, NH 03051
(603) 886-6008

From: Ian Desmarais <idesmarais@hessengineeringllc.com>

Sent: Friday, August 15, 2025 3:56 PM

To: Dubowik, Brooke <bdubowik@hudsonnh.gov>; Gradert Benjamin <bgradert@hudsonnh.gov>

Cc: michelrlacasse@gmail.com; William Hess <whess@hessengineeringllc.com>; Danielle Seufert <dseufert@hessengineeringllc.com>; Dhima, Elvis <edhima@hudsonnh.gov>; 'Jay Minkarah' <JayM@nashuarpc.org>

Subject: RE: August 13th Planning Board Meeting - Alvirne Drive Subdivision.

EXTERNAL: Do not open attachments or click links unless you recognize and trust the sender.

Hi Brooke,

Yes, this is the schedule I was using that is posted on the planning page under Dates and Deadlines.

I would also like to verify that the September 24th meeting's due date is September 2nd, as listed below.

Schedule of Regular Board Meetings 2025

MEETING DATE	APPLICATION DEADLINE	MEETING DATE	APPLICATION DEADLINE
January 08, 2025	December 17, 2024	July 09, 2025	June 17, 2025
January 22, 2025	December 31, 2024	July 23, 2025	July 01, 2025
February 12, 2025	January 21, 2025	August 13, 2025	July 22, 2025
February 26, 2025	February 04, 2025	August 27, 2025	August 05, 2025
March 12, 2025	February 18, 2025	September 10, 2025	August 19, 2025
March 26, 2025	March 04, 2025	September 24, 2025	September 02, 2025
April 09, 2025	March 18, 2025	October 08, 2025	September 16, 2025
April 23, 2025	April 01, 2025	October 22, 2025	September 30, 2025
May 14, 2025	April 22, 2025	November 12, 2025	October 21, 2025
May 28, 2025	May 06, 2025		
June 11, 2025	May 20, 2025	December 10, 2025	November 18, 2025
June 25, 2025	June 03, 2025		

NOTES:

- All items required for a complete application must be submitted by **12:00 PM** on the application deadline day.
- Meetings are held on the second and fourth Wednesday of each month at **7:00 PM** in the

For either date, we will be submitting:

Hard copies:

- 15 11x17s of plan set
- 1 (22x34) plan set
- 1 copy of response letter and other documents addressing the board, such as waiver requests
- Abutter list
 - o 2 sets of abutters' labels
 - o Check for 17 1st class mailings (not certified mailings)

Digital Copies:

- Plan set
- Revised drainage report and associated data
- Revised AOT documents
- Fire plans
- Sight Distance plan
- All other supporting documents that have been modified

Best,

Ian Desmarais

Project Engineer



603-968-5664

63 West St

P.O. Box 991

Ashland, NH 03217

<http://hessengineeringllc.com>

From: Dubowik, Brooke <bdubowik@hudsonnh.gov>

Sent: Friday, August 15, 2025 1:36 PM

To: Ian Desmarais <idesmarais@hessengineeringllc.com>; Gradert Benjamin <bgradert@hudsonnh.gov>

Cc: michelrlacasse@gmail.com; William Hess <whess@hessengineeringllc.com>; Danielle Seufert <dseufert@hessengineeringllc.com>; Dhima, Elvis <edhima@hudsonnh.gov>; 'Jay Minkarah' <JayM@nashuarpc.org>

Subject: RE: August 13th Planning Board Meeting - Alvirne Drive Subdivision.

Hi Ian,

Are you looking at the September 10th meeting? I just want to confirm what meeting you are shooting for.

Thank you,



TOWN OF HUDSON NH

Brooke Dubowik – Administrative Aide II
Planning Division
12 School Street
Hudson, NH 03051
(603) 886-6008

From: Ian Desmarais <idesmarais@hessengineeringllc.com>

Sent: Friday, August 15, 2025 11:57 AM

To: Dubowik, Brooke <bdubowik@hudsonnh.gov>; Gradert Benjamin <bgradert@hudsonnh.gov>

Cc: michelrlacasse@gmail.com; William Hess <whess@hessengineeringllc.com>; Danielle Seufert <dseufert@hessengineeringllc.com>; Dhima, Elvis <edhima@hudsonnh.gov>; 'Jay Minkarah' <JayM@nashuarpc.org>

Subject: RE: August 13th Planning Board Meeting - Alvirne Drive Subdivision.

EXTERNAL: Do not open attachments or click links unless you recognize and trust the sender.

Hi Brooke,

I apologize for the delay in getting back to you. We are currently working through the requested revisions and hoping to be on the next agenda. When would the next deadline be?

From looking at the calendar, it looks like August 19th is the deadline for the next meeting. I would just like to confirm this.

I hope you all have a good weekend!

Best,

Ian Desmarais

Project Engineer



603-968-5664

63 West St

P.O. Box 991

Ashland, NH 03217

<http://hessengineeringllc.com>

From: Dubowik, Brooke <bdubowik@hudsonnh.gov>

Sent: Thursday, August 7, 2025 10:46 AM

To: Ian Desmarais <idesmarais@hessengineeringllc.com>; Gradert Benjamin <bgradert@hudsonnh.gov>

Cc: michelrlacasse@gmail.com; William Hess <whess@hessengineeringllc.com>; Danielle Seufert <dseufert@hessengineeringllc.com>; Dhima, Elvis <edhima@hudsonnh.gov>; 'Jay Minkarah' <JayM@nashuarpc.org>

Subject: RE: August 13th Planning Board Meeting - Alvirne Drive Subdivision.

Hi Ian,

Comment from Engineering, and Fire are attached. Elvis's comments include DPW, as they were discussed together. I do not have another comments at this time.

In order to be on the August 27th meeting, we would need all new/revised material submitted no later than Tuesday, August 12th @ 10:00 A.M. I would also request that the revised material be available to us via PDF prior to the deadline so that we can make sure it is ready for hard copies to be dropped off. Do you see this deadline as doable?

Thank you,



TOWN OF HUDSON NH

Brooke Dubowik – Administrative Aide II
Planning Division
12 School Street
Hudson, NH 03051
(603) 886-6008

From: Ian Desmarais <idesmarais@hessengineeringllc.com>

Sent: Thursday, July 31, 2025 4:02 PM

To: Dubowik, Brooke <bdubowik@hudsonnh.gov>; Gradert Benjamin <bgradert@hudsonnh.gov>

Cc: michelrlacasse@gmail.com; William Hess <whess@hessengineeringllc.com>; Danielle Seufert <dseufert@hessengineeringllc.com>

Subject: August 13th Planning Board Meeting - Alvirne Drive Subdivision.

EXTERNAL: Do not open attachments or click links unless you recognize and trust the sender.

Hi Brooke,

Due to the new comments we received from Engineering and Public Works, we would like to postpone until the next planning board meeting in August. This would be greatly appreciated.

I would also like to ask for any remaining comments we have not received. I spoke with the fire department in June, and they said that their comments were not included either. While I have made the requested changes and plans, I would still like to have a record for clarity – if that is possible. If not, no worries! I would also like to make sure that no other departments made comments.

We will incorporate the Engineering and Public Works comments into the response with their own letter. I will do the same with the fire department comments if provided.

If there is anything else that we need to do, please let me know.

I look forward to continuing to work with everyone!

Best,

Ian Desmarais

Project Engineer



603-968-5664

63 West St

P.O. Box 991

Ashland, NH 03217

<http://hessengineeringllc.com>

Dubowik, Brooke

From: Hebert, David
Sent: Tuesday, July 29, 2025 10:58 AM
To: Dubowik, Brooke; Dhima, Elvis; Twardosky, Jason
Cc: Gradert Benjamin; 'Jay Minkarah'
Subject: RE: 24009 Taybre Drive Subdivision - Hudson

Brooke, Fire is all set with revised plan



Dave Hebert
Fire Marshal
Hudson Fire Department
Inspectional Services Division

Town of Hudson | 12 School Street | Hudson, NH 03051
603-886-6005 (Main) | 603-816-1271 (Direct)

Dubowik, Brooke

From: Dhima, Elvis
Sent: Wednesday, October 8, 2025 3:02 PM
To: Dubowik, Brooke; 'William Hess'; 'Pat Panciocco'; Ian Desmarais
Cc: Mike Lacasse; Twardosky, Jason
Subject: RE: Taybre Drive Subdivision Notifications

Add these comments as well, from ENG

Please be precise and on point with the replies , when applicable

Waiver Request – General Comments

All waiver requests are still dated August 27th, the original submission date. They need to reflect the revised date of the second submission (September). This discrepancy has caused unnecessary confusion and wasted staff time when trying to track changes. The applicant must correct this and improve accuracy on the next submittal.

Waiver Request – Project Phasing

The status of this request is unclear. It is not evident whether the applicant intends to pursue the project in one phase or multiple phases, and no supporting documentation has been provided in the second submittal.

Waiver Request – Curb Cut

The Engineering Department has no objection to this request, provided that the applicant includes an acceptable detail for the curb cut and specifies erosion stone adjacent to it to prevent erosion.

Waiver Request – Grading

The Engineering Department has no objection to this request, contingent upon the Department of Public Works also having no objection. In addition, the applicant shall add a note to all swales located on private property stating that the homeowner is responsible for their maintenance and upkeep.

Waiver Request – Pipe Slope

The applicant meets the 2 ft/s velocity requirement for all but one pipe, due to low flow intake regardless of storm event. After review and discussion, Engineering and Public Works staff have no objections to granting this waiver.

Engineering Department Comments

All other engineering comments have been addressed.

E

Dubowik, Brooke

From: Dhima, Elvis
Sent: Tuesday, October 7, 2025 11:02 AM
To: Dubowik, Brooke
Subject: RE: Taybre Subdivision FANDO Review

Brooke

Please see below

2. Driveway Review Codes (HR 193-10)

a. Former Fuss & O'Neill Comments: HR 193-10.A. & 193-10.E. The applicant has shown the location of a proposed driveway for each proposed lot on the plan set. The applicant has not provided sight distance information for the driveways on the plan set. / The applicant has stated that driveway sight distance will be provided at the time of driveway permitting. We note that the Town has requested it as part of the subdivision review. It is important to provide this information showing that a driveway at each lot has the ability to meet the Town's requirements.

Current Fuss & O'Neill Comment: The applicant has provided sight-distance information for Lots 88-8 & 88-9. We note that the sight lines for Lot 88-9 crosses Lot 88-1 and could possibly be blocked by future landscaping by the homeowner.

ENG: The applicant shall introduce a sight distance easement to the lot in question

3. Roadway Design

h. Former Fuss & O'Neill Comments: HR 289-18.E. The applicant has not provided any sight distance information for the proposed roadway intersection at Alvirne Drive. / The applicant has provided sight distance information. We note that the sight lines to both the east and west are at the edge of existing tree lines and may be obscured by vegetation when constructed and into the future. The applicant should consider additional clearing of vegetation within the Town's right-of-way to ensure sight lines are maintained. Also, the sight distance shown to the west does not meet the 400 feet required by Hudson Engineering Technical Guidelines & Typical Details Section 525.3 (375' is shown).

Current Fuss & O'Neill Comment: The applicant has revised the sight distance plan to show the roadway meets the 400-foot requirement. We continue to note that the sight lines to both the east and west are at the edge of existing tree lines and may be obscured by vegetation when construction is complete and into the future.

ENG: Department of Public Works will handle the tree clearing and pruning, when necessary, similar to current ongoing pruning operations through Town. No further action required on this comment.

4. Drainage Design /Stormwater Management (HR 289-20.C. /Chapter 290)

c. Former Fuss & O'Neill Comments: HR 289-20.C.1. The applicant should provide a similar comparison table of runoff volumes to ensure no net increase for all storms analyzed. / The applicant provided comparison tables of only Flow Rates in the Stormwater Management Report dated August 27, 2025, and did not provide the requested runoff volumes comparison tables. The applicant should provide the requested volume comparison tables.

Current Fuss & O'Neill Comment: The applicant has provided the required comparison tables of runoff volumes and illustrated an increase in volume at POI-8R. The applicant should coordinate with the Town if the proposed increases require additional discussion or if a waiver is required.

ENG: The applicant will show that the total pre vs post run off volumes requirements are met.

f. Former Fuss & O'Neill Comments: HR 290-5.A.4. The applicant should provide the GRV BMP worksheet illustrating required GRV is met. / The applicant provided only a BMP worksheet for Basin 1

Attachment "E"

(29P) in the Stormwater Management Report dated August 27, 2025, and did not provide the requested GRV worksheet. We note a waiver has been requested by the applicant, who should provide the requested GRV worksheet if a waiver is not granted.

Current Fuss & O'Neill Comment: The applicant should coordinate with the Town for any required GRV waivers.

ENG: If the applicant has requested a waiver for GRV, no worksheet is required. No further action required.

y. **Former/Current Fuss & O'Neill Comment:** HR 290-7.B.5. The applicant should coordinate with the Town if additional documentation is required to establish an HOA for the stormwater long term maintenance and inspection requirements.

ENG: The stormwater HOA shall be prepared and submitted for approval by the Town Planner, Development Services Director and Public Works Director, prior to the plans getting recoded
No further action required.

z. *Former Fuss & O'Neill Comment: Engineering Technical Guidelines and Typical Details (ETGTD) 930.1. We note the applicant has discussed with the Town Engineer to allow 2.0' of cover rather than the required 4.0' of cover for drainage pipe. The applicant should discuss if HDPE is allowed with this reduced cover, or if RCP is required in situations of reduced cover to help reduce heaving and "floating" of pipes from frozen ground and high-water table situations.*

Former/Current Fuss & O'Neill Comment: The applicant should coordinate with the Town Engineer on pipe material allowed and reduced cover.

ENG: The applicant has addressed this comment by replacing HDPE pipe with reinforced concrete pipe (RCP) for drainage infrastructure
No further action required.

6. Sewer/Water Design/Conflicts & Utility Design/Conflicts (HR 276-13.E.)

e. *Former Fuss & O'Neill Comments: HR 276-13.G. The applicant has not provided any information about septic systems for the proposed lots. The applicant has noted a NHDES Subdivision Approval number on the plan set. The applicant should provide typical design details on the plan. /The applicant has noted that septic designs will be provided at the time of individual lot development. We continue to note that the Regulation requires a typical detail be provided for the systems.*

Current Fuss & O'Neill Comment: The applicant has stated that systems

ENG: This request will be addressed at the time the applicant submits the septic system design plans to the state, which will happen after Planning Board approval, similar to previous projects.
No further action required.

Former Fuss & O'Neill Comment: HR 289-37.A. The applicant has not provided phasing information for the proposed subdivision. We note that per the Regulation 50% of the proposed lots can be given Final Approval in one year.

Current Fuss & O'Neill Comment: The applicant has requested a waiver from this requirement.

ENG: No further action required.

4. Drainage Design /Stormwater Management (HR 289-20.C. /Chapter 290)

ag. *Former Fuss & O'Neill Comments: We recommend the applicant review the need for fencing around stormwater basins, particularly Basin 1 which is proposed to have standing water. / With the proposed basins possibly becoming Town maintained, the applicant should review with the Town Engineer on the preferred fence height/material/placement. We note that NHDES Regulations will not govern a Town warranted fence.*

Current Fuss & O'Neill Comment: The Town should confirm if fencing is necessary.

ENG: The applicant shall add a note stating that a 4' fence will be installed and the location will be determined in the field by the Development Services Director and Public Works Director.

August 27th, 2025

Mr. Jay Minkarah
Acting Town Planner
Town of Hudson
12 School Street
Hudson, NH 03051



**RE: Town of Hudson Planning Board Review
Taybre Drive Subdivision
Tax Map 128, Lots 82 & 88 - Hudson
Fuss & O'Neill Memo #1 Response**

Dear Mr. Minkarah,

On behalf of M.R. Lacasse Homes, Hess Engineering & Construction Consultants respectfully requests a waiver from ETGTD 930.4 regarding required pipe slope and velocity.

The Town Engineer has stated that relief would be provided for pipes with slopes of 1.8% and greater if they can maintain at least 2 ft/sec velocity. This is to ensure that all pipes are self-cleansing. The applicant would like to only waive the requirement that all pipes be a minimum of 2% and instead have a minimum slope of 1.8%.

If you have any further questions, do not hesitate to contact Will Hess or the Hess Engineering & Construction Consultants office. We can be reached at (603) 968-5664 or by email at whess@hessengineeringllc.com.

Best,

Will Hess, PE
Principal
Hess Engineering & Construction Consultants, LLC
63 West Street
P.O. Box 991
Ashland, NH 03217

August 27th, 2025

Mr. Jay Minkarah
Acting Town Planner
Town of Hudson
12 School Street
Hudson, NH 03051



**RE: Town of Hudson Planning Board Review
Taybre Drive Subdivision
Tax Map 128, Lots 82 & 88 - Hudson
Fuss & O'Neill Memo #1 Response**

Dear Mr. Minkarah,

On behalf of M.R. Lacasse Homes, Hess Engineering & Construction Consultants respectfully requests a waiver from HR 298-37. A. regarding the site phasing requirements for subdivisions. The regulation states that no more than 50% of the subdivision can be completed within one year.

In order to construct the roadway, adjacent lots/lots to be created must be brought to grade due to roadway design standards and existing topography which leads to large areas of cut and fill. Phasing the project, per HR 298-37. A., would require re-disturbing areas and extending disruption to abutters. This would also increase the impact on the local environment.

Due to the small scale of this subdivision, we believe the impacts to the community, neighbors, town, and local ecology would be minimized by completing this as quickly as possible.

If you have any further questions, do not hesitate to contact Will Hess or the Hess Engineering & Construction Consultants office. We can be reached at (603) 968-5664 or by email at whess@hessengineeringllc.com.

Best,

Will Hess, PE
Principal
Hess Engineering & Construction Consultants, LLC

August 27th, 2025

Mr. Jay Minkarah
Acting Town Planner
Town of Hudson
12 School Street
Hudson, NH 03051



**RE: Town of Hudson Planning Board Review
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Tax Map 128, Lots 82 & 88 - Hudson
Fuss & O'Neill Memo #1 Response**

Dear Mr. Minkarah,

On behalf of M.R. Lacasse Homes, Hess Engineering & Construction Consultants respectfully requests a waiver from HR 290-5.A.4. regarding the ground water recharge volume (GRv) related to NHDES AoT regulations. A waiver has been requested with the NHDES AoT bureau for the same requirement.

HR 290-5.A.4. requires that the existing groundwater recharge levels shall be maintained unless infiltration is limited or not practicable. Due to the elevated water table and soil classification, infiltration is not practicable due to water table separation requirements. The applicant meets all requirements for water quality and does not create or cause further water quality impairment.

Based on the Site Specific Soil Survey conducted on this site by CSS Luke Powell, the majority of the site is classified as HSG B and C. Portions of the site that are to be developed in the HSG A soils require significant quantities of either cut or fill – making appropriate depth test pits difficult to conduct. Additionally, the locations with HSG A soils cannot and do not receive runoff generated by the site.

The proposed drainage system reduces the impact of runoff generated by the site by reducing the peak flow for the 2-, 10-, 25-, and 50-year storm events. The peak flows of runoff are the main culprit causing erosion and sedimentation downgradient of the site. The water quality will not be impacted or impaired by the proposed development.

While peak flows will be reduced from the currently existing site conditions, the proposed design will also decrease pollutant load via best management practices for stormwater, such as: deep sumps, forebays, vegetated swales, and a wet pond. It should be noted that the currently proposed system does not account for infiltration that naturally occurs in open drainage systems like grassed swales and forebays.

If you have any further questions, do not hesitate to contact Will Hess or the Hess Engineering & Construction Consultants office. We can be reached at (603) 968-5664 or by email at whess@hessengineeringllc.com.

Best,

Will Hess, PE
Principal
Hess Engineering & Construction Consultants, LLC

August 27th, 2025

Mr. Jay Minkarah
Acting Town Planner
Town of Hudson
12 School Street
Hudson, NH 03051



**RE: Town of Hudson Planning Board Review
Taybre Drive Subdivision
Tax Map 128, Lots 82 & 88 - Hudson
Fuss & O'Neill Memo #1 Response**

Dear Mr. Minkarah,

On behalf of M.R. Lacasse Homes, Hess Engineering & Construction Consultants respectfully requests a waiver from HR 298-28.C. regarding conformity to the typical street cross section throughout the proposed roadway. The regulations intend to prevent runoff generated by impervious areas within the Right-of-Way (ROW) from entering private property. This also ensures the runoff is treated and appropriately removed from the site.

The typical street cross-section has been used for the majority of the site except for the entrance, where the applicant is proposing to the right side of Taybre Drive away from the roadway instead of towards the roadway. Therefore, the waiver would only include the section from the edge of pavement to the edge of the proposed edge of the ROW. After leaving the ROW, the runoff enters the private swales into easements deeded to the Town of Hudson containing the treatment BMPs required by both NHDES AOT and the Town of Hudson regulations.

If you have any further questions, do not hesitate to contact Will Hess or the Hess Engineering & Construction Consultants office. We can be reached at (603) 968-5664 or by email at whess@hessengineeringllc.com.

Best,

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August 27th, 2025

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Fuss & O'Neill Memo #1 Response**

Dear Mr. Minkarah,

On behalf of M.R. Lacasse Homes, Hess Engineering & Construction Consultants respectfully requests a waiver from HR 298-28. F and *Engineering Technical Guidelines & Typical Details* (ETGTD) 930.12 regarding sloped granite curbing and curb cuts. The regulations require that sloped granite curbing be installed on both sides of the proposed roadway.

Due to the comments from Fuss & O'Neill and the Engineering Department requiring an initial road profile of 2% downgradient, the initial roadway section is too low to allow for a closed drainage system with catch basins. All other alternatives for this design request, such as tree filters, modular wetlands, drop inlets, etc. are unable to be used at this location due to the low elevations. Allowing the applicant to utilize curb cuts and culverts would facilitate the removal of the roadway runoff. The proposed design is not a typical curb cut or break in a curblin that experiences difficulties with functioning in the winter, as stated in the ETGTD guidance. The proposed design would prevent the issues typically seen with a curb cut and maintain closed drainage.

If you have any further questions, do not hesitate to contact Will Hess or the Hess Engineering & Construction Consultants office. We can be reached at (603) 968-5664 or by email at whess@hessengineeringllc.com.

Best,

Will Hess, PE
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August 27th, 2025

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**RE: Town of Hudson Planning Board Review
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Tax Map 128, Lots 82 & 88 - Hudson
Fuss & O'Neill Memo #1 Response**

Dear Mr. Minkarah,

On behalf of M.R. Lacasse Homes, Hess Engineering & Construction Consultants respectfully requests a waiver from HR 289-20.B.2. regarding catch basin placement. HR 289-20.B.2. states "catch basins shall be located on both sides of the roadway in continuous grades at intervals of not more than 400 feet at all sags in the roadway and near the corners of the roadway at intersecting streets."

The shallow depth of the ESHWT and the restrictions placed on the initial roadway profile by comments from Fuss & O'Neill and the Engineering department renders the sag elevation by the intersection too low for catch basins or other drainage structures to be placed. The low elevations cause drainage structures to be unable to outlet above the ESHWT. However, the proposed design still conveys away from the roadway and to the treatment BMPs via culverts and swales instead of catch basins.

The proposed roadway intersects Alvirne Drive, which does not have a closed drainage system within the vicinity of the site nor at the intersection with Dell Drive. The proposed design without curbing or catch basins at the entrance allows for Alvirne Drive to drain into the proposed stormwater system on site.

If you have any further questions, do not hesitate to contact Will Hess or the Hess Engineering & Construction Consultants office. We can be reached at (603) 968-5664 or by email at whess@hessengineeringllc.com.

Best,

Will Hess, PE
Principal
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