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Drainage Narrative and Erosion & Sediment Control Plan

20 Back Canaan Road
Strafford, NH
Tax Map 4, Lot 83-1

Prepared for

Lovely Revocable Living Trust
David & Rebecca S. Lovely, Trustees
20 Back Canaan Road
Strafford, NH 03884

Prepared by

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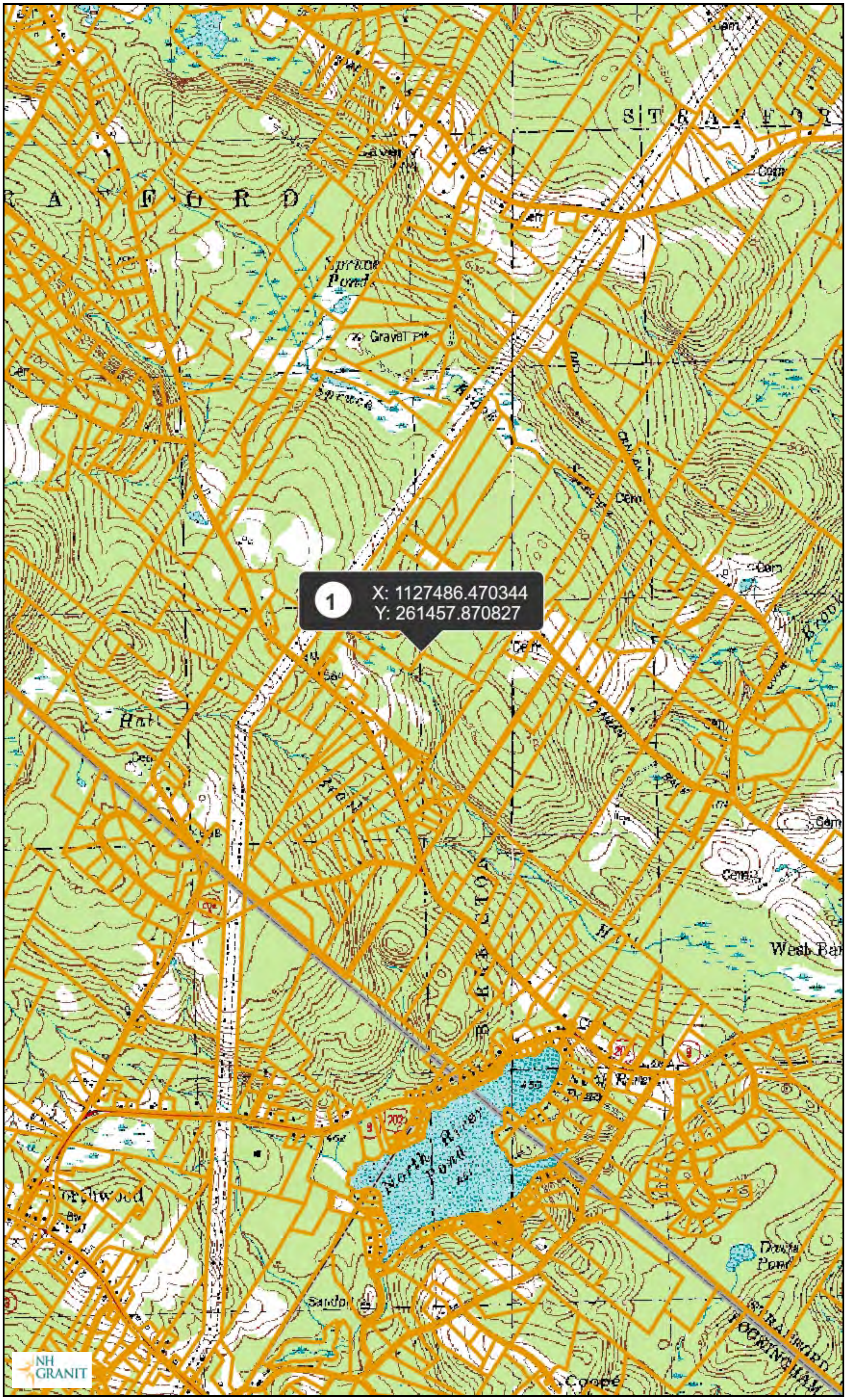
Map by NH GRANIT



Legend

- Parcels
- Additional Lines
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- World_Street_Map

Map Scale

1: 24,000

Map Generated: 9/25/2025

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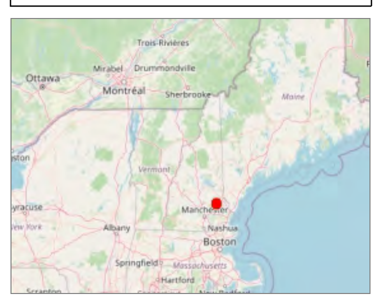

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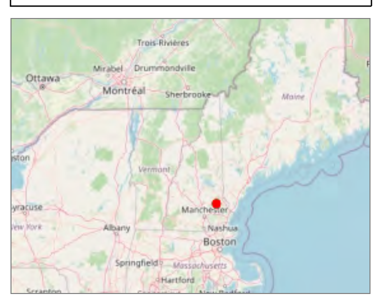

DESIGN METHOD OBJECTIVES

The owners of Tax Map 4, Lot 83-1, David & Rebecca Lovely, Trustees of the Lovely Revocable Living Trust are proposing to develop the property at 20 Back Canaan Road. The site is currently largely vacant, wooded land with a single duplex and a driveway. The proposal is to subdivide the parcel into 7 lots, with 5 utilizing a 585-foot-long private roadway.

On-site topography was completed by field crews of Berry Surveying & Engineering in the summer of 2025. Soils within the analyzed watershed are included in two hydrologic soil groups: HSG A and HSG C. (See attached report.) A wetland delineation was completed prior to the field work being conducted. The off-site subcatchment area which drains onto the locus parcel has been delineated using USGS Equivalent contours from public sources. (Google Tin & NH Lidar)

Existing and Proposed Conditions analyses were conducted for the purpose of estimating the peak rate of stormwater run-off as well as surface water volume and to subsequently design adequate mitigation of drainage. There are three existing drainage discharge points which were identified in the existing analysis and duplicated in the proposed conditions analysis. Designing two watershed models we have compared the differences in these rates of peak run-off and surface water volume. Sheet W1, Existing Conditions Watershed Plan, outlines the characteristics of the site in its existing or pre-construction conditions. The second analysis displays the proposed (post-construction) conditions (See Sheet W2). HydroCAD uses a series of node suffixes for numbering purposes (S = Subcatchment, P = Pond Device, R = Reach), to simplify annotation these suffixes are left off the watershed plans and node type is denoted by the symbol shape according to the displayed legend which coincides with HydroCAD graphics. The analysis was conducted using data for; 2 Yr-24 Hr (2.99”), 10 Yr-24 Hr (4.50”), 25 Yr-24 Hr (5.67”), 50 Yr-24 Hr (6.77”), and 100 Yr-24 Hr (8.08”) storm events. Storm event analysis was accomplished using the USDA SCS TR-20 method within the HydroCAD Stormwater Modeling System environment. Rainfall quantities are based on the Extreme Precipitation Table for this location from the Northeast Regional Climate Center / Cornell University (http://precip.eas.cornell.edu).

1.0 Existing Conditions Analysis:

Reference: Sheet W1 - Existing Conditions Watershed Plan (Enclosed)
Existing Conditions Plan

The existing parcel currently consists of a duplex and vacant land. The soils within the watershed are made up of multiple soil types, containing Hydrologic Soil Group (HSG) A & C. See USDA / NRCS Websoils report for more information. The land cover types involved are grassed land, woods, buildings, and road pavement.

The land area analyzed consists of 10.29 acres of the 40.89-acre parcel as well as 1.19 acres of offsite land. The parcel is naturally divided into four subcatchments, each flowing to one of three final reaches. The portion of the parcel that is proposed to be undeveloped is not being analyzed.

Final Reach #100

Subcatchment #1 consists of land area in the south western portion of the property. The limits of this subcatchment are defined by the crown of Canaan Road to the southwest and extend northeast to a natural high point within the locus parcel. Runoff generally flows southwest and drains to a delineated wetland being analyzed at **Final Reach #100** before entering a cross culvert under Canaan Road.

Subcatchment #4 is made up of land in the northern portion of the parcel. The limits of this subcatchment are defined by the roof line of the existing house to the north, a stone wall to the southwest, and natural topography to the southeast. Runoff flows to a delineated wetland in the center of the subcatchment which outlets easterly to a small stream modeled as a series of reaches (**Reaches #4a-#4c**) through **Subcatchment #1**, ultimately flowing to **Final Reach #100**.

Subcatchment #5 encompasses a small portion of land along Canaan Road and extending partway up an abutting driveway. The limits of this subcatchment are defined by the grading of the gravel driveway within the locus parcel as well as the existing stone wall near the abutting driveway. Runoff flows southwest to a driveway culvert which outlets to an overland reach (**Reach #5**) through **Subcatchment #1**, ultimately flowing to **Final Reach #100**.

Final Reach #200

Subcatchment #2 is land area in the center portion of the watershed. Limits of this subcatchment are largely defined by natural topography with the exception of an offsite house to the south of the parcel. Runoff drains to a delineated wetland in the northeastern portion of the parcel which is being analyzed at a point past the limits of proposed development as **Final Reach #200**.

Final Reach #300

Subcatchment #3 is comprised of land in the eastern portion of the watershed. The limits of this subcatchment are defined by natural topography to the south and west, an interior stone wall to the west, and the limits of the proposed development to the north. Runoff generally flows northeast to an area being analyzed as **Final Reach #300**.

2.0 Proposed Conditions Analysis:

Reference: Sheet W2 - Proposed Conditions Watershed Plan (Enclosed)
Proposed Grading & Drainage Plan

The client is proposing to subdivide Tax Map 4, Lot 83-1 into 7 lots (5 of which are proposed to include houses) and and install a private roadway 585 feet in length with a shared driveway off the end of the roadway. The existing house and driveway are proposed to be unchanged. The proposal is supported by two rain gardens, each directing runoff toward a separate final reach.

Final Reach #100

Subcatchment #1 is greatly decreased in size due to the construction of the proposed roadway, multiple dwelling units, and **Rain Garden #101**. Runoff still flows southwest to **Final Reach #100**. Note: The existing conveyance swale through this subcatchment must be preserved during and after construction.

Subcatchment #4 is negligibly decreased in size due to the construction of one of the proposed dwelling units. Runoff still flows to the delineated wetland being analyzed as **Pond #4** and subsequently to **Final Reach #100** through a series of overland reaches (**Reaches #4a-#4c**).

Subcatchment #5 is marginally decreased in size due to the proposed improvement of the existing travelled way off of Canaan Road. Runoff flows to a drop inlet (**Pond #5**) which conveys runoff under the proposed roadway and through a subsequent reach (**Reach #5**) to **Final Reach #100**.

*__Final Reach #100__ is directly up-slope of an existing cross culvert under Canaan Road. This culvert is shown to have a decrease in both rate of runoff and volume of runoff.

Subcatchment #101 is made up of a considerable portion of the proposed roadway as well as two driveways and a portion of the related dwelling units. The limits of this subcatchment are defined by the natural topography on the southeast side of the roadway and extend northwest to the peaks of the two proposed dwelling units. The southwestern limit of the subcatchment is defined by the berm of **Rain Garden #101**. Runoff generally flows southwest to **Rain Garden #101** and outlets to **Final Reach #100** through an outlet structure and an emergency spillway.

Final Reach #200

Subcatchment #2 decreased in size considerably due to the construction of the proposed roadway and the longer driveway. Runoff still flows generally southeast to **Final Reach #200**.
Subcatchment #11 consists of a small portion of land toward the end of the proposed roadway. The limits of this subcatchment are defined by the proposed roadway, the peak of the roof of one dwelling unit, and the edge of the related driveway. Runoff flows generally east to **Inlet Sump #1** (**Pond #11**) which outlets directly into **Rain Garden #102** (**Pond #102**). Runoff ultimately drains to **Final Reach #200**.

Subcatchment #12 encompasses a large portion of land south and east of the proposed roadway. The limits of this subcatchment are defined by natural topography to the south and west as well as a proposed driveway to the north and east and the berm of **Rain Garden #102** (**Pond #102**) to the north in the middle of the subcatchment. Runoff flows generally northeast to **Inlet Sump #2** (**Pond #12**) and subsequently to **Final Reach #200** through a series of overland reaches (**Reaches #12a & #12b**).

Subcatchment #102 is comprised of a small area of land on the inside of the bend in the proposed roadway including the hammerhead. The limits of this subcatchment are defined by the outer edge of the proposed roadway as well as the berm of **Rain Garden #102** (**Pond #102**). Runoff flows southeast to **Rain Garden #102** which outlets through an outlet structure (directed to **Pond #12** via **Reach #102a**) and an emergency spillway (directed to **Pond #12** via **Reaches #102b & #102c**) and subsequently to **Final Reach #200** through a pair of overland reaches (**Reaches #12a & #12b**).

***Final Reach #200** contributes runoff through a delineated wetland to a wetland complex. This analysis point is shown to equal or decrease rate of runoff. Volume of runoff is shown to be within Channel Protection Flow volume standards.

Final Reach #300

Subcatchment #3 is marginally reduced in size due to the construction of the proposed roadway and two dwelling units. This subcatchment still contributes runoff to the same **Final Reach #300**.

***Final Reach #300** is a non-point discharge where runoff flows over undeveloped land. This analysis point is shown to decrease both rate of runoff and volume of runoff.

3.0 Stormwater Treatment:

Treatment takes place within the two rain gardens designed to support the roadway, driveways, and houses proposed on site. Pre-treatment will be provided in the sediment forebay of each practice. The stormwater quality volume capability is treated within provided treatment area of the practices.

3.1 FULL COMPARATIVE ANALYSIS

ANALYSIS COMPONENT: PEAK RATE DISCHARGE (Cubic Feet / Second)

		2 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Final Reach #100	Existing	1.02	3.27	6.84	9.84	13.12
	Proposed	0.54	2.44	5.11	7.39	12.91
Final Reach #200	Existing	2.47	5.88	8.86	11.80	15.41
	Proposed	2.47	5.15	7.15	9.29	11.70
Final Reach #300	Existing	1.15	3.40	5.49	7.62	10.28
	Proposed	1.06	3.16	5.09	7.07	9.55

ANALYSIS COMPONENT: VOLUME (Acre Feet) (24 Hours)

		2 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Final Reach #100	Existing	0.145	0.404	0.637	0.871	1.165
	Proposed	0.136	0.335	0.574	0.815	1.115
Final Reach #200*	Existing	0.339	0.756	1.125	1.493	1.950
	Proposed	0.357	0.749	1.145	1.541	2.030
Final Reach #300	Existing	0.167	0.423	0.661	0.904	1.213
	Proposed	0.155	0.393	0.614	0.840	1.126

***Final Reach #200** meets the Channel Protection Volume (CPV) requirements (Env-Wq 1507.05) with a reduction in peak rate of runoff, an increase in the 2-YR, 24 hour volumes less than 0.1 AF, and discharge from the developed area of less than 2 CFS. See waiver request for stormwater runoff volume included in the application.

4.0 EROSION and SEDIMENT CONTROL PLAN & STORMWATER CONTROL MEASURES (SCM's)

Reference: Proposed Site Plan and Grading Plan
Erosion & Sediment Control Plan
Erosion & Sediment Control Details

The proposed site development is protected from erosion and the abutting properties are protected from sediment by the use of Best Management Practices as outlined in the New Hampshire Stormwater Manual (February 2025, NHDES & US EPA). Any area disturbed by construction will be re-stabilized within 30 days and abutting properties will not be adversely affected by this development. All swales and drainage structures will be constructed and stabilized prior to having run-off directed to them. Reference is also made to the Stormwater System Management: Inspection & Maintenance Manual and Stormwater Operations, Inspection & Maintenance Plan which has been developed specifically for this project and available to the owner.

Table of Stormwater Practices

4.1 Erosion Control Mix Berm

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (B46-B50) (Direct Quotes)

2022 US CGP (As Amended) 2.2.3 (Direct Quotes)

Chapter Env-Wq 1506.05 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

General Descriptions (NH SWM):

An erosion control mix berm is a type of sediment barrier with trapezoidal berm in shape that intercepts sheet flow and ponds stormwater runoff, allowing sediment to settle, and filtering runoff through sediment as well. They are an environmentally sensitive and cost-effective alternative to silt fence. An alternative to a simple erosion control mix berm is a "continuous contained berm." consisting of erosion control mix compost encapsulated in a mesh fabric (or "filter sock"). Refer to the "Filter Sock" fact sheet in this Appendix for specifications.

This barrier is installed across or at the toe of a slope, to intercept and retain small amounts of sediment from disturbed or unprotected areas.

Erosion control mix berms and socks sometimes offer a better solution than silt fence and other sediment control methods, because the organic material does not require any special trenching, construction, or removal, unlike straw bales, silt fence or coir rolls. This makes the technique very cost-effective. Silt fence must be disposed of as a solid waste.

The erosion control mix is organic, biodegradable, renewable, and can be left onsite. This is particularly important below embankments near streams, as re-entry to remove or maintain a synthetic barrier can cause additional disturbance.

Erosion control mix berms can be easily and quickly fixed if they are disturbed during construction activity.

Considerations (NH SWM):

The erosion control mix berm is used where:

- Erosion will occur in the form of sheet erosion only and there is no concentration of water in a channel or other drainage way above the berm.
- The area upslope of the berm has a slope of less than 5 percent.
- Sedimentation can pollute or degrade adjacent wetland and/ or watercourses.

• Sedimentation will reduce the capacity of storm drainage systems or adversely affect adjacent areas.
• The contributing drainage area is less than 1/4 acre per 100 feet of barrier length, the maximum length of slope above the barrier is 100 feet, and the maximum gradient behind the barrier is 5 percent. If the slope length is greater, other measures such as diversions may be necessary to reduce the slope length.
• Sediment barriers should not be used in areas of concentrated flows. Under no circumstances should erosion control mix barriers be constructed in live streams or in swales where there is the possibility of a washout.
• Sediment barriers are effective only if installed and maintained properly.
• Sediment barriers should be installed prior to any soil disturbance of the contributing drainage area above them.
• Frozen ground, outcrops of bedrock and very rooted forested areas are locations where berms of erosion control mix are most practical and effective.
• Other Erosion and Sediment Control (E&SC) measures should be used at low points of concentrated stormwater runoff, below culvert outlet aprons, around catch basins and closed storm systems, and at bottom of steep perimeter slopes.

Maintenance Requirements (NH SWM):

• All E&SC measures should be inspected at least once per week and within 24 hours of any storm event exceeding 1/4-inch in a 24-hour period, or as stipulated by the applicable permits. Repairs should be made as necessary.
• Filter berms should be inspected at least daily during prolonged rainfall. They should be repaired immediately if there are any signs of erosion or sedimentation below them. If there are signs of breaching of the barrier, or impounding of large volumes of water behind them, then they should be replaced with other measures to intercept and trap sediment (such as a diversion berm directing stormwater runoff to a sediment trap or basin).
• Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately 1/3 of the height of the barrier.
• Filter berms should be reshaped or reapplied as needed.
• Any sediment deposits remaining in place after the barrier is no longer required should be dressed to conform to the existing grade, prepared and seeded.
• See Chapter 6 for general information on inspection and maintenance of E&SC measures (e.g., inspection frequency, corrective actions, documentation requirements, etc.).

Specifications (NH SWM):

Erosion control mix can be manufactured on or off the project site. It must consist primarily of organic material, separated at the point of generation, and may include shredded bark, stump grindings, composted bark, or acceptable manufactured products. Wood and bark chips, ground construction debris or reprocessed wood products will not be acceptable as the organic component of the mix.

Specifications for erosion control mix berms include:

- Composition of the erosion control mix should be as follows:
  - o Erosion control mix should contain a well-graded mixture of particle sizes and may contain rocks less than 4 inches in diameter. Erosion control mix must be free of refuse, physical contaminants, and material toxic to plant growth.
  - o The mix composition should meet the following standards:
    - The organic matter content should be between 25 and 65 percent, dry weight basis.
    - Particle size by weight should be 100 percent passing a 3-inch screen, 90 percent to 100 percent passing a 1-inch screen, 70 percent to 100 percent passing a 0.75-inch screen, and a maximum of 30 percent to 75 percent, passing a 0.25-inch screen.
    - The organic portion needs to be fibrous and elongated.
    - The mix should not contain silts, clays, or fine sands.
    - Soluble salts content should be less than 4.0 millimhos per centimeter.
    - The pH should be between 5.0 and 8.0.
- The barrier must be placed along a relatively level contour and follow the contour of the land as closely as possible. It may be necessary to cut tall grasses or woody vegetation to avoid creating voids and bridges that would enable fines to wash under the barrier through the grass blades or plant stems.
- The barrier must be a minimum of 12 inches high, as measured on the uphill side of the barrier, and a minimum of 2 feet wide.

2022 CGP Requirements:

2.2.3 Install sediment controls along any perimeter areas of the site that are downslope from any exposed soil or other disturbed areas.

a. The perimeter control must be installed upgradient of any natural buffers established under Part 2.2.1, unless the control is being implemented pursuant to Part 2.2.1a.ii-iii;
b. To prevent stormwater from circumventing the edge of the perimeter control, install the perimeter control on the contour of the slope and extend both ends of the control up slope (e.g., at 45 degrees) forming a crescent rather than a straight line;

c. After installation, to ensure that perimeter controls continue to work effectively:

i. Remove sediment before it has accumulated to one-half of the above-ground height of any perimeter control;

ii. and After a storm event, if there is evidence of stormwater circumventing or undercutting the perimeter control, extend controls and/or repair undercut areas to fix the problem.

BS&E Considerations/Recommendations:

The erosion control mix berm is the preferred method of BS&E and other municipalities, such as Dover, as long as upslope conditions allow.

4.2 Filter Sock

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (B51-B55) (Direct Quotes)

2022 US CGP (As Amended) 2.2.3. (Direct Quotes)

General Description (NH SWM):

Filter socks, also known as "continuous contained berms" or "straw wattles" are an alternative to simple erosion control mix berms that add containment and stability. Filter socks consist of stump grindings or erosion control mix compost encapsulated in mesh fabric. A straw wattle consists of straw encapsulated in mesh fabric. These controls are a type of temporary sediment barrier installed across or at the toe of a slope to intercept and retain small amounts of sediment from disturbed or unprotected areas. The primary function of filter socks is to slow and pond the water, allowing soil particles to settle.

Considerations (NH SWM):

- Filter socks are not for use across streams or channels. They should be located only where shallow pools can form and where areas only contribute sheet flow to the device.
- Filter socks should be used for small, disturbed areas such as for providing protection around a soil stockpile.
- Filter socks, similar to other sediment barriers, should be designed for a contributing drainage area of less than 1/4 acre per 100 feet of barrier or with a drainage distance of 100 feet or less.
- Filter socks should only receive sheet flow from upgradient areas.
- Filter socks work especially well in areas where trenching is not feasible such as over frozen ground, over pavement, or over ledge areas.
- Filter socks are especially useful on steep slopes if sufficient anchoring and preparation is made (i.e., remove heavy vegetation) to ensure good contact of sock and underlying soil along its entire length. Maximum gradient behind the barrier is 2h:1v (50 percent).
- Filter socks must be used in conjunction with other measures that prevent or control erosion, as this control measure is for sediment only. Improperly applied or installed sediment barriers may increase erosion.
- Filter socks and straw wattle barriers may also be used for check dams where installation access or other conditions prevent the use of materials such as stone.
- Mesh materials should be 100 percent biodegradable where feasible. The opening size should be less than or equal to 1/8 inches as required by Env-Wq 1506.15. Non-biodegradable mesh encapsulation materials should be removed from the site following 85 percent vegetative site stabilization.

Maintenance Requirements (NH SWM):

• All E&SC measures should be inspected at least once per week and within 24 hours of any storm event exceeding 1/4-inch in a 24-hour period, or as stipulated by the applicable permits. Repairs should be made as necessary.
• Filter socks should be inspected at least daily during prolonged rainfall.
• At a minimum, sediment deposition should be removed when the silt deposition accumulates to one-half the height of the berm.
• These barriers can be entirely removed as a unit from the site following site stabilization.
• Biodegradable filter socks should last 6 months and may need to be replaced if disturbances are anticipated to last longer. B-52
• See Chapter 6 for general information on inspection and maintenance of Erosion and Sediment Control (E&SC) measures (e.g., inspection frequency, corrective actions, documentation requirements, etc.).

Specifications (NH SWM):

• Filter socks can be manufactured on or off the project site.
• Filter socks can range in diameter from 8 inches to 32 inches. Socks with diameters less than 12 inches should only be used for residential projects disturbing a quarter acre or less.
• Filter socks should be staked using 2-inch by 2-inch wooden stakes placed at 10-foot lineal spacing to a depth of 12 inches, or staked per manufacturer specifications. Socks placed on slopes should be anchored with stakes driven through the center of the sock or immediately downslope of the sock.
• The barrier should be installed to maintain surface contact and avoid potential creation of voids that would allow fines to flow under the barrier (i.e., full contact with the ground is critical for filter socks to properly function). It may be necessary to cut tall grasses or woody vegetation.
• Filter socks must consist of primarily organic material including shredded bark, stump grindings, composted bark, or acceptable manufactured products. Unacceptable materials include wood and bark chips, ground construction debris or reprocessed wood projects.
• Seeds may be added to the organic filler material, which can permanently stabilize the shallow slope. The seed mix must not contain non-native or nuisance species seed sources.
• Installation with J-hooks or "smiles" will increase berm efficiency and reduce erosion-causing failures.

2022 CGP Requirements:

2.2.3 Install sediment controls along any perimeter areas of the site that are downslope from any exposed soil or other disturbed areas.

- The perimeter control must be installed upgradient of any natural buffers established under Part 2.2.1, unless the control is being implemented pursuant to Part 2.2.1a.ii-iii;
- To prevent stormwater from circumventing the edge of the perimeter control, install the perimeter control on the contour of the slope and extend both ends of the control up slope (e.g., at 45 degrees) forming a crescent rather than a straight line;

- After installation, to ensure that perimeter controls continue to work effectively:
  - Remove sediment before it has accumulated to one-half of the above-ground height of any perimeter control;
  - and After a storm event, if there is evidence of stormwater circumventing or undercutting the perimeter control, extend controls and/or repair undercut areas to fix the problem.
- Exception. For areas at "linear construction sites" (as defined in Appendix A) where perimeter controls are infeasible (e.g., due to a limited or restricted right-of-way), implement other practices as necessary to minimize pollutant discharges to perimeter areas of the site.

4.3 Silt Fence

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (B58-B64) (Direct Quotes)

2022 US CGP (As Amended) 2.2.3 (Direct Quotes)

Chapter Env-Wq 1506.04 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

General Description (NH SWM):

Silt fences are temporary sediment barriers consisting of filter fabric attached to supporting posts and entrenched into the soil. This barrier is installed across or at the toe of a slope, to intercept and retain small amounts of sediment from disturbed or unprotected areas.

Silt fences have a useful life of one season. They function primarily to slow and pond the water and allow soil particles to settle. Silt fences are not designed to withstand high heads of water, and therefore should be located where only shallow pools can form. Their use is limited to areas where overland sheet flows are expected.

Silt fence is a sediment control measure, not an erosion control measure. It is intended to be used in conjunction with other measures that do prevent or control erosion. Improperly applied or installed silt fence will increase erosion.

Silt fences should not be used across streams, channels, swales, ditches, or other drainage ways. Silt fences are not capable of effectively filtering the high rates and volumes of water associated with channelized flow. Silt fences should not be designed to impound sediment or water more than 18 inches high. Silt fences installed across a concentrated flow path are subject to undercutting, end cutting, and overtopping. This frequently not only results in the bypass of sedimentladen water, but also in the complete failure of the fence. Such failures typically release sediment accumulated on the upgradient side of the fence, and result in severe erosion of the channel both upstream and downstream of the fence.

Considerations (NH SWM):

• Silt fence barriers are used where:

  o Erosion will occur only as of the result from sheet flow (flow depth of less than 0.1 feet) and there is no concentration of water in a channel or other drainage way above the fence.

  o Sedimentation can pollute or degrade adjacent wetlands or watercourses.

  o Sedimentation will reduce the capacity of storm drainage systems or adversely affect adjacent areas.

  o The contributing drainage area is less than 1/4 acre per 100 feet of barrier length, the maximum length of slope above the barrier is 100 feet, and the maximum gradient behind the barrier is 50 percent (2h:1v). If any of these conditions are exceeded, other measures may be necessary to control erosion and to intercept and treat the sediment load.

  o Sediment barriers should not be used in areas of concentrated flows. Under no circumstances should silt fences be constructed in streams or in swales where there is the possibility of a washout.

• Silt fences can be used for 60 days or longer depending on ultraviolet stability and manufacturer's recommendations. However, silt fences generally have a useful life of one season, and should be periodically replaced on longer duration construction projects.

• Avoid reinforcing silt fences with metal mesh or plastic mesh, which could potentially entangle and harm wildlife (USFWS, 2023).

• Silt fencing generally is a better sediment barrier than hay bale barriers.

• Potential causes of silt fence failure include:

  o Improper placement on the site.

  o Allowing excessive drainage area to the silt fence structure.

  o Inadequate trenching depth and improper backfill and compaction of the bottom of the silt fence fabric.

  o Improper attachment to posts.

  o Inadequate maintenance of the silt fence after installation.

  o Installing silt fence with a descending grade along the fence alignment, resulting in the diversion or concentration of stormwater runoff.

  o Placement of fence at mid-slope of a cut or fill embankment. Because a silt fence works by impounding water, it should be placed at the toe of such slopes, to allow for this function, and to avoid potential diversion or concentration of flows.

Maintenance Requirements (NH SWM):

• All E&SC measures should be inspected at least once per week and within 24 hours of any storm event exceeding 1/4-inch in a 24-hour period, or as stipulated by the applicable permits. Repairs should be made as necessary.
• Fences should be inspected and maintained at least daily during prolonged rainfall.
• Sediment deposition should be removed, at a minimum, when deposition accumulates to 1/3 the height of the fence, and moved to an appropriate location so the sediment is not readily transported back toward the silt fence.
• Silt fences should be repaired immediately if there are any signs of erosion or sedimentation below them. If there are signs of undercutting at the center or the edges of the barrier, or impounding of large volumes of water behind them, sediment barriers should be replaced with a temporary check dam.
• Should the fabric on a silt fence decompose or become ineffective prior to the end of the expected usable life and the barrier still is necessary, the fabric should be replaced promptly.
• Any sediment deposits remaining in place after the silt fence is no longer required should be dressed to conform to the existing grade, prepared and seeded.
• If there is evidence of end flow on properly installed barriers, extend barriers uphill or consider replacing them with other measures, such as temporary diversions and sediment traps.
• Silt fences have a useful life of one season. On longer construction projects, silt fence should be replaced periodically as required to maintain effectiveness.
• See Chapter 6 for general information on inspection and maintenance of Erosion and Sediment Control (E&SC) measures (e.g., inspection frequency, corrective actions, documentation requirements, etc.).

Specifications (NH SWM):

Fences should be used in areas where erosion will occur only in the form of sheet erosion and there is no concentration of water in a channel or drainage way above the fence. Sediment barriers should be installed prior to any soil disturbance of the contributing drainage area above them.

Specifications for use of silt fences are as follows:

• The maximum contributing drainage area above the fence should be less than 1/4 acre per 100 linear feet of fence.
• The maximum length of slope above the fence should be 100 feet.
• The maximum slope above the fence should be 2h:1v.
• Fences should be installed following the contour of the land as closely as possible, and • The ends of the fence should be flared upslope. B-60
• The fabric should be embedded a minimum of 4 inches in depth and 4 inches in width in a trench excavated into the ground, or if site conditions include frozen ground, ledge, or the presence of heavy roots, the base of the fabric should be backfilled with a minimum thickness of 8 inches of 3/4-inch stone.

• The soil should be compacted over the embedded fabric.
• Adjoining sections of the fence should be overlapped by a minimum of 6 inches (24 inches is preferred), folded and stapled to a support post. If metal posts are used, fabric should be wire-tied directly to the posts with three diagonal ties.
• Silt fencing should not be stapled or nailed to trees.
• The height of a silt fence should not exceed 36 inches as higher fences may impound volumes of water sufficient to cause failure of the structure.
• The filter fabric should be purchased in a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are necessary, filter cloth should be spliced together only at support post, with a minimum 6-inch overlap, and securely sealed.
• A manufactured silt fence system with integral posts may be used.
• A trench should be excavated approximately 4 inches wide and 4 inches deep along the line of posts and upgradient from the barrier. Post spacing should not exceed 6 feet. The trench should be backfilled and the soil compacted over the filter fabric.
• The filter fabric should be stapled or wired to the post, and 8 inches of the fabric should be extended into the trench. The fabric should not extend more than 36 inches above the original ground surface.
• Silt fence may be installed by "slicing" using mechanical equipment specifically designed for this procedure. The slicing method uses an implement towed behind a tractor to "plow" or slice the silt fence material into the soil. The slicing method minimally disrupts the soil upward and slightly displaces the soil, maintaining the soil's profile and creating an optimal condition for subsequent mechanical compaction.
• Silt fences should be installed with "smiles" or "J-hooks" to reduce the drainage area that any segment will impound (see diagrams). The ends of the fence should be turned uphill.
• Silt fences placed at the toe of a slope should be set at least 6 feet downgradient from the toe to allow space for shallow ponding and to allow for maintenance access without disturbing the slope.
• Silt fences should be removed when they have served their useful purpose, but not before the upslope areas have been permanently stabilized.

2022 CGP Requirements:

2.2.3 Install sediment controls along any perimeter areas of the site that are downslope from any exposed soil or other disturbed areas.

- The perimeter control must be installed upgradient of any natural buffers established under Part 2.2.1, unless the control is being implemented pursuant to Part 2.2.1a.ii-iii;
- To prevent stormwater from circumventing the edge of the perimeter control, install the perimeter control on the contour of the slope and extend both ends of the control up slope (e.g., at 45 degrees) forming a crescent rather than a straight line;
- After installation, to ensure that perimeter controls continue to work effectively:
    - Remove sediment before it has accumulated to one-half of the above-ground height of any perimeter control;

  - and After a storm event, if there is evidence of stormwater circumventing or undercutting the perimeter control, extend controls and/or repair undercut areas to fix the problem.
- Exception. For areas at "linear construction sites" (as defined in Appendix A) where perimeter controls are infeasible (e.g., due to a limited or restricted right-of-way), implement other practices as necessary to minimize pollutant discharges to perimeter areas of the site.

4.4 Culvert Inlet Sumps & Cross Culverts w/ Flared End Sections

Description: To convey the surface water runoff that is trapped within the roadway and runoff from backyards, there are multiple Residential Inlet Sumps. These culvert pipes, flared end sections, and constructed sumps will collect the runoff that is directed to that location during and after the residential development. The culvert will allow the runoff to discharge and not allow water to pond to the house elevations in the back yards. The location of the Residential Inlet Sumps will be marked and identified with painted metal fence posts.

Maintenance Considerations: Vegetation and debris will need to be removed from the culvert inlet several times a year, especially late fall after the majority of the leaves have fallen and in the spring. In addition to the sump and culverts themselves, the drainage channel will need to be inspected to ensure that the runoff intended to get to the inlets is making it to the sump. The identification fence post will be inspected for structural condition and painted condition.

The exit of the culvert pipes should be cleaned of any trash and sediment build-up. Riprap outlet protection shall not prevent the outlet from being free flowing, as applicable. The culvert should be clear to let collected water pass through the culvert unobstructed. Flared end sections and headwalls should be inspected for erosion and destabilization, with repairs made as required. The underdrains will require yearly jetting to ensure full operation.

4.5 Bioretention Systems

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (A35-A47) (Direct Quotes)

Chapter Env-Wq 1508.08 & 1508.06 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

Description:

Bioretention systems collect stormwater runoff in a landscaped depression, where it ponds, filters through the engineered soil media, and infiltrates into the ground or is collected and discharged to the surface. Bioretention systems can reduce sediment, nutrients, oil and grease, and trace metals.

The major difference between bioretention systems and other filtration systems is the composition of the filter media and the use of vegetation. A typical surface sand filter is designed to be maintained with no vegetation, whereas a bioretention cell is planted with a variety of vegetation whose roots assist with pollutant uptake. The use of vegetation allows these systems to blend in with other landscaping features.

The primary types of bioretention systems are:

• **Infiltrating bioretention systems** have an elevated underdrain (or no underdrain) and are configured to infiltrate filtered stormwater runoff directly into the subsoil (preferred).
• **Filtering bioretention systems** have an underdrain that is installed in poor soils or is lined where infiltration is not desired (e.g., hot spot areas) such that limited or no infiltration is anticipated. The underdrain collects filtered stormwater runoff and conveys it to a discharge outlet.
• **Bioretention systems with internal storage reservoirs (ISR)** are designed to include a storage reservoir that remains in saturated conditions and creates an anoxic zone suitable for denitrification. Bioretention systems with ISR can be designed as infiltrating or filtering systems. Infiltrating bioretention systems with ISR are also called "hybrid" bioretention systems.

Maintenance Requirements:

• Maintenance activities need to comply with laws that protect wildlife, including but not limited to RSA 209:8, RSA 209:9, RSA 209:10, and RSA 212-A:7.
• Special attention should be given to maintenance in the first two years of operation as vegetation is established.
• Systems should be inspected at least twice annually and following any rainfall event exceeding 2.5 inches in a 24- hour period, with maintenance or rehabilitation conducted as warranted by such inspection.
• Pre-treatment measures should be inspected at least twice annually, and cleaned of accumulated sediment as warranted by inspection, but no less than once annually.
• Trash and debris should be removed at each inspection.
• At least once annually, system should be inspected for drawdown time. If bioretention system does not drain within 72 hours following a rainfall event, then a qualified professional should assess the condition of the facility to determine measures required to restore filtration function

or infiltration function (as applicable), including but not limited to removal of accumulated sediments or reconstruction of the bioretention soil mixture.
• Vegetation should be inspected at least annually, and maintained in healthy condition, including pruning, removal, and replacement of dead or diseased vegetation, and removal of invasive species.
• Refer to UNHSC Maintenance Guidelines and Resources, "Checklist for Inspection of Bioretention Systems/ Tree Filters" for an example inspection checklist.

4.6 Sediment Forebay

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (A28-A30) (Direct Quotes)

Chapter Env-Wq 1508.12 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

Description:

A sediment forebay is an impoundment, basin, or other storage structure designed to dissipate the energy of incoming stormwater runoff and allow for initial settling of coarse sediments. Forebays are used for pre-treatment of stormwater runoff prior to discharge into the primary water quality treatment SCM. Forebays are generally integrated into the design of larger stormwater management structures.

Maintenance Requirements:

• Maintenance access must be provided.
• Embankment design must be engineered to meet applicable safety standards (see description of "Detention Basin").
• 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 using a level spreader, spillway, check dam, or other appropriate dissipation techniques.
• The bottom floor may be designed with a concrete pad or hardened bottom to aid in removal of accumulated sediment during maintenance.
• 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.
• For guidance on sizing of riprap, refer to the Federal Highway Administration's Bridge Scour and Stream Instability Countermeasures: Experience, Selection, and Design Guidance- Third

Edition, Volume I and II (FHWANHI-09-111 and FHWA-NHI-09-112, Hydraulic Engineering Circular 23, 2009).

4.7 Permanent Outlet Protection

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (A127-A131) (Direct Quotes)

Description:

Outlet protection is typically provided at stormwater discharge conduits from structural SCMs to reduce the velocity of concentrated stormwater flows to prevent scour and minimize the potential for downstream erosion. Outlet protection is also provided where conduits discharge stormwater runoff into an inground stormwater management practice (e.g., pond or swale) to prevent scour where flow enters the SCM.

Standard engineering practices allow for many different types of outlet protection which provide energy dissipation. Common outlet protection measures include:

- Riprap aprons, the design of which is covered within this section.
- Riprap lined scour holes, stilling basins or plunge pools. Design references for stilling basins are provided under 'References'.

Other outlet protection practices may be used, if documented by applicable technical literature.

Maintenance Requirements:

- Maintenance activities need to comply with laws that protect wildlife, including but not limited to RSA 209:8, RSA 209:9, RSA 209:10, and RSA 212-A:7.
- Inspect the outlet protection annually for damage and deterioration. Repair damages immediately.
- Remove sediment, debris, and woody vegetation.

4.8 Stone Berm Level Spreader

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (A132-A134) (Direct Quotes)

Chapter Env-Wq 1508.19 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

Description:

A stone berm level spreader is an outlet structure constructed at zero percent grade across a slope used to convert concentrated flow to "sheet flow." It disperses or "spreads" flow thinly over a receiving area, usually consisting of undisturbed, vegetated ground. The conversion of concentrated flow to shallow, sheet flow allows stormwater runoff to be discharged at non-erosive velocities onto natural ground. To stabilize the spreader outlet, a stone berm is provided to dissipate flow energy, and help disperse flows along the length of the spreader.

Level spreaders are not designed to remove pollutants from stormwater; however, some suspended sediment and associated phosphorus, nitrogen, metals and hydrocarbons will settle out of the stormwater runoff through settlement, filtration, infiltration, absorption, decomposition and volatilization.

Maintenance Requirements:

- Maintenance activities need to comply with laws that protect wildlife, including but not limited to RSA 209:8, RSA 209:9, RSA 209:10, and RSA 212-A:7.
- Inspect at least once annually for accumulation of sediment and debris and for signs of erosion within approach channel, spreader channel or down-slope of the spreader.
- Remove debris whenever observed during inspection.
- Remove sediment when accumulation exceeds 25 percent of spreader channel depth.
- Remove woody vegetation.
- Snow should not be stored within or down-slope of the level spreader or its approach channel.
- Repair any erosion and re-grade or replace stone berm material, as warranted by inspection.
- Reconstruct the spreader if down-slope channelization indicates that the spreader is not level or that discharge has become concentrated, and corrections cannot be made through minor regrading.

4.9 Conveyance Swale

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (A115-A117) (Direct Quotes)

Chapter Env-Wq 1508.20 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

Description:

Conveyance swales are stabilized channels designed to convey stormwater runoff at non-erosive velocities. They may be stabilized using vegetation, riprap, or a combination, or with an alternative lining designed to accommodate design flows while protecting the integrity of the sides and bottom of the channel. Conveyance swales may provide incidental water quality benefits, but are not specifically designed to provide treatment. Conveyance swales are not considered a Treatment or Pre-treatment Practice under the AoT regulations, unless they are also designed to meet the requirements of an acceptable Treatment/ Pre-treatment Practice as described elsewhere in this Appendix.

Maintenance Requirements:

• Maintenance activities need to comply with laws that protect wildlife, including but not limited to RSA 209:8, RSA 209:9, RSA 209:10, and RSA 212-A:7.
• Grassed swales 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, debris, and invasive species annually, or more frequently as warranted by inspection.
• Mow vegetated swales 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.

4.10 Temporary Construction Exit

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (B73-B75) (Direct Quotes)

2022 US CGP (As Amended) 2.2.4. (Direct Quotes)

Chapter Env-Wq 1506.09 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

General Description (NH SWM):

A stabilized construction exit consists of a pad of stone aggregate placed on a geotextile filter fabric, located at any point where traffic will be leaving a construction site to an existing access roadway or other paved surface. Its purpose is to reduce or eliminate the tracking of sediment onto public roads by construction vehicles. This helps protect receiving waters from sediment carried by stormwater runoff from public roads.

Considerations (NH SWM):

• Only construction traffic leaving the site is required to use the temporary stabilized exit. Consider providing a separate, unprotected, entrance for traffic entering the site. This will increase the longevity of the stabilized exit by eliminating heavy loads entering the site and reducing the total traffic over the device.
• Locate construction exits to limit sediment leaving the site and to provide for maximum utility by all construction vehicles. Avoid entrances that have steep grades and entrances at curves in public roads to minimize sight distance issues.

Maintenance Requirements (NH SWM):

• All E&SC measures should be inspected at least once per week and within 24 hours of any storm event exceeding 1/4-inch in a 24-hour period, or as stipulated by the applicable permits. Repairs should be made as necessary.
• The exit should be maintained in a condition that will prevent tracking of sediment onto public rights-of-way. This may require periodic top dressing with additional stone as conditions demand, and repair and/ or maintenance of any measures used to trap sediment.
• When the control pad becomes ineffective, the stone should be removed along with the collected soil material, regraded on site, and stabilized. The entrance should then be reconstructed.
• The contractor should sweep the pavement at exits whenever soil materials are tracked onto the adjacent pavement or traveled way.
• When wheel washing is required, it should be conducted on an area stabilized with aggregate, which drains into an approved sediment-trapping device. All sediment should be prevented from entering storm drains, channels/ swales, or waterways.
• See Chapter 6 for general information on inspection and maintenance of Erosion and Sediment Control (E&SC) measures (e.g., inspection frequency, corrective actions, documentation requirements, etc.).

Specifications (NH SWM):

Temporary construction exits should meet the following requirements:

• The stone should be 3-inch crushed stone (NHDOT Item No. 304.5).
• The minimum length of the pad should be 75 feet, except that the minimum length may be reduced to 50 feet if a 3-inch to 6-inch-high berm is installed at the entrance of the project site.
• The pad should extend the full width of the construction access road or 10 feet, whichever is greater.
• The pad should slope away from the existing roadway. B-74 • The pad should be at least 6 inches thick.
• A geotextile filter fabric should be placed between the stone pad and the earth surface below the pad.
• The pad should be maintained or replaced when mud and soil particles clog the voids in the stone such that mud and soil particles are tracked off-site.
• Natural drainage that crosses the location of the stone pad should be intercepted and piped beneath the pad, as necessary, with suitable outlet protection.

2022 CGP Requirements:

2.2.10 Minimize sediment track-out.

a. Restrict vehicle use to properly designated exit points;

b. Use appropriate stabilization techniques at all points that exit onto paved roads;

i. Exception: Stabilization is not required for exit points at linear utility construction sites that are used only episodically and for very short durations over the life of the project, provided other exit point controls are implemented to minimize sediment track-out;

c. Implement additional track-out controls as necessary to ensure that sediment removal occurs prior to vehicle exit; and

d. Where sediment has been tracked-out from your site onto paved roads, sidewalks, or other paved areas outside of your site, remove the deposited sediment by the end of the same business day in which the track-out occurs or by the end of the next business day if track-out occurs on a non-business day. Remove the track-out by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal. You are prohibited from hosing or sweeping tracked-out sediment into any constructed or natural site drainage feature, storm drain inlet, or receiving water.

4.11 Temporary Check Dam

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (B69-B72) (Direct Quotes)

2022 US CGP (As Amended) 2.2.11 (Direct Quotes)

Chapter Env-Wq 1506.07 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

General Description (NH SWM):

Temporary check dams are small temporary dams constructed across a swale, channel, or drainage ditch. Check dams are used to reduce the velocity of concentrated stormwater flows, thereby reducing erosion of the swale, channel, or ditch.

Check dams may also trap small amounts of sediment generated in the swale, channel, or ditch itself. However, the check dam is not a sediment trapping measure and should not be used as such.

The measure is limited to use in small open channels that drain one acre or less. It should not be used in either perennially flowing streams or intermittent stream channels.

Check dams can be constructed of stone. In locations where stone is not available, timber check dams may be considered. Typical applications include temporary or permanent ditches, channels, or swales, which need protection during the establishment of grass linings.

Hay or straw bales should generally not be used as check dams, or in any location where there is concentrated flow. However, they may be used for check dams in applications where installation access or other conditions prevent the use of preferred materials such as stone; in such cases, installation must provide proper embedment of the straw or hay bale barrier, limit contributing drainage area to less than one acre, and provide for frequent monitoring of the barrier.

Considerations (NH SWM):

- This measure is intended for use in areas of concentrated flow, but must not be used in stream channels (whether perennial or intermittent).
- The check dam may be left in place permanently to avoid unnecessary disturbance of the soil on removal, but only if the project design has accounted for their hydraulic performance and construction plans call for them to be retained.
- If it is necessary to remove a stone check dam from a grass-lined channel that will be mowed, care should be taken to ensure that all stones are removed, including stones that have washed downstream.

Maintenance Requirements (NH SWM):

- All E&SC measures should be inspected at least once per week and within 24 hours of any storm event exceeding 1/4-inch in a 24-hour period, or as stipulated by the applicable permits. Repairs should be made as necessary.
- Check dams should be inspected at least daily during prolonged rainfall.
- Inspections should verify that the center of the dam is lower than the edges.
- Erosion caused by high flows around the edges of the dam must be corrected immediately.
- If evidence of siltation in the water is apparent downstream from the check dam, the check dam should be inspected and adjusted immediately.
- Check dams should be checked for sediment accumulation after each significant rainfall. Sediment should be removed routinely and when it reaches a maximum depth of 1/2 of the original height.
- See Chapter 6 for general information on inspection and maintenance of Erosion and Sediment Control (E&SC) measures (e.g., inspection frequency, corrective actions, documentation requirements, etc.).

Specifications (NH SWM):

Temporary check dams should conform to the following requirements:

- Check dams should be installed before stormwater runoff is directed to the swale, channel, or drainage ditch.
- The maximum contributing drainage area to the dam should be less than one acre.
- The maximum height of the dam should be 2 feet.
- The center of the dam should be at least 6 inches lower than the outer edges.

• The maximum spacing between the dams should be such that the toe of the upstream dam is at the same elevation as the overflow elevation of the downstream dam.
• The check dam should not be used in a flowing stream.
• Hay bale check dams should be embedded into the ground at least 4 inches but no more than 6 inches.
• Stone check dams should be constructed of a well-graded angular 2-inch to 3-inch stone. 3/4-inch stone on the upgradient face is recommended for better filtering, with larger stone on the down-gradient face to provide stability.
• The stone should be keyed into swale/ channel/ ditch side slopes and extended by a minimum of 18 inches to prevent bypass or washout.
• If carefully installed and monitored, timber check dams may be used, and should be constructed of 4-inch to 6- inch logs embedded at least 18 inches deep into the soil. However, stone check dams are generally preferred. The stone has the ability to conform to the channel and settle if scour occurs, rendering stone check dams less susceptible to scour around the ends and downstream of the devices.
• If provided by design and construction plans, leave the dam in place permanently.
• Temporary structures should be removed once the swale, channel, or ditch has been stabilized:
  o In temporary ditches, channels, and swales, check dams should be removed, and the ditch/ channel/ swale filled in when it is no longer needed.
  o In permanent structures, check dams should be removed when a permanent lining has been established. If the permanent lining is vegetation, then the check dam should be retained until the grass has matured to protect the ditch, channel, or swale. The area beneath the check dam must be seeded and mulched immediately after removal.

2022 CGP Requirements:

2.2.11 Minimize Erosion of Stormwater Conveyances.

Control stormwater discharges, including both peak flowrates and total stormwater volume, to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points.

Examples of stormwater controls that can be used to comply with this requirement include the use of erosion controls and/or velocity dissipation devices (e.g., check dams, sediment traps), within and along the length of a constructed site drainage feature and at the outfall to slow down stormwater.

4.12 Temporary Sediment Basin

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (B76-B81) (Direct Quotes)

2022 US CGP (As Amended) 2.2.12 (Direct Quotes)

Chapter Env-Wq 1506.12 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

General Descriptions (NH SWM):

General Description A sediment basin is a water impoundment constructed to capture and store sediment and/ or debris. Sediment is removed by temporarily detaining sediment-laden stormwater runoff, allowing time for the sediment particles to settle. In some instances, settling may be enhanced by the introduction of flocculants (see separate "Flocculants" fact sheet in this Appendix). Flocculants should only be used upon approval by NHDES. Sediment basins may be made by constructing a dam or embankment or by excavating a depression. Sediment basins differ from sediment traps, in that basins are engineered impoundment structures, and may serve larger areas than sediment traps.

The sediment basin is designed to:

• Detain stormwater volume and slowly release it to the downstream waterways (if surface water quality standards can be met at discharge point).
• Trap sediment originating from construction site and prevent subsequent deposition in downstream drainage waterways.
• Provide storage of the trapped sediment and debris.

Considerations (NH SWM):

• Sediment basins should only be used where the following conditions exist:
  o Failure of the embankment or impoundment will not result in loss of life; damage to homes, commercial or industrial buildings, main highways, or railroads; or interruption of the use or service of public utilities.
  o The basin is designed by a Professional Engineer licensed in New Hampshire.
  o The basin is designed in accordance with the measures applicable to impoundment embankments, as identified in the Appendix A "Detention Basin" fact sheet.
• Sediment basins must meet all applicable requirements if they meet New Hampshire's definition of a "dam" (https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/dam-definiton.pdf). Applicable requirements may be accessed at the NHDES Dam Bureau web page at https://www.des.nh.gov/water/dam-maintenance-andmanagement.
• It is possible to use a basin that is designed for eventual permanent use as a detention basin or water quality treatment facility for the final constructed project. However, this measure should not be undertaken unless specifically provided in the design of the project, and authorized by the design engineer. In some cases, the longterm operating integrity of a basin can be adversely affected by temporary use as a sediment basin (such as potential clogging of soils intended to provide future infiltration function).
• A sediment basin should be installed as close as possible to the disturbed area or sediment source.

• Sediment basins should be installed where stormwater runoff from undisturbed areas can be excluded from the drainage area to the basin and should be placed in compliance with the Construction General Permit Appendix F, which requires a 50 foot vegetative natural buffer from wetlands, streams, and other jurisdictional areas.
• Sediment basins mostly trap coarse-grained sediments. Fine-grained sediments such as silts and clays will remain suspended in the water and will travel off-site unless the water is detained for an extended period of time, or unless other treatment measures (such as use of flocculants or downstream filters) are implemented to enhance settling of these materials. B-77
• Sediment basins, like detention basins, can result in warmer water temperatures than the natural condition (i.e., above ambient). Care must be exercised to not locate discharges from sediment basins near to cold-water streams.
• Basin locations and construction activities may affect downstream water quality, wetlands, and water-related wildlife habitats. These conditions must be considered in the design.
• Overall planning and design should be carefully considered to minimize the number of sediment basins required.

Maintenance Requirements (NH SWM):

• All E&SC measures should be inspected at least once per week and within 24 hours of any storm event exceeding 1/4-inch in a 24-hour period, or as stipulated by the applicable permits. Repairs should be made as necessary.
• Sediment basin installations need to be regularly inspected during their installation. If there is any evidence of siltation downstream of the basin, corrective measures need to be implemented to keep sediment from entering downstream areas.
• Sediment basins should be inspected at least daily during prolonged rainfall.
• Outlet structures and emergency spillways should be examined at the time of inspection for any damage, and repaired immediately if any such damage is observed.
• Side slopes and embankments should be examined at the time of inspection to ensure that they are structurally sound, are not showing signs of seepage, and are not damaged by erosion or by construction activities.
• The water discharged from sediment basins should be monitored during storm events to determine how well they are functioning and if sedimentation is apparent, additional erosion control measures should be applied to eliminate the source of sedimentation.
• Geotextile fabric or stone used around a pipe-outlet riser should be checked periodically and replaced when the material has become clogged with sediment.
• Sediment should be removed, and the trap restored to original capacity when sediment has accumulated to the original design sediment storage volume.
• The materials removed from the basin should be properly disposed of and stabilized.
• See Chapter 6 for general information on inspection and maintenance of Erosion and Sediment Control (E&SC) measures (e.g., inspection frequency, corrective actions, documentation requirements, etc.).

Specifications (NH SWM):

Sediment basins must meet the following requirements:

• Basins must be constructed and stabilized prior to disturbing the watershed above them. If sediment basins will be stabilized with vegetation, they must be installed early in the growing season.
• Erosion and Sediment Control (E&SC) measures should be employed during the construction of the sediment basin until stabilized to protect downstream waterbodies from sedimentation due to the construction disturbance required to install this E&SC measure.
• An outlet structure should be provided adequate to handle the 10-year frequency discharge without failure or significant erosion.

  o The outlet should be designed, constructed, and maintained in such a manner that sediment does not leave the trap and that erosion at or below the outlet does not occur.
  o Outlets should be designed so that the top of the embankment provides the minimum freeboard specified in Appendix A "Detention Basin" fact sheet. B-78
  o The outlet should discharge to a stabilized area. The outlets must empty onto undisturbed or stabilized ground, into a watercourse, stabilized channel, or a storm sewer system. Any discharges must meet surface water quality standards. Outlet protection should be provided (see Appendix A "Permanent Outlet Protection" fact sheet) or control valves on outlet structures should be provided to hold or reduce discharge volume.

• The minimum sediment storage volume of the basin should be 3,600 cubic feet of storage for each acre of drainage area, or the calculated stormwater runoff volume from a 2-year, 24-hour storm. The capacity of the sediment basin should be equal to the stormwater volume to be detained plus the volume of sediment expected to be trapped. Periodic removal of sediment will be necessary to maintain the basin's capacity.
• The side slopes of the basin should be 3h:1v or flatter, and should be stabilized immediately after their construction.
• Embankments should be designed to meet applicable regulations, and should meet the design requirements identified in Appendix A "Detention Basin" fact sheet for embankment construction.
• The drainage area contributing to the basin must be protected against erosion so that expected sedimentation will not shorten the planned effective life of the structure. • Basins must be designed to be drained within 72 hours or less.
• An emergency spillway should be provided to safely pass the 50-year design storm without damage to the embankment, assuming that the basin is full to design depth at the beginning of the storm. The emergency spillway should not be installed in filled embankments.
• All areas disturbed during construction should be stabilized within 7 calendar days of that disturbance in accordance with the Permanent Vegetation E&SC measure, Temporary Mulching E&SC measure, or other appropriate structural E&SC measure. All construction of sediment basins must be completed and seeded by September 15 if vegetative measures will be used for final stabilization. Otherwise, side slopes must be stabilized with an alternative approved long-term stabilization measure. If structural measures such as riprap will be used for final

stabilization, this time limit will not apply. Water should not be directed to the sediment basin until the basin is stabilized with vegetative or other measures.
• A sediment basin with a pipe outlet structure should be fitted with a perforated riser surrounded by a gravel cone. This will serve to filter fine particulate material. A geotextile filter should be installed around the riser prior to the placement of the gravel.

Additional Outlet Protection Considerations (NH SWM):

• Note that sediment basins are vulnerable to discharging sediment-laden water and may require additional protection at the outlet, particularly when construction sediment is fine (i.e., comprised mostly of fine silts or clays). • Additional measures may include, but are not limited to stone filter rings, porous, baffling systems, and sediment skimmers as pictured below.

2022 CGP Requirements:

a. Situate the basin or impoundment outside of any receiving water. and any natural buffers established under Part 2.2.1;

b. Design the basin or impoundment to avoid collecting water from wetlands;

c. Design the basin or impoundment to provide storage for either: i. The calculated volume of runoff from a 2-year, 24-hour storm;33 or ii. 3,600 cubic feet per acre drained.

d. Utilize outlet structures that withdraw water from the surface of the sediment basin or similar impoundment, unless infeasible;

e. Use erosion controls and velocity dissipation devices to prevent erosion at inlets and outlets; and

f. Remove accumulated sediment to maintain at least one-half of the design capacity and conduct all other appropriate maintenance to ensure the basin or impoundment remains in effective operating condition.

4.13 Temporary Sediment Trap

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (B82-B88) (Direct Quotes)

Chapter Env-Wq 1506.10 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

General Description (NH DWM):

A sediment trap is a small, temporary ponding area to intercept sediment-laden stormwater runoff from small, disturbed areas. Intercepted stormwater runoff is retained long enough to allow for settling of the coarser sediment particles. Sediment traps are usually installed at the outlet of stormwater diversion structures, channels, slope drains, construction exit wash areas, or other points of discharge from disturbed area.

Considerations (NH SWM):

• A sediment trap should be installed as close as possible to the disturbed area or sediment source.
• Sediment traps should be used in drainage ways with small watersheds (contributing drainage area less than 5 acres, but usually significantly smaller than this). For larger contributing areas, engineered sediment basins should be used instead.
• Sediment traps should be installed where stormwater runoff from undisturbed areas can be excluded from the trap.
• Traps should be located to obtain maximum storage benefit from the terrain, as well as for ease of removal and disposal of accumulated sediment.
• Sediment trap discharge should meet NH surface water quality standards at discharges to streams, rivers, or other waterbodies.

Maintenance Requirements (NH SWM):

• All E&SC measures should be inspected at least once per week and within 24 hours of any storm event exceeding 1/4-inch in a 24-hour period, or as stipulated by the applicable permits. Repairs should be made as necessary.
• Sediment traps should be inspected at least daily during prolonged rainfall.
• Sediment should be removed, and the trap restored to original capacity when sediment has accumulated to 50 percent of the original volume.
• The materials removed from the trap should be properly disposed of and stabilized.
• Sediment trap outlets should be examined at the time of inspection for any damage, and repaired immediately if any such damage is observed.
• Geotextile fabric or stone used around a pipe-outlet riser should be checked periodically and replaced when the material has become clogged with sediment.
• See Chapter 6 for general information on inspection and maintenance of Erosion and Sediment Control (E&SC) measures (e.g., inspection frequency, corrective actions, documentation requirements, etc.).

Specifications (NH SWM):

Temporary sediment traps should meet the following requirements:

• Sediment traps should be located so that they can be installed prior to disturbing the area they are to protect.
• The trap should be installed as close to the disturbed area or source of sediment as possible.
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• The maximum contributing drainage area to the trap should be less than 5 acres.

• The minimum volume of the trap should be 3,600 cubic feet of storage for each acre of drainage area.
• The side slopes of the trap should be 3h:1v or flatter, and should be stabilized immediately after their construction.

Embankments:

• The maximum height of the sediment trap embankment should be 4 feet when measured from the lowest point of natural ground on the downstream side of the embankment.
• The minimum top width of the embankment should be 6 feet.

Outlets (General Requirements):

• The outlet should be designed, constructed, and maintained in such a manner that sediment does not leave the trap and that erosion at or below the outlet does not occur.
• Outlets should be designed so that the top of the embankment is a minimum of 1 foot above the crest elevation of the outlet.
• The outlet should discharge to a stabilized area (see "Temporary and Permanent Mulching," "Temporary Erosion Control Blanket," or "Temporary Vegetation").
• Outlets may be constructed as earth spillways, stone outlets, or pipe outlets.

Earth Outlets:

• An earth outlet sediment trap has a discharge point that is located either over natural ground or cut into natural ground.
• The outlet width should be equal to 6 times the drainage area in acres.
• The embankment and outlet should be vegetated within 3 days of construction.

Stone Outlets:

• A stone outlet sediment trap has an outlet consisting of a crushed stone section in the embankment.
• The stone section should be located at the low point of the natural ground, as determined at the downstream side of the embankment.
• The outlet should be constructed of minimum size 1.5-inch crushed stone.

Pipe Outlets:

• A pipe outlet sediment trap has a pipe through the embankment, with an inlet consisting of a perforated riser.
• The pipe and riser should be constructed of corrugated metal. Plastic pipe (polyvinyl chloride or high-density polyethylene) may be considered, if the piping is located where it will not be subject to damage from vehicle traffic or from ice and frost conditions.
• The top 2/3 of the riser should be perforated with 1-inch diameter holes spaced 8 inches vertically and 10 to 12 inches horizontally around the pipe.

• Anchoring Weight: The riser should have a base with sufficient weight to prevent flotation of the riser. Two approved bases are: (1) A concrete base 12 inches thick with the riser embedded 9 inches into the concrete base, or (2) 1/4-inch minimum thickness steel plate attached to the riser by a continuous weld around the circumference of the riser to form a watertight connection. The plate should be backfilled with a minimum of 2.5 feet of stone, gravel, or earth to prevent flotation. In either case, each side of the square base measurement should be the riser diameter plus 24 inches.
• To increase the efficiency of the trap, the riser can be wrapped with a geotextile fabric held in place by woven wire and secured by strapping. The cloth should cover an area at least 6 inches above the highest hole and 6 inches below the lowest hole. The top of the riser pipe should not be covered with filter cloth.
• Crushed stone can also be used around the riser to increase trap efficiency.
• The minimum pipe sizes should be determined as provided in the following table:

Maximum Drainage Area (acres)	Minimum Barrel Diameter (inches)	Minimum Riser Diameter (inches)
1	15	21
2	18	24
3	21	30
4	24	30
5	30	36

Combination of Earth, Stone, or Pipe Outlets:

• A temporary sediment trap may have a combination of outlets. For instance, an 18-foot earth spillway outlet (adequate for 3 acres) and a pipe outlet with an 18-inch CMP barrel with a 24-inch CMP riser (adequate for 2 acres) could be used for the maximum drainage area of 5 acres.

Vegetation:

• All embankments, earth spillways, and disturbed areas below the structure should be vegetated within 72 hours of completion of the construction of the structure.
• If the structure is not planned for more than one vegetative growing season, the structure may be vegetated using the recommendation for "Temporary Vegetation" described in this Appendix.
• Basins that will be carried over the winter and into the next vegetative growing season should be vegetated using the recommendations for "Permanent Vegetation" described in this Appendix.

4.14 Diversion Ditch/ Berm

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (B7-B10) (Direct Quotes)

Chapter Env-Wq 1506.12 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

General Description (NH SWM):

A diversion is a temporary channel constructed across the slope to intercept stormwater runoff and direct it to a stable outlet or sediment trapping structures. The channel may be formed by excavation, placement of a berm (or dike), or a combination of these measures. This temporary measure is used immediately above a new cut or soil fill slope or around the perimeter of a disturbed area. Diversions can be used as follows:

• To divert stormwater runoff from upslope drainage areas away from unprotected disturbed areas and slopes to a stabilized outlet. In this case, the diversion is placed upslope of the construction area.
• To divert sediment-laden stormwater runoff from a disturbed area to a sediment-trapping structure such as a sediment trap or sediment basin. In this case, the diversion is placed below the disturbed area, to assure that sediment-laden stormwater runoff will not leave the site without treatment.

Diversions are intended to facilitate management of the site during construction, and should not be substituted for terracing, vegetated waterways, permanent land grading practices, and other permanent measures for providing long-term erosion control.

Considerations (NH SWM):

• If erosion of the temporary diversion measure occurs during construction, the basin, channel, and berm must be stabilized.
• The gradient along the flow path must have a positive grade to assure drainage, but should not be so steep as to result in erosion due to high velocity channel flow. If such erosion occurs during construction, corrective action should be taken to stabilize the channel and berm, flatten the gradient of the channel, or otherwise eliminate the cause of erosion. Channel slopes greater than 2 percent require stabilization.
• Diversions are typically installed using material available on the site and can usually be constructed with equipment needed for site grading. The useful life of the measure can be extended by stabilizing the berm with vegetation.
• Temporary diversion berms are often used as a perimeter control in association with a sediment trap or a sediment basin, or a series of sediment-trapping facilities, on moderate to large construction sites. If installed properly and in the first phase of grading, maintenance costs are very low.
• Diversions upslope of a construction area should not be located below high sediment-producing areas unless land treatment practices or structural measures designed to prevent damaging accumulations of sediment in the channels are installed with or before the diversions.

(The exception is where the diversion is used to divert sediment-laden water to a sedimentation facility.)
• Where diversions carry concentrated flows, their outlets require treatment or structures to dissipate energy and re-disperse flow or re-create sheet flow into undisturbed upland areas, where stormwater runoff can be absorbed. Untreated, sediment-laden stormwater runoff should not be discharged to undisturbed areas.
• Temporary vegetative stabilization of slopes should be conducted on slopes that are not in the final configuration and will have no work for an extended time period, but will have more work in the future.

Maintenance Requirements (NH SWM):

• All E&SC measures should be inspected at least once per week and within 24 hours of any storm event exceeding 1/4-inch in a 24-hour period, or as stipulated by the applicable permits. Repairs should be made as necessary.
• Diversion berms used to trap sediment should be inspected and cleaned out after every significant storm.
• Diversion ditches must be cleared of sediment whenever sediment accumulates.
• Damages caused by construction traffic or other activity must be repaired before the end of each working day.
• If inspection indicates vegetation has not been established or has been damaged, the affected areas must be reseeded immediately.
• Once diversions have been stabilized, they should be mowed periodically to maintain a healthy vegetative cover, but the grass should not be cut shorter than 4 inches. Diversion ridges can be hazardous to mow, and equipment operators should be made aware of this potential hazard.
• Vegetation should be inspected at least annually, and maintained in healthy condition, including pruning, removal, and replacement of dead or diseased vegetation, and removal of invasive species.
• See Chapter 6 for general information on inspection and maintenance of Erosion and Sediment Control (E&SC) measures (e.g., inspection frequency, corrective actions, documentation requirements, etc.).

Construction Specifications (NH SWM):

• Temporary diversion berms should be installed as an initial step in the land-disturbing activity. They must be functional prior to exposure of soils in the area being served by the diversion.
• Ditches or gullies within the limits of the diversion should be filled, and trees and other obstructions should be removed before or as part of construction.
• Berms should be located to minimize damages by construction operations and traffic. • Where the diversion crosses an underground utility or other structure, measures should be employed to prevent damage to the utility, and to prevent settlement or displacement of trench backfill resulting from placement of the diversion.

• Once soil is exposed for a diversion channel, it should be immediately shaped, graded, and stabilized. Berms should be adequately compacted to prevent failure.
• Diversions must be completely stabilized prior to directing stormwater runoff to them. • Where vegetation is used for stabilization, disturbed areas should be established to grass immediately after construction. Seedbed preparation, seeding, fertilizing, and mulching should comply with "Temporary and Permanent Vegetation" measures described in this Appendix.
• Temporary or permanent seeding and mulch should be applied to the berm immediately following its construction.
• If the soils or winter conditions preclude the use of vegetation and protection is needed, nonvegetative means, such as erosion control mats or an armor stone lining may be used.
• Each diversion must have an adequate outlet. The outlet must convey stormwater runoff to a point where outflow will not cause damage. The outlet should be installed and stabilized before the construction of the diversion.

4.15 Dust Control

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (B11-B12) (Direct Quotes)

2022 US CGP (As Amended) 2.2.6. (Direct Quotes)

Chapter Env-Wq 1506.08 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

General Description (NH SWM):

A diversion is a temporary channel constructed across the slope to intercept stormwater runoff and direct it to a stable outlet or sediment trapping structures. The channel may be formed by excavation, placement of a berm (or dike), or a combination of these measures. This temporary measure is used immediately above a new cut or soil fill slope or around the perimeter of a disturbed area. Diversions can be used as follows:

• To divert stormwater runoff from upslope drainage areas away from unprotected disturbed areas and slopes to a stabilized outlet. In this case, the diversion is placed upslope of the construction area.
• To divert sediment-laden stormwater runoff from a disturbed area to a sediment-trapping structure such as a sediment trap or sediment basin. In this case, the diversion is placed below the disturbed area, to assure that sediment-laden stormwater runoff will not leave the site without treatment.

Diversions are intended to facilitate management of the site during construction, and should not be substituted for terracing, vegetated waterways, permanent land grading practices, and other permanent measures for providing longterm erosion control.

Considerations (NH SWM):

• If erosion of the temporary diversion measure occurs during construction, the basin, channel, and berm must be stabilized.
• The gradient along the flow path must have a positive grade to assure drainage, but should not be so steep as to result in erosion due to high velocity channel flow. If such erosion occurs during construction, corrective action should be taken to stabilize the channel and berm, flatten the gradient of the channel, or otherwise eliminate the cause of erosion. Channel slopes greater than 2 percent require stabilization.
• Diversions are typically installed using material available on the site and can usually be constructed with equipment needed for site grading. The useful life of the measure can be extended by stabilizing the berm with vegetation.
• Temporary diversion berms are often used as a perimeter control in association with a sediment trap or a sediment basin, or a series of sediment-trapping facilities, on moderate to large construction sites. If installed properly and in the first phase of grading, maintenance costs are very low.
• Diversions upslope of a construction area should not be located below high sediment-producing areas unless land treatment practices or structural measures designed to prevent damaging accumulations of sediment in the channels are installed with or before the diversions. (The exception is where the diversion is used to divert sediment-laden water to a sedimentation facility.)
• Where diversions carry concentrated flows, their outlets require treatment or structures to dissipate energy and re-disperse flow or re-create sheet flow into undisturbed upland areas, where stormwater runoff can be absorbed. Untreated, sediment-laden stormwater runoff should not be discharged to undisturbed areas.
• Temporary vegetative stabilization of slopes should be conducted on slopes that are not in the final configuration and will have no work for an extended time period, but will have more work in the future.

Maintenance Requirements (NH SWM):

• All E&SC measures should be inspected at least once per week and within 24 hours of any storm event exceeding 1/4-inch in a 24-hour period, or as stipulated by the applicable permits. Repairs should be made as necessary.
• Diversion berms used to trap sediment should be inspected and cleaned out after every significant storm.
• Diversion ditches must be cleared of sediment whenever sediment accumulates. • Damages caused by construction traffic or other activity must be repaired before the end of each working day.
• If inspection indicates vegetation has not been established or has been damaged, the affected areas must be reseeded immediately.
• Once diversions have been stabilized, they should be mowed periodically to maintain a healthy vegetative cover, but the grass should not be cut shorter than 4 inches. Diversion

ridges can be hazardous to mow, and equipment operators should be made aware of this potential hazard.

• Vegetation should be inspected at least annually, and maintained in healthy condition, including pruning, removal, and replacement of dead or diseased vegetation, and removal of invasive species.

• See Chapter 6 for general information on inspection and maintenance of Erosion and Sediment Control (E&SC) measures (e.g., inspection frequency, corrective actions, documentation requirements, etc.).

Specifications (NH SWM):

Water Application:

• Periodically moisten exposed soil surfaces with adequate water to control dust.

• Avoid excessive application of water that would result in mobilizing sediment and subsequent deposition in natural waterbodies.

Stone Application:

• Cover surface with crushed stone or coarse gravel.

• In areas adjacent to waterways, use only chemically stable or washed aggregate.

Commercial Products:

• The use of other commercial products (i.e., tackifiers) to stabilize exposed surfaces or stockpiles for dust control will be subject to acceptance by NHDES on a project-specific basis.

Other Measures:

• Apply other temporary and permanent stabilization measures as specified in this Appendix.

• Calcium chloride cannot be applied in watersheds with chloride-impaired waterbodies. Elsewhere, it should only be used when other methods are not practical, and following these guidelines:

  o For dry application, use a commercial chemical product that is either loose dry granules or flakes, fine enough to feed through a spreader at a rate that will keep the surface moist but not cause pollution or plant damage.

  o For liquid applications, the application rate will vary depending on the relative quality of materials in a given road surface. Some calcium chloride suppliers may require a road sample before recommending an application rate. Typically, 30 percent calcium chloride is recommended for most gravel roads.

2022 CGP Requirements:

2.2.6 Minimize Dust

On areas of exposed soil, minimize dust through the appropriate application of water or other dust suppression techniques to control the generation of pollutants that could be discharged in stormwater from the site.

4.16 Soil Stockpile Protection Practices

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (B18-B19) (Direct Quotes)

2022 US CGP (As Amended) 2.2.5. (Direct Quotes)

Chapter Env-Wq 1506.08 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

General Description (NH SWM):

Surface roughening is a technique for creating furrows in a bare soil surface, by tracking the slope with construction equipment. The purpose of surface roughening is to aid the establishment of vegetative cover from seed, to reduce stormwater runoff velocity and increase infiltration, and to reduce erosion and provide for sediment trapping.

This measure applies to all construction slopes to facilitate long-term stabilization with vegetation, and particularly slopes steeper than 3h:1v.

Maintenance Requirements (NH SWM):

- All E&SC measures should be inspected at least once per week and within 24 hours of any storm event exceeding 1/4-inch in a 24-hour period, or as stipulated by the applicable permits. Repairs should be made as necessary.
- Any sign of rill or gully erosion should be immediately investigated and repaired as needed.
- Periodically inspect seeded slopes for rills or other signs of erosion. Fill these areas slightly above the original grade, reseed, and mulch as soon as possible, but no more than 3 days following inspection.
- See Chapter 6 for general information on inspection and maintenance of Erosion and Sediment Control (E&SC) measures (e.g., inspection frequency, corrective actions, documentation requirements, etc.).

Specifications Cut Slope Roughening:

• Groove the slope using machinery to create a series of ridges and depressions that run across the slope, on the contour.

Fill Slope Roughening:

• In general, fill slopes with a gradient steeper than 3h:1v should be constructed in lifts not to exceed 12 inches, compacting each lift. The contractor should refer to the project geotechnical report for specific guidance.
• The face of the slope should consist of loose, uncompacted fill 4 to 6 inches deep.
• Use grooving or tracking to roughen the face of the slopes, if necessary.
• Apply seed, fertilizer, and straw mulch, and then track or punch in the mulch with the bulldozer.
• Avoid blading or scraping the final slope face.

Cuts, Fills, and Graded Areas:

• Make mowed slopes no steeper than 3h:1v.
• Roughen these areas to shallow grooves by normal tilling, disking, or harrowing. The final pass of any such tillage should be on the contour.
• Make grooves formed by such implements close together (less than 10 inches), and not less than 1-inch deep.
• Excessive roughness is undesirable where mowing is planned.

Roughening With Tracked Machinery:

• Limit roughening with tracked machinery to soils with a sandy textural component to avoid undue compaction of the soil surface.
• Operate tracked machinery up and down the slope to leave horizontal depressions in the soil. Avoid back-blading during the final grading operation.
• Immediately seed and mulch roughened areas to obtain optimum seed germination and growth.

2022 CGP Requirements:

2.2.5 Manage stockpiles or land clearing debris piles composed, in whole or in part, of sediment and/or soil:

- Locate the piles outside of any natural buffers established under Part 2.2.1 and away from any constructed or natural site drainage features, storm drain inlets, and areas where stormwater flow is concentrated; Install a sediment barrier along all downgradient perimeter areas of stockpiled soil or land clearing debris piles;
- For piles that will be unused for 14 or more days, provide cover
- or appropriate temporary stabilization (consistent with Part 2.2.14);

- You are prohibited from hosing down or sweeping soil or sediment accumulated on pavement or other impervious surfaces into any constructed or natural site drainage feature, storm drain inlet, or receiving water.

4.17 Surface Roughening

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (B20-B22) (Direct Quotes)

General Description (NH SWM):

Surface roughening is a technique for creating furrows in a bare soil surface, by tracking the slope with construction equipment. The purpose of surface roughening is to aid the establishment of vegetative cover from seed, to reduce stormwater runoff velocity and increase infiltration, and to reduce erosion and provide for sediment trapping.

This measure applies to all construction slopes to facilitate long-term stabilization with vegetation, and particularly slopes steeper than 3h:1v.

Considerations (NH SWM):

Graded areas with smooth, hard surfaces may be initially attractive, but such surfaces increase the potential for erosion. A rough, loose soil surface gives a mulching effect that provides more favorable moisture conditions than hard, smooth surfaces; this aids seed germination.

Methods for achieving a roughened soil surface on a slope include tracking, furrowing, and serrating (or grooving). Selection of the method is based on slope steepness, mowing requirements, and whether the slope is formed by cutting or filling.

Maintenance Requirements (NH SWM):

• All E&SC measures should be inspected at least once per week and within 24 hours of any storm event exceeding 1/4-inch in a 24-hour period, or as stipulated by the applicable permits. Repairs should be made as necessary.
• Any sign of rill or gully erosion should be immediately investigated and repaired as needed.
• Periodically inspect seeded slopes for rills or other signs of erosion. Fill these areas slightly above the original grade, reseed, and mulch as soon as possible, but no more than 3 days following inspection.
• See Chapter 6 for general information on inspection and maintenance of Erosion and Sediment Control (E&SC) measures (e.g., inspection frequency, corrective actions, documentation requirements, etc.).

Specifications (NH SWM):

Cut Slope Roughening:

• Groove the slope using machinery to create a series of ridges and depressions that run across the slope, on the contour.

Fill Slope Roughening:

• In general, fill slopes with a gradient steeper than 3h:1v should be constructed in lifts not to exceed 12 inches, compacting each lift. The contractor should refer to the project geotechnical report for specific guidance.
• The face of the slope should consist of loose, uncompacted fill 4 to 6 inches deep.
• Use grooving or tracking to roughen the face of the slopes, if necessary.
• Apply seed, fertilizer, and straw mulch, and then track or punch in the mulch with the bulldozer.
• Avoid blading or scraping the final slope face.

Cuts, Fills, and Graded Areas:

• Make mowed slopes no steeper than 3h:1v.
• Roughen these areas to shallow grooves by normal tilling, disking, or harrowing. The final pass of any such tillage should be on the contour.
• Make grooves formed by such implements close together (less than 10 inches), and not less than 1-inch deep.
• Excessive roughness is undesirable where mowing is planned.

Roughening With Tracked Machinery:

• Limit roughening with tracked machinery to soils with a sandy textural component to avoid undue compaction of the soil surface.
• Operate tracked machinery up and down the slope to leave horizontal depressions in the soil. Avoid back-blading during the final grading operation.
• Immediately seed and mulch roughened areas to obtain optimum seed germination and growth.

4.18 Temporary Erosion Control Blanket and Matting

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (B33-B39) (Direct Quotes)

2022 US CGP (As Amended) 2.2.14. (Direct Quotes)

Chapter Env-Wq 1506.03 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

General Description (NH SWM):

Erosion control blankets or mats consist of protective manufactured mulch blankets installed on prepared soil surfaces to provide erosion protection and surface stability on steep slopes, vegetated channels, or shorelines during vegetation establishment.

Erosion control blankets temporarily stabilize and protect disturbed soil from raindrop impact and surface erosion. Like other types of mulch, the blankets help increase infiltration, decrease compaction, and soil crusting, and conserve soil moisture. Erosion control blankets increase germination rates for grasses and legumes and promote vegetation establishment. Erosion control blankets also protect seeds from predators and reduce desiccation and evaporation by insulating the soil and seed environment.

Erosion control blankets generally consist of machine-made mats made of organic, biodegradable mulch such as straw, curled wood fiber (excelsior), coconut fiber or a combination thereof, evenly distributed on or between netting. Netting should be wildlife friendly (see wildlife friendly considerations below) and composed of biodegradable natural fiber. The blankets are provided in rolls for ease of handling and installation.

Note: This erosion control measure as described in this manual does not cover the selection and installation of turf reinforcement products. If such products are used on-site, they must be included in the project plans, designed by a Professional Engineer registered in New Hampshire, and included in permit approvals.

Consideration (NH SWM):

Erosion control blankets can be applied to steep slopes, vegetated waterways, and other areas sensitive to erosion, to supplement vegetation during initial establishment and help provide for safe conveyance of stormwater runoff over the protected surface.

The following considerations are important for proper use of erosion control blankets and matting:

- During the growing season (April 15 – September 15) use mats (or mulch and netting) on:
    - o The base of grassed waterways.
    - o Steep slopes (15 percent or greater).
    - o Any disturbed soil within 100 feet of lakes, ponds, rivers, streams, and wetlands.
- During late fall and winter (September 15 – April 15) use heavy grade mats on all areas noted above plus use lighter grade mats (or mulch and netting) on:
    - o Side slopes of grassed waterways.

o Moderate slopes (greater than 8 percent). There may be cases where mats will be needed on slopes flatter than 8 percent, depending on site conditions and length of the slope.

• The most critical aspect of installing mats is obtaining firm continuous contact between the mat and the soil. Without such contact, erosion will occur underneath the mat.
• Install mats and staple in accordance with the manufacturer's recommendations.
• The designer must exercise care to choose the type of blanket or matting which is appropriate for the specific objectives and site conditions of the project. There are many soil stabilization products available, and a thorough review by an engineer or erosion control professional is necessary to evaluate the advantages, disadvantages, and construction requirements of the manufactured products, and to select and specify a product for a particular application.

Maintenance Requirements (NH SWM):

• All E&SC measures should be inspected at least once per week and within 24 hours of any storm event exceeding 1/4-inch in a 24-hour period, or as stipulated by the applicable permits. Repairs should be made as necessary.
• Any failure should be repaired immediately. If washout of the slope, displacement of the mat, or damage to the mat occurs, the affected slope shall be repaired and reseeded, and the affected area of mat shall be re-installed or replaced.
• See Chapter 6 for general information on inspection and maintenance of Erosion and Sediment Control (E&SC) measures (e.g., inspection frequency, corrective actions, documentation requirements, etc.).

Design Erosion Control Blankets and Matting to be Wildlife Friendly (NH SWM):
Blankets and matting should be designed to minimize potential harm to wildlife. Wildlife friendly considerations based on the United States Fish and Wildlife Service (USFWS, 2023) include:

• Use of natural fiber, loose weave netting or no netting. Avoid plastic netting of any type- including "photodegradable" netting.
• Use of 100 percent biodegradable materials.
• Rectangle (elongated) mesh is better than square.
• All edges of blankets and mats should be secured with wooden stakes and buried.
• Remove blankets and mats as soon as they are no longer needed for erosion control.

Specifications (NH SWM):

Site Preparation:

Proper site preparation is essential to ensure complete contact of the protection matting with the soil. Site preparation should include the following specifications:

• Grade and shape area of installation.
• Remove all rocks, clods, trash, vegetation, or other obstructions so that the installed blankets will have direct contact with the soil.
• Prepare seedbed by loosening 2 to 3 inches of topsoil above final grade.
• Incorporate amendments, such as lime and fertilizer, into the soil according to soil test and the seeding plan.

Seeding:

• Seed area before blanket installation for erosion control and re-vegetation. Seeding and top soil layering after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all check slots and other areas disturbed during installation must be reseeded.
• Where soil filling is specified, seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

Installing and Anchoring Blankets:

• Blankets shall be installed and anchored per the manufacturer's specifications. If the manufacturer's instructions differ from those listed below, the manufacturer's instructions should be followed.
• Blankets shall be placed within 24 hours after sowing seed in that area.
• Lay blankets loosely and maintain direct contact with the soil – avoid stretching.
• U-shaped wire staples, metal geotextile stake pins, or triangular wooden stakes can be used to anchor mats to the ground surface. Biodegradable anchors are preferred.
  o Wire staples should be a minimum gauge as specified by the manufacturer.
  o Metal stake pins should be 3/16-inch diameter steel with a 1.5-inch steel washer at the head of the pin, or as specified by the manufacturer.
• Wire staples and wood or metal stakes should be driven flush to the soil surface. All anchors should have sufficient ground penetration to resist pullout. Longer anchors may be required for loose soils.

Installation on Slopes:

• Blankets shall be installed on slopes per the manufacturer's specifications. If the manufacturer's instructions differ from those listed below, the manufacturer's instructions should be followed.
• Blankets shall be laid loosely over the soils, maintaining contact with the soil, and not stretched.
• Blankets shall be anchored at the top of the slope in a trench to prevent stormwater runoff from undermining the mat. Subsequent mats should be overlapped by the upslope mat. Backfill trench and tamp earth firmly.
• Blankets should be placed starting at the bottom (downslope) so proper overlap is achieved.
• Blankets shall be unrolled in the direction of the water flow, overlapping the edges by a minimum of 4 inches and stapling the edges, as directed by the manufacturer.

• When blankets must be spliced, they shall be placed end over end (shingle style) with 6-inch minimum overlap. Staple through overlapped area, approximately 12 inches apart, or as specified by manufacturer.
• Blankets shall be stapled sufficiently to anchor blanket and maintain contact with the soil. Staples shall be placed down the center and staggered with the staples placed along the edges. Stapling pattern and number of staples will depend on steepness of slope and manufacturer's anchoring methods; follow manufacturer's instructions.

Installation in Channels:

• Blankets shall be installed in channels per the manufacturer's specifications. If the manufacturer's instructions differ from those listed below, the manufacturer's instructions should be followed.
• Dig initial anchor trench across the channel at the lower end of the project area.
• Excavate intermittent check slots, across the channel at 25- to 30-foot intervals along the channel, or as specified by manufacturer.
• Cut longitudinal channel anchor slots along each side of the installation to bury edges of matting. Whenever possible extend matting 2 to 3 inches above the crest of channel side slopes.
• Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices, as directed by the manufacturer. Note: matting will initially be upside down in anchor trench.
• In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 3 inches.
• Secure these initial ends of mats with anchors at manufacturer's specified intervals, backfill and compact soil.
• Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench.
• Unroll adjacent mats upstream in similar fashion, maintaining a 3-inch minimum overlap.
• Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at manufacturer's specified intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.
• Alternative method for noncritical installations: place two rows of anchors on 6-inch centers at 25 to 30 feet intervals in lieu of excavated check slots.
• Shingle-lap spliced ends by a minimum of 1-foot with upstream mat on top to prevent uplifting by water or begin new rolls in a check slot. Anchor overlapped area by placing two rows of anchors, 1-foot apart on 1-foot intervals.
• Place edges of outside mats in previously excavated longitudinal slots, anchor using prescribed staple pattern, backfill and compact soil.
• Anchor, fill, and compact upstream end of mat in a terminal trench, as directed by manufacturer.
• Secure mat to ground surface using U-shaped wire staples, geotextile pins, wooden stakes, or other anchors as recommended by the manufacturer.

2022 CGP Requirements:

2.2.14 Stabilize exposed portions of the site. Implement and maintain stabilization measures (e.g., seeding protected by erosion controls until vegetation is established, sodding, mulching, erosion control blankets, hydromulch, gravel) that minimize erosion from any areas of exposed soil on the site in accordance with Part.

BS&E Considerations/Recommendations:

BS&E typically requires rolled erosion control blanket within the interior side slopes of stormwater SCMs, regardless of if the interior is 2:1 or flatter.

4.19 Construction Dewatering

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (B42-B45) (Direct Quotes)

2022 US CGP (As Amended) 2.4 (Direct Quotes)

Chapter Env-Wq 1506.11 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

General Description (NH SWM):

This construction dewatering measure is intended to prevent sedimentation associated with the management of water removed during construction from excavations, cofferdams, and other work areas that trap stormwater and groundwater. Dewatering activities must meet state surface water quality standards.

Construction sites in New Hampshire typically require construction dewatering operations. For example, excavations within the work area can trap rainwater or groundwater. This water needs to be removed before certain operations can be performed or to keep work conditions safe. Dewatering may also be required for water from cofferdams and when bypassing stream flows (both of which would require a permit from the Wetlands Bureau). Contractors typically use ditch pumps to dewater these enclosed areas. If care is not taken to select the point of discharge and provide adequate treatment, the pumped water may discharge to down-gradient natural resources such as lakes, ponds, rivers, streams, or wetlands with subsequent sedimentation of those waterbodies.

Construction dewatering activities must be conducted in a proper manner to:

- Prevent the discharged water from eroding soil on the site.
- Remove sediment from the collected water.
- Preserve down-gradient natural resources and property.

Considerations (NH SWM):

• Choose the best location for discharge to meet the above objectives. The discharge areas should be chosen with careful consideration to the down-gradient water resources and the existing landscape's ability to treat water flows from the dewatering process. Wooded buffers and flat to moderate slopes provide the best opportunity for filtration and absorption of such discharges.
• Care must be exercised to prevent contact of water from construction dewatering with oil, grease, other petroleum products, or toxic and hazardous materials. Contaminated stormwater runoff must be contained, treated, and discharged or removed in accordance with NHDES requirements.
• All requirements of state law and permit requirements of local, state, and federal agencies must be met, including the Dewatering and Remediation General Permit for projects that propose to discharge construction dewatering water to surface waters such as lakes, ponds, rivers, streams, and wetlands.
• The discharge should be stopped immediately if the receiving area shows any sign of instability or erosion.

Maintenance Requirements (NH SWM):

• All E&SC measures should be inspected at least once per week and within 24 hours of any storm event exceeding 1/4-inch in a 24-hour period, or as stipulated by the applicable permits. Repairs should be made as necessary.
• During the active dewatering process, inspection of the dewatering facility should be reviewed at least daily, with more frequent or continuous supervision as warranted by site conditions.
• Special attention should be paid to the buffer area for any sign of erosion or concentration of flow that may damage the buffer's vegetation or underlying soil. B-43
• The visual quality of the effluent should be monitored to assess whether additional treatment can be provided to prevent sedimentation of downstream receiving waters.
• See Chapter 6 for general information on inspection and maintenance of Erosion and Sediment Control (E&SC) measures (e.g., inspection frequency, corrective actions, documentation requirements, etc.).

Specifications (NH SWM):

Dewatering excavated areas is conducted in three distinct operations: the removal of the collected water within the excavation, the treatment of the collected water, and the controlled discharge of water in a non-erosive manner.

Water Removal:

• Install diversion ditches or berms to minimize the amount of clean stormwater runoff allowed into the excavated area.
• For trench excavation, limit the trench length to 500 feet and place the excavated material on the upgradient side of the trench.

• The removal of water from the excavated area can be accomplished by numerous methods, including but not limited to gravity drainage through channels, mechanical pumping, siphoning, and using the bucket of construction equipment to scoop and dump water from the excavation. Water may also be withdrawn from the ground adjacent to an excavation by pumping of well points.
• All channels, swales, and ditches dug for discharging water from the excavated area should be stable prior to directing discharge to them. If flow velocities cause erosion within these channels, then the channel should be restabilized; if necessary, a stone lining or other stabilizing measure should be used.
• Bucketed water should be discharged in a stable manner to the sediment removal area. A splash pad of riprap underlain with geotextile may be necessary to prevent scouring of the soil in the basin.
• Dewatering during periods of intense, heavy rain should be avoided.

Sediment Removal:

• There are several methods for settling or filtering sediment that a contractor may use. Typical measures include temporary basins or sediment traps, sedimentation tanks, and manufactured fabric bags designed for filtering pumped discharges.
• Flow to the sediment removal structure must not exceed the structure's capacity to settle or filter the receiving flow.
• Sediment removal structures should discharge wherever possible to a well-vegetated buffer through sheet flow and should maximize the distance to the nearest water resources and minimizing the slope of the buffer area.

Temporary Basin Designs:

Temporary basin designs include but are not limited to:

• An enclosure of Jersey Barriers lined with geotextile fabric.
• A temporary enclosure constructed with hay bales, silt fence, or both. Erosion control mix also may be incorporated with silt fence or hay bales. A silt fence must be supported to prevent it from collapsing under the weight of impounded water.
• Chambered settling system fabricated of concrete or steel and designed for sediment removal.
• Excavated or bermed sedimentation trap. See the description of "Temporary Sediment Trap" in this Appendix.
• A sediment basin (including temporarily modified stormwater detention ponds), if designed in accordance with the description of "Temporary Sediment Basin" in this Appendix.

Frac Tanks:

• Frac tanks can provide storage for large volumes of water during construction dewatering measures. As water is held in the frac tank, sediment in the water will settle to the bottom of the tank.

• Frac tanks are commonly used with a flocculant (see "Flocculants") to increase sediment removal effectiveness.
• Frac tanks are commonly deployed in constrained construction sites.
• Frac tanks must be carefully sized in accordance with manufacturer instructions and based on the anticipated amount of dewatering volume needed.

Manufactured Filter Bags:

• Water from construction operations may be discharged to a manufactured filter structure specifically designed for sediment removal, such as a manufactured silt "bag" or other similar product.
• The filter bag should be used in accordance with the manufacturer's recommended guidelines.
• The type of fabric should be based on the size of the soil particles to be trapped (i.e., woven material for coarse particles and nonwoven material for fine particles).
• Filter bags have finite capacity. Avoid over-pressurizing the bag and routinely inspect for tears or other malfunctions.

Discharges:

• Water that is visibly clear of sediment, and has not come into contact with other contaminants, may be directly discharged into well-vegetated buffered areas with less than 2 percent slope, as long as a method is used to spread flow into sheet flow as it enters the buffer.
• Never discharge to areas that are bare or newly vegetated.
• The discharge should be stopped immediately if the receiving area is showing any sign of instability or erosion.
• Stilling basins may require a properly sized and stabilized spillway for discharge.

2022 CGP Requirements:

2.4 Construction Dewatering Requirements

Comply with the following requirements to minimize the discharge of pollutants from dewatering operations.

2.4.1 Route dewatering water through a sediment control (e.g., sediment trap or basin, pumped water filter bag) designed to prevent discharges with visual turbidity;

2.4.2 Do not discharge visible floating solids or foam;

2.4.3 The discharge must not cause the formation of a visible sheen on the water surface, or visible oily deposits on the bottom or shoreline of the receiving water. Use an oil-water separator or suitable filtration device (such as a cartridge filter) designed to remove oil, grease, or other products if dewatering water is found to or expected to contain these materials;

2.4.4 To the extent feasible, use well-vegetated (e.g., grassy or wooded), upland areas of the site to infiltrate dewatering water before discharge. You are prohibited from using receiving waters as part of the treatment area;

2.4.5 To prevent dewatering-related erosion and related sediment discharges: Use stable, erosion-resistant surfaces (e.g., well-vegetated grassy areas, clean filter stone, geotextile underlayment) to discharge from dewatering controls; Do not place dewatering controls, such as pumped water filter bags, on steep slopes (as defined in Appendix A); and At all points where dewatering water is discharged, comply with the velocity dissipation requirements of Part 2.2.11.

2.4.6 For backwash water, either haul it away for disposal or return it to the beginning of the treatment process;

2.4.7 Replace and clean the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer's specifications; and

2.4.8 Comply with dewatering-specific inspection requirements in Part 4.

4.20 Temporary and Permanent Mulching

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (B23-B25) (Direct Quotes)

2022 US CGP (As Amended) 2.2.14. (Direct Quotes)

Chapter Env-Wq 1506.01 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

General Description (NH SWM):

Temporary mulching consists of the application of plant residues or other suitable materials to the soil surface. Mulching reduces erosion potential by protecting the exposed soil surface from direct impact by rainfall. It also aids in the growth of vegetation by conserving available moisture, controlling weeds, and providing protection against extreme heat and cold. Mulches can also protect the infiltration rate of the soil, prevent soil compaction, and provide a suitable microclimate for seed germination. This is the quickest and most cost-effective method of preventing erosion on disturbed soils and its value should not be underestimated.

Permanent mulching consists of the application of long-term surface cover such as bark, wood chips, or erosion control mix. Permanent mulch can be used as a permanent ground cover, as an overwinter stabilization mulch, or left to naturalize. It is not designed to support grass vegetation, but legumes or woody vegetation may be established for additional stability. Permanent mulch must not be used in areas of concentrated water flows. Slopes with evidence of groundwater seepage may require the use of other treatments such as riprap.

The composition of "erosion control mix" is further described in the "Erosion Control Mix Berm" fact sheet. In addition to its use for the temporary or semi-permanent stabilization of slopes, it can be applied to protect areas from erosion during spring thaw. It can also be used in construction yards to mitigate muddy conditions. In these applications, the erosion control mix application rate will need to be adjusted for site conditions, use, and long-term effectiveness. With time, the organic component of the erosion control mix will decompose and become ineffective. Any required repairs should be made immediately, with additional erosion control mix placed on top to reach the desired thickness.

Timing of Temporary versus Permanent Stabilization (NH SWM):

All areas of exposed or disturbed soil should be temporarily stabilized as soon as practicable but no later than 45 days from the time of initial disturbance unless a shorter time is specified by local authorities, the construction sequence approved as part of the issued permit, or an independent monitor. Permanent stabilization must be completed as soon as practicable but no later than 3 days following final grading (Env-Wq 1505.03).

The EPA Construction General Permit also requires any area that is inactive for 14 days to be temporarily stabilized; however, it is generally good practice to stabilize any area that will be inactive for 7 days.

Maintenance Requirements (NH SWM):

• All E&SC measures should be inspected at least once per week and within 24 hours of any storm event exceeding 1/4-inch in a 24-hour period, or as stipulated by the applicable permits. Repairs should be made as necessary.
• If less than 90 percent of the soil surface is covered by mulch, additional mulch should be immediately applied. Anchor nets must be inspected after rain events for dislocation or failure. If washouts or breakages occur, repair any damage to the slope and re-install or replace netting as necessary. Inspections should take place until grasses are firmly established (85 percent soil surface uniformly covered with healthy stand of grass).
• Erosion control mix mulch used for temporary stabilization should be left in place and incorporated into any permanent mulching or final stabilization phase. Vegetation adds stability and should be promoted.
• Where permanent mulch is used in conjunction with ornamental plantings, inspect periodically throughout the year to determine if mulch is maintaining coverage of the soil surface. Repair as needed.
• Permanently mulched areas should be inspected at least annually, and after each large rainfall (2.5 inches or more in a 24-hour period). Any repairs required to restore erosion control functionality should be made immediately. Where erosion control mix has been used, place

additional mix on top of the mulch to maintain recommended thickness. When the mulch is decomposed, clogged with sediment, eroded or ineffective, it must be replaced or repaired.
• If the mulch needs to be removed, spread it out into the landscape if feasible.
• Vegetation should be inspected at least annually, and maintained in healthy condition, including pruning, removal, and replacement of dead or diseased vegetation, and removal of invasive species.
• See Chapter 6 for general information on inspection and maintenance of Erosion and Sediment Control (E&SC) measures (e.g., inspection frequency, corrective actions, documentation requirements, etc.).

Specifications (NH SWM):

General:

• Apply mulch prior to a storm event. This is especially applicable in extremely sensitive areas such as within 100 feet of lakes, ponds, rivers, streams, and wetlands. It will be necessary to closely monitor weather predictions to have adequate warning of significant storms.
• Mulching should be completed within the following specified time periods from original soil exposure:
  o Within 100 feet of rivers, streams, wetlands, and in lake and pond watersheds, the time period should be no greater than 7 days. This 7-day limit should be reduced further during wet weather periods.
  o In other areas, the time period can range from 14 to 30 days, the length of time varying with site conditions (soil erodibility, season of year, extent of disturbance, proximity to sensitive resources) and the potential impact of erosion on adjacent areas. Other state or local restrictions may also apply.
• The choice of mulch material should be based on site conditions, soils, slope, flow conditions, and time of year.
• Jute and fibrous mats and wood excelsior should be installed according to the applicable manufacturer’s instructions.

Hay or Straw Mulches:

• Organic mulches including hay and straw should be air-dried, free of undesirable seeds and coarse materials.
• Application rate should be 2 bales (70 to 90 pounds) per 1000 square feet or 1.5 to 2 tons (90 to 100 bales) per acre to cover 75 to 90 percent of the ground surface.
• Hay or straw mulch should be anchored to prevent displacement by wind or flowing water, using one of the following methods:
  o Netting: Install jute, wood fiber, or other biodegradable netting over hay or straw to anchor it to the soil surface. Install netting material according to manufacturer’s recommendation. Netting should be used sensibly, as wildlife can become entangled in the materials. Use of plastic netting should be avoided as indicated in Env-Wt 104.64.
  o Tackifier: Apply polymer or organic tackifier to anchor hay or straw mulch. Application rates vary by manufacturer: typically, 40 to 60 pounds per acre for polymer material,

and 80 to 120 pounds per acre for organic material. Liquid mulch binders are also typically applied heavier at edges, in valleys, and at crests than other areas.

• When mulch is applied to provide protection over winter (past the growing season), it should be applied to a depth of 4 inches (150 to 200 pounds of hay or straw per 1,000 square feet, or double standard application rate). Seeding cannot generally be expected to grow up through this depth of mulch and will be smothered. If vegetation is desired, the mulch will need to be removed in the springtime and the area seeded and mulched.

Wood Chips or Bark:

• Wood chips or ground bark should be applied to a thickness of 2 to 6 inches.
• Wood chips or ground bark should be applied at a rate of 10 to 20 tons per acre or 460 to 920 pounds per 1,000 square feet.

Erosion Control Mix:

Erosion control mix can be manufactured on or off the project site. It must consist primarily of organic material, separated at the point of generation, and may include shredded bark, stump grindings, composted bark, or acceptable manufactured products. Wood and bark chips, ground construction debris or reprocessed wood products will not be acceptable as the organic component of the mix. Erosion control mix must be placed at a thickness of 2 inches or more. See the "Erosion Control Mix Berm" fact sheet for detailed erosion control mix requirements.

Erosion Control Blankets and Mats:

Mats are manufactured combinations of mulch and netting designed to protect against erosion and to retain soil moisture and modify soil temperature. See specifications on "Temporary Erosion Control Blanket and Matting" fact sheet.

2022 CGP Requirements:

2.2.14 Stabilize exposed portions of the site. Implement and maintain stabilization measures (e.g., seeding protected by erosion controls until vegetation is established, sodding, mulching, erosion control blankets, hydromulch, gravel) that minimize erosion from any areas of exposed soil on the site in accordance with Part.

4.21 Temporary and Permanent Vegetation

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (B26-B32) (Direct Quotes)

2022 US CGP (As Amended) 2.2.14. (Direct Quotes)

Chapter Env-Wq 1505.04 & 1506.02 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

General Description (NH SWM):

Temporary vegetation consists of the establishment of a grass and legume cover on exposed soils for periods of up to 12 months. The purpose is to reduce erosion and sedimentation by stabilizing disturbed areas that will not be brought to final grade for a year or less and to reduce problems associated with mud and dust production from exposed soil surfaces during construction. Temporary seeding is also essential to preserve the integrity of earthen structures used to control sediment, such as diversions and embankments of sediment basins.

Temporary vegetative cover should be applied where exposed soil surfaces will not be final graded within 45 days from initial disturbance. Such areas include excavated areas, soil stockpiles, berms, embankments and sides of sediment basins, temporary road banks, and other earthworks. Annual plants that sprout rapidly and survive for only one growing season are suitable temporary vegetative cover.

Permanent vegetation should be established on disturbed areas where permanent, long-lived vegetative cover is needed to stabilize soil, reduce damages from sediment and stormwater runoff, and enhance the environment. A site is considered stable when it has a minimum of 85% vegetative cover.

Stormwater runoff and sheet erosion caused by splash erosion (raindrop impact on bare soil) is the source of most fine particles in sediment. To reduce sediment load in stormwater runoff, the soil surface itself should be protected. The most effective and economical means of controlling sheet and rill erosion is to establish a vegetative cover.

Timing of Temporary versus Permanent Stabilization (NH SWM):

All areas of exposed or disturbed soil should be temporarily stabilized as soon as practicable but no later than 45 days from the time of initial disturbance, unless a shorter time is specified by local authorities, the construction sequence approved as part of the issued permit, or an independent monitor. Permanent stabilization must be completed as soon as practicable but no later than 3 days following final grading (Env-Wq 1505.03).

The EPA Construction General Permit also requires any area that is inactive for 14 days to be temporarily stabilized; however, it is generally good practice to stabilize any area that will be inactive for 7 days.

Maintenance Requirements (NH SWM):

• All E&SC measures should be inspected at least once per week and within 24 hours of any storm event exceeding 1/4-inch in a 24-hour period, or as stipulated by the applicable permits. Repairs should be made as necessary.
• Temporary seeding should also be inspected just prior to September 15, to ascertain whether additional seeding is required to provide stabilization over the winter period.
• Permanent seeded areas should be inspected at least monthly during the course of construction. Inspections, maintenance, and corrective actions should continue until the owner assumes permanent operation of the site.
• Based on inspection, areas should be reseeded to achieve full stabilization of exposed soils. If it is too late in the planting season to apply additional seed, then other temporary stabilization measures should be implemented.
• At a minimum, 85 percent of the soil surface should be covered by vegetation. Reseeding may be required to achieve or retain 85 percent vegetative cover.
• Seeded areas should be mowed as required to maintain a healthy stand of vegetation, with mowing height and frequency dependent on type of grass cover.
• Vegetation should be inspected at least annually, and maintained in healthy condition, including pruning, removal, and replacement of dead or diseased vegetation, and removal of invasive species.
• If any evidence of erosion or sedimentation is apparent, repairs should be made and areas should be reseeded, with other temporary measures (e.g., mulch) used to provide erosion protection during the period of vegetation establishment.
• See Chapter 6 for general information on inspection and maintenance of Erosion and Sediment Control (E&SC) measures (e.g., inspection frequency, corrective actions, documentation requirements, etc.).

Specifications (NH SWM):

Site Preparation:

• Install erosion and sediment control measures such as siltation barriers, diversions, and sediment traps as needed.
• Grade as needed for the access of equipment for seedbed preparation, seeding, mulch application, and mulch anchoring.
• Stormwater runoff should be diverted from the seeded area.
• On slopes 4h:1v or steeper, the final preparation should include creating horizontal grooves perpendicular to the direction of the slope to catch seed and reduce stormwater runoff.

Seedbed Preparation:

• Remove all stones 2 inches or larger in any dimension from the surface. Remove all other debris such as wire, cable, tree roots, concrete, clods, lumps, trash, or other unsuitable material.

• Where the soil has been compacted by construction operations, loosen soil to a depth of 2 inches before applying fertilizer, limestone, and seed.
• If needed to ensure growth, fertilizer and organic soil amendments should be applied during the growing season.

o Apply limestone and fertilizer according to soil test recommendations. If soil testing is not feasible on small or variable sites, or where timing is critical, fertilizer may be applied at the rate of 600 pounds per acre or 13.8 pounds per 1,000 square feet of low phosphate fertilizer1 (N-P2O5-K2O) or equivalent. Apply limestone (equivalent to 50 percent calcium plus magnesium oxide) at a rate of 3 tons per acre (138 pounds per 1,000 square feet).
o Fertilizer should be restricted to a low phosphate, slow-release2 nitrogen fertilizer when applied to areas between 25 feet and 250 feet from a surface water body. No fertilizer except limestone should be applied within 25 feet of a surface water body. These limitations are requirements for any water body protected by the Shoreland Water Quality Protection Act (RSA 483-B; Env-Wq 1400).

Additional Requirements for Permanent Seedbed Preparation:

• Inspect seedbed just before seeding. If traffic has compacted the soil, the area must be tilled and firmed as above.
• Work limestone and fertilizer into the soil as practical to a depth of 4 inches with a disc, spring tooth harrow or other suitable equipment. The final harrowing operation should be on the general contour. Continue tillage until a reasonably uniform, fine seedbed is prepared. All but clay or silty soils and coarse sands should be rolled to firm the seedbed wherever feasible.

Seeding:

• For temporary vegetation, select seed from recommendations in the "Seeding Recommendations for Temporary Vegetation" table below.
• For permanent vegetation, select a seed mixture in Seed Mixture Selection Based on Soil Type table that is appropriate for the soil type and moisture content as found at the site, the amount of sun exposure and for level of use. Select seed from recommendations in Seed Mixtures for Permanent Vegetation.
• Apply seed uniformly by hand, cyclone seeder, drill, cultipacker type seeder or hydroseeder (slurry including seed and fertilizer). Normal seeding depth is from 1/4- to 1/2-inch. Hydroseeding that includes mulch may be left on soil surface. Seeding operations should be on the contour.
• Spring seeding usually gives the best results for all seed mixes or with legumes. Permanent seeding should be completed 45 days prior to the first killing frost. When crown vetch is seeded in later summer, at least 35 percent of the seed should be hard seed (unscarified). If seeding cannot be done within the specified seeding dates, mulch according to the "Temporary and Permanent Mulching" fact sheet and delay seeding until the next recommended seeding period.
o Temporary seeding should typically occur prior to September 15 of the year in which the area being seeded was disturbed.

o Areas seeded between May 15 and August 15 should be covered with hay or straw mulch, according to the "Temporary and Permanent Mulching" fact sheet.
• Vegetated growth covering at least 85 percent of the disturbed area should be achieved prior to October 15. If this condition is not achieved, implement other temporary stabilization measures for overwinter protection, and if applicable, complete permanent seed stabilization during the next growing season.
• Inoculate all legume seed with the correct type and amount of inoculant.
• For permanent seeding, except where either a cultipacker type seeder or hydroseeder is used, the seedbed should be firmed following seeding operations with a roller, or light drag.

Seeding Notes:

Low phosphorus fertilizer is defined by the Shoreland Water Quality Protection Act as less than 2 percent phosphorus. The University of New Hampshire (UNH) Cooperative Extension has found through soil tests that New Hampshire's soils have ample phosphorus and recommend low phosphorus fertilizers with 0 percent to 1 percent phosphorus such as 3:1:3 or 10:0:10 N:P:K. They discourage the use of imbalanced fertilizers.

Slow-release fertilizers must be at least 50 percent slow-release nitrogen component, which means that half of the nitrogen will not be immediately available. Typically, it takes 2 to 24 weeks for all slow-release nitrogen to become available. Slow-release fertilizers do not necessarily reduce nitrogen loading. Nitrogen fertilizers are necessary for grass lawns, however, according to the UNH Cooperative Extension, nitrogen fertilizers for lawns that consist of legume and clover are not necessary.

Hydroseeding:

• When hydroseeding (hydraulic application), prepare the seedbed as specified above or by hand raking to loosen and smooth the soil and remove surface stones larger than 2 inches in diameter.
• Slopes must be no steeper than 2h:1v.
• Lime and fertilizer may be applied simultaneously with the seed. The use of fiber mulch on critical areas is not recommended (unless it is used to hold straw or hay). Better protection is gained by using straw mulch and holding it with adhesive materials or 500 pounds per acre of wood fiber mulch.
• Seeding rates must be increased 10 percent when hydroseeding.

Seeding Recommendations for Temporary Vegetation

Species	Per Acre Bushels (BU) or Pounds (lbs)	Per 1,000 Square Feet	Remarks
Winter Rye	2 BU or 112 lbs	2.5 lbs	Best for fall seeding. Seed from August 15 for best cover. Seed to a depth of 1-inch.
Oats	2.5 BU or 80 lbs	2 lbs	Best for spring seedings. Seed no later than May 15 for summer protection. Seed to a depth of 1-inch.
Annual Ryegrass	40 lbs	1 lb	Grows quickly but is of short duration. Use where appearances are important. Seed early spring and/ or between August 15 and September 15. Cover the seed with no more than 1/4-inch of soil.
Perennial Ryegrass	30 lbs	0.7 lb	Good cover which is longer lasting than annual ryegrass. Seed between April 1 and June 1 and/ or between August 15 and September 15. Mulching will allow seeding throughout the growing season. Seed to a depth of approximately 1/2-inch.

Seed Mixture Selection Based on Soil Type

Use	Seed Mixture (see table below)	Soil Drainage: Droughty	Soil Drainage: Well Drained	Soil Drainage: Moderately Well Drained	Soil Drainage: Poorly Drained
Steep cuts and fills, borrow and disposal areas	A B C D E	Fair Poor Poor Fair Fair	Good Good Good Fair Excellent	Good Fair Excellent Good Excellent	Fair Fair Good Excellent Poor
Waterways, emergency spillways, and other channels with flowing water	A C D	Good Good Good	Good Excellent Excellent	Good Excellent Excellent	Fair Fair Fair
Lightly used parking lots, unused lands, and low intensity use recreation sites	A B C D	Good Good Good Fair	Good Good Excellent Good	Good Fair Excellent Good	Fair Poor Fair Excellent
Play areas and athletic fields. (Topsoil is essential for good turf.)	F G	Fair Fair	Excellent Excellent	Excellent Excellent	See Note See Note
Gravel pit	Consult with USDA Natural Resource Conservation Service.				

Seed Mixtures for Permanent Vegetation

Mixture	Species	Pounds Per Acre	Pounds Per 1,000 Square Feet
A	Tall fescue Creeping red fescue Redtop *Total*	20 20 2 42	0.45 0.45 0.05 0.95
B[3]	Tall fescue Creeping red fescue Crown vetch Or Flatpea *Total*	15 10 15 - 30 40 or 55	0.35 0.25 0.35 - 0.75 0.95 or 1.35
C[3]	Tall fescue Creeping red fescue Birdsfoot trefoil *Total*	20 20 8 48	0.45 0.45 .20 1.10
D[3]	Birdsfoot trefoil Redtop Reed canary grass *Total*	10 5 15 30	0.25 0.10 0.35 0.70
E	Tall fescue Flatpea *Total*	20 30 50	0.45 0.75 1.20
F	Creeping red fescue[2] Kentucky bluegrass[2] *Total*	50 50 100	1.15 1.15 2.30
G	Tall fescue[2]	150	3.60

2022 CGP Requirements:

2.2.14 Stabilize exposed portions of the site. Implement and maintain stabilization measures (e.g., seeding protected by erosion controls until vegetation is established, sodding, mulching, erosion control blankets, hydromulch, gravel) that minimize erosion from any areas of exposed soil on the site in accordance with Part.

BS&E Considerations/Recommendations:

Conservation Mix

Virginia Wild Rye	Native	FACW-
Little Bluestem	Native	FACU
Big Bluestem	Native	FAC
Red Fescue	Native	FACU
Switch Grass	Native	FAC
Partridge Pea	Native	FACU
Showy Tick Trefoil	Native	FAC
Butterfly Milkweed	Native	NI
Beggar Ticks	Native	FACW
Purple Joe Pye Weed	Native	FAC
Black Eyed Susan	Native	FACU-
Total	**25**	**0.57**

Conservation Mix will used to stabilize all 2:1 slopes and all land area disturbed within the wetland buffer. As the site is to be stabilized with erosion control mix as a mulch, the vegetation should be established with a high percentage of white clover for growth to be established. Conservation Mix will also be used to plant and stabilize the erosion control mix mulch. Seed will originally be applied by hydroseeding which includes a tackifier.

Rain Garden

The grass that is planted within a rain garden bio-filtration system within the bio-media must consist of a combination of warm season grass seed and cold season grass seed in order for the grass to start growing for stabilization and continue growing in the sandy well-drained environment. Planting specification will meet the requirements as outlined in 'Vegetation New Hampshire Sand and Gravel Pits' mix 1 (warm season grasses) (15 lbs/ac) and include annual and perennial rye grass seed (15 lbs/ac); the New England native warm season grass mix (23 lbs/ac) by New England Wetland Plants, inc.; Rain Garden Mix 180 (15 lbs/ac & 15 lbs/ac of rye) or Rain Garden Grass Mix 180-1 (20 lbs/ac & 10 lbs/ac of rye) by Ernst Conservation Seeds.

4.22 Straw or Hay Bale Barrier

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (B65-B68) (Direct Quotes)

Chapter Env-Wq 1506.06 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

General Description (NH SWM):

Straw and hay bale barriers are a type of temporary sediment barrier installed across or at the toe of a slope, to intercept and retain small amounts of sediment from disturbed or unprotected areas.

Straw or hay bale barriers have a useful life of less than six months. They function primarily to slow and pond the water and allow soil particles to settle. They are not designed to withstand high heads of water, and therefore should be located where only shallow pools can form. Their use is limited to areas that only contribute sheet flow to the device.

Straw or hay bale barriers constitute a sediment control measure, not an erosion control measure. They must be used in conjunction with other measures that prevent or control erosion. Improperly applied or installed sediment barriers will increase erosion.

Straw or hay bale barriers should generally not be used across streams, channels, swales, ditches, or other drainage ways or areas with concentrated flows. Such barriers are not capable of effectively filtering the high rates and volumes of water associated with channelized flow. However, they may be used for check dams in applications where installation access or other conditions prevent the use of preferred materials such as stone; in such cases, installation must provide proper embedment of the straw or hay bale barrier, limit contributing drainage area to less than an acre, and provide for frequent monitoring of the barrier. Straw or hay bale barriers installed across a concentrated flow path are subject to undercutting, end cutting, and overtopping. This can frequently result in the bypass of sediment-laden water, but also in the complete failure of the barrier. Such failures typically release the sediment accumulated on the upgradient side of the barrier, and severe erosion of the channel both upstream and downstream of the device.

Hay Bale Alternatives (NH SWM):

Construction sites have historically used straw or hay bales for erosion and sediment control as check dams, inlet protection, outlet protection and perimeter control. Many applications of straw hale bales for erosion and sediment control are ineffective due to their composition, inappropriate placement, inadequate installation, lack of maintenance, or a combination of these factors. Some local regulations limit the use of hay bales. For these reasons, the United States Environmental Protection Agency (EPA) recommends carefully considering other E&SC measure first. For example, consider silt fence for perimeter controls, stone check dams for diversion channels, erosion control blanket and matting for slope protection, filter sacks for inlet protection, and prefabricated washout containers for concrete washout structures. Refer to the U.S. EPA Fact Sheet for Straw or Hay Bales for more information.

Considerations (NH SWM):

• Straw or hay bale barriers principally trap sediment by temporarily ponding water, allowing particles to settle. These barriers are not designed to withstand high heads of water; therefore, they should be located where only shallow pools can form.
• Straw or hay bale barriers are used where:
  o Erosion will occur only in the form of sheet erosion and there is no concentration of water in a channel or other drainage way above the barrier.
  o Sedimentation can pollute or degrade adjacent wetlands or watercourses.
  o Sedimentation will reduce the capacity of storm drainage systems or adversely affect adjacent areas.
  o The contributing drainage area is less than 1/4 acre per 100 feet of barrier length, the maximum length of slope above the barrier is 100 feet, and the maximum gradient behind the barrier is 50 percent (2h:1v). If any of these conditions are exceeded, other measures may be necessary to control erosion and to intercept and treat the sediment load.
  o Sediment barriers should not be used in areas of concentrated flows. However, they may be used for check dams in applications where installation access or other conditions prevent the use of preferred materials such as stone; in such cases, installation must provide proper embedment of the straw or hay bale barrier, limit contributing drainage area to less than one acre, and provide for frequent monitoring of the barrier. Under no circumstances should sediment barriers be constructed in live streams or in swales where there is the possibility of a washout.
• Straw or hay bales should only be used as a temporary barrier for no longer than 60 days.
• Potential causes of straw or hay bale barrier failure include:
  o Improper placement on the site.
  o Allowing excessive drainage area to the barrier.
  o Inadequate keying of the bales into the ground surface.
  o Inadequate maintenance after installation.

Maintenance Requirements (NH SWM):

• All E&SC measures should be inspected at least once per week and within 24 hours of any storm event exceeding 1/4-inch in a 24-hour period, or as stipulated by the applicable permits. Repairs should be made as necessary.
• Hay bale barriers should be inspected at least daily during prolonged rainfall.
• Barriers should be repaired immediately if there are any signs of erosion or sedimentation below them. If there are signs of undercutting at the center or the edges of the barrier or impounding of large volumes of water behind the barrier, the barrier should be replaced with an

alternative measure to intercept and capture sediment (e.g., a diversion berm directing sediment-laden stormwater runoff to a sediment trap or basin).
• Damaged or decomposed bales should be replaced promptly.
• Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately 1/3 the height of the barrier.
• Any sediment deposits remaining in place after the filter barrier is no longer required should be dressed to conform to the existing grade, prepared and seeded.
• See Chapter 6 for general information on inspection and maintenance of Erosion and Sediment Control (E&SC) measures (e.g., inspection frequency, corrective actions, documentation requirements, etc.).

Specifications (NH SWM):

• Sediment barriers should be installed prior to any soil disturbance of the contributing drainage area above them.
• Bales should be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. The ends of the barrier should be flared up slope. Barriers should follow the contour or run parallel across slopes of the land as closely as possible.
• Barriers should not be constructed more than 1 bale high.
• All bales should be either wire-bound or string-tied. Bales should be installed so that bindings are oriented around the sides, parallel to the ground surface to prevent deterioration of the bindings.
• The barrier should be entrenched and backfilled. A trench should be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. • After the bales are staked and chinked, the excavated soil should be backfilled against the barrier. Backfill soil should conform to the ground level on the downhill side and should be built up 4 inches against the uphill side of the barrier. Ideally, bales should be placed 10 feet downgradient from the toe of slope.
• At least two stakes driven through the bale and penetrating at least 18 inches into the ground, should securely anchor each bale. The first stake in each bale should be driven toward the previously laid bale to force the bales together.
• The gaps between bales should be chinked (filled by wedging) with hay or straw to prevent water from escaping between the bales.
• Inspection should be frequent, and repair or replacement should be made promptly as needed. Bale barriers should be removed when they have served their usefulness, but not before the upslope areas have been permanently stabilized.

4.23 Control of Invasive Plants

During maintenance activities, check for the presence of invasive plants and remove in a safe manner as described on the following pages. They should be controlled as described on the following pages.

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

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

resisting control except by hazardous chemical.

4.24 Construction Sequence

1.) Cut and remove trees in construction area only as required, relocate any project T.B.M.
2.) Construct and/or install temporary and permanent sediment erosion and detention control facilities as specified. Erosion and sediment control measures shall be installed prior to any soil land disturbance.
3.) Erosion, sediment and detention control facility shall be installed & stabilized prior to directing runoff to them, temporary diversions may be required. <u>Post construction storm water management practices must be initiated and stabilized early in the process</u>.
4.) Clear, cut and dispose of debris in approved facility. Grubbing and stockpiling shall not occur until after erosion & sediment control measures are installed.
5.) Construct temporary water diversions (swales, basins, etc.) As needed until site is stabilized.
6.) All swales are to be installed prior to rough grading of the site. Temporary water diversion (swales, etc.) Must be used as necessary until areas are stabilized.
7.) Construct roadways for access to desired construction areas. All roads shall be stabilized immediately.
8.) Install pipe and construction associated appurtenances as required or directed. Install detention pond and infiltration pond. All disturbed areas shall stabilized immediately after grading.
9.) Begin permanent and temporary seeding and mulching. All cut and fill slopes and disturbed areas shall be seeded or mulched as required, or directed. Any area disturbed by construction will be re-stabilized within 45 days (Env-Wq 1504.16) and abutting properties will not be adversely affected by this development. All swales and drainage structures will be constructed and stabilized prior to having run-off directed to them. IAW EPA 2022 CGP 2.2.14, site stabilization will be initiated immediately in any areas of exposed soil where construction activities have permanently ceased or will be temporarily

inactive for 14 or more calendar days. The installation of stabilization will be completed as soon as practicable but no later than 14 calendar days. All roadways and parking areas shall be stabilized within 72 hours of achieving finished grades. All cut and fill slopes shall be stabilized within 72 hours of achieving finished grades.

10.) Construct temporary berms, drains ditches, silt fences, sediment traps, etc. Mulch and seed as required.
11.) Inspect and maintain all erosion and sediment control measures during construction. All SWPPP inspections must be conducted by a qualified professional such as a professional engineer (PE), a certified professional in erosion and sediment control (CPESC), a certified erosion sediment and storm water inspector (CESSWI), or a Certified Professional in Storm Water Quality (CPSWQ). Inspection reports shall be submitted to the planning department. Inspections shall be conducted weekly and within 24 hours of a 0.25 inch rain event.
12.) Complete permanent seeding and landscaping.
13.) Remove temporary erosion control measures after seeding areas have established themselves and site improvements are complete.
14.) Smooth and revegetate all disturbed areas. Stabilization should occur within 14 days of removing temporary measures.
15.) Finish paving all roadways.
16.) Lot disturbance, other than that shown on the approved plans, shall not commence until after the roadway has the base course to design elevation and the associated drainage is complete and stable.

4.25 Temporary Erosion Control Measures

1. The smallest practical area of land shall be exposed at any one time.
2. Erosion, sediment and detention measures shall be installed as shown on the plans and at locations as required, directed by the engineer.
3. All disturbed areas shall be returned to original grades and elevations. Disturbed areas shall be loamed with a minimum of 4" of loam and seeded with not less than one pound of seed per 50 square yards of area. (see seed specifications this sheet)
4. All disturbed areas will be restabilized within 45 days. At any one time, no more than 5 acres, (217,800 Sq. Ft.) Will be disturbed.
5. Silt fences and perimeter barriers shall be inspected periodically and after every rain during the life of the project. All damaged areas shall be repaired, sediment deposits shall periodically be removed and disposed of.
6. After all disturbed areas have been stabilized, the temporary erosion and sediment control measures are to be removed and the area disturbed by the removal smoothed and re-vegetated.
7. Per the EPA CGP requirements there will be reports of the erosion control inspections IAW SWPPP prepared by BS&E. All erosion controls shall be inspected weekly and within 24 hours after 0.25" or greater rain event.
8. Ditches, swales, and basins shall be stabilized prior to directing runoff to them.

9. Do not traffic exposed soil surfaces with construction equipment. If feasible, perform excavations with equipment positioned outside the limits of the infiltration system.
10. Roadways, driveways and cut and fill slopes must be stabilized within 72 hours of achieving final grade.
11. Stabilization means:
11.1. A minimum of 85% of vegetative cover has been established.
11.2. A minimum of 3 inches of non-erosive material such as stone or rip rap has been installed, or
11.3. Erosion control blankets have been installed.
12. This project is to be managed in a manner that meets the requirements and intent of RSA 430:53 and chapter AGR 3800 relative to invasive species.
13. The NHDES stormwater manual, dated February 2025, is a part of this plan set and the more restrictive will govern. (NH SWM)

4.26 Winter Weather Stabilization

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (B96-B98) (Direct Quotes)

Chapter Env-Wq 1505.06 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

General Description (NH SWM):

A project involving construction activity extending beyond one construction season will require measures to stabilize the site for the over-winter period. If a construction site is not stabilized with pavement, a road gravel base, 85 percent mature vegetation cover, or riprap by October 15, then the site must be protected with over-winter stabilization. The winter construction period is from October 15 through May 1.

Considerations (NH SWM):

Winter excavation and earthwork activities need to be limited in extent and duration, to minimize potential erosion and sedimentation impacts.

The following considerations are important for winter weather stabilization:

• No more than one acre of the site should be exposed (without stabilization) at any one time. Generally, the exposed area should be limited to only those areas in which work will occur during the following 15 days and that can be mulched in one day prior to any snow or rainfall event.
• Subsequent work areas should not be exposed until the previously exposed work area has been fully stabilized.
• An area is considered “exposed” until stabilized with pavement, vegetation, mulching, erosion control mix, erosion control mats, or riprap (or gravel base on a road or parking area).

• All erosion and sediment control measures installed for the project should have routine maintenance and cleaning completed prior to winter work by October 15. These should be inspected and repaired as needed in preparation for the winter season. Temporary embankments should be fully vegetated or otherwise stabilized by accepted methods.

Maintenance Requirements (NH SWM):

• All E&SC measures should be inspected at least once per week and within 24 hours of any storm event exceeding 1/4-inch in a 24-hour period, or as stipulated by the applicable permits. Repairs should be made as necessary.
• Inspection and maintenance measures should continue as needed throughout construction, including the overwinter period, after each snowstorm or period of thawing and stormwater runoff.
• For any area stabilized by temporary or permanent seeding prior to the onset of the winter season, the contractor should conduct an inspection in the spring to ascertain the condition of vegetation cover, and repair any damage areas or bare spots and reseed as required to achieve an established vegetative cover (at least 85 percent of area vegetated with healthy, vigorous growth).
• See Chapter 6 for general information on inspection and maintenance of Erosion and Sediment Control (E&SC) measures (e.g., inspection frequency, corrective actions, documentation requirements, etc.).

Specifications (NH SWM):

To adequately protect water quality during cold weather and during spring stormwater runoff, the following stabilization techniques should be employed during the period from October 15 through May 1:

• Before winter:
  - o Stabilization as follows should be completed within a day of establishing the grade that is final or that otherwise will exist for more than 5 days:
    - ▪ All proposed vegetated areas having a slope of less than 15 percent which do not exhibit a minimum of 85 percent vegetative growth by October 15, or which are disturbed after October 15, should be seeded and covered with 3 to 4 tons of hay or straw mulch per acre secured with anchored netting, or 2 inches of erosion control mix (see "Erosion Control Mix Berm" fact sheet for material specifications).
    - ▪ All proposed vegetated areas having a slope of greater than 15 percent which do not exhibit a minimum of 85 percent vegetative growth by October 15, or which are disturbed after October 15, should be seeded and covered with a properly installed and anchored erosion control blanket or with a minimum 4- inch thickness of erosion control mix, unless otherwise specified by the manufacturer. Note that erosion control blankets, with compost, should not exceed 2 inches in thickness or they may overheat.
  - o All stone-covered slopes must be constructed and stabilized by October 15.
  - o Stockpiles of soil materials should be mulched for over winter protection with hay or straw at twice the normal rate or with a 4-inch layer of erosion control mix. Mulching should be done within 24 hours of stocking, and reestablished prior to any rainfall or snowfall. No soil stockpile should be placed (even covered with mulch) within 100 feet from any wetland or other water resource area.

o Installation of erosion control blankets should not occur over snow of greater than 1-inch in depth or on frozen ground.
o All grass-lined ditches, swales, and channels should be constructed and stabilized by September 1. All ditches, swales, or channels which do not exhibit a minimum of 85 percent vegetative growth by October 15, or which are disturbed after October 15, should be stabilized temporarily with stone or erosion control blankets appropriate for the design flow conditions, as determined by a qualified Professional Engineer or a Certified Professional in Erosion and Sediment Control as certified by the CSPESC Council of EnviroCert International, Inc. If a stone lining is necessary, the contractor may need to re-grade the ditch, swale, or channel as required to provide adequate cross-section after allowing for placement of the stone.
o All stone-lined ditches, swales, and channels must be constructed and stabilized by October 15.

• During winter:
o The area of exposed, unstabilized soil should be limited to one acre and should be protected against erosion by the methods described in this section prior to any thaw or spring melt event. Subject to applicable regulations, the allowable area of exposed soil may be increased if activities are conducted according to a winter construction plan, developed by a Professional Engineer licensed to practice in the state of New Hampshire or a Certified Professional in Erosion and Sediment Control as certified by the CSPESC Council of EnviroCert International, Inc.
o Installation of anchored hay mulch or erosion control mix should not occur over snow of greater than 1-inch in depth or on frozen ground.
o All mulch applied during winter should be anchored (e.g., by netting, tracking, wood cellulose fiber).
o Frozen materials, (e.g., frost layer that is removed during winter construction), should be stockpiled separately and in a location that is away from any area needing to be protected. Stockpiles of frozen material can melt in the spring and become unworkable and difficult to transport due to the high moisture content in the soil.
o After October 15, incomplete road or parking areas where active construction of the road or parking area has stopped for the winter season should be protected with a minimum 3-inch layer of base course gravels B-98 meeting the graduation requirements of NHDOT Standard Specification for Road and Bridge Construction Table 304-1, Item No. 304.1, 304.2, or 304.3.

o Sediment barriers that are installed during frozen conditions should consist of erosion control mix berms, or continuous contained berms. Silt fences and hay bales should not be installed when frozen conditions prevent proper embedment of these barriers.

Inspection and Maintenance Schedule

Fencing (if used) will be inspected during and after storm events to ensure that the fence still has integrity and is not allowing sediment to pass. Depending on SWPPP criteria, all controls will be inspected either once every 7 days or once every 14 days and after storm events. Inspection reports must be submitted to Town of Strafford Planning Department. See also Stormwater System Management: Inspection and Maintenance Manual with accompanying plan published separately also by Berry Surveying & Engineering. See also Storm Water Pollution Prevention Plan (SWPPP) developed in accordance with EPA NPDES requirements & the Town of Strafford Planning Department.

Corrective Action measures will be made in accordance with SWPPP requirements and records maintained on site by the Contractor.

5.0 CONCLUSION

Peak rates of runoff flow are modeled to be reduced in the post-construction analysis, as compared to the pre-construction analysis. This reduction occurs at all storm events due to the site grading and the attenuation taking place in **Rain Gardens #101 & #102**.

The volume of stormwater discharge is reduced from the existing condition over a 24-hour span at **Final Reach #100 & #300. Final Reach #200** meets the Channel Protection Volume (CPV) requirements (Env-Wq 1507.05) with a reduction in peak rate of runoff, an increase in the 2-YR, 24-hour volumes less than 0.1 AF, and discharge from the developed area of less than 2CFS. See waiver request for stormwater runoff volume included in the application.

A Site Specific, Terrain Alteration Permit (RSA 485: A-17) is not required for this site plan due to the area of disturbance being less than 100,000 SF. Lot development may not start until the roadway is complete and stable. The impact is approximately 67,500 square feet, therefore an EPA Notice of Intent is required to be filed prior to construction and a Stormwater Pollution Prevention Plan prepared.

Respectfully Submitted,
BERRY SURVEYING & ENGINEERING

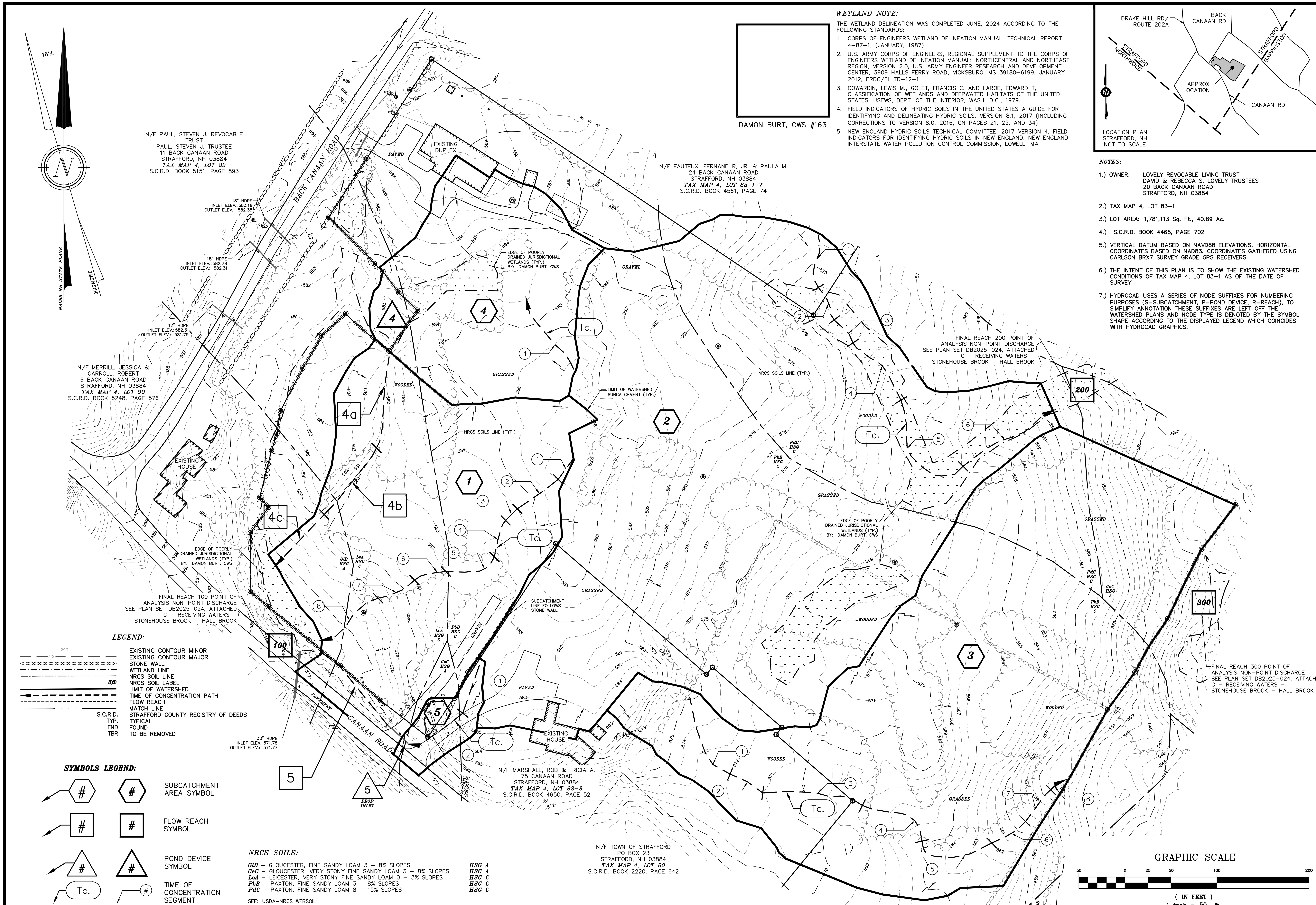
Christopher R. Berry, LLS
Principal, President

Kenneth A. Berry PE, LLS,
CPSWQ, CPESC, CESSWI
Principal, VP - Technical Operations

Kevin R. Poulin, PE
Design Engineer

Appendix I –Existing Conditions Analysis

25 Yr - 24 Hr. Full Summary
2 Yr - 24 Hr. Node Listing
10 Yr -24 Hr. Node Listing
25 Yr -24 Hr. Node Listing
50 Yr - 24 Hr. Node Listing
100 Yr -24 Hr. Node Listing



WETLAND NOTE:

THE WETLAND DELINEATION WAS COMPLETED JUNE, 2024 ACCORDING TO THE FOLLOWING STANDARDS:

1. CORPS OF ENGINEERS WETLAND DELINEATION MANUAL, TECHNICAL REPORT 4–87–1, (JANUARY, 1987)
2. U.S. ARMY CORPS OF ENGINEERS, REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION, VERSION 2.0, U.S. ARMY ENGINEER RESEARCH AND DEVELOPMENT CENTER, 3909 HALLS FERRY ROAD, VICKSBURG, MS 39180–6199, JANUARY 2012, ERDC/EL TR–12–1
3. COWARDIN, LEWIS M., GOLET, FRANCIS C. AND LAROE, EDWARD T, CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES, USFWS, DEPT. OF THE INTERIOR, WASH. D.C., 1979.
4. FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES A GUIDE FOR IDENTIFYING AND DELINEATING HYDRIC SOILS, VERSION 8.1, 2017 (INCLUDING CORRECTIONS TO VERSION 8.0, 2016, ON PAGES 21, 25, AND 34)
5. NEW ENGLAND HYDRIC SOILS TECHNICAL COMMITTEE. 2017 VERSION 4, FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION, LOWELL, MA

NOTES:

1.) OWNER: LOVELY REVOCABLE LIVING TRUST
DAVID & REBECCA S. LOVELY TRUSTEES
20 BACK CANAAN ROAD
STRAFFORD, NH 03884

2.) TAX MAP 4, LOT 83–1

3.) LOT AREA: 1,781,113 Sq. Ft., 40.89 Ac.

4.) S.C.R.D. BOOK 4465, PAGE 702

5.) VERTICAL DATUM BASED ON NAVD88 ELEVATIONS. HORIZONTAL COORDINATES BASED ON NAD83. COORDINATES GATHERED USING CARLSON BRX7 SURVEY GRADE GPS RECEIVERS.

6.) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING WATERSHED CONDITIONS OF TAX MAP 4, LOT 83–1 AS OF THE DATE OF SURVEY.

7.) HYDROCAD USES A SERIES OF NODE SUFFIXES FOR NUMBERING PURPOSES (S=SUBCATCHMENT, P=POND DEVICE, R=REACH), TO SIMPLIFY ANNOTATION THESE SUFFIXES ARE LEFT OFF THE WATERSHED PLANS AND NODE TYPE IS DENOTED BY THE SYMBOL SHAPE ACCORDING TO THE DISPLAYED LEGEND WHICH COINCIDES WITH HYDROCAD GRAPHICS.

LEGEND:

EXISTING CONTOUR MINOR
EXISTING CONTOUR MAJOR
STONE WALL
WETLAND LINE
NRCS SOIL LINE
HfB NRCS SOIL LABEL
LIMIT OF WATERSHED
TIME OF CONCENTRATION PATH
FLOW REACH
MATCH LINE
S.C.R.D. STRAFFORD COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND
TBR TO BE REMOVED

SYMBOLS LEGEND:

SUBCATCHMENT AREA SYMBOL
FLOW REACH SYMBOL
POND DEVICE SYMBOL
TIME OF CONCENTRATION SEGMENT

NRCS SOILS:

GlB	– GLOUCESTER, FINE SANDY LOAM 3 – 8% SLOPES	***HSG A***
GsC	– GLOUCESTER, VERY STONY FINE SANDY LOAM 3 – 8% SLOPES	***HSG A***
LeA	– LEICESTER, VERY STONY FINE SANDY LOAM 0 – 3% SLOPES	***HSG C***
PbB	– PAXTON, FINE SANDY LOAM 3 – 8% SLOPES	***HSG C***
PdC	– PAXTON, FINE SANDY LOAM 8 – 15% SLOPES	***HSG C***

SEE: USDA–NRCS WEBSOIL

REVISION	DATE	DESCRIPTION
#1	12–04–25	DESIGN REVISION

SWPPP EPA SITE MAP (EXISTING)

W–1 EXISTING WATERSHED PLAN
LAND OF
LOVELY REVOCABLE LIVING TRUST
DAVID & REBECCA S. LOVELY TRUSTEES
20 BACK CANAAN ROAD
STRAFFORD, N.H.
TAX MAP 4, LOT 83–1

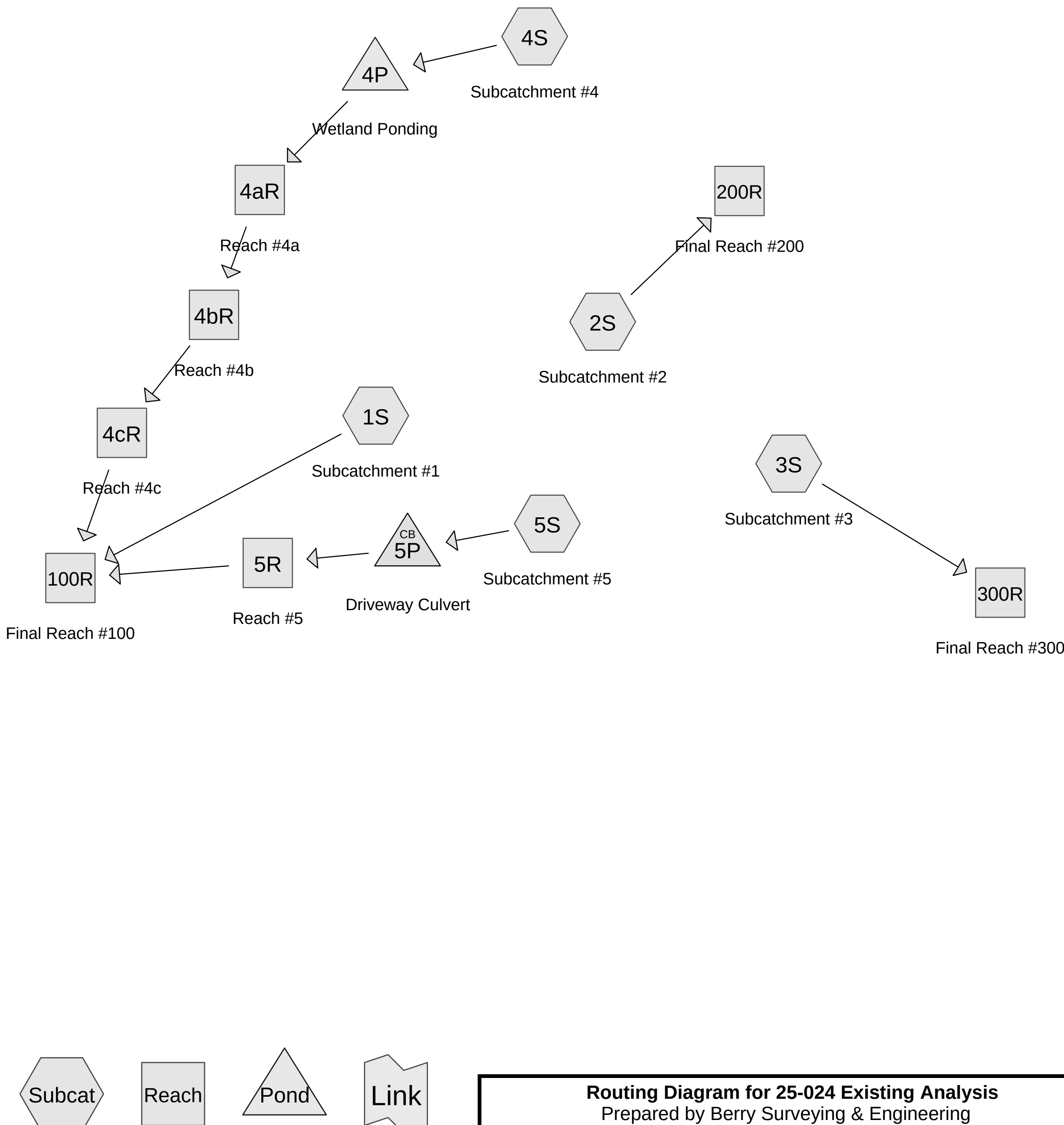
BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332–2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : OCTOBER 14, 2025
FILE NO. : DB 2025–024

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14243
LICENSED
PROFESSIONAL ENGINEER

SHEET 1 OF 2

NOT FOR CONSTRUCTION



Routing Diagram for 25-024 Existing Analysis
Prepared by Berry Surveying & Engineering
HydroCAD® 10.00-26 s/n 07605 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.401	39	>75% Grass cover, Good, HSG A (1S, 3S, 5S)
5.882	74	>75% Grass cover, Good, HSG C (1S, 2S, 3S, 4S, 5S)
0.019	96	Gravel surface, HSG A (1S, 5S)
0.096	96	Gravel surface, HSG C (1S, 2S, 4S, 5S)
0.036	98	Paved parking, HSG A (1S, 5S)
0.146	98	Paved parking, HSG C (1S, 2S, 4S, 5S)
0.045	98	Roofs, HSG C (2S, 4S)
0.344	30	Woods, Good, HSG A (1S, 3S)
4.513	70	Woods, Good, HSG C (1S, 2S, 3S, 4S)
11.482	**71**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.799	HSG A	1S, 3S, 5S
0.000	HSG B	
10.682	HSG C	1S, 2S, 3S, 4S, 5S
0.000	HSG D	
0.000	Other	
11.482		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.401	0.000	5.882	0.000	0.000	6.283	>75% Grass cover, Good	1S, 2S, 3S, 4S, 5S
0.019	0.000	0.096	0.000	0.000	0.115	Gravel surface	1S, 2S, 4S, 5S
0.036	0.000	0.146	0.000	0.000	0.181	Paved parking	1S, 2S, 4S, 5S
0.000	0.000	0.045	0.000	0.000	0.045	Roofs	2S, 4S
0.344	0.000	4.513	0.000	0.000	4.857	Woods, Good	1S, 2S, 3S, 4S
0.799	**0.000**	**10.682**	**0.000**	**0.000**	**11.482**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	5P	574.52	574.00	31.3	0.0166	0.012	15.0	0.0	0.0

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=86,567 sf 1.88% Impervious Runoff Depth>2.45"
Flow Length=362' Tc=14.9 min CN=69 Runoff=4.26 cfs 0.406 af

Subcatchment 2S: Subcatchment #2 Runoff Area=210,084 sf 1.55% Impervious Runoff Depth>2.80"
Flow Length=462' Tc=30.7 min CN=73 Runoff=8.86 cfs 1.125 af

Subcatchment 3S: Subcatchment #3 Runoff Area=152,172 sf 0.00% Impervious Runoff Depth>2.27"
Flow Length=530' Tc=26.1 min CN=67 Runoff=5.49 cfs 0.661 af

Subcatchment 4S: Subcatchment #4 Runoff Area=45,798 sf 7.56% Impervious Runoff Depth>3.00"
Flow Length=93' Slope=0.0349 '/' Tc=7.7 min CN=75 Runoff=3.45 cfs 0.263 af

Subcatchment 5S: Subcatchment #5 Runoff Area=5,525 sf 27.87% Impervious Runoff Depth>2.19"
Flow Length=124' Tc=9.0 min CN=66 Runoff=0.28 cfs 0.023 af

Reach 4aR: Reach #4a Avg. Flow Depth=0.42' Max Vel=1.20 fps Inflow=2.47 cfs 0.209 af
n=0.080 L=100.8' S=0.0209 '/' Capacity=14.55 cfs Outflow=2.44 cfs 0.208 af

Reach 4bR: Reach #4b Avg. Flow Depth=0.35' Max Vel=1.46 fps Inflow=2.44 cfs 0.208 af
n=0.035 L=92.2' S=0.0076 '/' Capacity=21.77 cfs Outflow=2.44 cfs 0.208 af

Reach 4cR: Reach #4c Avg. Flow Depth=0.34' Max Vel=1.85 fps Inflow=2.44 cfs 0.208 af
n=0.080 L=76.2' S=0.0722 '/' Capacity=24.96 cfs Outflow=2.45 cfs 0.208 af

Reach 5R: Reach #5 Avg. Flow Depth=0.11' Max Vel=0.52 fps Inflow=0.28 cfs 0.023 af
n=0.035 L=105.6' S=0.0047 '/' Capacity=29.60 cfs Outflow=0.26 cfs 0.023 af

Reach 100R: Final Reach #100 Inflow=6.84 cfs 0.637 af
Outflow=6.84 cfs 0.637 af

Reach 200R: Final Reach #200 Inflow=8.86 cfs 1.125 af
Outflow=8.86 cfs 1.125 af

Reach 300R: Final Reach #300 Inflow=5.49 cfs 0.661 af
Outflow=5.49 cfs 0.661 af

Pond 4P: Wetland Ponding Peak Elev=583.89' Storage=3,324 cf Inflow=3.45 cfs 0.263 af
Outflow=2.47 cfs 0.209 af

Pond 5P: Driveway Culvert Peak Elev=574.76' Inflow=0.28 cfs 0.023 af
15.0" Round Culvert n=0.012 L=31.3' S=0.0166 '/' Outflow=0.28 cfs 0.023 af

Total Runoff Area = 11.482 ac Runoff Volume = 2.477 af Average Runoff Depth = 2.59"
98.03% Pervious = 11.255 ac 1.97% Impervious = 0.227 ac

Summary for Subcatchment 1S: Subcatchment #1

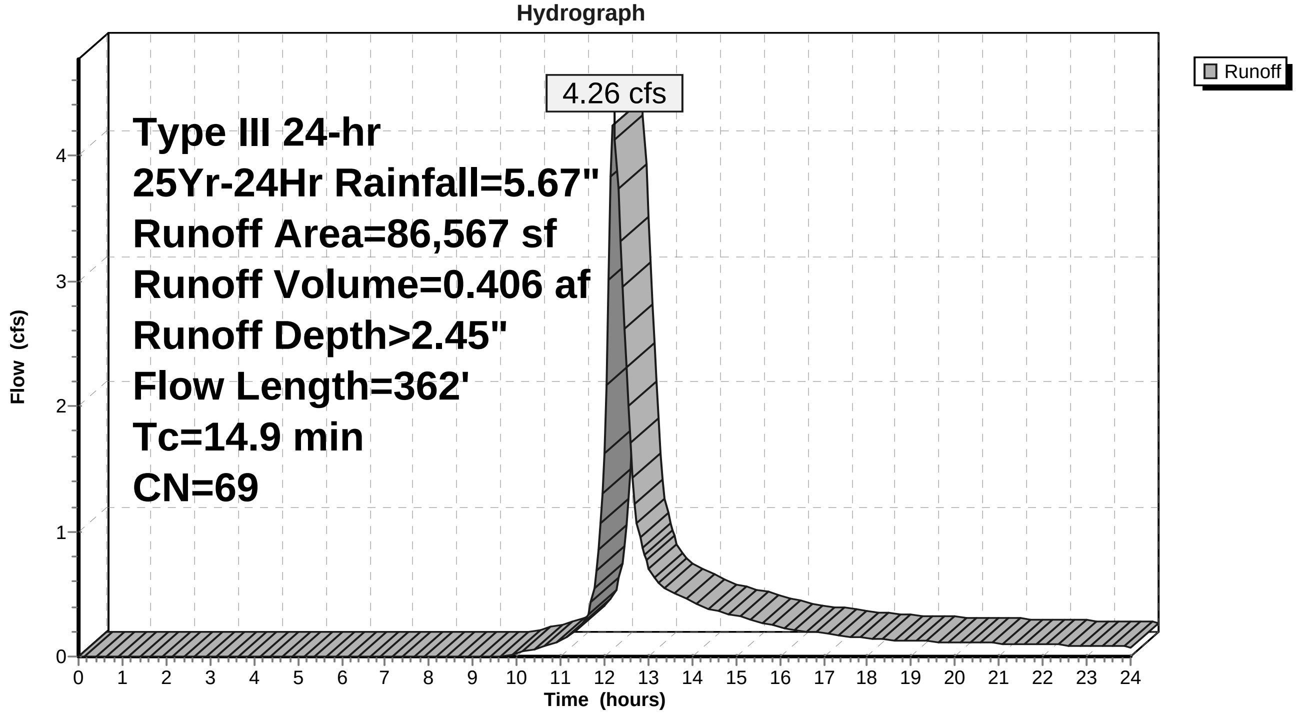
Runoff = 4.26 cfs @ 12.21 hrs, Volume= 0.406 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25Yr-24Hr Rainfall=5.67"

Area (sf)	CN	Description
2,151	39	>75% Grass cover, Good, HSG A
416	98	Paved parking, HSG A
8,110	30	Woods, Good, HSG A
752	96	Gravel surface, HSG A
44,222	74	>75% Grass cover, Good, HSG C
1,209	98	Paved parking, HSG C
28,284	70	Woods, Good, HSG C
1,423	96	Gravel surface, HSG C
86,567	69	Weighted Average
84,942		98.12% Pervious Area
1,625		1.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	27	0.0182	0.12		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 2.99"
4.2	55	0.0548	0.22		**Sheet Flow, Segment #2** Grass: Short n= 0.150 P2= 2.99"
2.2	18	0.0281	0.13		**Sheet Flow, Segment #3** Grass: Short n= 0.150 P2= 2.99"
0.6	42	0.0239	1.08		**Shallow Concentrated Flow, Segment #4** Short Grass Pasture Kv= 7.0 fps
2.2	60	0.0083	0.46		**Shallow Concentrated Flow, Segment #5** Woodland Kv= 5.0 fps
0.5	36	0.0279	1.17		**Shallow Concentrated Flow, Segment #6** Short Grass Pasture Kv= 7.0 fps
0.4	45	0.0666	1.81		**Shallow Concentrated Flow, Segment #7** Short Grass Pasture Kv= 7.0 fps
1.1	79	0.0569	1.19		**Shallow Concentrated Flow, Segment #8** Woodland Kv= 5.0 fps
14.9	362	Total			

Subcatchment 1S: Subcatchment #1



Summary for Subcatchment 2S: Subcatchment #2

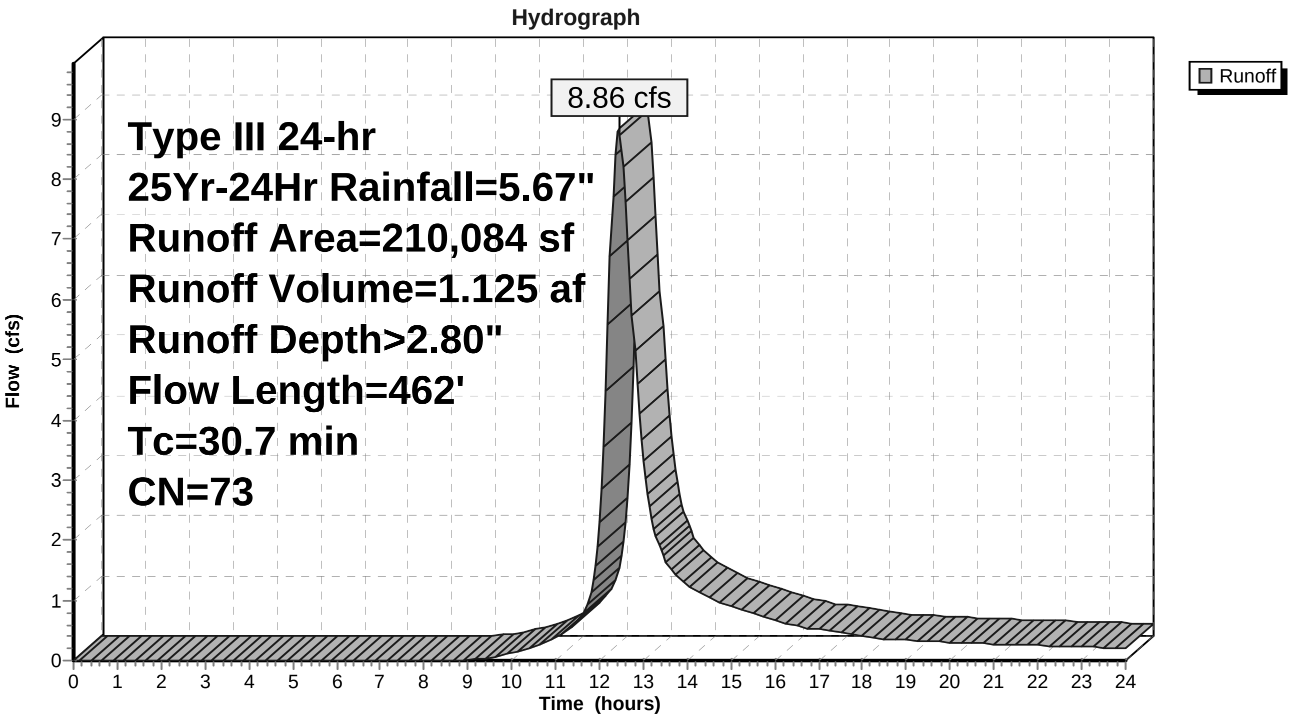
Runoff = 8.86 cfs @ 12.44 hrs, Volume= 1.125 af, Depth> 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25Yr-24Hr Rainfall=5.67"

Area (sf)	CN	Description
875	98	Roofs, HSG C
116,435	74	>75% Grass cover, Good, HSG C
2,375	98	Paved parking, HSG C
88,375	70	Woods, Good, HSG C
2,024	96	Gravel surface, HSG C
210,084	73	Weighted Average
206,834		98.45% Pervious Area
3,250		1.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	60	0.0417	0.09		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 2.99"
12.9	40	0.0125	0.05		**Sheet Flow, Segment #2** Woods: Light underbrush n= 0.400 P2= 2.99"
0.9	33	0.0152	0.62		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
1.5	83	0.0360	0.95		**Shallow Concentrated Flow, Segment #4** Woodland Kv= 5.0 fps
2.9	130	0.0230	0.76		**Shallow Concentrated Flow, Segment #5** Woodland Kv= 5.0 fps
1.5	116	0.0667	1.29		**Shallow Concentrated Flow, Segment #6** Woodland Kv= 5.0 fps
30.7	462	Total			

Subcatchment 2S: Subcatchment #2



Summary for Subcatchment 3S: Subcatchment #3

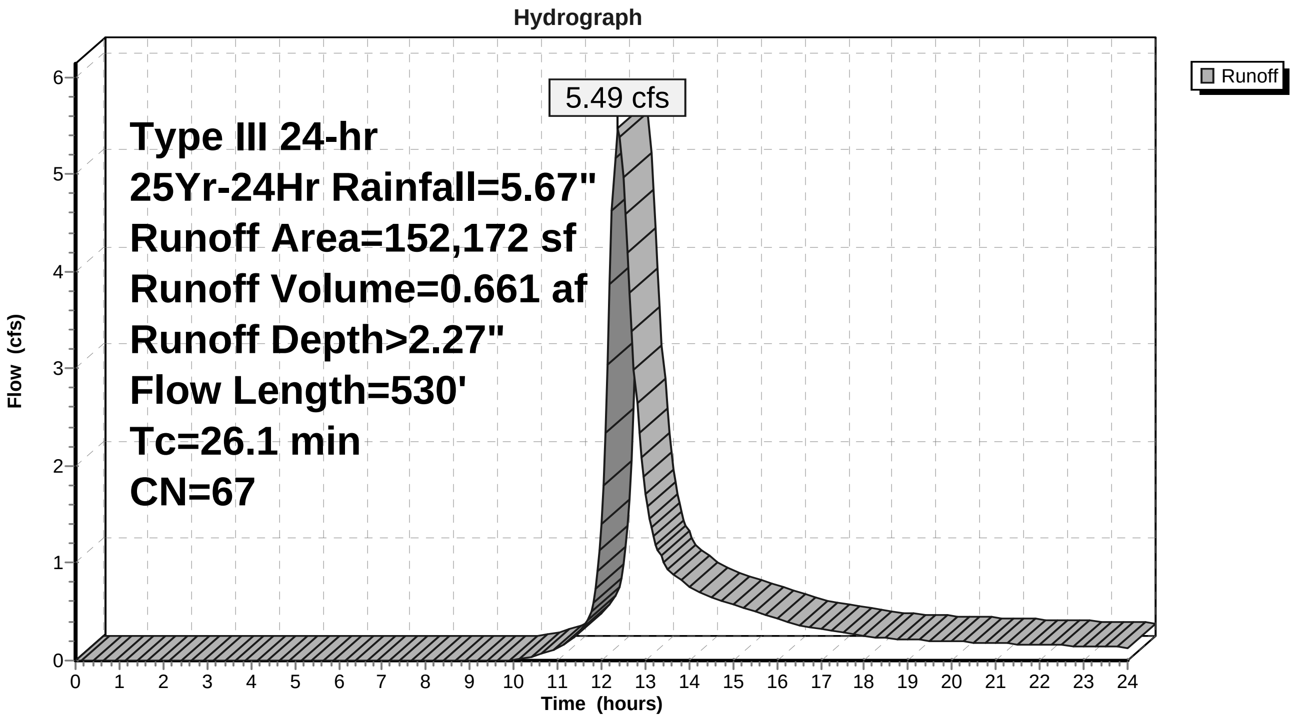
Runoff = 5.49 cfs @ 12.38 hrs, Volume= 0.661 af, Depth> 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25Yr-24Hr Rainfall=5.67"

Area (sf)	CN	Description
12,928	39	>75% Grass cover, Good, HSG A
6,874	30	Woods, Good, HSG A
65,266	74	>75% Grass cover, Good, HSG C
67,104	70	Woods, Good, HSG C
152,172	67	Weighted Average
152,172		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	100	0.0300	0.09		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 2.99"
0.9	41	0.0243	0.78		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
2.3	111	0.0269	0.82		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
0.9	84	0.0447	1.48		**Shallow Concentrated Flow, Segment #4** Short Grass Pasture Kv= 7.0 fps
1.9	89	0.0252	0.79		**Shallow Concentrated Flow, Segment #5** Woodland Kv= 5.0 fps
0.6	44	0.0682	1.31		**Shallow Concentrated Flow, Segment #6** Woodland Kv= 5.0 fps
0.4	44	0.1132	1.68		**Shallow Concentrated Flow, Segment #7** Woodland Kv= 5.0 fps
0.2	17	0.0596	1.22		**Shallow Concentrated Flow, Segment #8** Woodland Kv= 5.0 fps
26.1	530	Total			

Subcatchment 3S: Subcatchment #3



Summary for Subcatchment 4S: Subcatchment #4

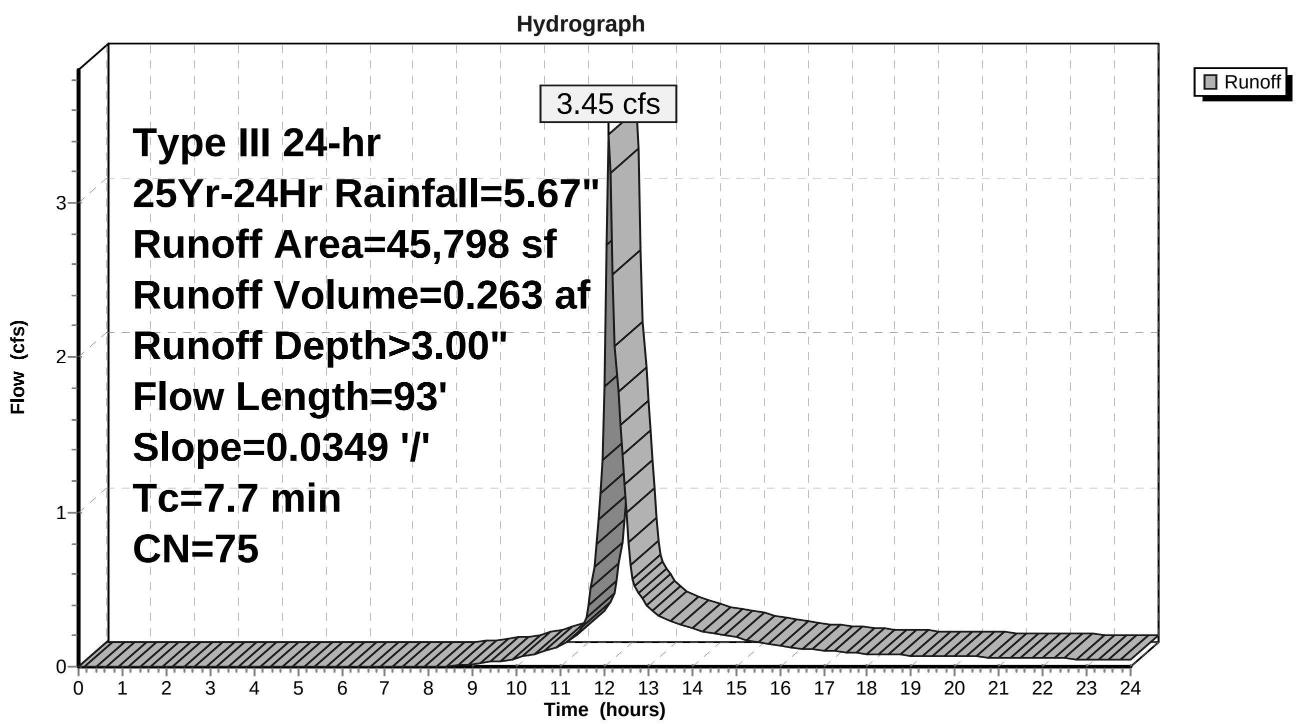
Runoff = 3.45 cfs @ 12.11 hrs, Volume= 0.263 af, Depth> 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25Yr-24Hr Rainfall=5.67"

Area (sf)	CN	Description
1,100	98	Roofs, HSG C
28,831	74	>75% Grass cover, Good, HSG C
2,361	98	Paved parking, HSG C
12,824	70	Woods, Good, HSG C
682	96	Gravel surface, HSG C
45,798	75	Weighted Average
42,337		92.44% Pervious Area
3,461		7.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	93	0.0349	0.20		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 2.99"

Subcatchment 4S: Subcatchment #4



Summary for Subcatchment 5S: Subcatchment #5

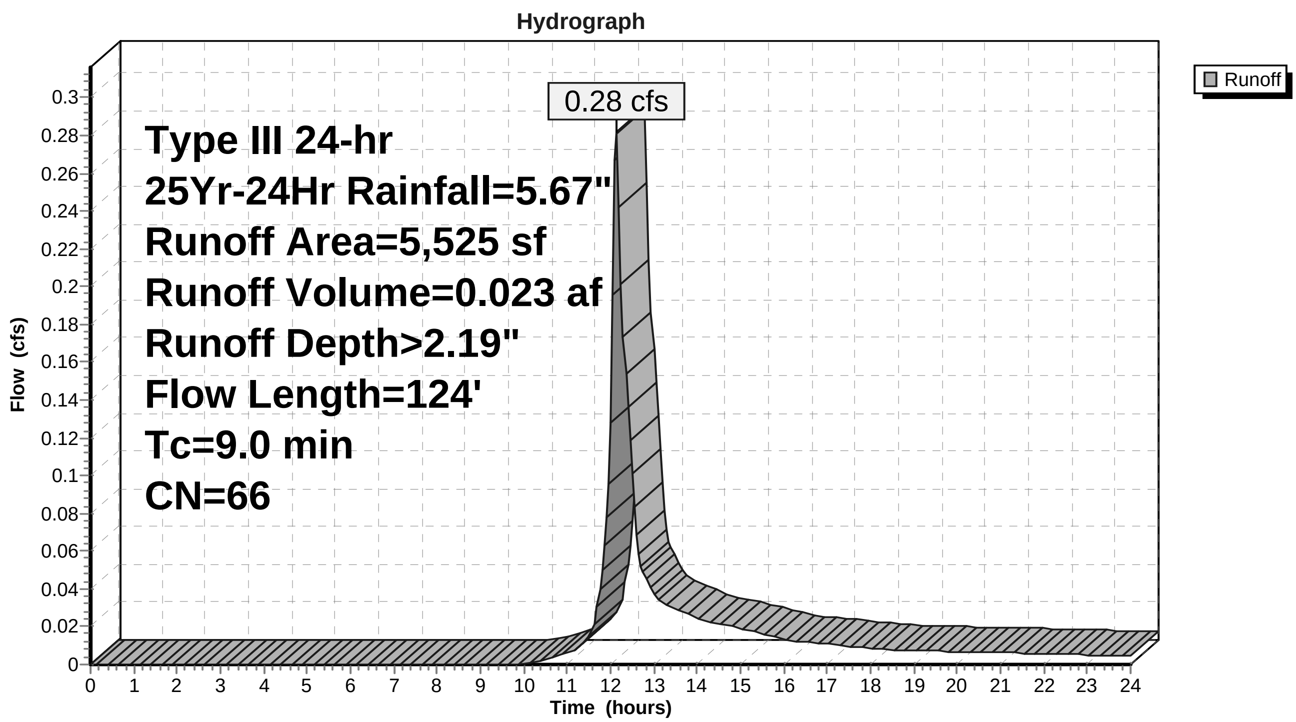
Runoff = 0.28 cfs @ 12.14 hrs, Volume= 0.023 af, Depth> 2.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25Yr-24Hr Rainfall=5.67"

Area (sf)	CN	Description
2,372	39	>75% Grass cover, Good, HSG A
1,132	98	Paved parking, HSG A
85	96	Gravel surface, HSG A
1,484	74	>75% Grass cover, Good, HSG C
408	98	Paved parking, HSG C
44	96	Gravel surface, HSG C
5,525	66	Weighted Average
3,985		72.13% Pervious Area
1,540		27.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	56	0.0090	0.11		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 2.99"
0.2	68	0.1247	7.17		**Shallow Concentrated Flow, Segment #2** Paved Kv= 20.3 fps
9.0	124	Total			

Subcatchment 5S: Subcatchment #5



Summary for Reach 4aR: Reach #4a

Inflow Area = 1.051 ac, 7.56% Impervious, Inflow Depth > 2.38" for 25Yr-24Hr event
Inflow = 2.47 cfs @ 12.22 hrs, Volume= 0.209 af
Outflow = 2.44 cfs @ 12.24 hrs, Volume= 0.208 af, Atten= 2%, Lag= 1.2 min

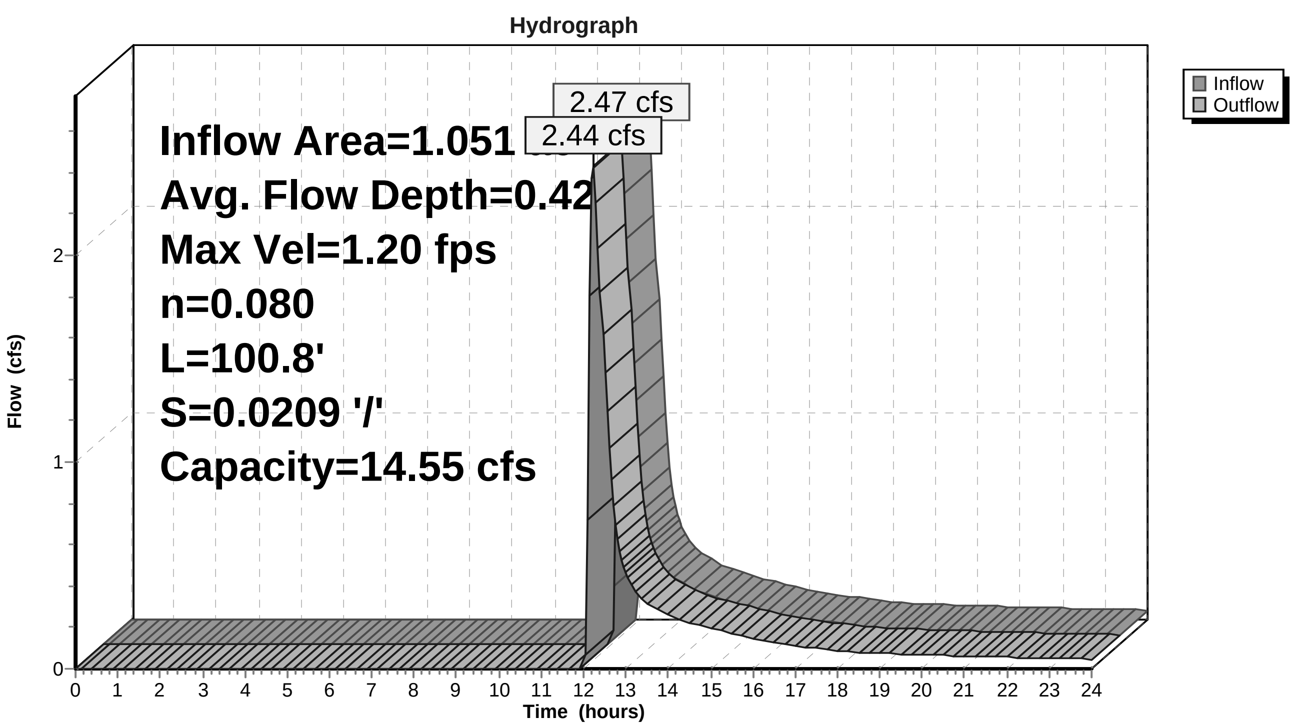
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.20 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 0.48 fps, Avg. Travel Time= 3.5 min

Peak Storage= 205 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.42'
Bank-Full Depth= 1.00' Flow Area= 7.5 sf, Capacity= 14.55 cfs

3.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 4.0 5.0 '/' Top Width= 12.00'
Length= 100.8' Slope= 0.0209 '/'
Inlet Invert= 582.31', Outlet Invert= 580.20'

‡

Reach 4aR: Reach #4a



Summary for Reach 4bR: Reach #4b

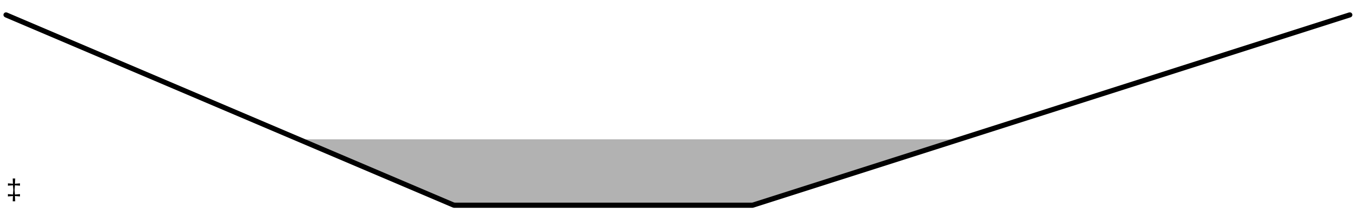
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[61] Hint: Exceeded Reach 4aR outlet invert by 0.35' @ 12.25 hrs

Inflow Area = 1.051 ac, 7.56% Impervious, Inflow Depth > 2.38" for 25Yr-24Hr event
Inflow = 2.44 cfs @ 12.24 hrs, Volume= 0.208 af
Outflow = 2.44 cfs @ 12.25 hrs, Volume= 0.208 af, Atten= 0%, Lag= 0.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.46 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.58 fps, Avg. Travel Time= 2.7 min

Peak Storage= 154 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.35'
Bank-Full Depth= 1.00' Flow Area= 8.3 sf, Capacity= 21.77 cfs

3.00' x 1.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 4.5 6.0 '/' Top Width= 13.50'
Length= 92.2' Slope= 0.0076 '/'
Inlet Invert= 580.20', Outlet Invert= 579.50'



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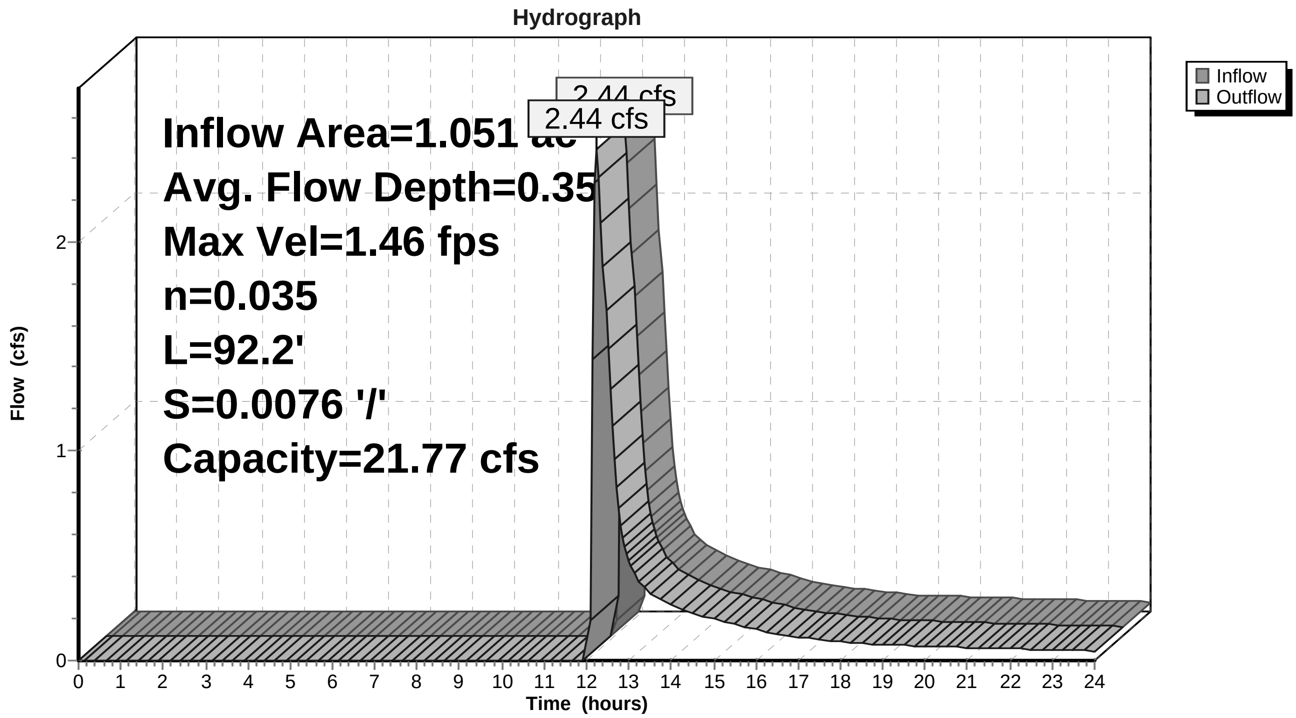
Reach 4bR: Reach #4b



Summary for Reach 4cR: Reach #4c

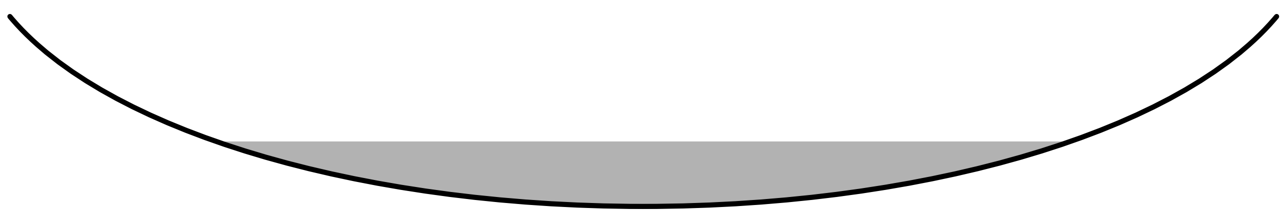
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[62] Hint: Exceeded Reach 4bR OUTLET depth by 0.02' @ 15.60 hrs

Inflow Area = 1.051 ac, 7.56% Impervious, Inflow Depth > 2.38" for 25Yr-24Hr event
Inflow = 2.44 cfs @ 12.25 hrs, Volume= 0.208 af
Outflow = 2.45 cfs @ 12.26 hrs, Volume= 0.208 af, Atten= 0%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.85 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.76 fps, Avg. Travel Time= 1.7 min

Peak Storage= 101 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.34'
Bank-Full Depth= 1.00' Flow Area= 6.7 sf, Capacity= 24.96 cfs

10.00' x 1.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 76.2' Slope= 0.0722 '/'
Inlet Invert= 579.50', Outlet Invert= 574.00'



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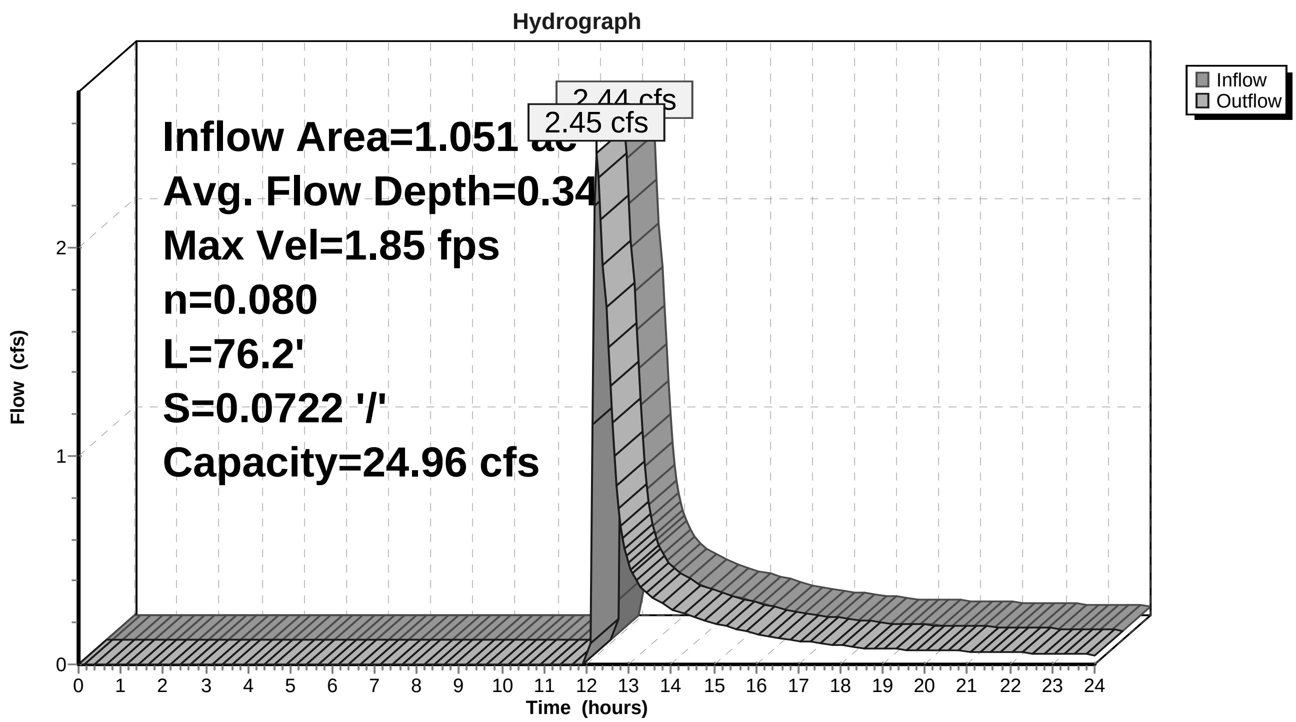
Reach 4cR: Reach #4c



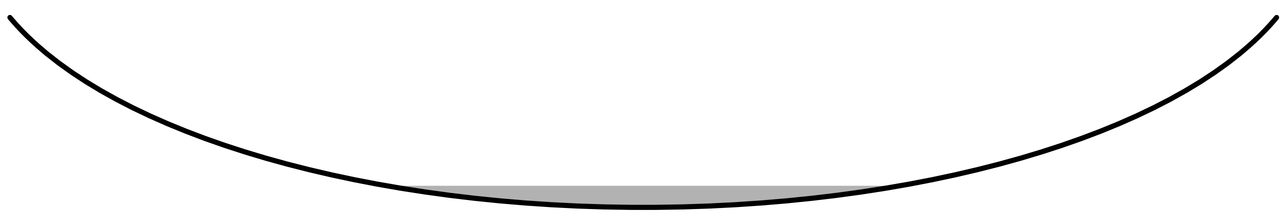
Summary for Reach 5R: Reach #5

Inflow Area = 0.127 ac, 27.87% Impervious, Inflow Depth > 2.19" for 25Yr-24Hr event
Inflow = 0.28 cfs @ 12.14 hrs, Volume= 0.023 af
Outflow = 0.26 cfs @ 12.18 hrs, Volume= 0.023 af, Atten= 7%, Lag= 2.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.52 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.21 fps, Avg. Travel Time= 8.5 min

Peak Storage= 53 cf @ 12.18 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 1.00' Flow Area= 13.3 sf, Capacity= 29.60 cfs

20.00' x 1.00' deep Parabolic Channel, n= 0.035 Earth, dense weeds
Length= 105.6' Slope= 0.0047 '/'
Inlet Invert= 574.00', Outlet Invert= 573.50'



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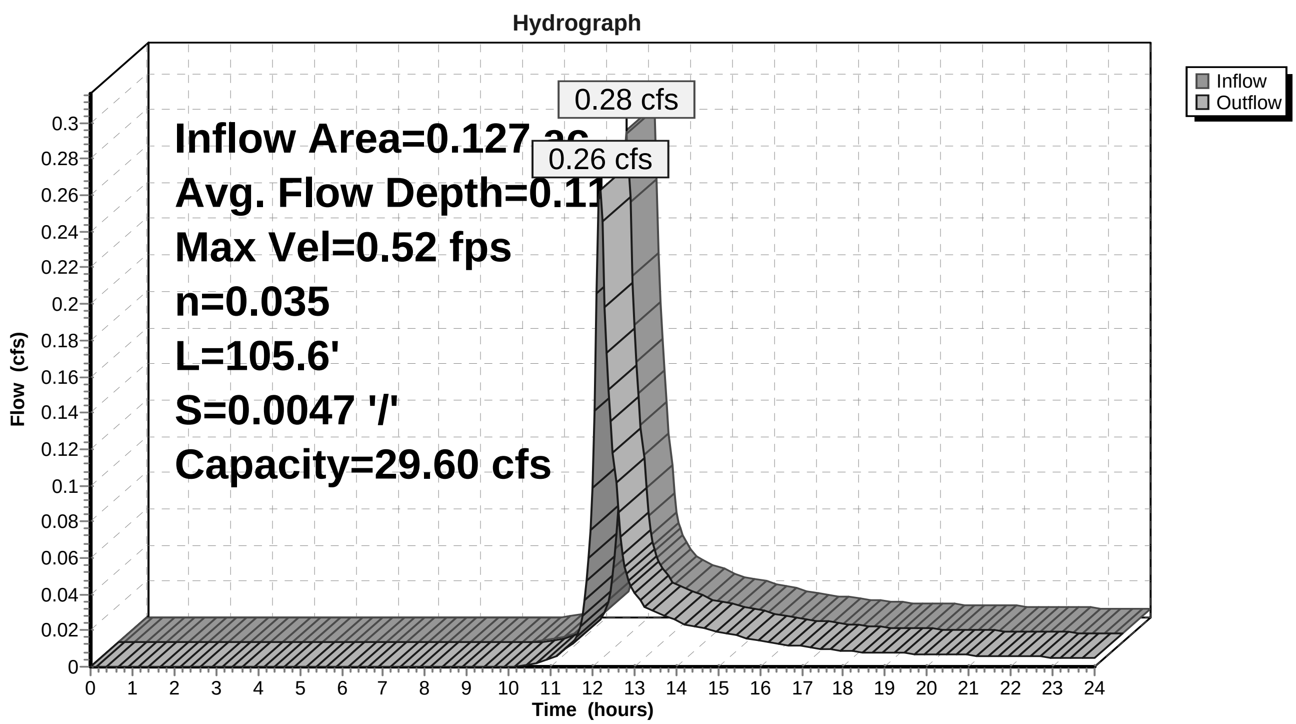
Reach 5R: Reach #5



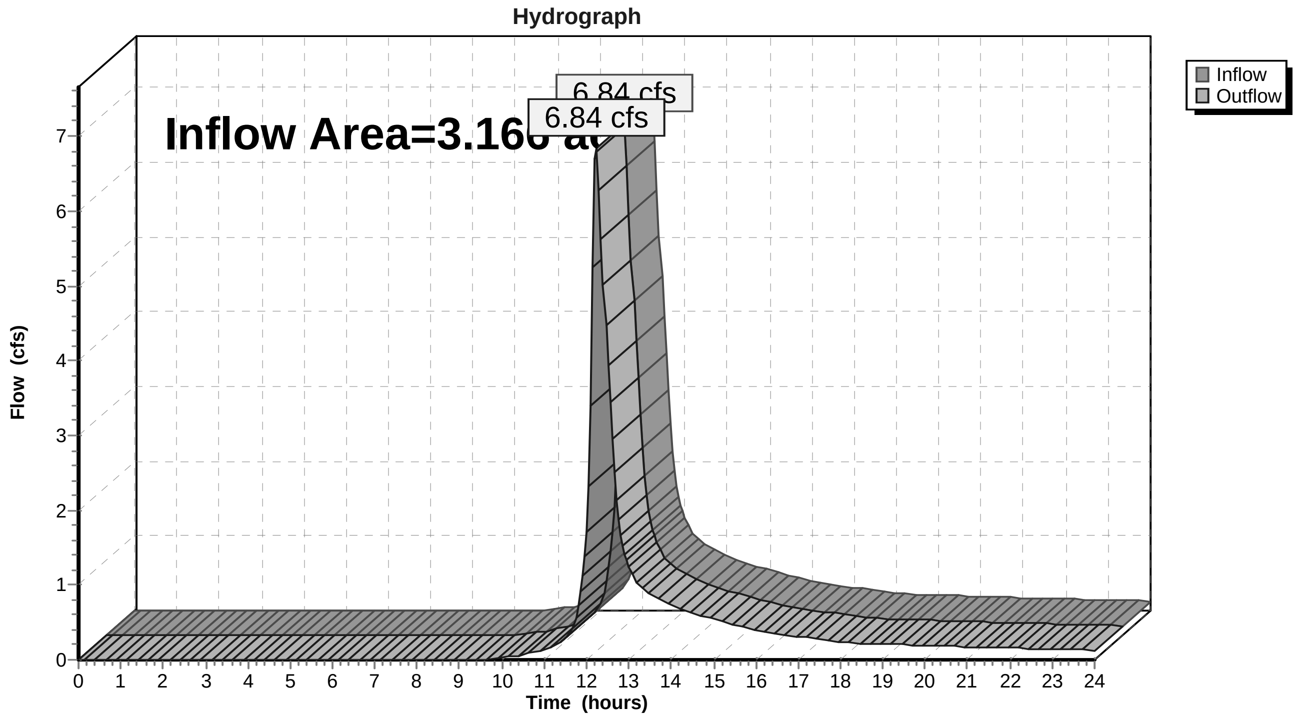
Summary for Reach 100R: Final Reach #100

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

Inflow Area = 3.166 ac, 4.81% Impervious, Inflow Depth > 2.41" for 25Yr-24Hr event
Inflow = 6.84 cfs @ 12.23 hrs, Volume= 0.637 af
Outflow = 6.84 cfs @ 12.23 hrs, Volume= 0.637 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 100R: Final Reach #100



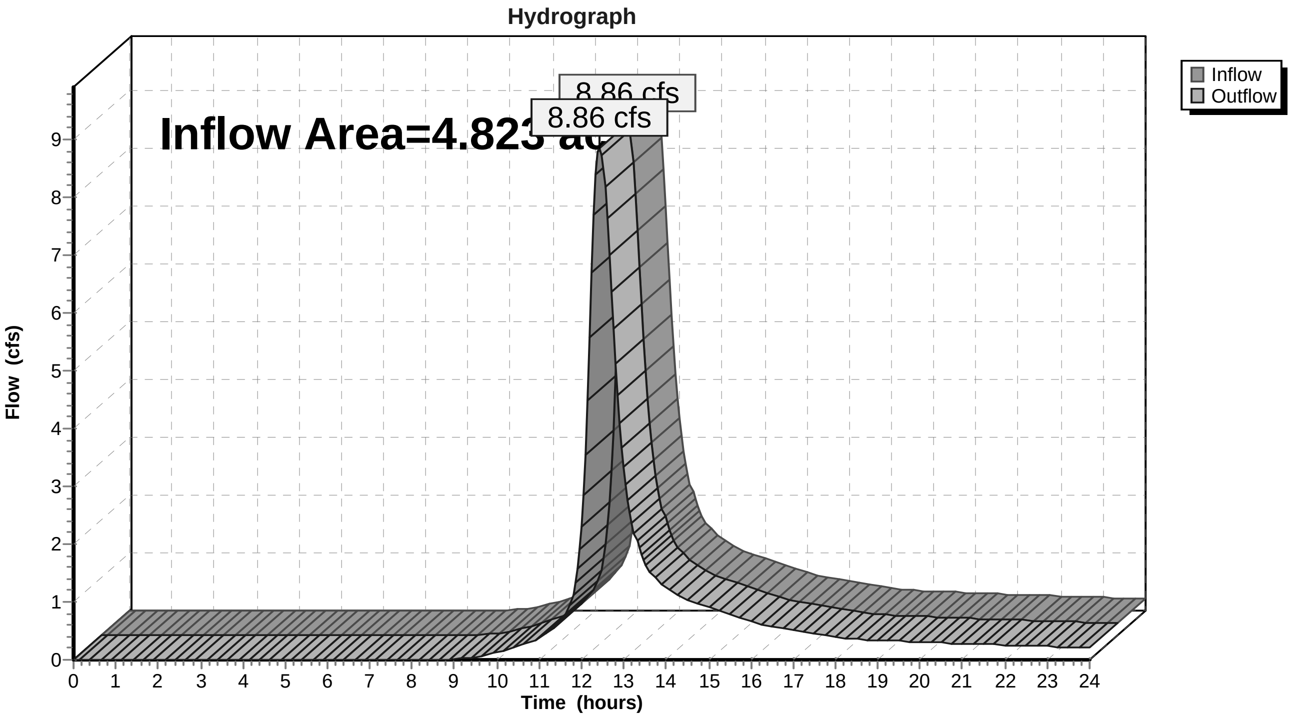
Summary for Reach 200R: Final Reach #200

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

Inflow Area = 4.823 ac, 1.55% Impervious, Inflow Depth > 2.80" for 25Yr-24Hr event
Inflow = 8.86 cfs @ 12.44 hrs, Volume= 1.125 af
Outflow = 8.86 cfs @ 12.44 hrs, Volume= 1.125 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 200R: Final Reach #200



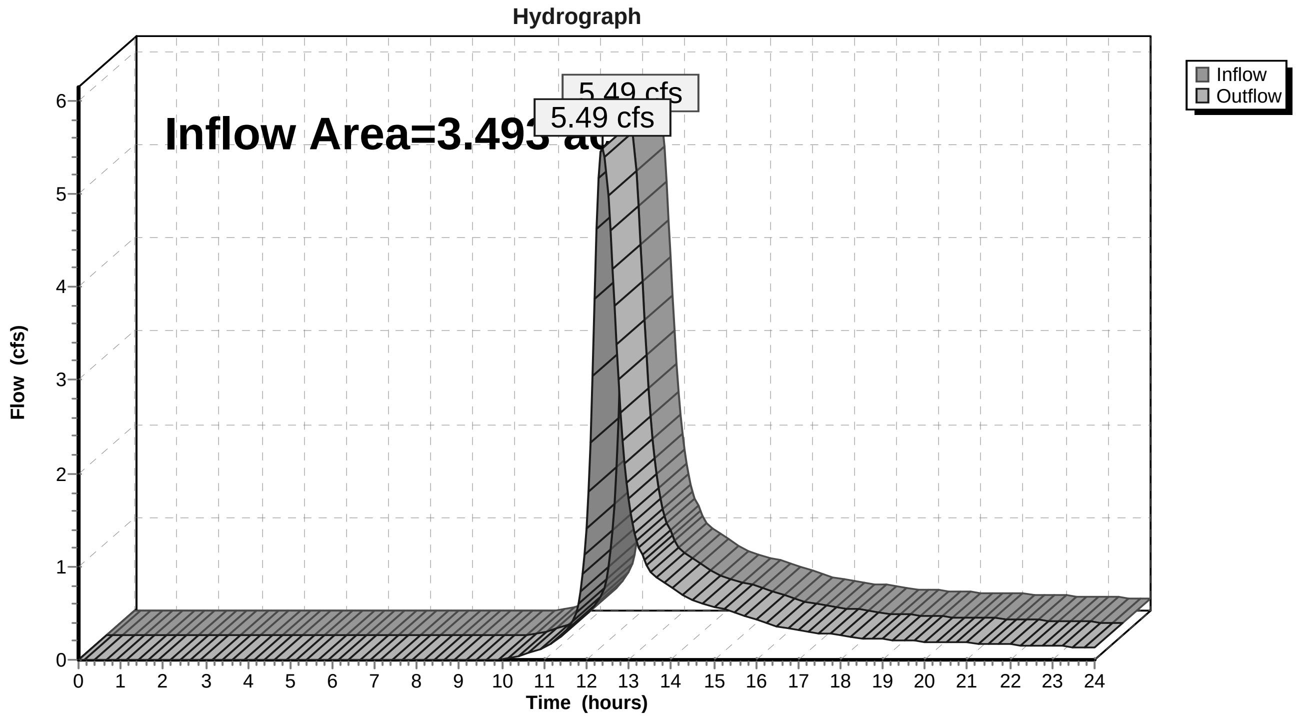
Summary for Reach 300R: Final Reach #300

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

Inflow Area = 3.493 ac, 0.00% Impervious, Inflow Depth > 2.27" for 25Yr-24Hr event
Inflow = 5.49 cfs @ 12.38 hrs, Volume= 0.661 af
Outflow = 5.49 cfs @ 12.38 hrs, Volume= 0.661 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 300R: Final Reach #300



Summary for Pond 4P: Wetland Ponding

Inflow Area = 1.051 ac, 7.56% Impervious, Inflow Depth > 3.00" for 25Yr-24Hr event
Inflow = 3.45 cfs @ 12.11 hrs, Volume= 0.263 af
Outflow = 2.47 cfs @ 12.22 hrs, Volume= 0.209 af, Atten= 28%, Lag= 6.2 min
Primary = 2.47 cfs @ 12.22 hrs, Volume= 0.209 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 583.89' @ 12.22 hrs Surf.Area= 8,230 sf Storage= 3,324 cf

Plug-Flow detention time= 123.0 min calculated for 0.209 af (79% of inflow)
Center-of-Mass det. time= 44.3 min (874.1 - 829.8)

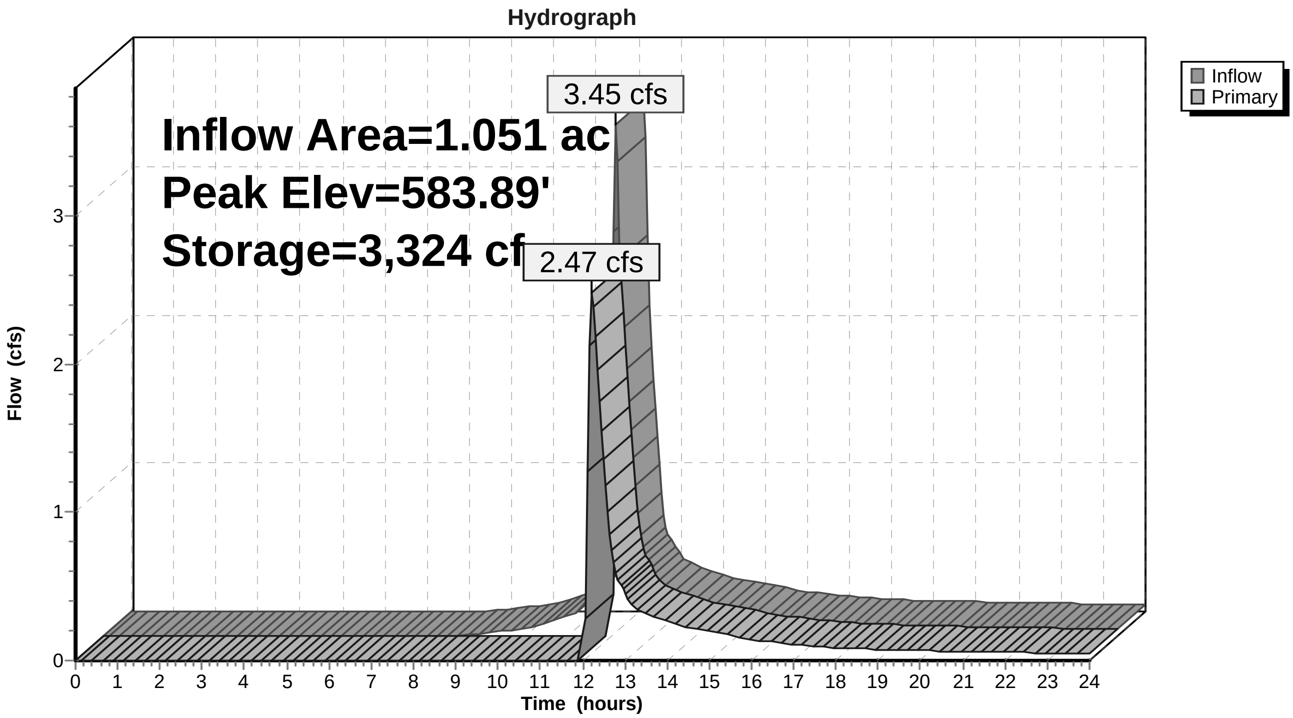
Volume	Invert	Avail.Storage	Storage Description
#1	583.00'	4,303 cf	**Wetland Ponding (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
583.00	650	131.2	0	0	650
584.00	9,743	550.6	4,303	4,303	23,407

Device	Routing	Invert	Outlet Devices
#1	Primary	583.75'	**20.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.43 cfs @ 12.22 hrs HW=583.89' TW=582.72' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 2.43 cfs @ 0.87 fps)

Pond 4P: Wetland Ponding



Summary for Pond 5P: Driveway Culvert

[57] Hint: Peaked at 574.76' (Flood elevation advised)

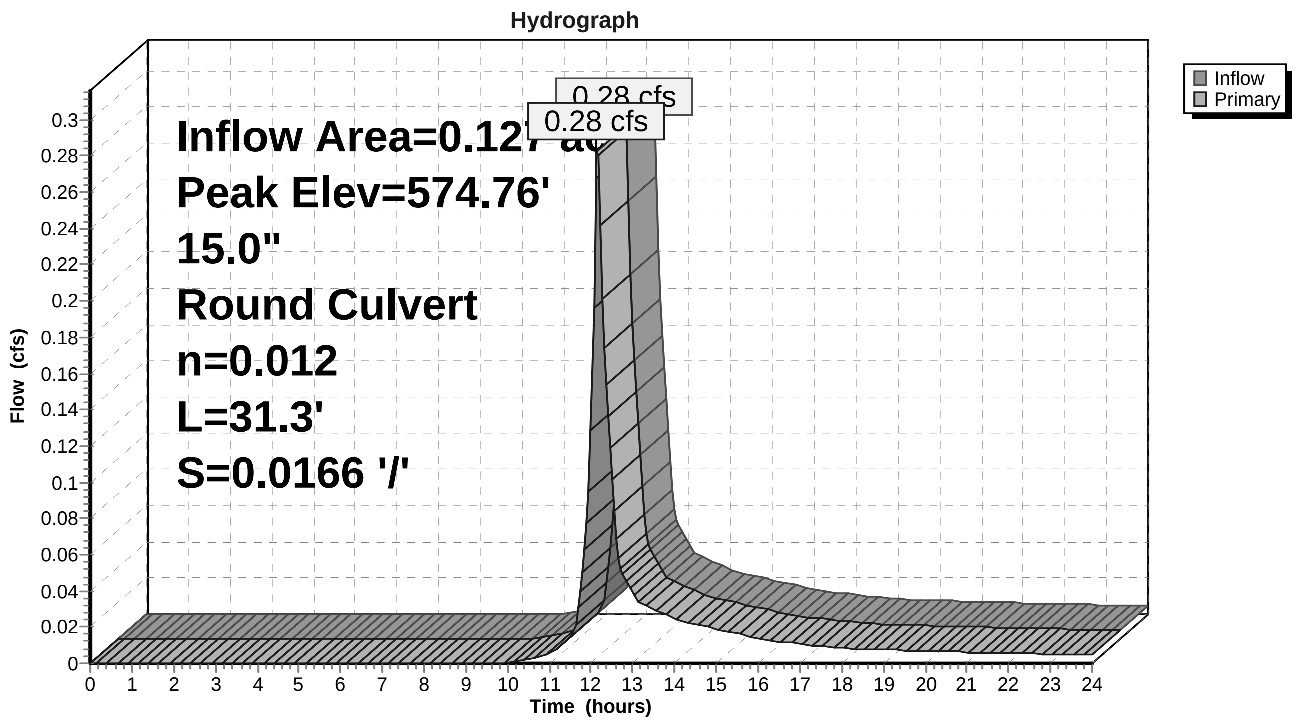
Inflow Area = 0.127 ac, 27.87% Impervious, Inflow Depth > 2.19" for 25Yr-24Hr event
Inflow = 0.28 cfs @ 12.14 hrs, Volume= 0.023 af
Outflow = 0.28 cfs @ 12.14 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min
Primary = 0.28 cfs @ 12.14 hrs, Volume= 0.023 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 574.76' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	574.52'	**15.0" Round 15" N-12 HDPE** L= 31.3' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 574.52' / 574.00' S= 0.0166 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.28 cfs @ 12.14 hrs HW=574.76' TW=574.11' (Dynamic Tailwater)
└─**1=15" N-12 HDPE** (Inlet Controls 0.28 cfs @ 1.67 fps)

Pond 5P: Driveway Culvert



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=86,567 sf 1.88% Impervious Runoff Depth>0.66"
Flow Length=362' Tc=14.9 min CN=69 Runoff=0.98 cfs 0.110 af

Subcatchment 2S: Subcatchment #2 Runoff Area=210,084 sf 1.55% Impervious Runoff Depth>0.84"
Flow Length=462' Tc=30.7 min CN=73 Runoff=2.47 cfs 0.339 af

Subcatchment 3S: Subcatchment #3 Runoff Area=152,172 sf 0.00% Impervious Runoff Depth>0.58"
Flow Length=530' Tc=26.1 min CN=67 Runoff=1.15 cfs 0.167 af

Subcatchment 4S: Subcatchment #4 Runoff Area=45,798 sf 7.56% Impervious Runoff Depth>0.95"
Flow Length=93' Slope=0.0349 '/' Tc=7.7 min CN=75 Runoff=1.03 cfs 0.083 af

Subcatchment 5S: Subcatchment #5 Runoff Area=5,525 sf 27.87% Impervious Runoff Depth>0.54"
Flow Length=124' Tc=9.0 min CN=66 Runoff=0.05 cfs 0.006 af

Reach 4aR: Reach #4a Avg. Flow Depth=0.06' Max Vel=0.39 fps Inflow=0.08 cfs 0.030 af
n=0.080 L=100.8' S=0.0209 '/' Capacity=14.55 cfs Outflow=0.08 cfs 0.030 af

Reach 4bR: Reach #4b Avg. Flow Depth=0.05' Max Vel=0.47 fps Inflow=0.08 cfs 0.030 af
n=0.035 L=92.2' S=0.0076 '/' Capacity=21.77 cfs Outflow=0.08 cfs 0.030 af

Reach 4cR: Reach #4c Avg. Flow Depth=0.07' Max Vel=0.64 fps Inflow=0.08 cfs 0.030 af
n=0.080 L=76.2' S=0.0722 '/' Capacity=24.96 cfs Outflow=0.08 cfs 0.030 af

Reach 5R: Reach #5 Avg. Flow Depth=0.05' Max Vel=0.30 fps Inflow=0.05 cfs 0.006 af
n=0.035 L=105.6' S=0.0047 '/' Capacity=29.60 cfs Outflow=0.05 cfs 0.006 af

Reach 100R: Final Reach #100 Inflow=1.02 cfs 0.145 af
Outflow=1.02 cfs 0.145 af

Reach 200R: Final Reach #200 Inflow=2.47 cfs 0.339 af
Outflow=2.47 cfs 0.339 af

Reach 300R: Final Reach #300 Inflow=1.15 cfs 0.167 af
Outflow=1.15 cfs 0.167 af

Pond 4P: Wetland Ponding Peak Elev=583.76' Storage=2,381 cf Inflow=1.03 cfs 0.083 af
Outflow=0.08 cfs 0.030 af

Pond 5P: Driveway Culvert Peak Elev=574.62' Inflow=0.05 cfs 0.006 af
15.0" Round Culvert n=0.012 L=31.3' S=0.0166 '/' Outflow=0.05 cfs 0.006 af

Total Runoff Area = 11.482 ac Runoff Volume = 0.705 af Average Runoff Depth = 0.74"
98.03% Pervious = 11.255 ac 1.97% Impervious = 0.227 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=86,567 sf 1.88% Impervious Runoff Depth>1.60"
Flow Length=362' Tc=14.9 min CN=69 Runoff=2.70 cfs 0.264 af

Subcatchment 2S: Subcatchment #2 Runoff Area=210,084 sf 1.55% Impervious Runoff Depth>1.88"
Flow Length=462' Tc=30.7 min CN=73 Runoff=5.88 cfs 0.756 af

Subcatchment 3S: Subcatchment #3 Runoff Area=152,172 sf 0.00% Impervious Runoff Depth>1.45"
Flow Length=530' Tc=26.1 min CN=67 Runoff=3.40 cfs 0.423 af

Subcatchment 4S: Subcatchment #4 Runoff Area=45,798 sf 7.56% Impervious Runoff Depth>2.05"
Flow Length=93' Slope=0.0349 '/' Tc=7.7 min CN=75 Runoff=2.33 cfs 0.179 af

Subcatchment 5S: Subcatchment #5 Runoff Area=5,525 sf 27.87% Impervious Runoff Depth>1.39"
Flow Length=124' Tc=9.0 min CN=66 Runoff=0.17 cfs 0.015 af

Reach 4aR: Reach #4a Avg. Flow Depth=0.27' Max Vel=0.94 fps Inflow=1.07 cfs 0.126 af
n=0.080 L=100.8' S=0.0209 '/' Capacity=14.55 cfs Outflow=1.06 cfs 0.125 af

Reach 4bR: Reach #4b Avg. Flow Depth=0.22' Max Vel=1.14 fps Inflow=1.06 cfs 0.125 af
n=0.035 L=92.2' S=0.0076 '/' Capacity=21.77 cfs Outflow=1.06 cfs 0.125 af

Reach 4cR: Reach #4c Avg. Flow Depth=0.23' Max Vel=1.43 fps Inflow=1.06 cfs 0.125 af
n=0.080 L=76.2' S=0.0722 '/' Capacity=24.96 cfs Outflow=1.06 cfs 0.125 af

Reach 5R: Reach #5 Avg. Flow Depth=0.09' Max Vel=0.45 fps Inflow=0.17 cfs 0.015 af
n=0.035 L=105.6' S=0.0047 '/' Capacity=29.60 cfs Outflow=0.16 cfs 0.015 af

Reach 100R: Final Reach #100 Inflow=3.27 cfs 0.404 af
Outflow=3.27 cfs 0.404 af

Reach 200R: Final Reach #200 Inflow=5.88 cfs 0.756 af
Outflow=5.88 cfs 0.756 af

Reach 300R: Final Reach #300 Inflow=3.40 cfs 0.423 af
Outflow=3.40 cfs 0.423 af

Pond 4P: Wetland Ponding Peak Elev=583.83' Storage=2,850 cf Inflow=2.33 cfs 0.179 af
Outflow=1.07 cfs 0.126 af

Pond 5P: Driveway Culvert Peak Elev=574.71' Inflow=0.17 cfs 0.015 af
15.0" Round Culvert n=0.012 L=31.3' S=0.0166 '/' Outflow=0.17 cfs 0.015 af

Total Runoff Area = 11.482 ac Runoff Volume = 1.638 af Average Runoff Depth = 1.71"
98.03% Pervious = 11.255 ac 1.97% Impervious = 0.227 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=86,567 sf 1.88% Impervious Runoff Depth>2.45"
Flow Length=362' Tc=14.9 min CN=69 Runoff=4.26 cfs 0.406 af

Subcatchment 2S: Subcatchment #2 Runoff Area=210,084 sf 1.55% Impervious Runoff Depth>2.80"
Flow Length=462' Tc=30.7 min CN=73 Runoff=8.86 cfs 1.125 af

Subcatchment 3S: Subcatchment #3 Runoff Area=152,172 sf 0.00% Impervious Runoff Depth>2.27"
Flow Length=530' Tc=26.1 min CN=67 Runoff=5.49 cfs 0.661 af

Subcatchment 4S: Subcatchment #4 Runoff Area=45,798 sf 7.56% Impervious Runoff Depth>3.00"
Flow Length=93' Slope=0.0349 '/' Tc=7.7 min CN=75 Runoff=3.45 cfs 0.263 af

Subcatchment 5S: Subcatchment #5 Runoff Area=5,525 sf 27.87% Impervious Runoff Depth>2.19"
Flow Length=124' Tc=9.0 min CN=66 Runoff=0.28 cfs 0.023 af

Reach 4aR: Reach #4a Avg. Flow Depth=0.42' Max Vel=1.20 fps Inflow=2.47 cfs 0.209 af
n=0.080 L=100.8' S=0.0209 '/' Capacity=14.55 cfs Outflow=2.44 cfs 0.208 af

Reach 4bR: Reach #4b Avg. Flow Depth=0.35' Max Vel=1.46 fps Inflow=2.44 cfs 0.208 af
n=0.035 L=92.2' S=0.0076 '/' Capacity=21.77 cfs Outflow=2.44 cfs 0.208 af

Reach 4cR: Reach #4c Avg. Flow Depth=0.34' Max Vel=1.85 fps Inflow=2.44 cfs 0.208 af
n=0.080 L=76.2' S=0.0722 '/' Capacity=24.96 cfs Outflow=2.45 cfs 0.208 af

Reach 5R: Reach #5 Avg. Flow Depth=0.11' Max Vel=0.52 fps Inflow=0.28 cfs 0.023 af
n=0.035 L=105.6' S=0.0047 '/' Capacity=29.60 cfs Outflow=0.26 cfs 0.023 af

Reach 100R: Final Reach #100 Inflow=6.84 cfs 0.637 af
Outflow=6.84 cfs 0.637 af

Reach 200R: Final Reach #200 Inflow=8.86 cfs 1.125 af
Outflow=8.86 cfs 1.125 af

Reach 300R: Final Reach #300 Inflow=5.49 cfs 0.661 af
Outflow=5.49 cfs 0.661 af

Pond 4P: Wetland Ponding Peak Elev=583.89' Storage=3,324 cf Inflow=3.45 cfs 0.263 af
Outflow=2.47 cfs 0.209 af

Pond 5P: Driveway Culvert Peak Elev=574.76' Inflow=0.28 cfs 0.023 af
15.0" Round Culvert n=0.012 L=31.3' S=0.0166 '/' Outflow=0.28 cfs 0.023 af

Total Runoff Area = 11.482 ac Runoff Volume = 2.477 af Average Runoff Depth = 2.59"
98.03% Pervious = 11.255 ac 1.97% Impervious = 0.227 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=86,567 sf 1.88% Impervious Runoff Depth>3.32"
Flow Length=362' Tc=14.9 min CN=69 Runoff=5.83 cfs 0.549 af

Subcatchment 2S: Subcatchment #2 Runoff Area=210,084 sf 1.55% Impervious Runoff Depth>3.71"
Flow Length=462' Tc=30.7 min CN=73 Runoff=11.80 cfs 1.493 af

Subcatchment 3S: Subcatchment #3 Runoff Area=152,172 sf 0.00% Impervious Runoff Depth>3.11"
Flow Length=530' Tc=26.1 min CN=67 Runoff=7.62 cfs 0.904 af

Subcatchment 4S: Subcatchment #4 Runoff Area=45,798 sf 7.56% Impervious Runoff Depth>3.94"
Flow Length=93' Slope=0.0349 '/' Tc=7.7 min CN=75 Runoff=4.53 cfs 0.345 af

Subcatchment 5S: Subcatchment #5 Runoff Area=5,525 sf 27.87% Impervious Runoff Depth>3.02"
Flow Length=124' Tc=9.0 min CN=66 Runoff=0.39 cfs 0.032 af

Reach 4aR: Reach #4a Avg. Flow Depth=0.51' Max Vel=1.34 fps Inflow=3.66 cfs 0.291 af
n=0.080 L=100.8' S=0.0209 '/' Capacity=14.55 cfs Outflow=3.66 cfs 0.291 af

Reach 4bR: Reach #4b Avg. Flow Depth=0.43' Max Vel=1.64 fps Inflow=3.66 cfs 0.291 af
n=0.035 L=92.2' S=0.0076 '/' Capacity=21.77 cfs Outflow=3.66 cfs 0.290 af

Reach 4cR: Reach #4c Avg. Flow Depth=0.41' Max Vel=2.08 fps Inflow=3.66 cfs 0.290 af
n=0.080 L=76.2' S=0.0722 '/' Capacity=24.96 cfs Outflow=3.66 cfs 0.290 af

Reach 5R: Reach #5 Avg. Flow Depth=0.13' Max Vel=0.58 fps Inflow=0.39 cfs 0.032 af
n=0.035 L=105.6' S=0.0047 '/' Capacity=29.60 cfs Outflow=0.38 cfs 0.032 af

Reach 100R: Final Reach #100 Inflow=9.84 cfs 0.871 af
Outflow=9.84 cfs 0.871 af

Reach 200R: Final Reach #200 Inflow=11.80 cfs 1.493 af
Outflow=11.80 cfs 1.493 af

Reach 300R: Final Reach #300 Inflow=7.62 cfs 0.904 af
Outflow=7.62 cfs 0.904 af

Pond 4P: Wetland Ponding Peak Elev=583.93' Storage=3,682 cf Inflow=4.53 cfs 0.345 af
Outflow=3.66 cfs 0.291 af

Pond 5P: Driveway Culvert Peak Elev=574.81' Inflow=0.39 cfs 0.032 af
15.0" Round Culvert n=0.012 L=31.3' S=0.0166 '/' Outflow=0.39 cfs 0.032 af

Total Runoff Area = 11.482 ac Runoff Volume = 3.324 af Average Runoff Depth = 3.47"
98.03% Pervious = 11.255 ac 1.97% Impervious = 0.227 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=86,567 sf 1.88% Impervious Runoff Depth>4.41"
Flow Length=362' Tc=14.9 min CN=69 Runoff=7.77 cfs 0.730 af

Subcatchment 2S: Subcatchment #2 Runoff Area=210,084 sf 1.55% Impervious Runoff Depth>4.85"
Flow Length=462' Tc=30.7 min CN=73 Runoff=15.41 cfs 1.950 af

Subcatchment 3S: Subcatchment #3 Runoff Area=152,172 sf 0.00% Impervious Runoff Depth>4.17"
Flow Length=530' Tc=26.1 min CN=67 Runoff=10.28 cfs 1.213 af

Subcatchment 4S: Subcatchment #4 Runoff Area=45,798 sf 7.56% Impervious Runoff Depth>5.11"
Flow Length=93' Slope=0.0349 '/' Tc=7.7 min CN=75 Runoff=5.85 cfs 0.448 af

Subcatchment 5S: Subcatchment #5 Runoff Area=5,525 sf 27.87% Impervious Runoff Depth>4.07"
Flow Length=124' Tc=9.0 min CN=66 Runoff=0.54 cfs 0.043 af

Reach 4aR: Reach #4a Avg. Flow Depth=0.59' Max Vel=1.45 fps Inflow=4.90 cfs 0.393 af
n=0.080 L=100.8' S=0.0209 '/' Capacity=14.55 cfs Outflow=4.86 cfs 0.393 af

Reach 4bR: Reach #4b Avg. Flow Depth=0.49' Max Vel=1.77 fps Inflow=4.86 cfs 0.393 af
n=0.035 L=92.2' S=0.0076 '/' Capacity=21.77 cfs Outflow=4.87 cfs 0.392 af

Reach 4cR: Reach #4c Avg. Flow Depth=0.47' Max Vel=2.28 fps Inflow=4.87 cfs 0.392 af
n=0.080 L=76.2' S=0.0722 '/' Capacity=24.96 cfs Outflow=4.87 cfs 0.392 af

Reach 5R: Reach #5 Avg. Flow Depth=0.15' Max Vel=0.64 fps Inflow=0.54 cfs 0.043 af
n=0.035 L=105.6' S=0.0047 '/' Capacity=29.60 cfs Outflow=0.51 cfs 0.043 af

Reach 100R: Final Reach #100 Inflow=13.12 cfs 1.165 af
Outflow=13.12 cfs 1.165 af

Reach 200R: Final Reach #200 Inflow=15.41 cfs 1.950 af
Outflow=15.41 cfs 1.950 af

Reach 300R: Final Reach #300 Inflow=10.28 cfs 1.213 af
Outflow=10.28 cfs 1.213 af

Pond 4P: Wetland Ponding Peak Elev=583.97' Storage=4,030 cf Inflow=5.85 cfs 0.448 af
Outflow=4.90 cfs 0.393 af

Pond 5P: Driveway Culvert Peak Elev=574.86' Inflow=0.54 cfs 0.043 af
15.0" Round Culvert n=0.012 L=31.3' S=0.0166 '/' Outflow=0.54 cfs 0.043 af

Total Runoff Area = 11.482 ac Runoff Volume = 4.383 af Average Runoff Depth = 4.58"
98.03% Pervious = 11.255 ac 1.97% Impervious = 0.227 ac

Appendix II - Proposed Conditions Analysis

25 Yr - 24 Hr. Full Summary
2 Yr - 24 Hr. Node Listing
10 Yr -24 Hr. Node Listing
25 Yr -24 Hr. Node Listing
50 Yr - 24 Hr. Node Listing
100 Yr -24 Hr. Node Listing

NOTES (CONT.):

8.) EPA CGP 7.2.4 SITE MAP LEGEND

B5 VEHICLE EXIT
C RECEIVING WATERS
G2 STORMWATER BEST MANAGEMENT PRACTICE

SEE ALSO:

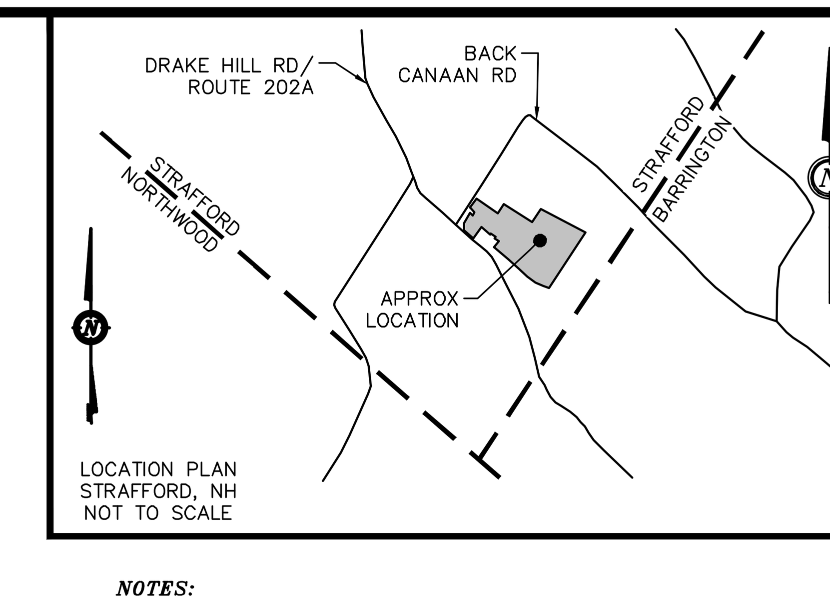
GRADING & DRAINAGE PLAN
EROSION & SEDIMENT CONTROL PLAN
DRAINAGE ANALYSIS & EROSION AND SEDIMENT CONTROL MANUAL
DRAINAGE OPERATION: INSPECTION & MAINTENANCE MANUAL

DAMON BURT, CWS #163

WETLAND NOTE:

THE WETLAND DELINEATION WAS COMPLETED JUNE, 2024 ACCORDING TO THE FOLLOWING STANDARDS:

1. CORPS OF ENGINEERS WETLAND DELINEATION MANUAL, TECHNICAL REPORT 4-87-1. (JANUARY, 1987)
2. U.S. ARMY CORPS OF ENGINEERS, REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION, VERSION 2.0, U.S. ARMY ENGINEER RESEARCH AND DEVELOPMENT CENTER, 3909 HALLS FERRY ROAD, VICKSBURG, MS 39180-6199, JANUARY 2012, ERDC/EL TR-12-1
3. COWARDIN, LEWS M., GOLET, FRANCIS C. AND LAROE, EDWARD T. CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES, USFWS, DEPT. OF THE INTERIOR, WASH. D.C., 1979.
4. FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES A GUIDE FOR IDENTIFYING AND DELINEATING HYDRIC SOILS, VERSION 8.1, 2017 (INCLUDING CORRECTIONS TO VERSION 8.0, 2016, ON PAGES 21, 25, AND 34)
5. NEW ENGLAND HYDRIC SOILS TECHNICAL COMMITTEE. 2017 VERSION 4, FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION, LOWELL, MA



NOTES:

1.) OWNER: LOVELY REVOCABLE LIVING TRUST
DAVID & REBECCA S. LOVELY TRUSTEE'S
20 BACK CANAAN ROAD
STRAFFORD, NH 03884

2.) TAX MAP 4, LOT 83-1

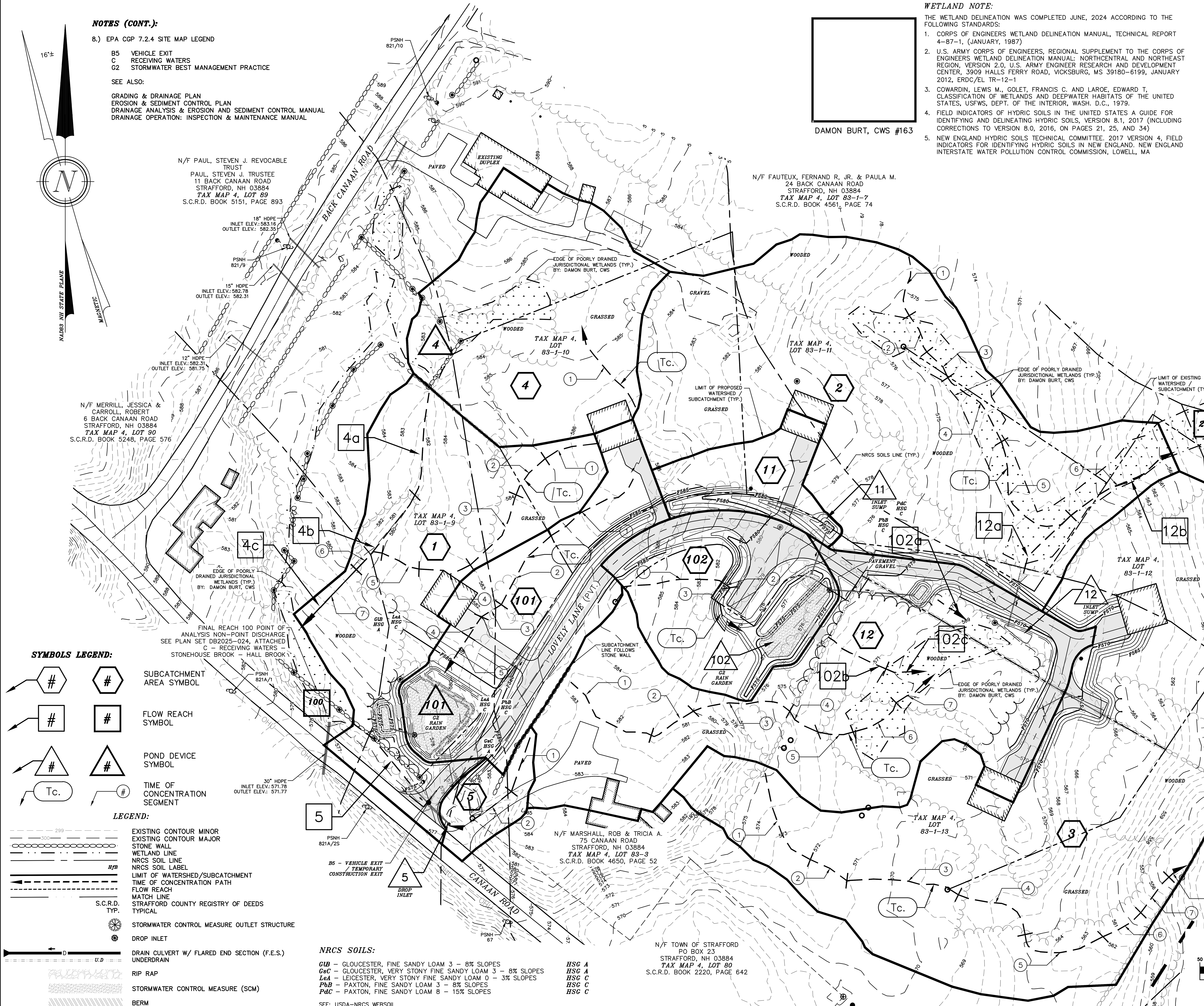
3.) LOT AREA: 1,781,113 Sq. Ft., 40.89 Ac.

4.) S.C.R.D. BOOK 4465, PAGE 702

5.) VERTICAL DATUM BASED ON NAVD88 ELEVATIONS. HORIZONTAL COORDINATES BASED ON NAD83. COORDINATES GATHERED USING CARLSON BRX7 SURVEY GRADE GPS RECEIVERS.

6.) THE INTENT OF THIS PLAN IS TO SHOW THE PROPOSED POST CONSTRUCTION WATERSHED CONDITIONS OF TAX MAP 4, LOT 83-1.

7.) HYDROCAD USES A SERIES OF NODE SUFFIXES FOR NUMBERING PURPOSES (S=SUBCATCHMENT, P=POND DEVICE, R=REACH), TO SIMPLIFY ANNOTATION THESE SUFFIXES ARE LEFT OFF THE WATERSHED PLANS AND NODE TYPE IS DENOTED BY THE SYMBOL SHAPE ACCORDING TO THE DISPLAYED LEGEND WHICH COINCIDES WITH HYDROCAD GRAPHICS.



SYMBOLS LEGEND:

SUBCATCHMENT AREA SYMBOL
FLOW REACH SYMBOL
POND DEVICE SYMBOL
TIME OF CONCENTRATION SEGMENT

LEGEND:

EXISTING CONTOUR MINOR
EXISTING CONTOUR MAJOR
STONE WALL
WETLAND LINE
NRCS SOIL LINE
NRCS SOIL LABEL
LIMIT OF WATERSHED/SUBCATCHMENT
TIME OF CONCENTRATION PATH
FLOW REACH
MATCH LINE
S.C.R.D. STRAFFORD COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
STORMWATER CONTROL MEASURE OUTLET STRUCTURE
DROP INLET
DRAIN CULVERT W/ FLARED END SECTION (F.E.S.)
UNDERDRAIN
RIP RAP
STORMWATER CONTROL MEASURE (SCM)
BERM

NRCS SOILS:

GlB - GLOUCESTER, FINE SANDY LOAM 3 - 8% SLOPES	HSG A
GsC - GLOUCESTER, VERY STONY FINE SANDY LOAM 3 - 8% SLOPES	HSG A
LeA - LEICESTER, VERY STONY FINE SANDY LOAM 0 - 3% SLOPES	HSG C
PbB - PAXTON, FINE SANDY LOAM 3 - 8% SLOPES	HSG C
PdC - PAXTON, FINE SANDY LOAM 8 - 15% SLOPES	HSG C

SEE: USDA-NRCS WEBSOIL

GRAPHIC SCALE

0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

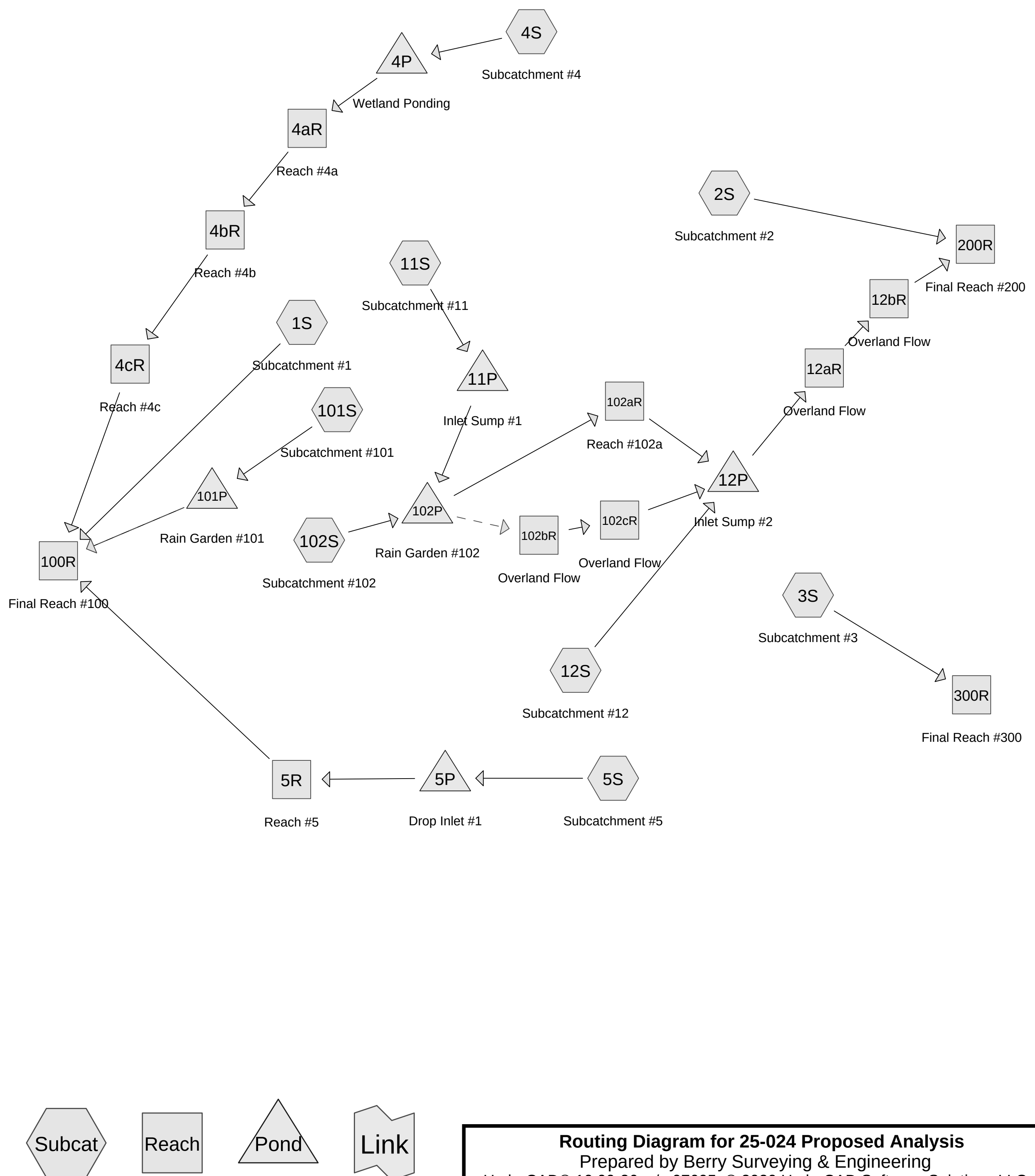
REVISION	DATE	DESCRIPTION
#1	12-04-25	DESIGN REVISION

SWPPP EPA SITE MAP (PROPOSED)
W-2 PROPOSED WATERSHED PLAN
LAND OF
LOVELY REVOCABLE LIVING TRUST
DAVID & REBECCA S. LOVELY TRUSTEES
20 BACK CANAAN ROAD
STRAFFORD, N.H.
TAX MAP 4, LOT 83-1

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : OCTOBER 14, 2025
FILE NO. : DB 2025-024

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14243
LICENSED PROFESSIONAL ENGINEER



Routing Diagram for 25-024 Proposed Analysis
Prepared by Berry Surveying & Engineering
HydroCAD® 10.00-26 s/n 07605 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.408	39	>75% Grass cover, Good, HSG A (1S, 3S, 5S, 101S)
5.958	74	>75% Grass cover, Good, HSG C (1S, 2S, 3S, 4S, 5S, 11S, 12S, 101S, 102S)
0.004	96	Gravel surface, HSG A (1S, 5S, 101S)
0.153	96	Gravel surface, HSG C (1S, 2S, 3S, 4S, 11S, 12S, 101S, 102S)
0.050	98	Paved parking, HSG A (1S, 5S, 101S)
0.645	98	Paved parking, HSG C (1S, 4S, 5S, 11S, 12S, 101S, 102S)
0.154	98	Roofs, HSG C (1S, 2S, 4S, 11S, 12S, 101S)
0.036	98	Unconnected pavement, HSG C (3S)
0.055	98	Unconnected roofs, HSG C (3S)
0.337	30	Woods, Good, HSG A (1S, 3S)
3.682	70	Woods, Good, HSG C (1S, 2S, 3S, 4S, 12S)
11.482	**72**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.799	HSG A	1S, 3S, 5S, 101S
0.000	HSG B	
10.682	HSG C	1S, 2S, 3S, 4S, 5S, 11S, 12S, 101S, 102S
0.000	HSG D	
0.000	Other	
11.482		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.408	0.000	5.958	0.000	0.000	6.366	>75% Grass cover, Good	1S, 2S, 3S, 4S, 5S, 11S, 12S, 101S, 102S
0.004	0.000	0.153	0.000	0.000	0.156	Gravel surface	1S, 2S, 3S, 4S, 5S, 11S, 12S, 101S, 102S
0.050	0.000	0.645	0.000	0.000	0.695	Paved parking	1S, 4S, 5S, 11S, 12S, 101S, 102S
0.000	0.000	0.154	0.000	0.000	0.154	Roofs	1S, 2S, 4S, 11S, 12S, 101S
0.000	0.000	0.036	0.000	0.000	0.036	Unconnected pavement	3S
0.000	0.000	0.055	0.000	0.000	0.055	Unconnected roofs	3S
0.337	0.000	3.682	0.000	0.000	4.020	Woods, Good	1S, 2S, 3S, 4S, 12S
0.799	**0.000**	**10.682**	**0.000**	**0.000**	**11.482**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	5P	574.50	574.00	50.0	0.0100	0.012	15.0	0.0	0.0
2	11P	574.50	574.00	42.0	0.0119	0.012	15.0	0.0	0.0
3	12P	568.00	567.75	40.0	0.0063	0.012	12.0	0.0	0.0
4	101P	574.00	573.75	19.2	0.0130	0.012	15.0	0.0	0.0
5	102P	571.50	571.00	77.5	0.0065	0.012	15.0	0.0	0.0

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=51,278 sf 7.62% Impervious Runoff Depth>2.28"
Flow Length=385' Tc=14.4 min CN=67 Runoff=2.36 cfs 0.223 af

Subcatchment 2S: Subcatchment #2 Runoff Area=98,229 sf 0.81% Impervious Runoff Depth>2.80"
Flow Length=462' Tc=30.7 min CN=73 Runoff=4.14 cfs 0.526 af

Subcatchment 3S: Subcatchment #3 Runoff Area=141,322 sf 2.80% Impervious Runoff Depth>2.27"
Flow Length=530' Tc=26.1 min UI Adjusted CN=67 Runoff=5.09 cfs 0.614 af

Subcatchment 4S: Subcatchment #4 Runoff Area=45,221 sf 9.42% Impervious Runoff Depth>3.09"
Flow Length=93' Slope=0.0349 '/' Tc=7.7 min CN=76 Runoff=3.51 cfs 0.268 af

Subcatchment 5S: Subcatchment #5 Runoff Area=6,203 sf 23.04% Impervious Runoff Depth>1.95"
Flow Length=124' Tc=9.0 min CN=63 Runoff=0.28 cfs 0.023 af

Subcatchment 11S: Subcatchment #11 Runoff Area=11,729 sf 18.01% Impervious Runoff Depth>3.38"
Tc=6.0 min CN=79 Runoff=1.05 cfs 0.076 af

Subcatchment 12S: Subcatchment #12 Runoff Area=81,393 sf 13.10% Impervious Runoff Depth>3.09"
Flow Length=406' Tc=15.0 min CN=76 Runoff=5.11 cfs 0.481 af

Subcatchment 101S: Subcatchment #101 Runoff Area=36,192 sf 21.67% Impervious Runoff Depth>3.38"
Flow Length=269' Tc=11.6 min CN=79 Runoff=2.72 cfs 0.234 af

Subcatchment 102S: Subcatchment #102 Runoff Area=28,572 sf 20.82% Impervious Runoff Depth>3.38"
Flow Length=156' Tc=7.7 min CN=79 Runoff=2.42 cfs 0.185 af

Reach 4aR: Reach #4a Avg. Flow Depth=0.43' Max Vel=1.21 fps Inflow=2.58 cfs 0.214 af
n=0.080 L=100.8' S=0.0209 '/' Capacity=14.55 cfs Outflow=2.55 cfs 0.213 af

Reach 4bR: Reach #4b Avg. Flow Depth=0.35' Max Vel=1.48 fps Inflow=2.55 cfs 0.213 af
n=0.035 L=92.2' S=0.0076 '/' Capacity=21.77 cfs Outflow=2.55 cfs 0.213 af

Reach 4cR: Reach #4c Avg. Flow Depth=0.35' Max Vel=1.87 fps Inflow=2.55 cfs 0.213 af
n=0.080 L=76.2' S=0.0722 '/' Capacity=24.96 cfs Outflow=2.55 cfs 0.213 af

Reach 5R: Reach #5 Avg. Flow Depth=0.10' Max Vel=0.66 fps Inflow=0.28 cfs 0.023 af
n=0.035 L=80.0' S=0.0094 '/' Capacity=41.65 cfs Outflow=0.27 cfs 0.023 af

Reach 12aR: Overland Flow Avg. Flow Depth=0.42' Max Vel=0.79 fps Inflow=3.04 cfs 0.621 af
n=0.080 L=74.8' S=0.0100 '/' Capacity=4.46 cfs Outflow=3.04 cfs 0.620 af

Reach 12bR: Overland Flow Avg. Flow Depth=0.27' Max Vel=1.53 fps Inflow=3.04 cfs 0.620 af
n=0.080 L=115.3' S=0.0672 '/' Capacity=11.55 cfs Outflow=3.04 cfs 0.619 af

Reach 100R: Final Reach #100 Inflow=5.11 cfs 0.574 af
Outflow=5.11 cfs 0.574 af

Reach 102aR: Reach #102a Avg. Flow Depth=0.12' Max Vel=1.88 fps Inflow=0.99 cfs 0.141 af
n=0.035 L=21.0' S=0.0595 '/' Capacity=104.94 cfs Outflow=0.99 cfs 0.141 af

Reach 102bR: Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=64.5' S=0.0698 '/' Capacity=17.89 cfs Outflow=0.00 cfs 0.000 af

Reach 102cR: Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=26.5' S=0.0283 '/' Capacity=4.99 cfs Outflow=0.00 cfs 0.000 af

Reach 200R: Final Reach #200 Inflow=7.15 cfs 1.145 af
Outflow=7.15 cfs 1.145 af

Reach 300R: Final Reach #300 Inflow=5.09 cfs 0.614 af
Outflow=5.09 cfs 0.614 af

Pond 4P: Wetland Ponding Peak Elev=583.90' Storage=3,358 cf Inflow=3.51 cfs 0.268 af
Outflow=2.58 cfs 0.214 af

Pond 5P: Drop Inlet #1 Peak Elev=574.76' Storage=1 cf Inflow=0.28 cfs 0.023 af
15.0" Round Culvert n=0.012 L=50.0' S=0.0100 '/' Outflow=0.28 cfs 0.023 af

Pond 11P: Inlet Sump #1 Peak Elev=575.34' Storage=57 cf Inflow=1.05 cfs 0.076 af
15.0" Round Culvert n=0.012 L=42.0' S=0.0119 '/' Outflow=1.03 cfs 0.075 af

Pond 12P: Inlet Sump #2 Peak Elev=569.32' Storage=3,447 cf Inflow=5.16 cfs 0.622 af
12.0" Round Culvert n=0.012 L=40.0' S=0.0063 '/' Outflow=3.04 cfs 0.621 af

Pond 101P: Rain Garden #101 Peak Elev=577.45' Storage=5,495 cf Inflow=2.72 cfs 0.234 af
Primary=0.55 cfs 0.114 af Secondary=0.00 cfs 0.000 af Outflow=0.55 cfs 0.114 af

Pond 102P: Rain Garden #102 Peak Elev=575.33' Storage=5,550 cf Inflow=3.44 cfs 0.260 af
Primary=0.99 cfs 0.141 af Secondary=0.00 cfs 0.000 af Outflow=0.99 cfs 0.141 af

Total Runoff Area = 11.482 ac Runoff Volume = 2.629 af Average Runoff Depth = 2.75"
91.82% Pervious = 10.542 ac 8.18% Impervious = 0.939 ac

Summary for Subcatchment 1S: Subcatchment #1

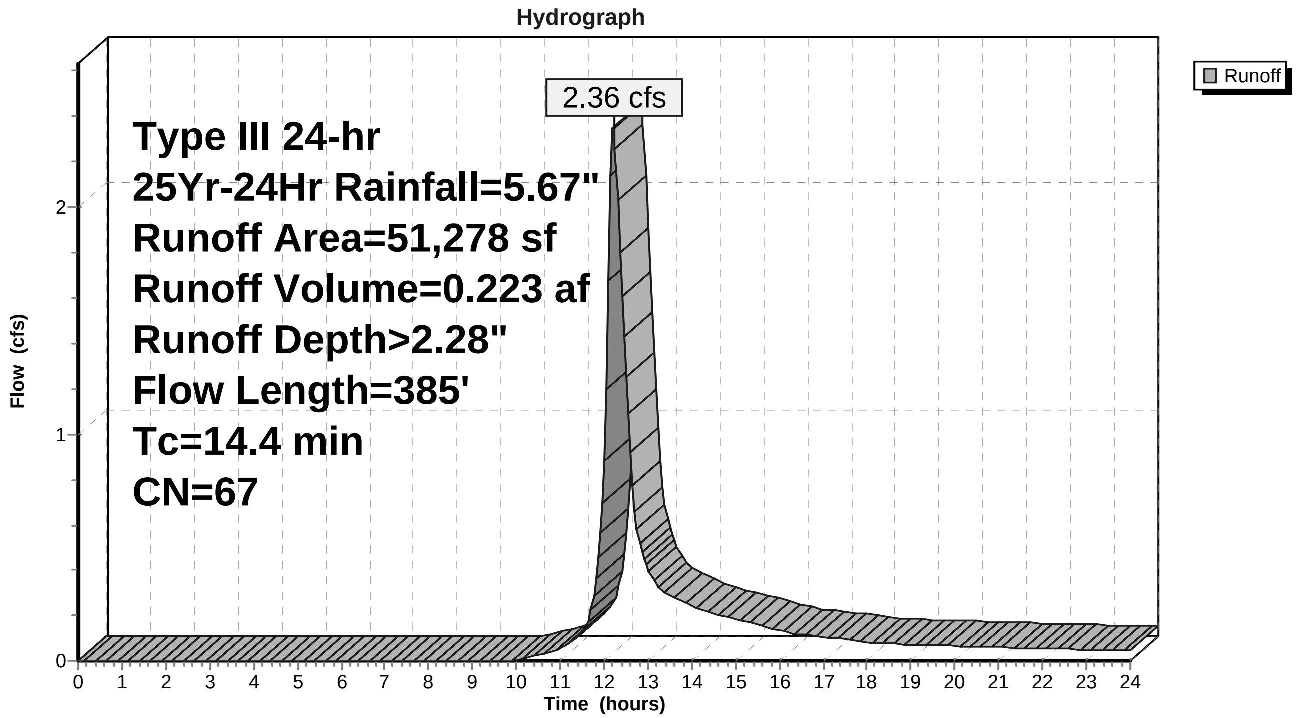
Runoff = 2.36 cfs @ 12.21 hrs, Volume= 0.223 af, Depth> 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25Yr-24Hr Rainfall=5.67"

Area (sf)	CN	Description
1,518	39	>75% Grass cover, Good, HSG A
515	98	Paved parking, HSG A
7,822	30	Woods, Good, HSG A
62	96	Gravel surface, HSG A
800	98	Roofs, HSG C
22,219	74	>75% Grass cover, Good, HSG C
2,590	98	Paved parking, HSG C
15,495	70	Woods, Good, HSG C
257	96	Gravel surface, HSG C
51,278	67	Weighted Average
47,373		92.38% Pervious Area
3,905		7.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	54	0.0277	0.17		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 2.99"
5.5	46	0.0196	0.14		**Sheet Flow, Segment #2** Grass: Short n= 0.150 P2= 2.99"
0.6	84	0.1310	2.53		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
0.9	53	0.0188	0.96		**Shallow Concentrated Flow, Segment #4** Short Grass Pasture Kv= 7.0 fps
0.4	39	0.0509	1.58		**Shallow Concentrated Flow, Segment #5** Short Grass Pasture Kv= 7.0 fps
0.6	33	0.0152	0.86		**Shallow Concentrated Flow, Segment #6** Short Grass Pasture Kv= 7.0 fps
1.0	76	0.0655	1.28		**Shallow Concentrated Flow, Segment #7** Woodland Kv= 5.0 fps
14.4	385	Total			

Subcatchment 1S: Subcatchment #1



Summary for Subcatchment 2S: Subcatchment #2

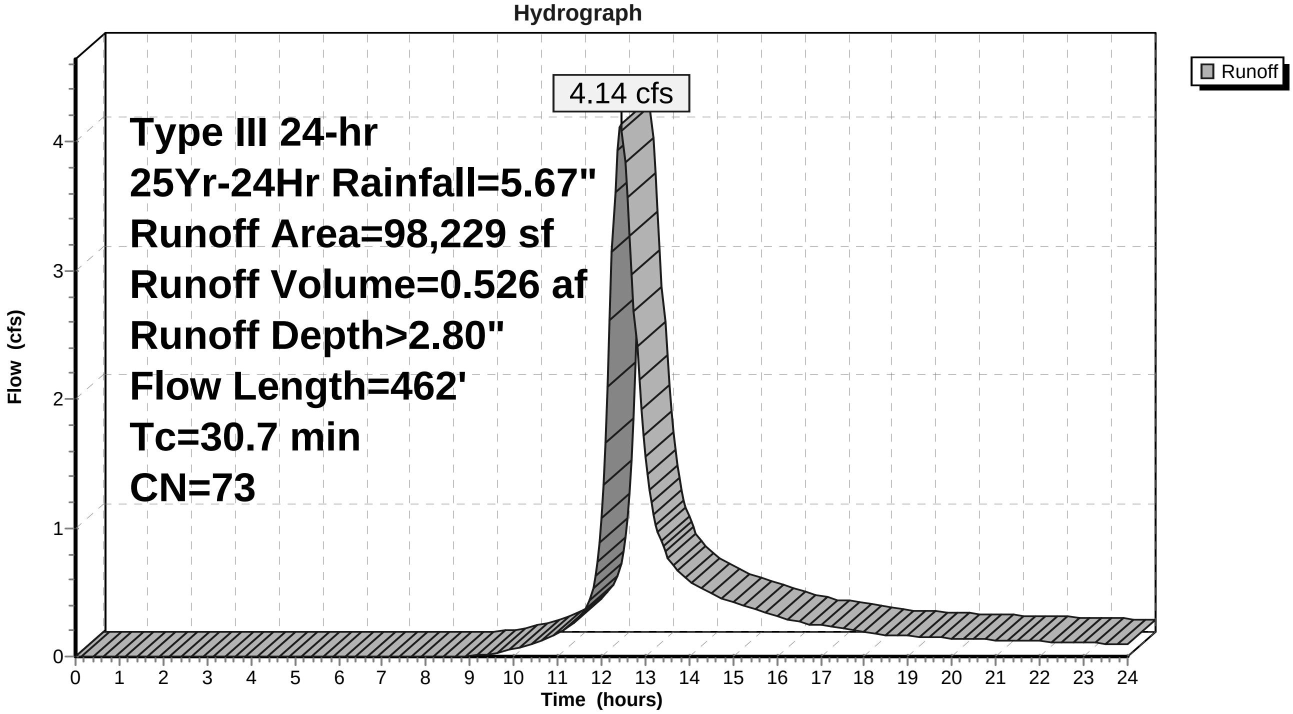
Runoff = 4.14 cfs @ 12.44 hrs, Volume= 0.526 af, Depth> 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25Yr-24Hr Rainfall=5.67"

Area (sf)	CN	Description
800	98	Roofs, HSG C
44,063	74	>75% Grass cover, Good, HSG C
50,900	70	Woods, Good, HSG C
2,466	96	Gravel surface, HSG C
98,229	73	Weighted Average
97,429		99.19% Pervious Area
800		0.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	60	0.0417	0.09		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 2.99"
12.9	40	0.0125	0.05		**Sheet Flow, Segment #2** Woods: Light underbrush n= 0.400 P2= 2.99"
0.9	33	0.0152	0.62		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
1.5	83	0.0360	0.95		**Shallow Concentrated Flow, Segment #4** Woodland Kv= 5.0 fps
2.9	130	0.0230	0.76		**Shallow Concentrated Flow, Segment #5** Woodland Kv= 5.0 fps
1.5	116	0.0667	1.29		**Shallow Concentrated Flow, Segment #6** Woodland Kv= 5.0 fps
30.7	462	Total			

Subcatchment 2S: Subcatchment #2



Summary for Subcatchment 3S: Subcatchment #3

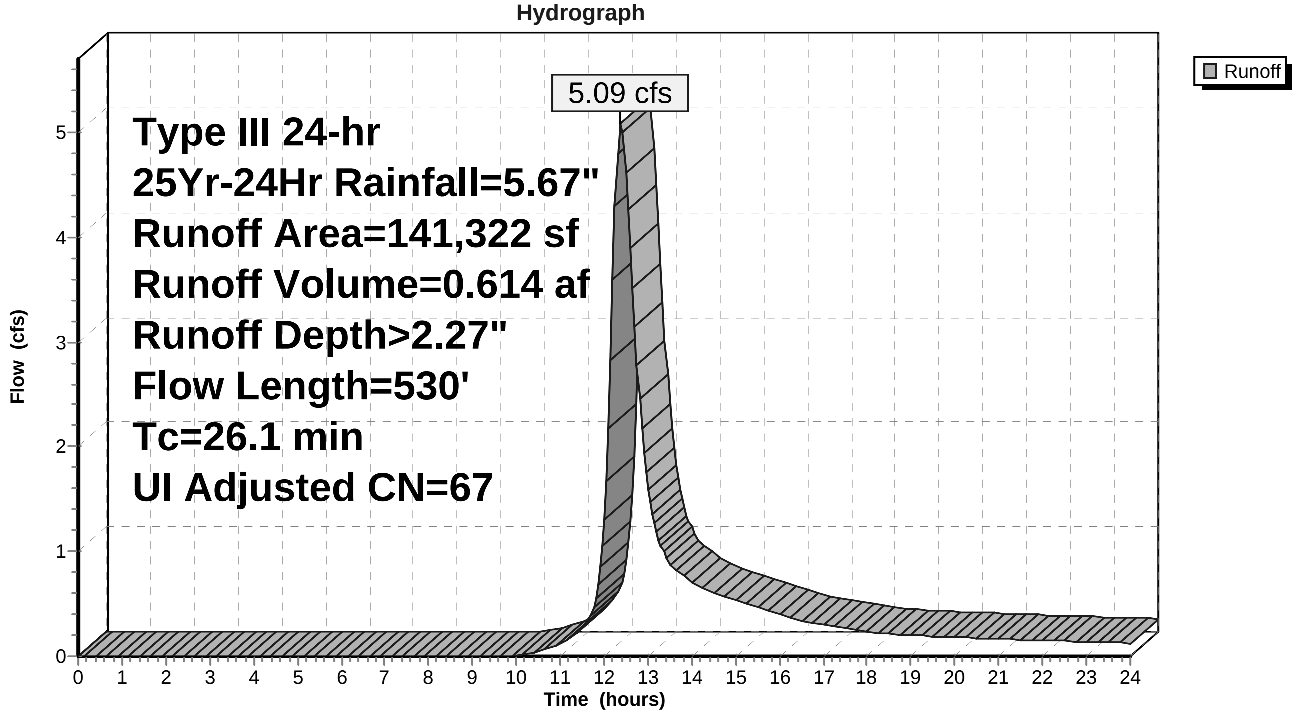
Runoff = 5.09 cfs @ 12.38 hrs, Volume= 0.614 af, Depth> 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25Yr-24Hr Rainfall=5.67"

Area (sf)	CN	Adj	Description
12,928	39		>75% Grass cover, Good, HSG A
6,874	30		Woods, Good, HSG A
2,400	98		Unconnected roofs, HSG C
61,837	74		>75% Grass cover, Good, HSG C
1,563	98		Unconnected pavement, HSG C
55,072	70		Woods, Good, HSG C
648	96		Gravel surface, HSG C
141,322	68	67	Weighted Average, UI Adjusted
137,359			97.20% Pervious Area
3,963			2.80% Impervious Area
3,963			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	100	0.0300	0.09		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 2.99"
0.9	41	0.0243	0.78		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
2.3	111	0.0269	0.82		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
0.9	84	0.0447	1.48		**Shallow Concentrated Flow, Segment #4** Short Grass Pasture Kv= 7.0 fps
1.9	89	0.0252	0.79		**Shallow Concentrated Flow, Segment #5** Woodland Kv= 5.0 fps
0.6	44	0.0682	1.31		**Shallow Concentrated Flow, Segment #6** Woodland Kv= 5.0 fps
0.4	44	0.1132	1.68		**Shallow Concentrated Flow, Segment #7** Woodland Kv= 5.0 fps
0.2	17	0.0596	1.22		**Shallow Concentrated Flow, Segment #8** Woodland Kv= 5.0 fps
26.1	530	Total			

Subcatchment 3S: Subcatchment #3



Summary for Subcatchment 4S: Subcatchment #4

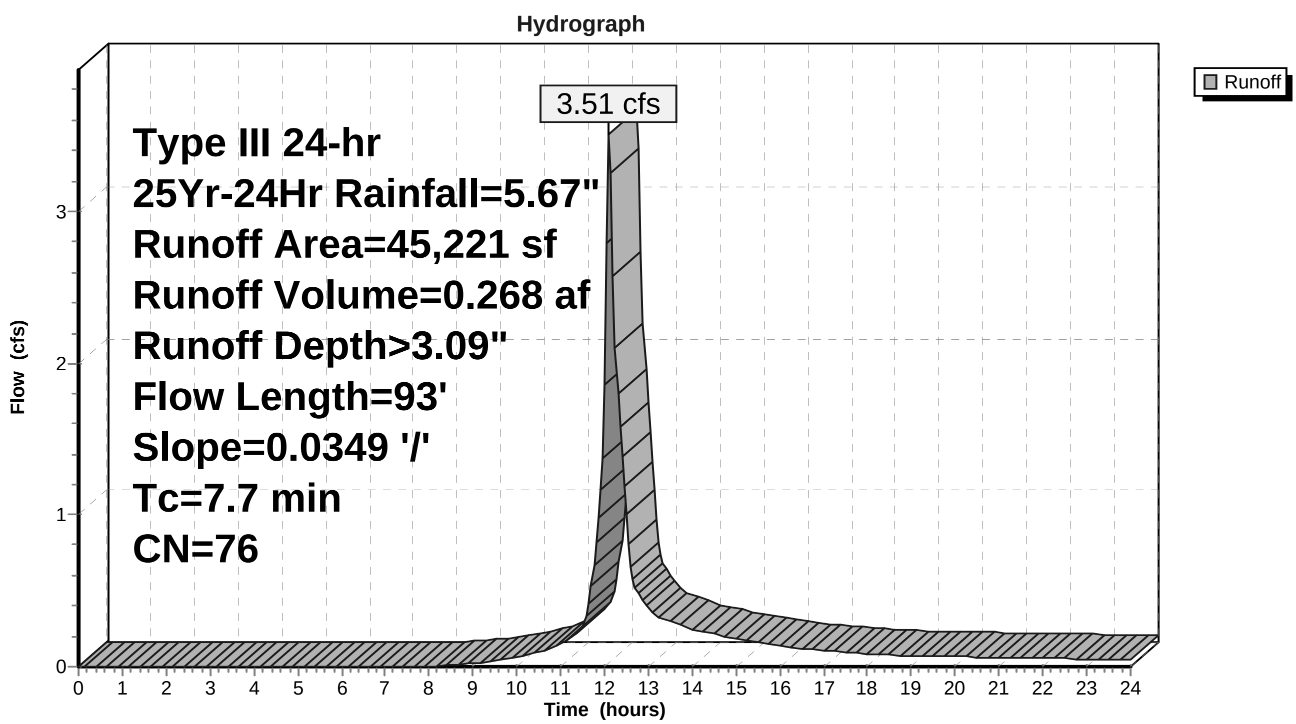
Runoff = 3.51 cfs @ 12.11 hrs, Volume= 0.268 af, Depth> 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25Yr-24Hr Rainfall=5.67"

Area (sf)	CN	Description
1,900	98	Roofs, HSG C
28,106	74	>75% Grass cover, Good, HSG C
2,361	98	Paved parking, HSG C
12,173	70	Woods, Good, HSG C
681	96	Gravel surface, HSG C
45,221	76	Weighted Average
40,960		90.58% Pervious Area
4,261		9.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	93	0.0349	0.20		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 2.99"

Subcatchment 4S: Subcatchment #4



Summary for Subcatchment 5S: Subcatchment #5

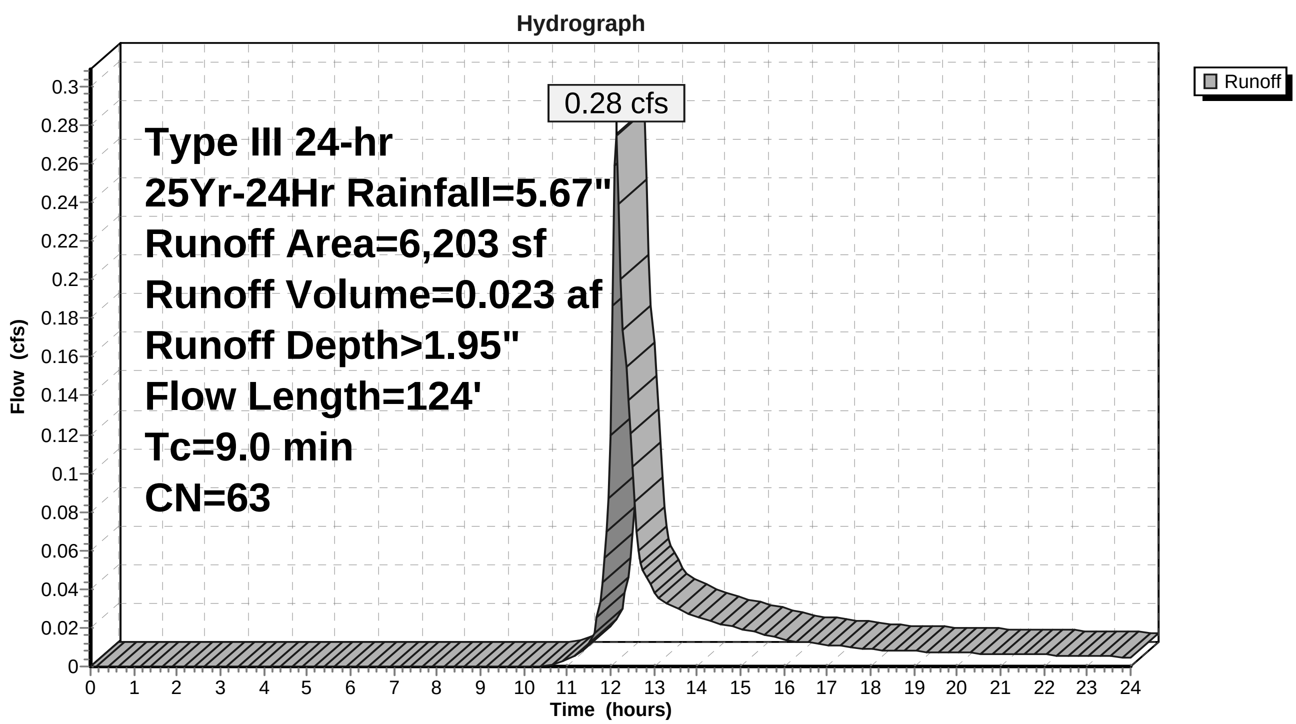
Runoff = 0.28 cfs @ 12.14 hrs, Volume= 0.023 af, Depth> 1.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25Yr-24Hr Rainfall=5.67"

Area (sf)	CN	Description
2,956	39	>75% Grass cover, Good, HSG A
1,132	98	Paved parking, HSG A
4	96	Gravel surface, HSG A
1,814	74	>75% Grass cover, Good, HSG C
297	98	Paved parking, HSG C
6,203	63	Weighted Average
4,774		76.96% Pervious Area
1,429		23.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	56	0.0090	0.11		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 2.99"
0.2	68	0.1247	7.17		**Shallow Concentrated Flow, Segment #2** Paved Kv= 20.3 fps
9.0	124	Total			

Subcatchment 5S: Subcatchment #5



Summary for Subcatchment 11S: Subcatchment #11

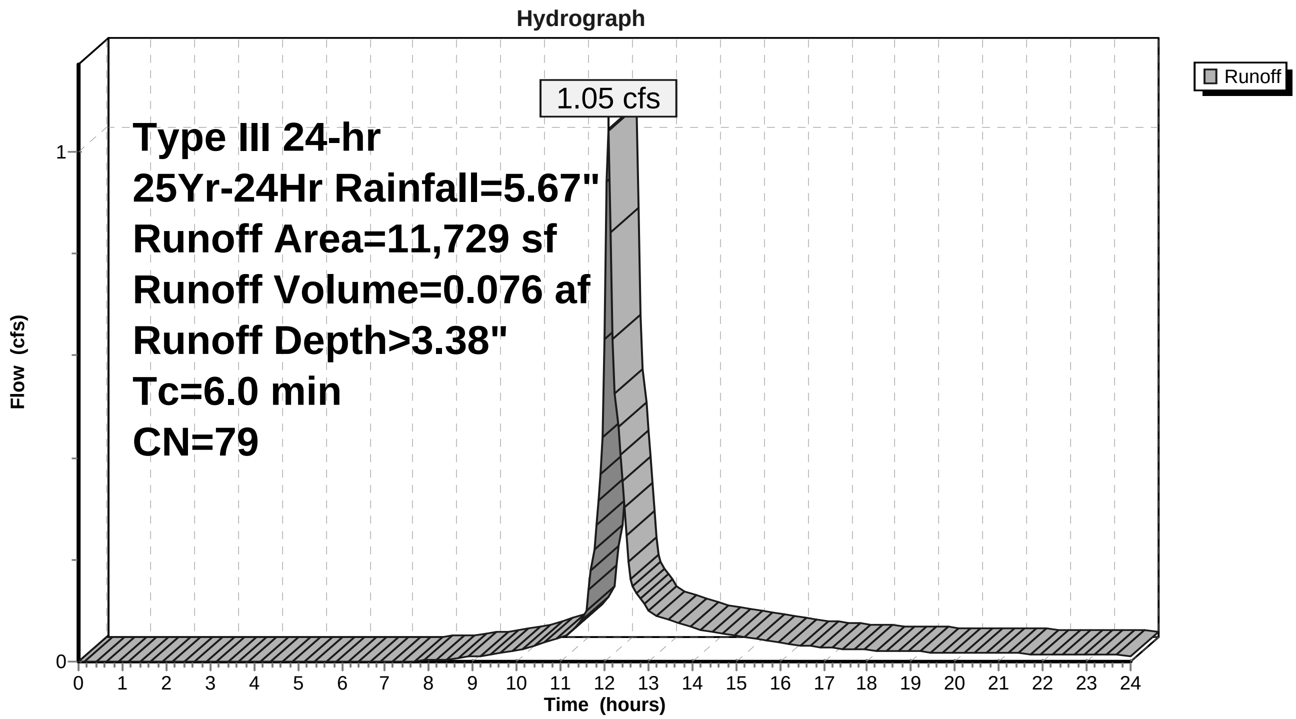
Runoff = 1.05 cfs @ 12.09 hrs, Volume= 0.076 af, Depth> 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25Yr-24Hr Rainfall=5.67"

Area (sf)	CN	Description
800	98	Roofs, HSG C
9,348	74	>75% Grass cover, Good, HSG C
1,312	98	Paved parking, HSG C
269	96	Gravel surface, HSG C
11,729	79	Weighted Average
9,617		81.99% Pervious Area
2,112		18.01% Impervious Area

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

Subcatchment 11S: Subcatchment #11



Summary for Subcatchment 12S: Subcatchment #12

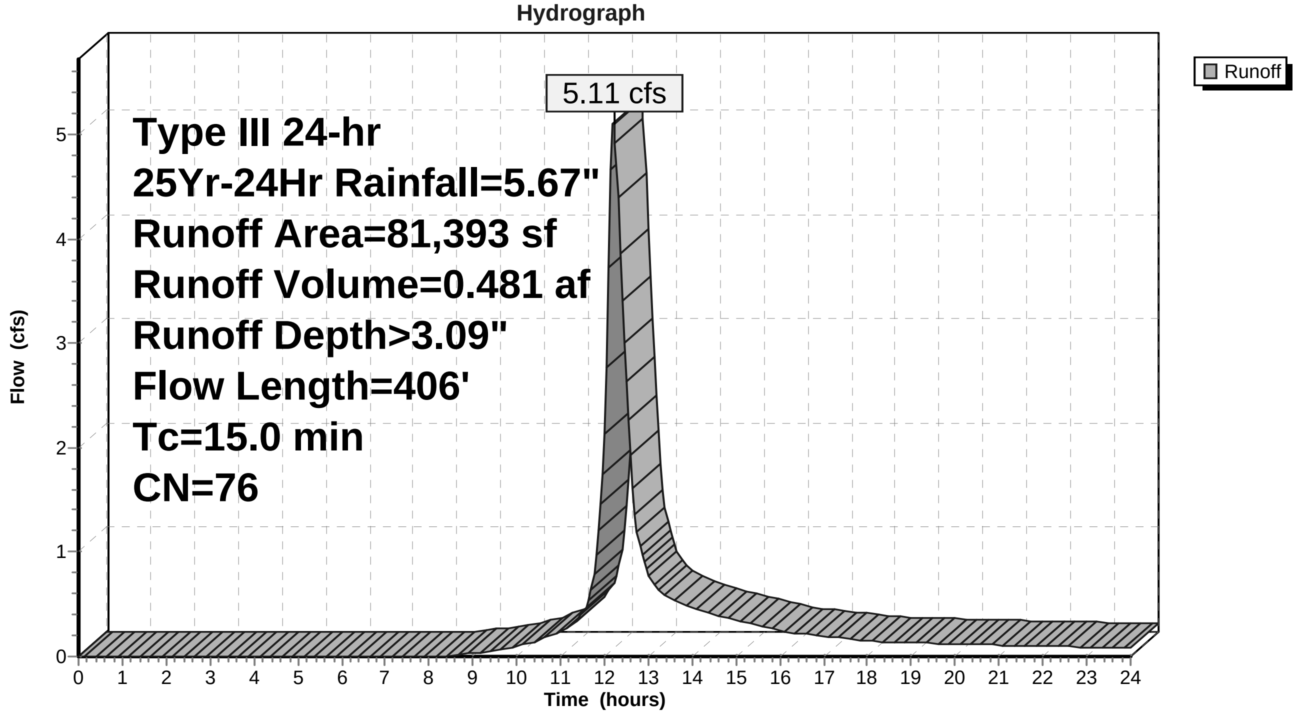
Runoff = 5.11 cfs @ 12.21 hrs, Volume= 0.481 af, Depth> 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25Yr-24Hr Rainfall=5.67"

Area (sf)	CN	Description
800	98	Roofs, HSG C
43,187	74	>75% Grass cover, Good, HSG C
9,859	98	Paved parking, HSG C
783	96	Gravel surface, HSG C
26,764	70	Woods, Good, HSG C
81,393	76	Weighted Average
70,734		86.90% Pervious Area
10,659		13.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.0200	0.16		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 2.99"
0.8	49	0.0205	1.00		**Shallow Concentrated Flow, Segment #2** Short Grass Pasture Kv= 7.0 fps
0.9	98	0.0614	1.73		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
0.7	35	0.0287	0.85		**Shallow Concentrated Flow, Segment #4** Woodland Kv= 5.0 fps
0.3	35	0.0573	1.68		**Shallow Concentrated Flow, Segment #5** Short Grass Pasture Kv= 7.0 fps
1.1	53	0.0141	0.83		**Shallow Concentrated Flow, Segment #6** Short Grass Pasture Kv= 7.0 fps
1.1	36	0.0125	0.56		**Shallow Concentrated Flow, Segment #7** Woodland Kv= 5.0 fps
15.0	406	Total			

Subcatchment 12S: Subcatchment #12



Summary for Subcatchment 101S: Subcatchment #101

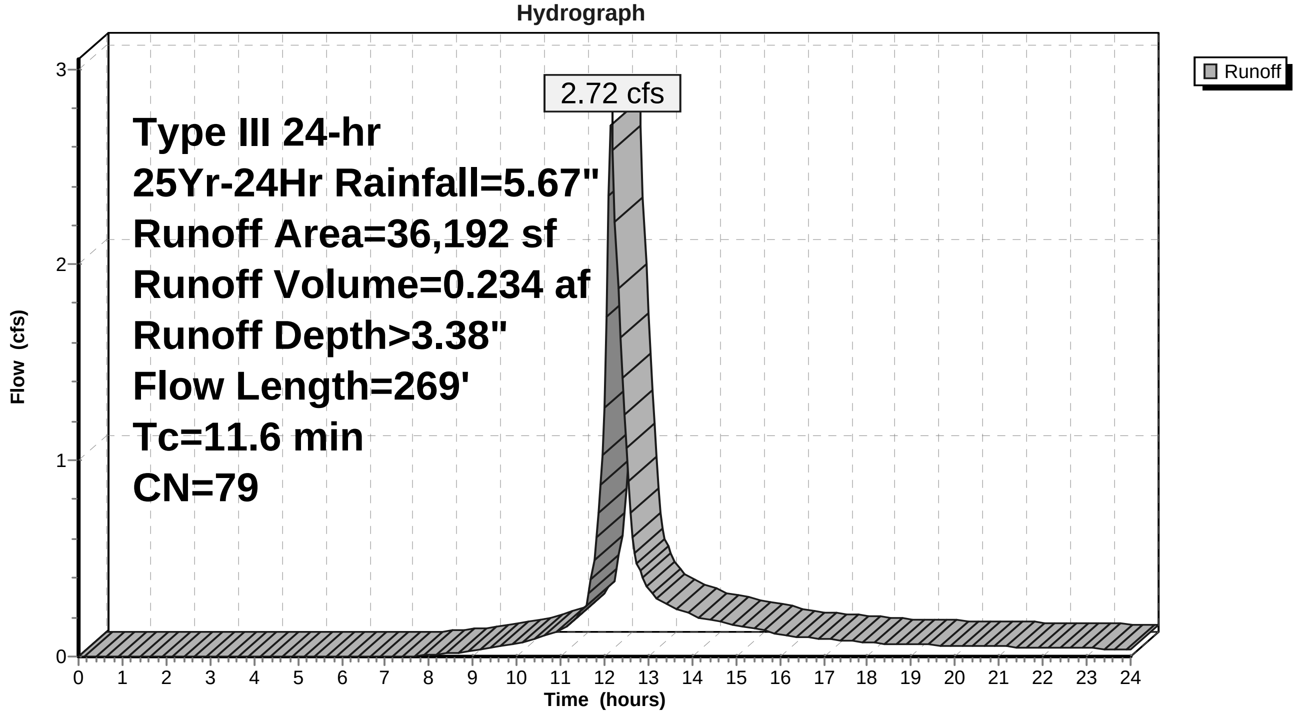
Runoff = 2.72 cfs @ 12.16 hrs, Volume= 0.234 af, Depth> 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25Yr-24Hr Rainfall=5.67"

Area (sf)	CN	Description
389	39	>75% Grass cover, Good, HSG A
524	98	Paved parking, HSG A
92	96	Gravel surface, HSG A
1,600	98	Roofs, HSG C
26,965	74	>75% Grass cover, Good, HSG C
5,717	98	Paved parking, HSG C
905	96	Gravel surface, HSG C
36,192	79	Weighted Average
28,351		78.33% Pervious Area
7,841		21.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	100	0.0350	0.21		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 2.99"
2.7	84	0.0056	0.52		**Shallow Concentrated Flow, Segment #2** Short Grass Pasture Kv= 7.0 fps
0.3	23	0.0441	1.47		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
0.1	23	0.0220	3.01		**Shallow Concentrated Flow, Segment #4** Paved Kv= 20.3 fps
0.4	39	0.0646	1.78		**Shallow Concentrated Flow, Segment #5** Short Grass Pasture Kv= 7.0 fps
11.6	269	Total			

Subcatchment 101S: Subcatchment #101



Summary for Subcatchment 102S: Subcatchment #102

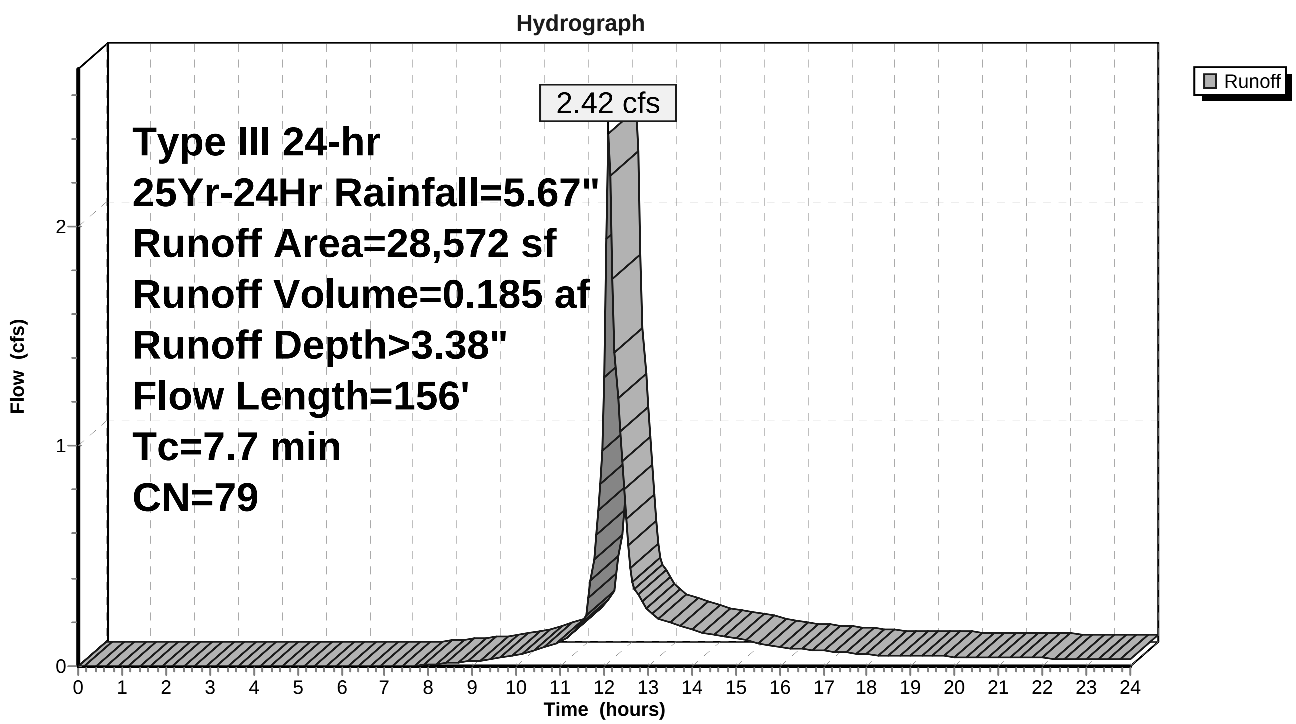
Runoff = 2.42 cfs @ 12.11 hrs, Volume= 0.185 af, Depth> 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25Yr-24Hr Rainfall=5.67"

Area (sf)	CN	Description
21,973	74	>75% Grass cover, Good, HSG C
5,950	98	Paved parking, HSG C
649	96	Gravel surface, HSG C
28,572	79	Weighted Average
22,622		79.18% Pervious Area
5,950		20.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	98	0.0458	0.23		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 2.99"
0.0	9	0.4199	4.54		**Shallow Concentrated Flow, Segment #2** Short Grass Pasture Kv= 7.0 fps
0.5	49	0.0459	1.50		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
7.7	156	Total			

Subcatchment 102S: Subcatchment #102



Summary for Reach 4aR: Reach #4a

Inflow Area = 1.038 ac, 9.42% Impervious, Inflow Depth > 2.47" for 25Yr-24Hr event
Inflow = 2.58 cfs @ 12.21 hrs, Volume= 0.214 af
Outflow = 2.55 cfs @ 12.23 hrs, Volume= 0.213 af, Atten= 1%, Lag= 0.9 min

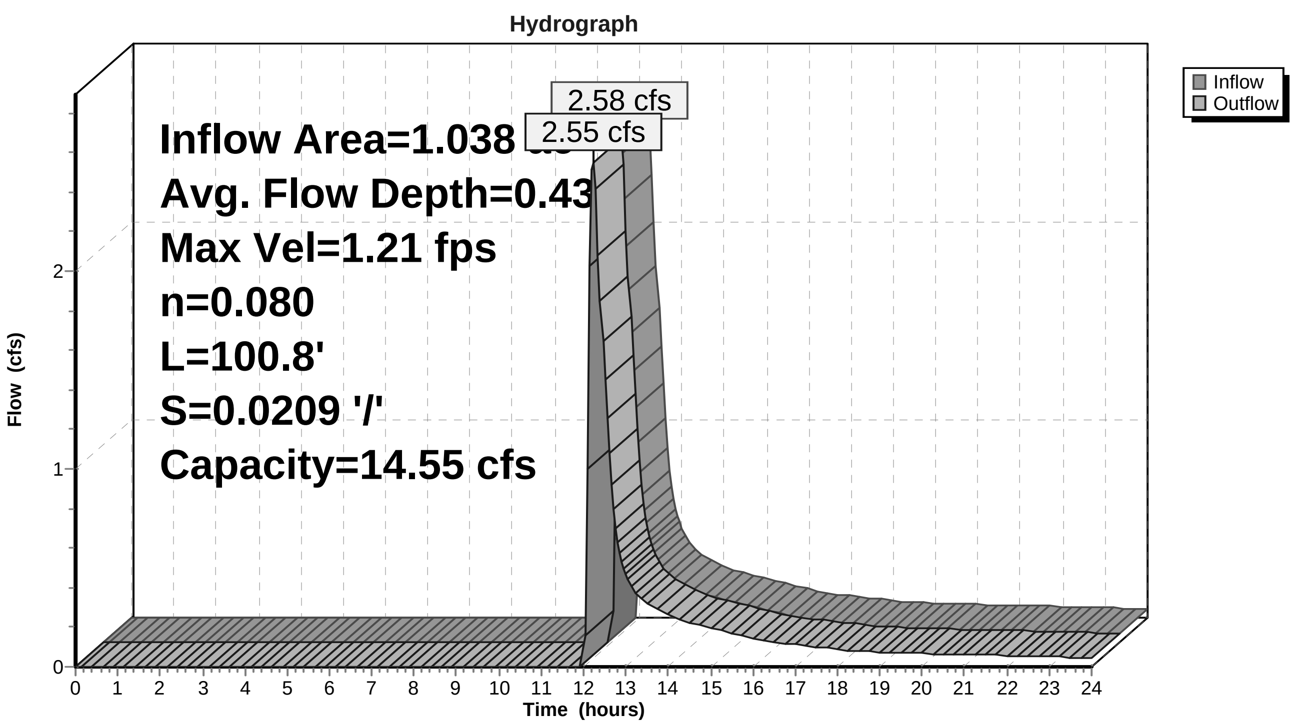
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.21 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 0.48 fps, Avg. Travel Time= 3.5 min

Peak Storage= 212 cf @ 12.23 hrs
Average Depth at Peak Storage= 0.43'
Bank-Full Depth= 1.00' Flow Area= 7.5 sf, Capacity= 14.55 cfs

3.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 4.0 5.0 '/' Top Width= 12.00'
Length= 100.8' Slope= 0.0209 '/'
Inlet Invert= 582.31', Outlet Invert= 580.20'

‡

Reach 4aR: Reach #4a



Summary for Reach 4bR: Reach #4b

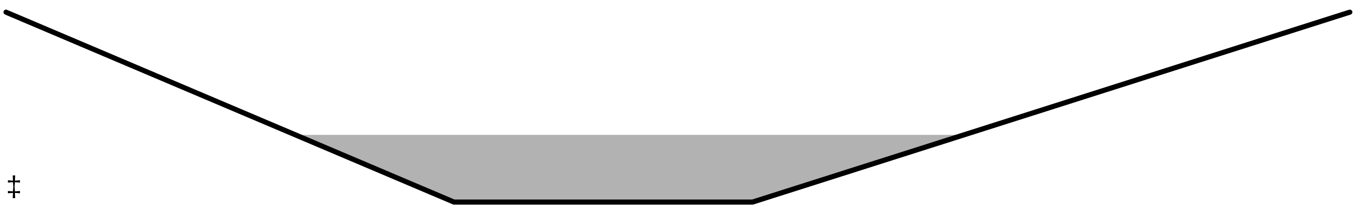
[61] Hint: Exceeded Reach 4aR outlet invert by 0.35' @ 12.25 hrs

Inflow Area = 1.038 ac, 9.42% Impervious, Inflow Depth > 2.46" for 25Yr-24Hr event
Inflow = 2.55 cfs @ 12.23 hrs, Volume= 0.213 af
Outflow = 2.55 cfs @ 12.24 hrs, Volume= 0.213 af, Atten= 0%, Lag= 1.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.48 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.58 fps, Avg. Travel Time= 2.6 min

Peak Storage= 159 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.35'
Bank-Full Depth= 1.00' Flow Area= 8.3 sf, Capacity= 21.77 cfs

3.00' x 1.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 4.5 6.0 '/' Top Width= 13.50'
Length= 92.2' Slope= 0.0076 '/'
Inlet Invert= 580.20', Outlet Invert= 579.50'



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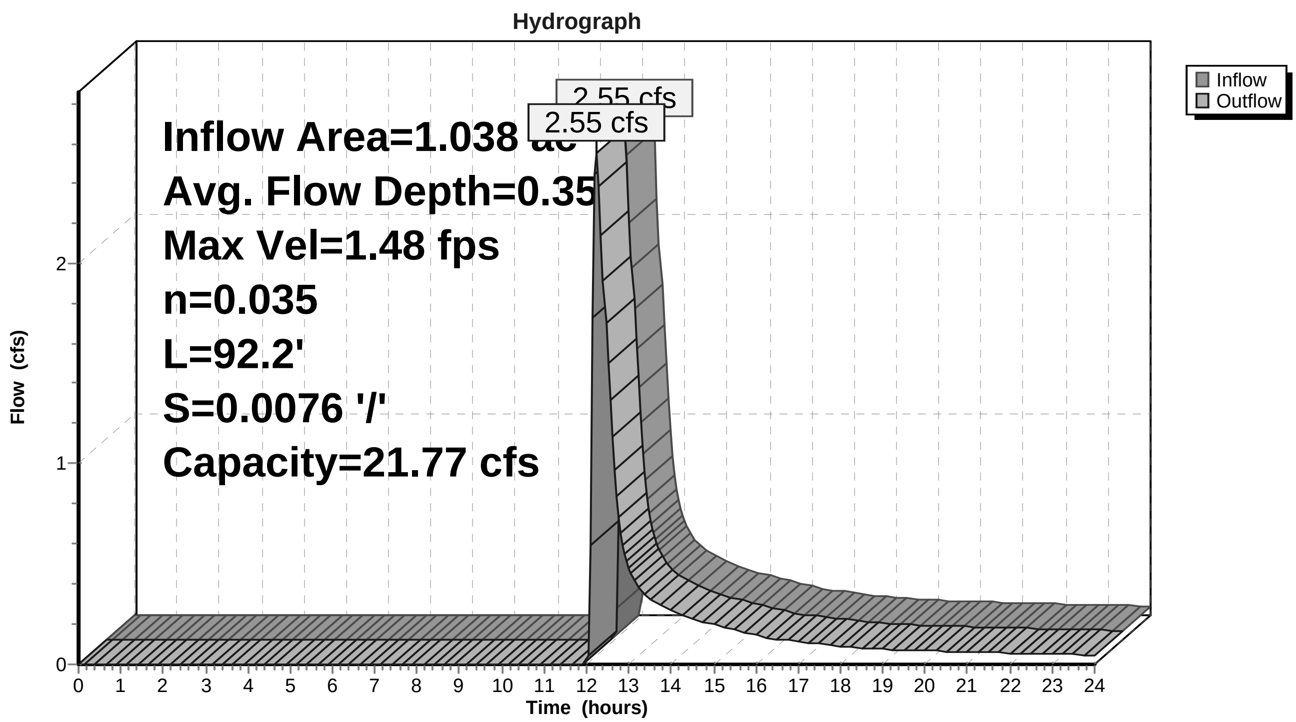
Reach 4bR: Reach #4b



Summary for Reach 4cR: Reach #4c

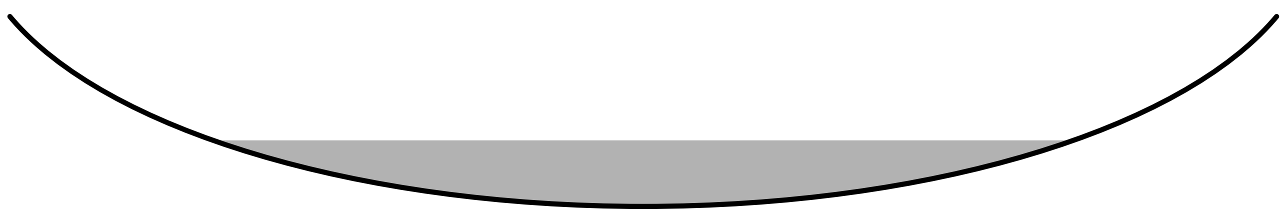
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[62] Hint: Exceeded Reach 4bR OUTLET depth by 0.02' @ 15.60 hrs

Inflow Area = 1.038 ac, 9.42% Impervious, Inflow Depth > 2.46" for 25Yr-24Hr event
Inflow = 2.55 cfs @ 12.24 hrs, Volume= 0.213 af
Outflow = 2.55 cfs @ 12.25 hrs, Volume= 0.213 af, Atten= 0%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.87 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.76 fps, Avg. Travel Time= 1.7 min

Peak Storage= 104 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.35'
Bank-Full Depth= 1.00' Flow Area= 6.7 sf, Capacity= 24.96 cfs

10.00' x 1.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 76.2' Slope= 0.0722 '/'
Inlet Invert= 579.50', Outlet Invert= 574.00'



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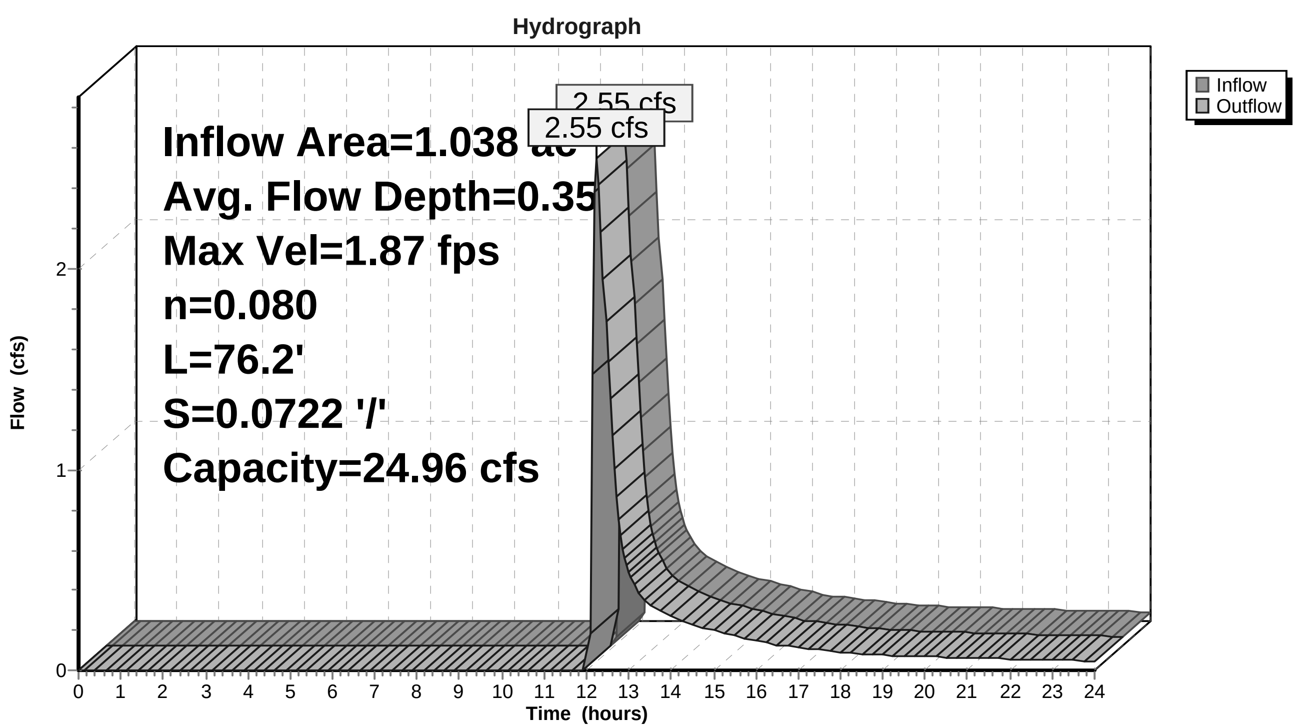
Reach 4cR: Reach #4c



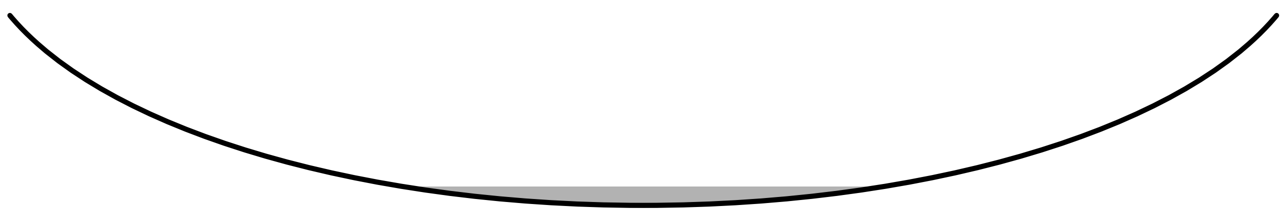
Summary for Reach 5R: Reach #5

Inflow Area = 0.142 ac, 23.04% Impervious, Inflow Depth > 1.95" for 25Yr-24Hr event
Inflow = 0.28 cfs @ 12.14 hrs, Volume= 0.023 af
Outflow = 0.27 cfs @ 12.17 hrs, Volume= 0.023 af, Atten= 2%, Lag= 1.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.66 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 0.27 fps, Avg. Travel Time= 5.0 min

Peak Storage= 33 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 1.00' Flow Area= 13.3 sf, Capacity= 41.65 cfs

20.00' x 1.00' deep Parabolic Channel, n= 0.035 Earth, dense weeds
Length= 80.0' Slope= 0.0094 '/'
Inlet Invert= 574.25', Outlet Invert= 573.50'



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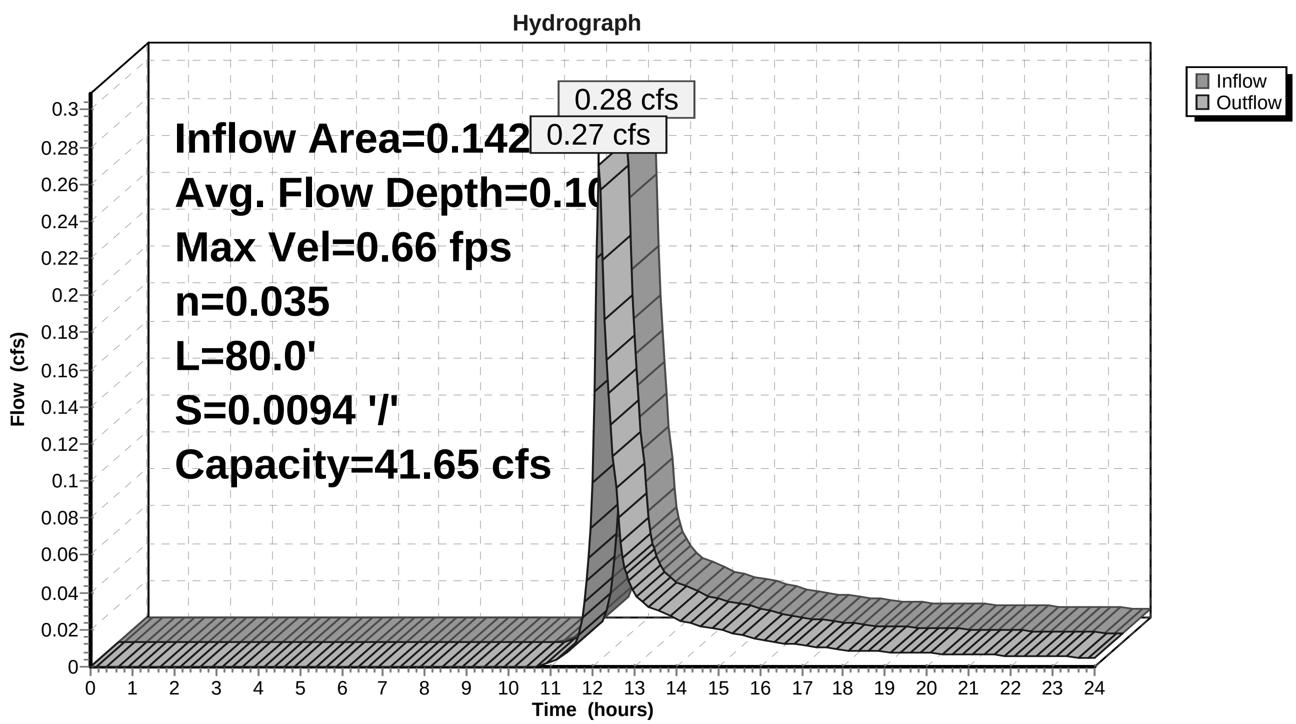
Reach 5R: Reach #5



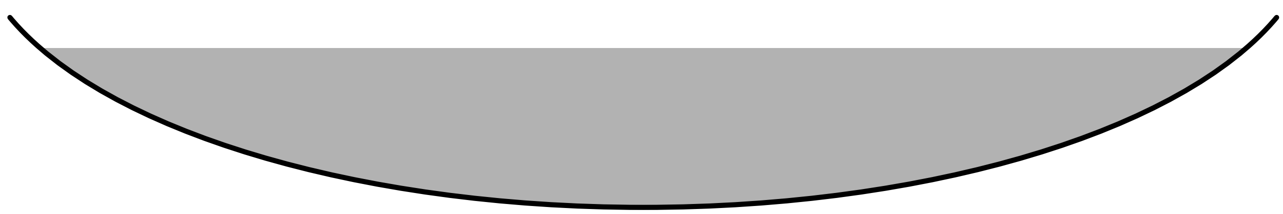
Summary for Reach 12aR: Overland Flow

Inflow Area = 2.794 ac, 15.38% Impervious, Inflow Depth > 2.67" for 25Yr-24Hr event
Inflow = 3.04 cfs @ 12.50 hrs, Volume= 0.621 af
Outflow = 3.04 cfs @ 12.65 hrs, Volume= 0.620 af, Atten= 0%, Lag= 9.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.79 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.39 fps, Avg. Travel Time= 3.2 min

Peak Storage= 287 cf @ 12.65 hrs
Average Depth at Peak Storage= 0.42'
Bank-Full Depth= 0.50' Flow Area= 5.0 sf, Capacity= 4.46 cfs

15.00' x 0.50' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 74.8' Slope= 0.0100 '/'
Inlet Invert= 567.75', Outlet Invert= 567.00'



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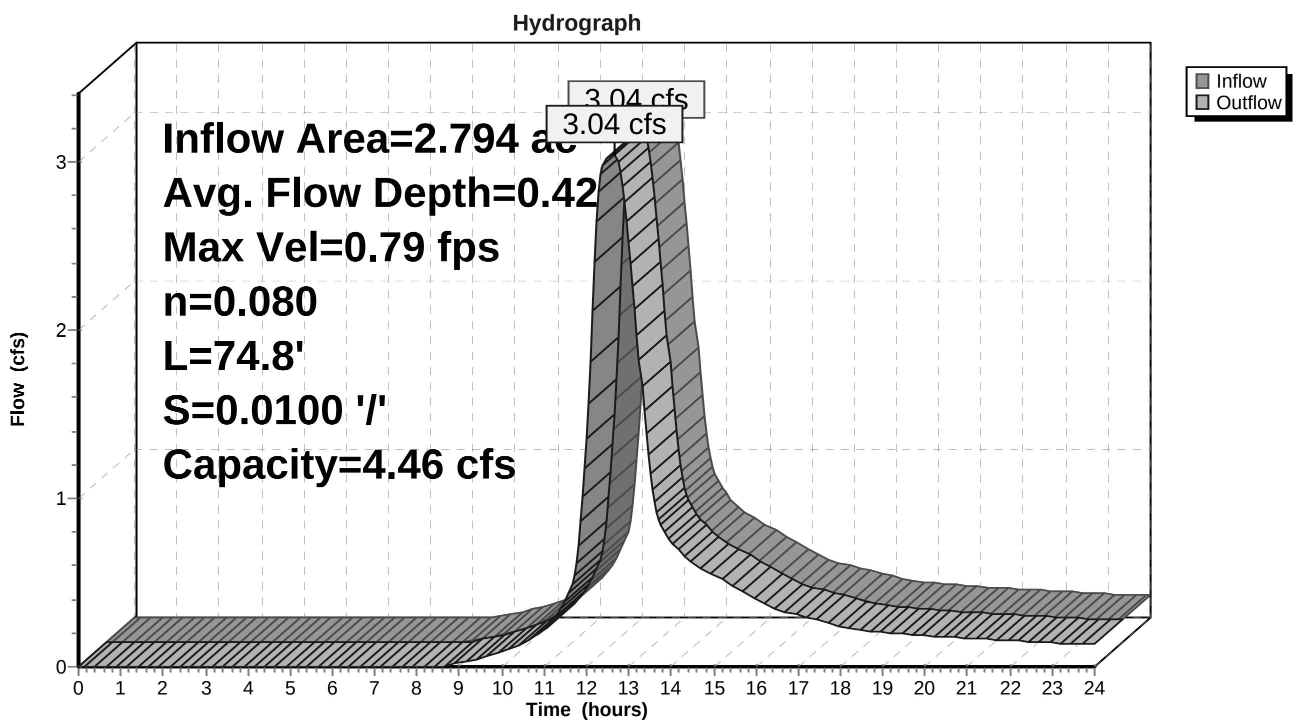
Reach 12aR: Overland Flow



Summary for Reach 12bR: Overland Flow

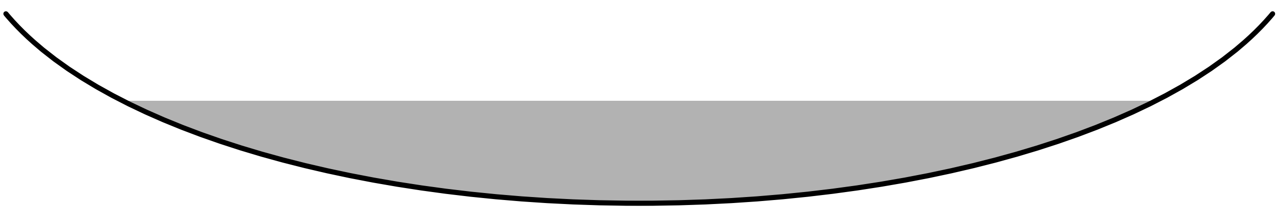
[61] Hint: Exceeded Reach 12aR outlet invert by 0.27' @ 12.55 hrs

Inflow Area = 2.794 ac, 15.38% Impervious, Inflow Depth > 2.66" for 25Yr-24Hr event
Inflow = 3.04 cfs @ 12.65 hrs, Volume= 0.620 af
Outflow = 3.04 cfs @ 12.55 hrs, Volume= 0.619 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.53 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.75 fps, Avg. Travel Time= 2.6 min

Peak Storage= 229 cf @ 12.55 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 0.50' Flow Area= 5.0 sf, Capacity= 11.55 cfs

15.00' x 0.50' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 115.3' Slope= 0.0672 '/'
Inlet Invert= 567.00', Outlet Invert= 559.25'



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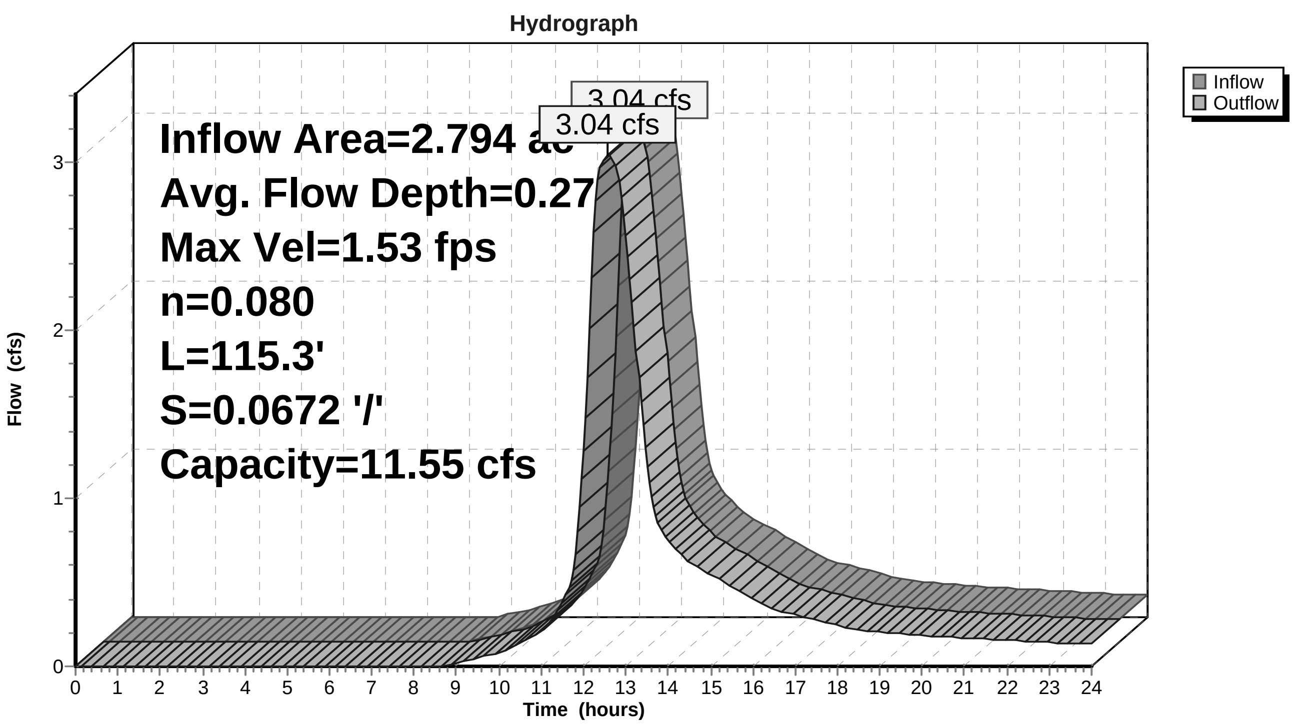
Reach 12bR: Overland Flow



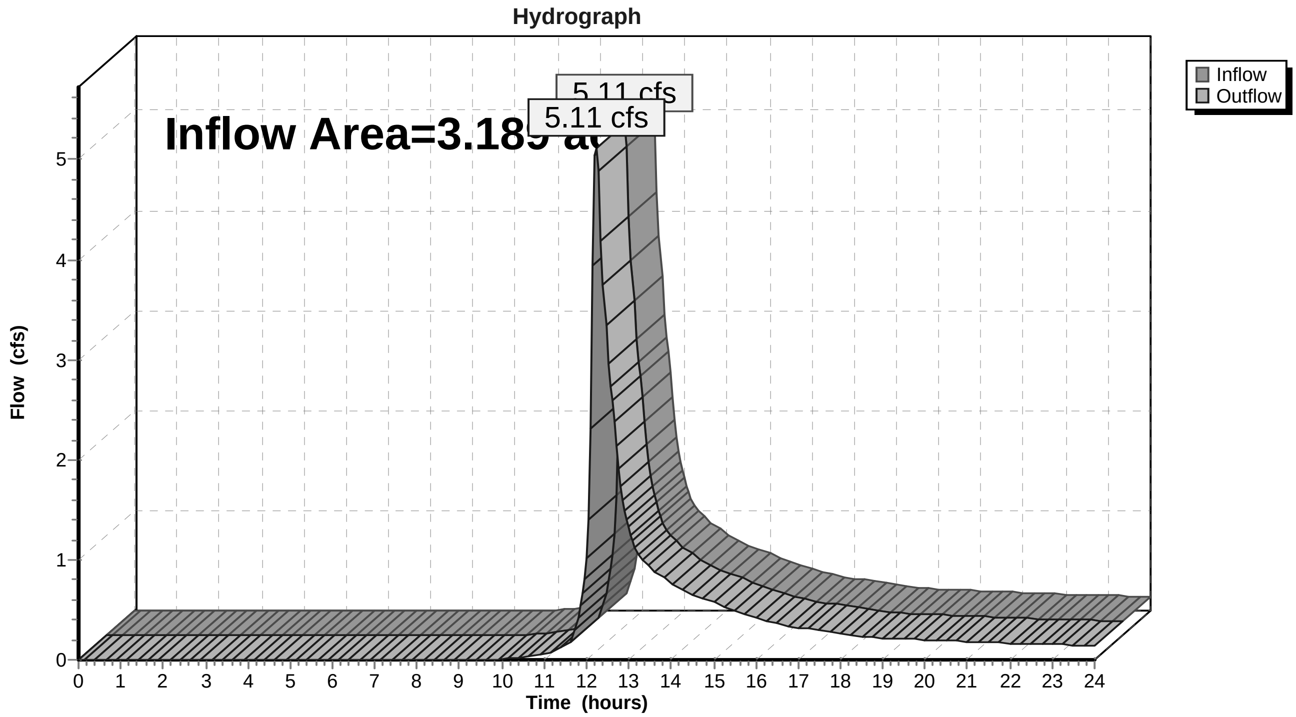
Summary for Reach 100R: Final Reach #100

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

Inflow Area = 3.189 ac, 12.55% Impervious, Inflow Depth > 2.16" for 25Yr-24Hr event
Inflow = 5.11 cfs @ 12.23 hrs, Volume= 0.574 af
Outflow = 5.11 cfs @ 12.23 hrs, Volume= 0.574 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 100R: Final Reach #100



Summary for Reach 102aR: Reach #102a

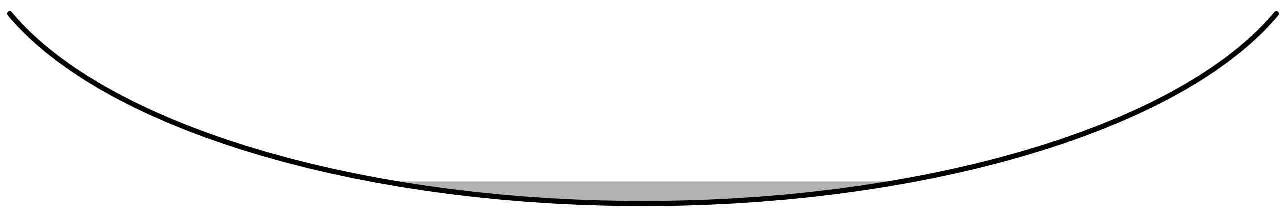
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)

Inflow Area = 0.925 ac, 20.00% Impervious, Inflow Depth > 1.83" for 25Yr-24Hr event
Inflow = 0.99 cfs @ 12.49 hrs, Volume= 0.141 af
Outflow = 0.99 cfs @ 12.48 hrs, Volume= 0.141 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.88 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.94 fps, Avg. Travel Time= 0.4 min

Peak Storage= 11 cf @ 12.48 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 1.00' Flow Area= 13.3 sf, Capacity= 104.94 cfs

20.00' x 1.00' deep Parabolic Channel, n= 0.035 Earth, dense weeds
Length= 21.0' Slope= 0.0595 '/'
Inlet Invert= 571.00', Outlet Invert= 569.75'



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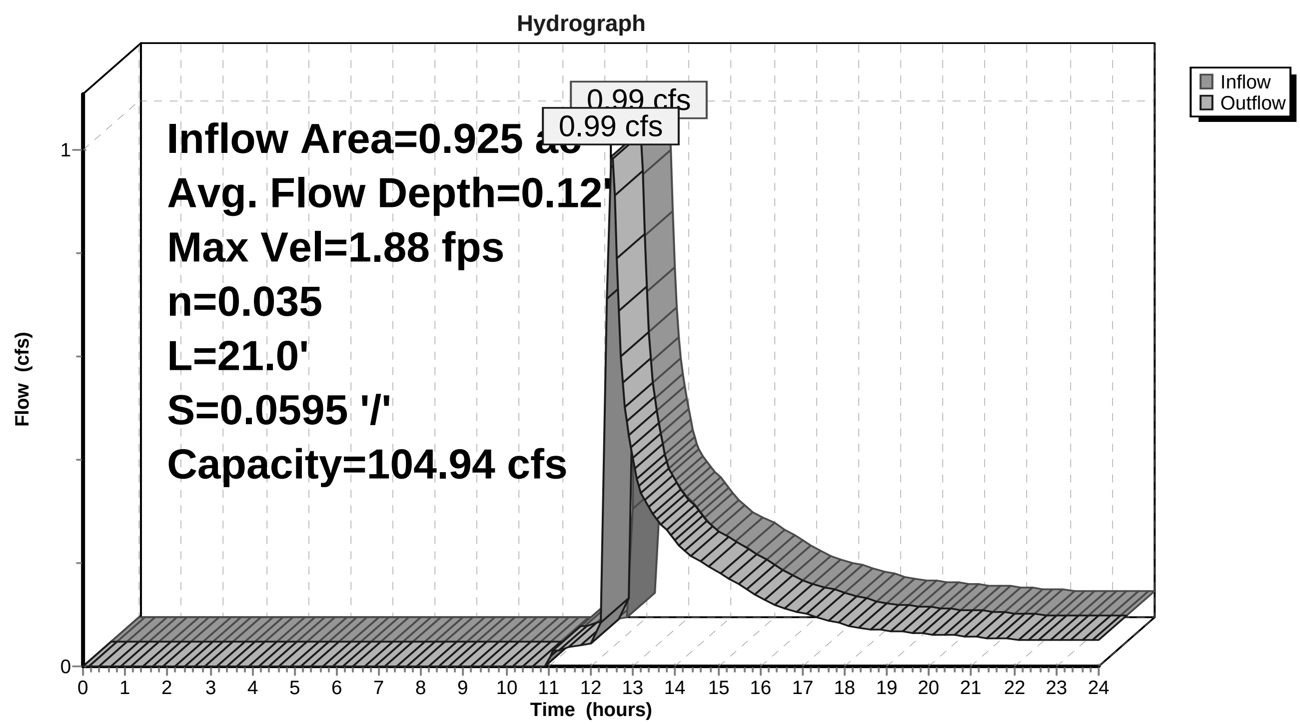
Reach 102aR: Reach #102a



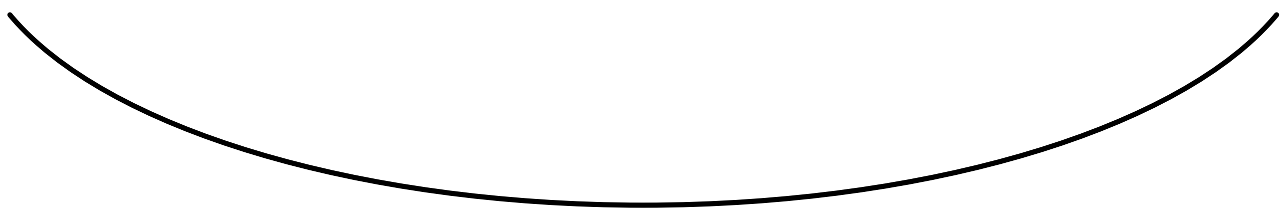
Summary for Reach 102bR: Overland Flow

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.50' Flow Area= 3.3 sf, Capacity= 17.89 cfs

10.00' x 0.50' deep Parabolic Channel, n= 0.035 Earth, dense weeds
Length= 64.5' Slope= 0.0698 '/'
Inlet Invert= 575.00', Outlet Invert= 570.50'



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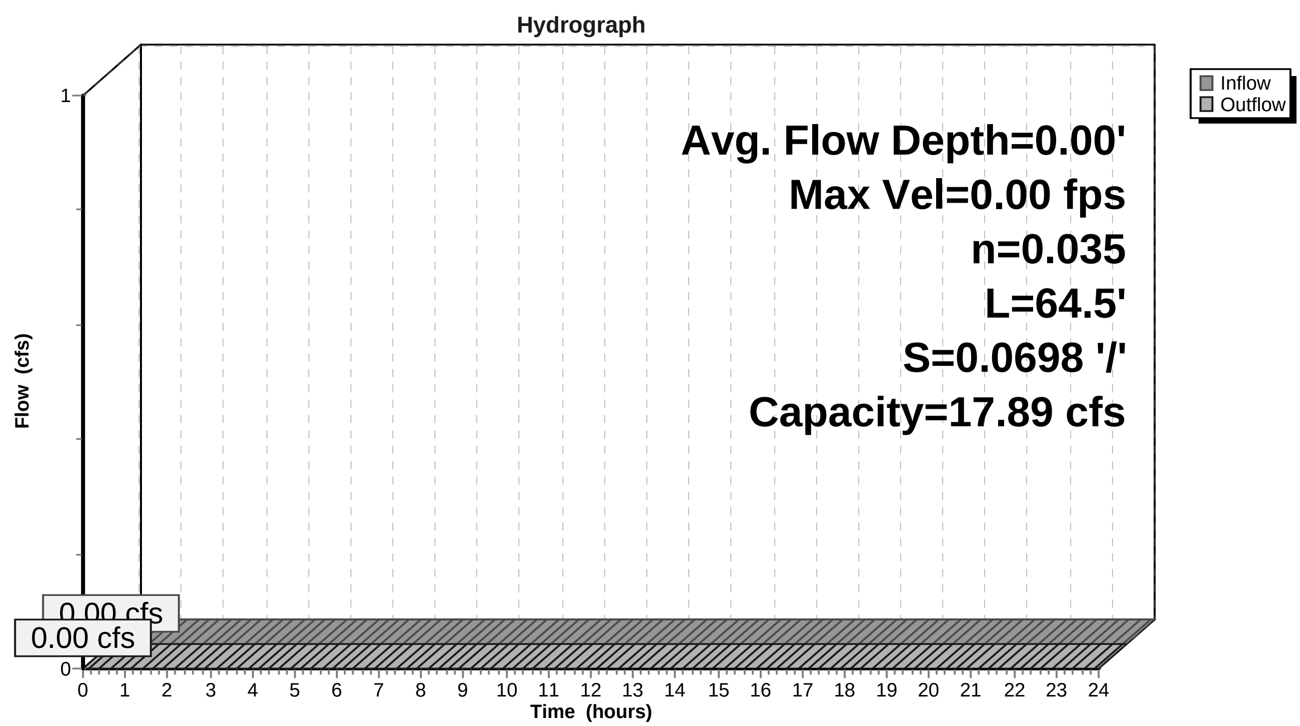
Reach 102bR: Overland Flow



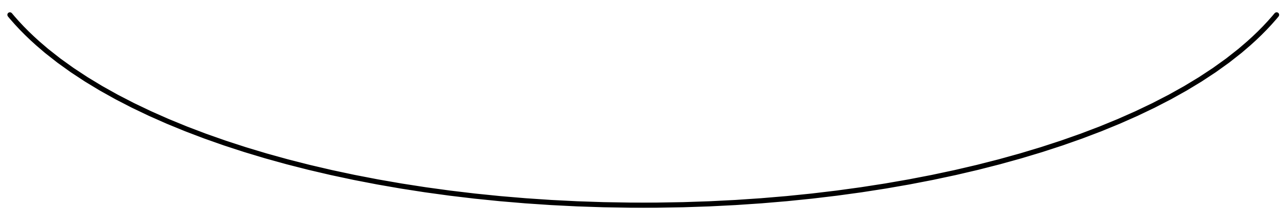
Summary for Reach 102cR: Overland Flow

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.50' Flow Area= 3.3 sf, Capacity= 4.99 cfs

10.00' x 0.50' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 26.5' Slope= 0.0283 '/'
Inlet Invert= 570.50', Outlet Invert= 569.75'



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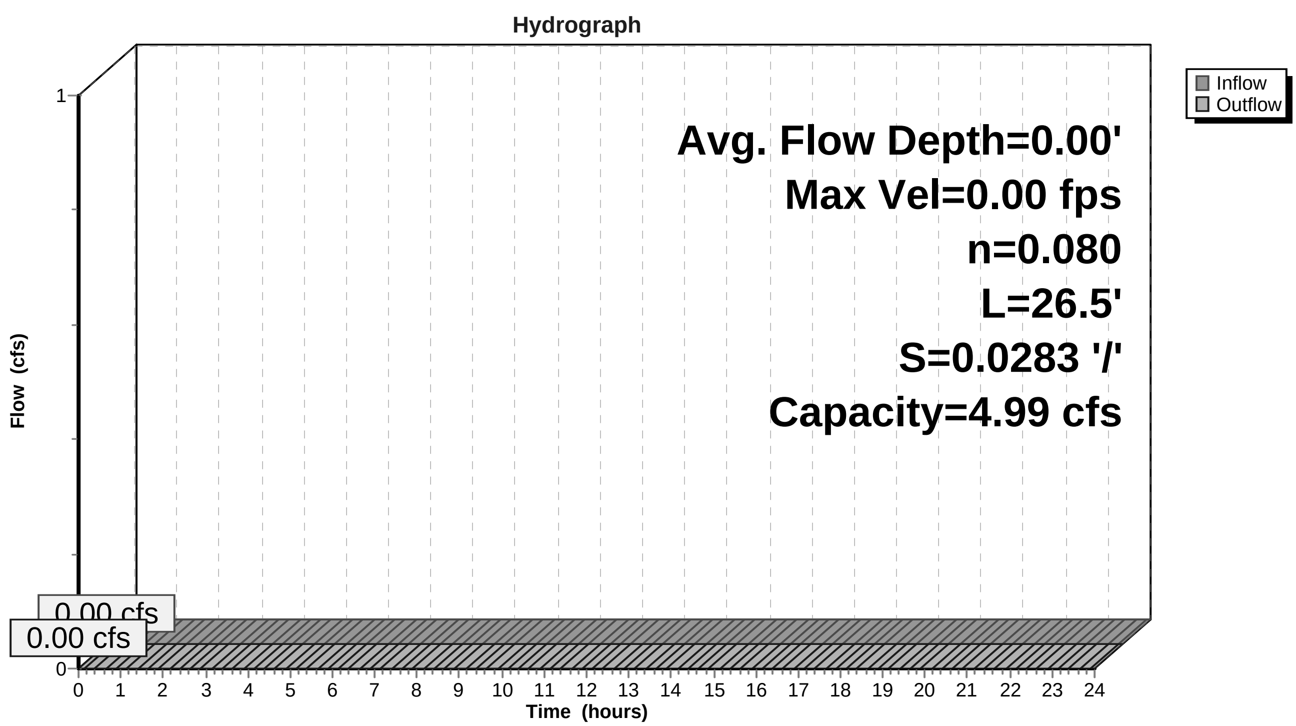
Reach 102cR: Overland Flow



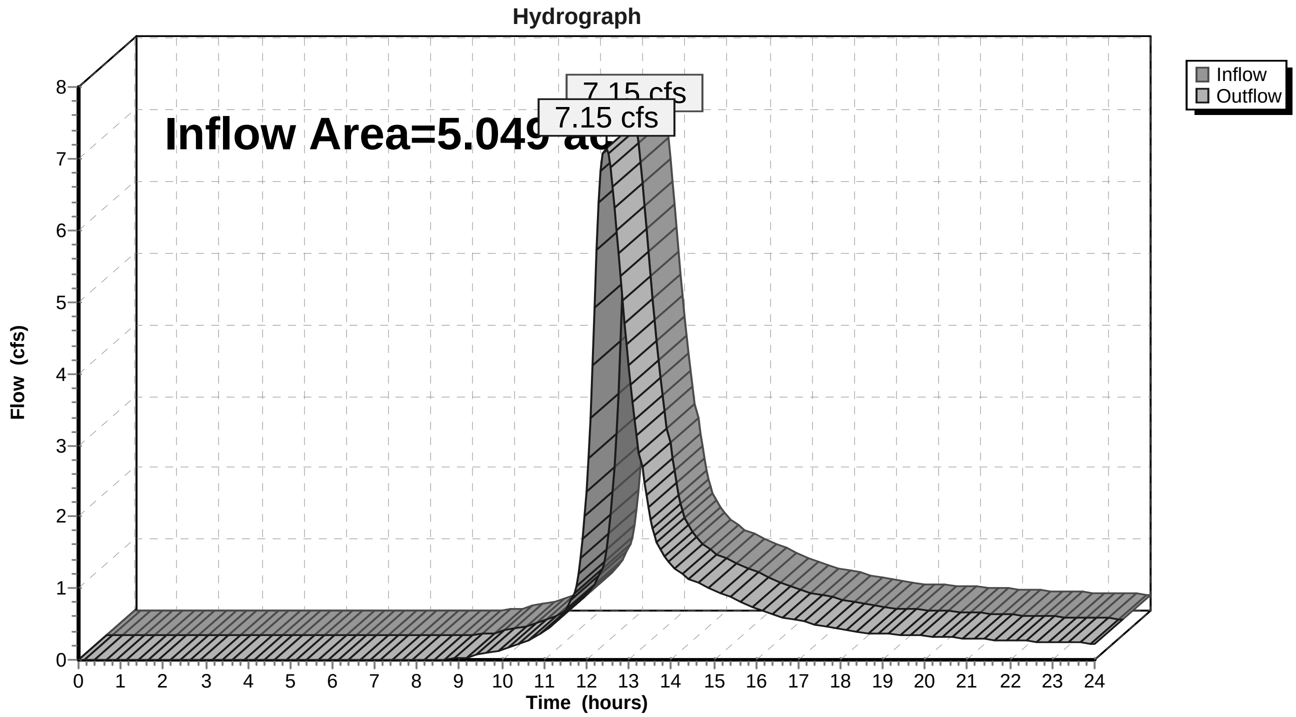
Summary for Reach 200R: Final Reach #200

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

Inflow Area =	5.049 ac,	8.88% Impervious,	Inflow Depth > 2.72"	for 25Yr-24Hr event	
Inflow =	7.15 cfs @	12.45 hrs,	Volume=	1.145 af	
Outflow =	7.15 cfs @	12.45 hrs,	Volume=	1.145 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 200R: Final Reach #200



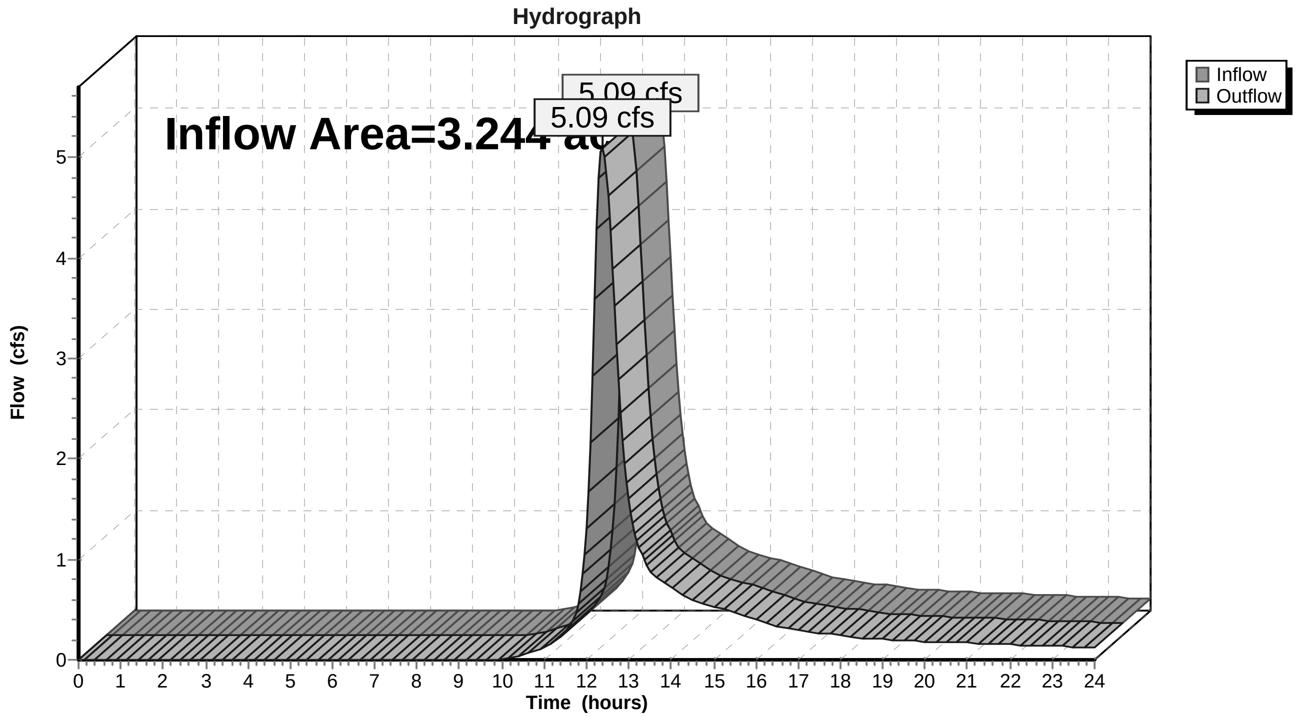
Summary for Reach 300R: Final Reach #300

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

Inflow Area = 3.244 ac, 2.80% Impervious, Inflow Depth > 2.27" for 25Yr-24Hr event
Inflow = 5.09 cfs @ 12.38 hrs, Volume= 0.614 af
Outflow = 5.09 cfs @ 12.38 hrs, Volume= 0.614 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 300R: Final Reach #300



Summary for Pond 4P: Wetland Ponding

Inflow Area =	1.038 ac,	9.42% Impervious, Inflow Depth > 3.09"	for 25Yr-24Hr event		
Inflow =	3.51 cfs @	12.11 hrs, Volume=	0.268 af		
Outflow =	2.58 cfs @	12.21 hrs, Volume=	0.214 af,	Atten= 26%,	Lag= 5.9 min
Primary =	2.58 cfs @	12.21 hrs, Volume=	0.214 af		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 583.90' @ 12.21 hrs Surf.Area= 8,285 sf Storage= 3,358 cf

Plug-Flow detention time= 120.6 min calculated for 0.213 af (80% of inflow)
Center-of-Mass det. time= 43.9 min (871.2 - 827.3)

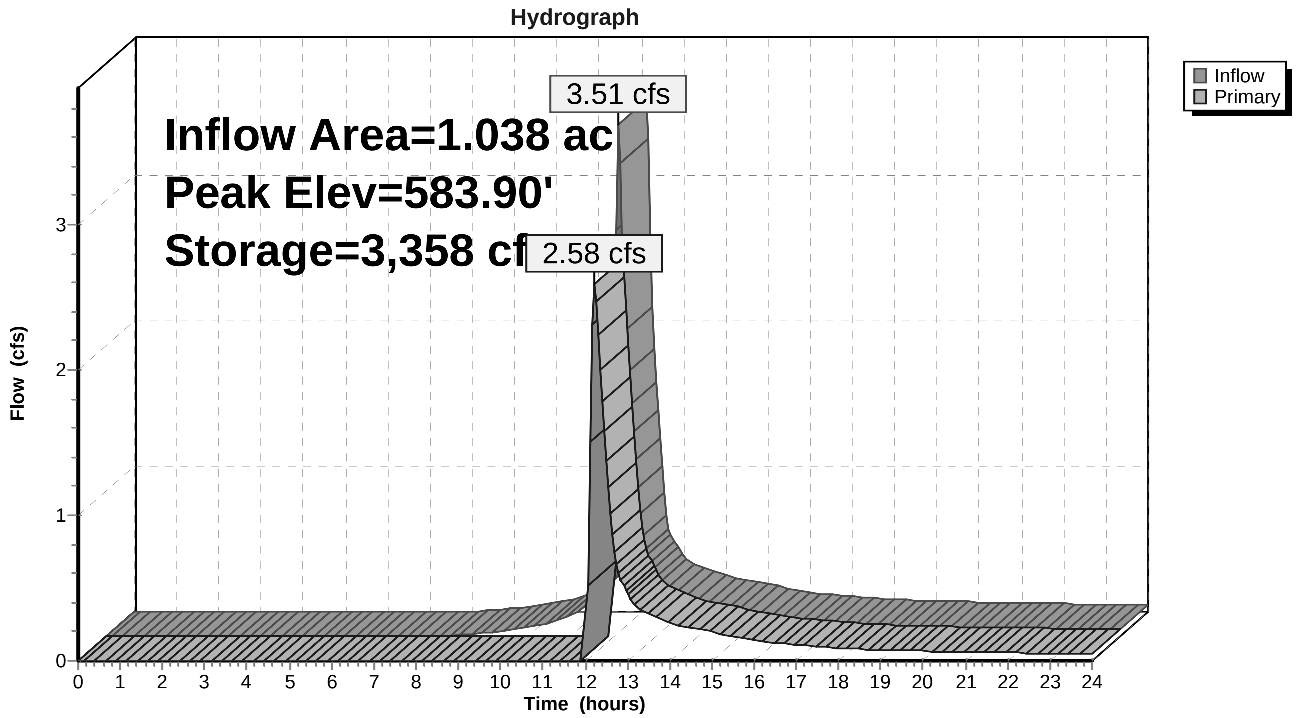
Volume	Invert	Avail.Storage	Storage Description
#1	583.00'	4,303 cf	**Wetland Ponding (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
583.00	650	131.2	0	0	650
584.00	9,743	550.6	4,303	4,303	23,407

Device	Routing	Invert	Outlet Devices
#1	Primary	583.75'	**20.0' long x 5.0' breadth Overflow** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.55 cfs @ 12.21 hrs HW=583.89' TW=582.73' (Dynamic Tailwater)
1=Overflow (Weir Controls 2.55 cfs @ 0.89 fps)

Pond 4P: Wetland Ponding



Summary for Pond 5P: Drop Inlet #1

Inflow Area =	0.142 ac, 23.04% Impervious, Inflow Depth > 1.95" for 25Yr-24Hr event			
Inflow =	0.28 cfs @	12.14 hrs, Volume=	0.023 af	
Outflow =	0.28 cfs @	12.14 hrs, Volume=	0.023 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.28 cfs @	12.14 hrs, Volume=	0.023 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 574.76' @ 12.14 hrs Surf.Area= 3 sf Storage= 1 cf
Flood Elev= 576.50' Surf.Area= 3 sf Storage= 6 cf

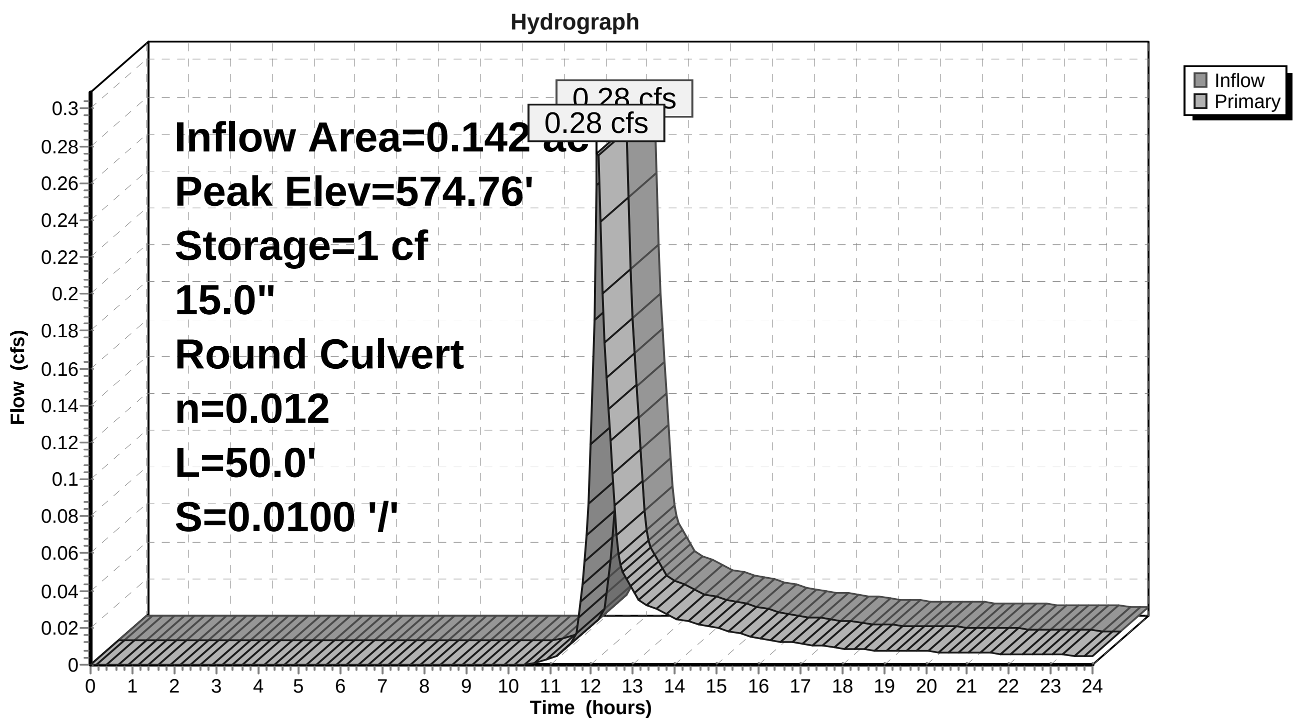
Plug-Flow detention time= 0.2 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (860.2 - 860.1)

Volume	Invert	Avail.Storage	Storage Description
#1	574.50'	6 cf	**2.00'D x 2.00'H 2' Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	574.50'	**15.0" Round 15" RCP** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 574.50' / 574.00' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.27 cfs @ 12.14 hrs HW=574.75' TW=574.35' (Dynamic Tailwater)
└─**1=15" RCP** (Outlet Controls 0.27 cfs @ 2.27 fps)

Pond 5P: Drop Inlet #1



Summary for Pond 11P: Inlet Sump #1

Inflow Area = 0.269 ac, 18.01% Impervious, Inflow Depth > 3.38" for 25Yr-24Hr event
Inflow = 1.05 cfs @ 12.09 hrs, Volume= 0.076 af
Outflow = 1.03 cfs @ 12.10 hrs, Volume= 0.075 af, Atten= 1%, Lag= 0.2 min
Primary = 1.03 cfs @ 12.10 hrs, Volume= 0.075 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 575.34' @ 12.52 hrs Surf.Area= 124 sf Storage= 57 cf
Flood Elev= 577.00' Surf.Area= 659 sf Storage= 628 cf

Plug-Flow detention time= 10.3 min calculated for 0.075 af (99% of inflow)
Center-of-Mass det. time= 2.0 min (820.5 - 818.5)

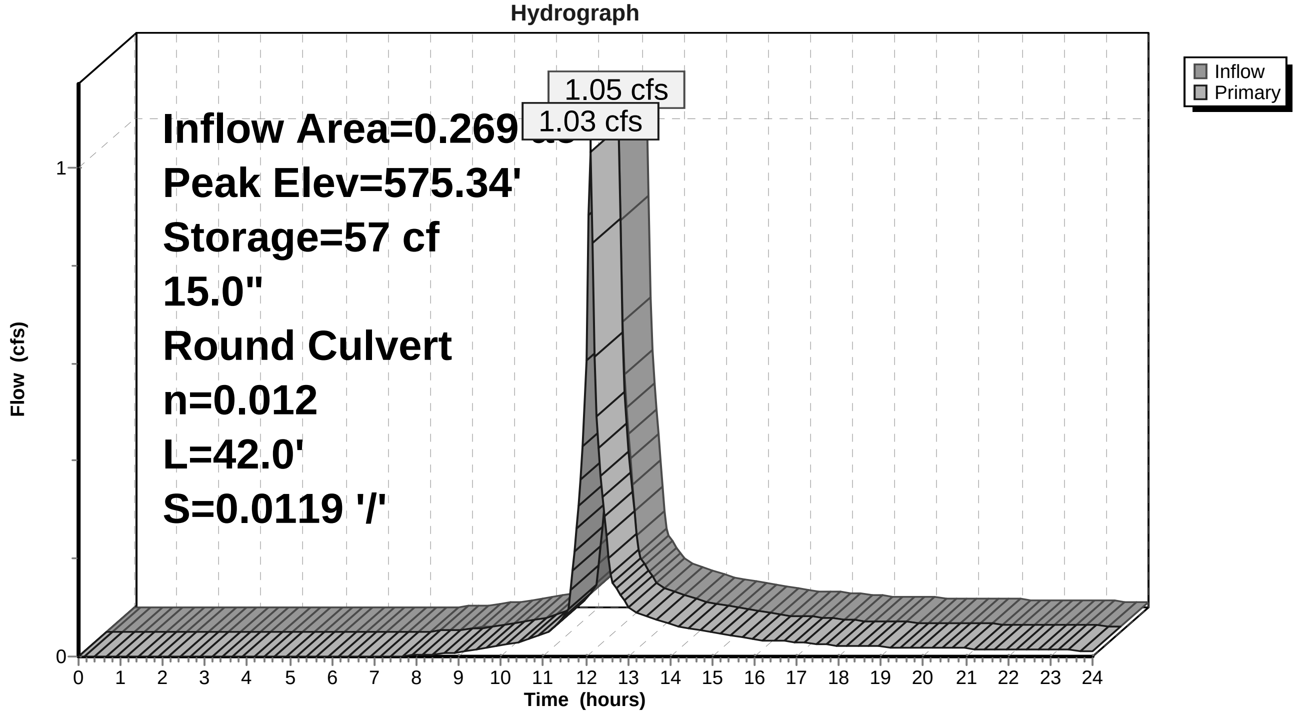
Volume	Invert	Avail.Storage	Storage Description
#1	574.50'	628 cf	**Open Water Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
574.50	27	20.0	0	0	27
575.00	73	32.4	24	24	80
576.00	263	73.5	158	182	431
577.00	659	139.2	446	628	1,548

Device	Routing	Invert	Outlet Devices
#1	Primary	574.50'	**15.0" Round 15" HDPE N-12** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 574.50' / 574.00' S= 0.0119 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.80 cfs @ 12.10 hrs HW=575.01' TW=574.74' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Outlet Controls 0.80 cfs @ 2.50 fps)

Pond 11P: Inlet Sump #1



Summary for Pond 12P: Inlet Sump #2

Inflow Area = 2.794 ac, 15.38% Impervious, Inflow Depth > 2.67" for 25Yr-24Hr event
Inflow = 5.16 cfs @ 12.21 hrs, Volume= 0.622 af
Outflow = 3.04 cfs @ 12.50 hrs, Volume= 0.621 af, Atten= 41%, Lag= 17.4 min
Primary = 3.04 cfs @ 12.50 hrs, Volume= 0.621 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 569.32' @ 12.56 hrs Surf.Area= 6,798 sf Storage= 3,447 cf
Flood Elev= 570.00' Surf.Area= 11,039 sf Storage= 9,446 cf

Plug-Flow detention time= 9.3 min calculated for 0.619 af (100% of inflow)
Center-of-Mass det. time= 8.1 min (862.8 - 854.7)

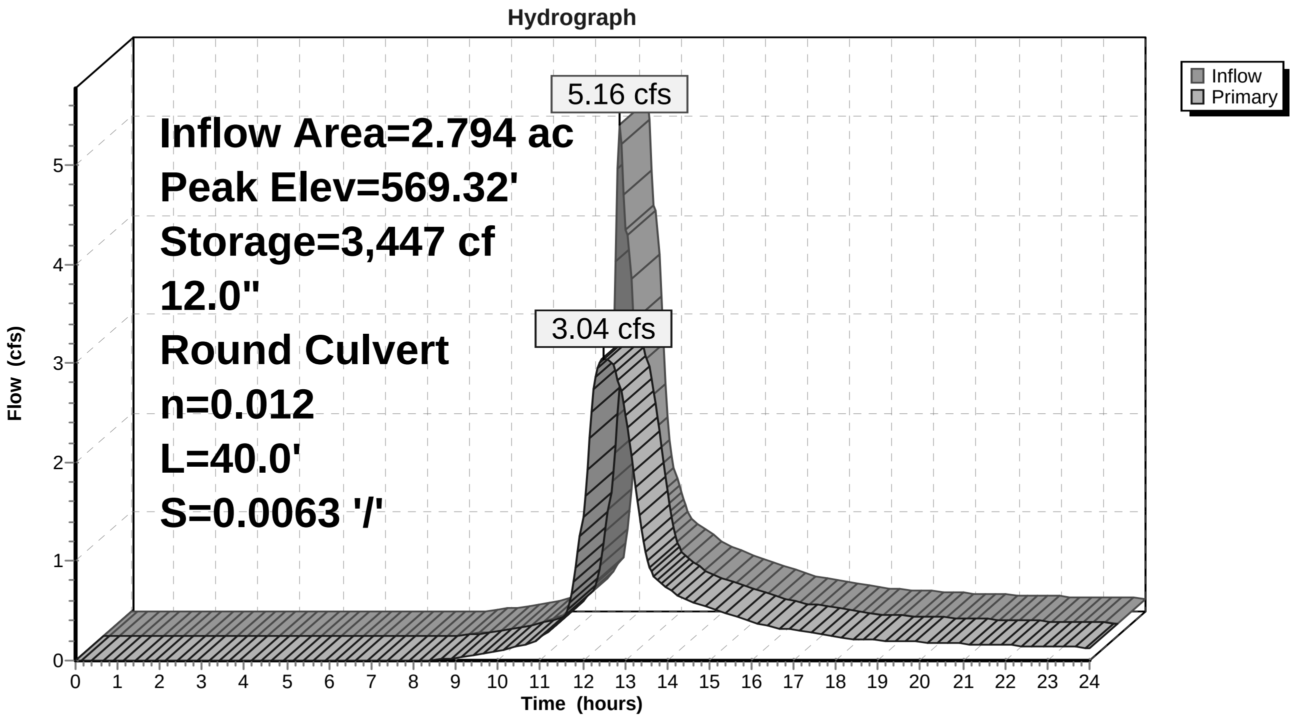
Volume	Invert	Avail.Storage	Storage Description
#1	568.00'	14,966 cf	**Open Water Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
568.00	187	66.7	0	0	187
568.50	761	171.3	221	221	2,169
569.00	5,151	406.4	1,315	1,536	12,978
570.00	11,039	554.2	7,910	9,446	24,286
570.50	11,039	554.2	5,520	14,966	24,563

Device	Routing	Invert	Outlet Devices
#1	Primary	568.00'	**12.0" Round 12" HDPE N-12** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 568.00' / 567.75' S= 0.0063 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=3.04 cfs @ 12.50 hrs HW=569.31' TW=568.17' (Dynamic Tailwater)
└─**1=12" HDPE N-12** (Barrel Controls 3.04 cfs @ 3.89 fps)

Pond 12P: Inlet Sump #2



Summary for Pond 101P: Rain Garden #101

Inflow Area = 0.831 ac, 21.67% Impervious, Inflow Depth > 3.38" for 25Yr-24Hr event
Inflow = 2.72 cfs @ 12.16 hrs, Volume= 0.234 af
Outflow = 0.55 cfs @ 12.70 hrs, Volume= 0.114 af, Atten= 80%, Lag= 32.1 min
Primary = 0.55 cfs @ 12.70 hrs, Volume= 0.114 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 577.45' @ 12.70 hrs Surf.Area= 2,525 sf Storage= 5,495 cf
Flood Elev= 578.00' Surf.Area= 2,525 sf Storage= 8,229 cf

Plug-Flow detention time= 243.4 min calculated for 0.114 af (49% of inflow)
Center-of-Mass det. time= 130.4 min (953.4 - 823.0)

Volume	Invert	Avail.Storage	Storage Description
#1	576.50'	1,167 cf	**Sediment Forebay (Irregular)**Listed below (Recalc) -Impervious
#2	574.00'	1,010 cf	**Stone (Irregular)** Listed below (Recalc) -Impervious 2,525 cf Overall x 40.0% Voids
#3	575.00'	758 cf	**BioMedia (Irregular)** Listed below (Recalc) 3,788 cf Overall x 20.0% Voids
#4	576.50'	2,775 cf	**Cell (Irregular)** Listed below (Recalc) -Impervious
#5	577.50'	2,520 cf	**Open Water Storage (Irregular)**Listed below (Recalc) -Impervious
		8,229 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
576.50	808	244.5	0	0	808
577.00	1,167	259.1	491	491	1,406
577.50	1,544	272.8	676	1,167	2,001

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
574.00	2,525	200.7	0	0	2,525
575.00	2,525	200.7	2,525	2,525	2,726

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
575.00	2,525	200.7	0	0	2,525
576.50	2,525	200.7	3,788	3,788	2,826

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
576.50	2,525	200.7	0	0	2,525
577.00	2,773	208.8	1,324	1,324	2,808
577.50	3,033	217.1	1,451	2,775	3,109

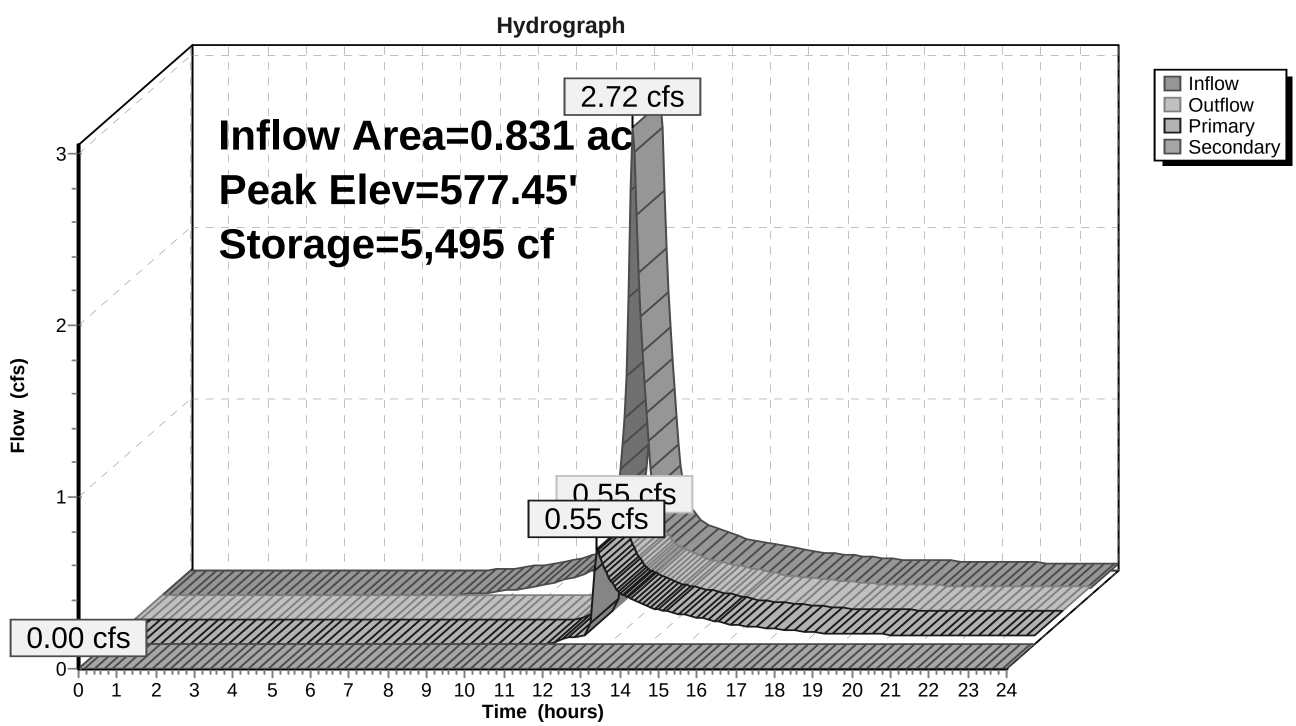
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
577.50	4,827	257.4	0	0	4,827
578.00	5,257	267.9	2,520	2,520	5,285

Device	Routing	Invert	Outlet Devices
#1	Primary	574.00'	**15.0" Round 15" HDPE N-12** L= 19.2' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 574.00' / 573.75' S= 0.0130 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	574.00'	**1.0" Vert. 1" Orifice** C= 0.600
#3	Device 2	575.00'	**10.000 in/hr 10in/HR Biomedia over Surface area**
#4	Device 1	577.40'	**48.0" Horiz. 4' Structure** C= 0.600 Limited to weir flow at low heads
#5	Secondary	577.50'	**10.0' long x 9.0' breadth E Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.46 2.55 2.70 2.69 2.68 2.68 2.67 2.64 2.64 2.64 2.65 2.64 2.65 2.65 2.66 2.67 2.69

Primary OutFlow Max=0.55 cfs @ 12.70 hrs HW=577.45' TW=0.00' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Passes 0.55 cfs of 9.94 cfs potential flow)
  ├─**2=1" Orifice** (Orifice Controls 0.05 cfs @ 8.89 fps)
  │ └─**3=10in/HR Biomedia** (Passes 0.05 cfs of 0.58 cfs potential flow)
  └─**4=4' Structure** (Weir Controls 0.50 cfs @ 0.75 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=574.00' TW=0.00' (Dynamic Tailwater)
└─**5=E Spillway** (Controls 0.00 cfs)

Pond 101P: Rain Garden #101



Summary for Pond 102P: Rain Garden #102

[80] Warning: Exceeded Pond 11P by 0.04' @ 12.30 hrs (0.54 cfs 0.009 af)

Inflow Area = 0.925 ac, 20.00% Impervious, Inflow Depth > 3.37" for 25Yr-24Hr event
Inflow = 3.44 cfs @ 12.11 hrs, Volume= 0.260 af
Outflow = 0.99 cfs @ 12.49 hrs, Volume= 0.141 af, Atten= 71%, Lag= 22.8 min
Primary = 0.99 cfs @ 12.49 hrs, Volume= 0.141 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 575.33' @ 12.49 hrs Surf.Area= 1,698 sf Storage= 5,550 cf
Flood Elev= 576.00' Surf.Area= 1,698 sf Storage= 8,678 cf

Plug-Flow detention time= 217.9 min calculated for 0.141 af (54% of inflow)
Center-of-Mass det. time= 108.0 min (928.0 - 820.0)

Volume	Invert	Avail.Storage	Storage Description
#1	574.00'	925 cf	**Forebay (Irregular)** Listed below (Recalc) -Impervious
#2	571.50'	679 cf	**Stone (Irregular)** Listed below (Recalc) -Impervious 1,698 cf Overall x 40.0% Voids
#3	572.50'	509 cf	**BioMedia (Irregular)** Listed below (Recalc) 2,547 cf Overall x 20.0% Voids
#4	574.00'	2,085 cf	**Cell (Irregular)** Listed below (Recalc) -Impervious
#5	575.00'	4,480 cf	**Open Water Storage (Irregular)** Listed below (Recalc) -Impervious
		8,678 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
574.00	718	157.2	0	0	718
575.00	1,149	176.1	925	925	1,246

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
571.50	1,698	208.0	0	0	1,698
572.50	1,698	208.0	1,698	1,698	1,906

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
572.50	1,698	208.0	0	0	1,698
574.00	1,698	208.0	2,547	2,547	2,010

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
574.00	1,698	208.0	0	0	1,698
575.00	2,498	307.4	2,085	2,085	5,783

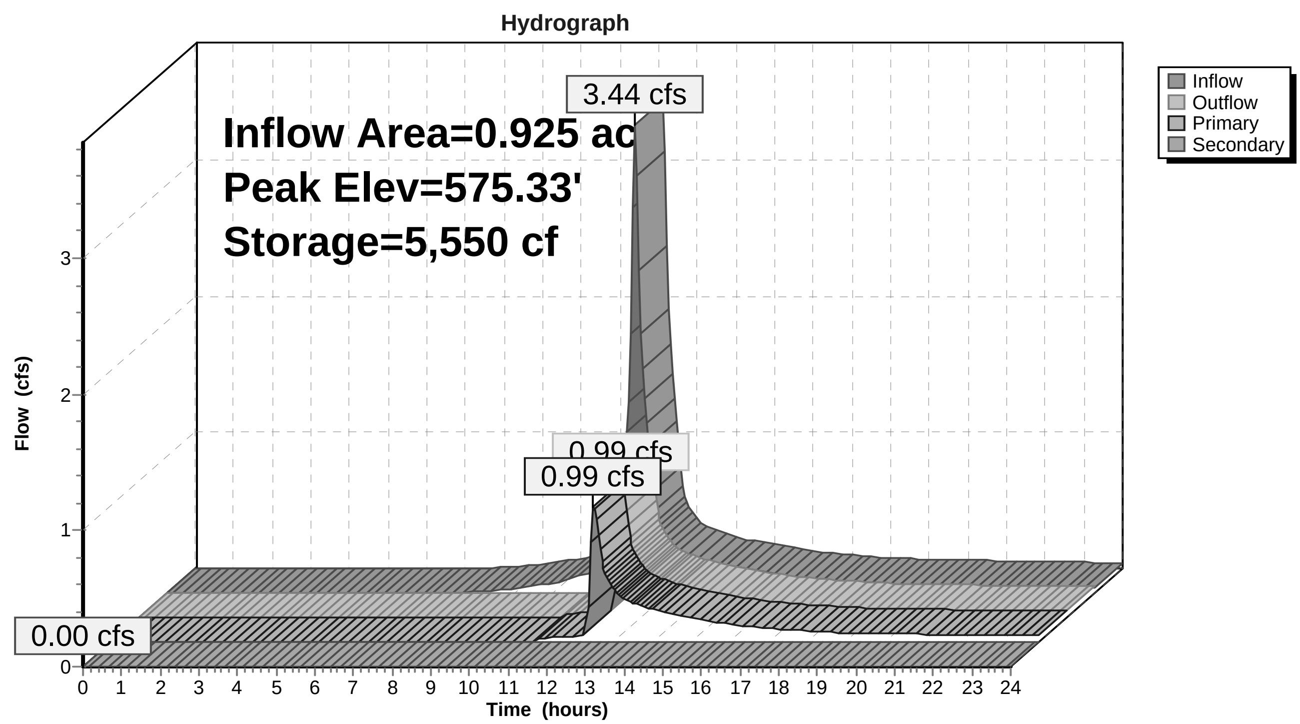
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
575.00	3,902	326.8	0	0	3,902
576.00	5,083	365.7	4,480	4,480	6,073

Device	Routing	Invert	Outlet Devices
#1	Primary	571.50'	**15.0" Round 15" HDPE N-12** L= 77.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 571.50' / 571.00' S= 0.0065 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	571.50'	**1.0" Vert. 1" Orifice** C= 0.600
#3	Device 2	572.50'	**10.000 in/hr 10"/HR Bio Media over Surface area**
#4	Device 1	575.25'	**48.0" Horiz. 4' Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	575.50'	**10.0' long x 9.0' breadth E Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.46 2.55 2.70 2.69 2.68 2.68 2.67 2.64 2.64 2.64 2.65 2.64 2.65 2.65 2.66 2.67 2.69

Primary OutFlow Max=0.98 cfs @ 12.49 hrs HW=575.33' TW=571.12' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Passes 0.98 cfs of 9.91 cfs potential flow)
  ├─**2=1" Orifice** (Orifice Controls 0.05 cfs @ 9.37 fps)
  │ └─**3=10"/HR Bio Media** (Passes 0.05 cfs of 0.39 cfs potential flow)
  └─**4=4' Grate** (Weir Controls 0.93 cfs @ 0.92 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=571.50' TW=575.00' (Dynamic Tailwater)
└─**5=E Spillway** (Controls 0.00 cfs)

Pond 102P: Rain Garden #102



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=51,278 sf 7.62% Impervious Runoff Depth>0.58"
Flow Length=385' Tc=14.4 min CN=67 Runoff=0.48 cfs 0.057 af

Subcatchment 2S: Subcatchment #2 Runoff Area=98,229 sf 0.81% Impervious Runoff Depth>0.84"
Flow Length=462' Tc=30.7 min CN=73 Runoff=1.15 cfs 0.159 af

Subcatchment 3S: Subcatchment #3 Runoff Area=141,322 sf 2.80% Impervious Runoff Depth>0.58"
Flow Length=530' Tc=26.1 min UI Adjusted CN=67 Runoff=1.06 cfs 0.155 af

Subcatchment 4S: Subcatchment #4 Runoff Area=45,221 sf 9.42% Impervious Runoff Depth>1.01"
Flow Length=93' Slope=0.0349 '/' Tc=7.7 min CN=76 Runoff=1.09 cfs 0.087 af

Subcatchment 5S: Subcatchment #5 Runoff Area=6,203 sf 23.04% Impervious Runoff Depth>0.43"
Flow Length=124' Tc=9.0 min CN=63 Runoff=0.04 cfs 0.005 af

Subcatchment 11S: Subcatchment #11 Runoff Area=11,729 sf 18.01% Impervious Runoff Depth>1.18"
Tc=6.0 min CN=79 Runoff=0.36 cfs 0.026 af

Subcatchment 12S: Subcatchment #12 Runoff Area=81,393 sf 13.10% Impervious Runoff Depth>1.00"
Flow Length=406' Tc=15.0 min CN=76 Runoff=1.58 cfs 0.156 af

Subcatchment 101S: Subcatchment #101 Runoff Area=36,192 sf 21.67% Impervious Runoff Depth>1.18"
Flow Length=269' Tc=11.6 min CN=79 Runoff=0.93 cfs 0.082 af

Subcatchment 102S: Subcatchment #102 Runoff Area=28,572 sf 20.82% Impervious Runoff Depth>1.18"
Flow Length=156' Tc=7.7 min CN=79 Runoff=0.83 cfs 0.064 af

Reach 4aR: Reach #4a Avg. Flow Depth=0.06' Max Vel=0.41 fps Inflow=0.08 cfs 0.034 af
n=0.080 L=100.8' S=0.0209 '/' Capacity=14.55 cfs Outflow=0.08 cfs 0.033 af

Reach 4bR: Reach #4b Avg. Flow Depth=0.05' Max Vel=0.49 fps Inflow=0.08 cfs 0.033 af
n=0.035 L=92.2' S=0.0076 '/' Capacity=21.77 cfs Outflow=0.08 cfs 0.033 af

Reach 4cR: Reach #4c Avg. Flow Depth=0.07' Max Vel=0.66 fps Inflow=0.08 cfs 0.033 af
n=0.080 L=76.2' S=0.0722 '/' Capacity=24.96 cfs Outflow=0.08 cfs 0.033 af

Reach 5R: Reach #5 Avg. Flow Depth=0.04' Max Vel=0.36 fps Inflow=0.04 cfs 0.005 af
n=0.035 L=80.0' S=0.0094 '/' Capacity=41.65 cfs Outflow=0.04 cfs 0.005 af

Reach 12aR: Overland Flow Avg. Flow Depth=0.29' Max Vel=0.62 fps Inflow=1.35 cfs 0.199 af
n=0.080 L=74.8' S=0.0100 '/' Capacity=4.46 cfs Outflow=1.35 cfs 0.199 af

Reach 12bR: Overland Flow Avg. Flow Depth=0.19' Max Vel=1.19 fps Inflow=1.35 cfs 0.199 af
n=0.080 L=115.3' S=0.0672 '/' Capacity=11.55 cfs Outflow=1.35 cfs 0.199 af

Reach 100R: Final Reach #100 Inflow=0.54 cfs 0.136 af
Outflow=0.54 cfs 0.136 af

Reach 102aR: Reach #102a Avg. Flow Depth=0.03' Max Vel=0.74 fps Inflow=0.05 cfs 0.044 af
n=0.035 L=21.0' S=0.0595 '/' Capacity=104.94 cfs Outflow=0.05 cfs 0.044 af

Reach 102bR: Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=64.5' S=0.0698 '/' Capacity=17.89 cfs Outflow=0.00 cfs 0.000 af

Reach 102cR: Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=26.5' S=0.0283 '/' Capacity=4.99 cfs Outflow=0.00 cfs 0.000 af

Reach 200R: Final Reach #200 Inflow=2.47 cfs 0.357 af
Outflow=2.47 cfs 0.357 af

Reach 300R: Final Reach #300 Inflow=1.06 cfs 0.155 af
Outflow=1.06 cfs 0.155 af

Pond 4P: Wetland Ponding Peak Elev=583.76' Storage=2,389 cf Inflow=1.09 cfs 0.087 af
Outflow=0.08 cfs 0.034 af

Pond 5P: Drop Inlet #1 Peak Elev=574.60' Storage=0 cf Inflow=0.04 cfs 0.005 af
15.0" Round Culvert n=0.012 L=50.0' S=0.0100 '/' Outflow=0.04 cfs 0.005 af

Pond 11P: Inlet Sump #1 Peak Elev=574.78' Storage=10 cf Inflow=0.36 cfs 0.026 af
15.0" Round Culvert n=0.012 L=42.0' S=0.0119 '/' Outflow=0.36 cfs 0.026 af

Pond 12P: Inlet Sump #2 Peak Elev=568.69' Storage=479 cf Inflow=1.62 cfs 0.200 af
12.0" Round Culvert n=0.012 L=40.0' S=0.0063 '/' Outflow=1.35 cfs 0.199 af

Pond 101P: Rain Garden #101 Peak Elev=576.64' Storage=2,249 cf Inflow=0.93 cfs 0.082 af
Primary=0.04 cfs 0.041 af Secondary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.041 af

Pond 102P: Rain Garden #102 Peak Elev=574.49' Storage=2,515 cf Inflow=1.18 cfs 0.091 af
Primary=0.05 cfs 0.044 af Secondary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.044 af

Total Runoff Area = 11.482 ac Runoff Volume = 0.792 af Average Runoff Depth = 0.83"
91.82% Pervious = 10.542 ac 8.18% Impervious = 0.939 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=51,278 sf 7.62% Impervious Runoff Depth>1.46"
Flow Length=385' Tc=14.4 min CN=67 Runoff=1.46 cfs 0.143 af

Subcatchment 2S: Subcatchment #2 Runoff Area=98,229 sf 0.81% Impervious Runoff Depth>1.88"
Flow Length=462' Tc=30.7 min CN=73 Runoff=2.75 cfs 0.354 af

Subcatchment 3S: Subcatchment #3 Runoff Area=141,322 sf 2.80% Impervious Runoff Depth>1.45"
Flow Length=530' Tc=26.1 min UI Adjusted CN=67 Runoff=3.16 cfs 0.393 af

Subcatchment 4S: Subcatchment #4 Runoff Area=45,221 sf 9.42% Impervious Runoff Depth>2.13"
Flow Length=93' Slope=0.0349 '/' Tc=7.7 min CN=76 Runoff=2.40 cfs 0.184 af

Subcatchment 5S: Subcatchment #5 Runoff Area=6,203 sf 23.04% Impervious Runoff Depth>1.20"
Flow Length=124' Tc=9.0 min CN=63 Runoff=0.16 cfs 0.014 af

Subcatchment 11S: Subcatchment #11 Runoff Area=11,729 sf 18.01% Impervious Runoff Depth>2.37"
Tc=6.0 min CN=79 Runoff=0.74 cfs 0.053 af

Subcatchment 12S: Subcatchment #12 Runoff Area=81,393 sf 13.10% Impervious Runoff Depth>2.12"
Flow Length=406' Tc=15.0 min CN=76 Runoff=3.49 cfs 0.331 af

Subcatchment 101S: Subcatchment #101 Runoff Area=36,192 sf 21.67% Impervious Runoff Depth>2.37"
Flow Length=269' Tc=11.6 min CN=79 Runoff=1.91 cfs 0.164 af

Subcatchment 102S: Subcatchment #102 Runoff Area=28,572 sf 20.82% Impervious Runoff Depth>2.37"
Flow Length=156' Tc=7.7 min CN=79 Runoff=1.70 cfs 0.130 af

Reach 4aR: Reach #4a Avg. Flow Depth=0.28' Max Vel=0.96 fps Inflow=1.15 cfs 0.130 af
n=0.080 L=100.8' S=0.0209 '/' Capacity=14.55 cfs Outflow=1.15 cfs 0.130 af

Reach 4bR: Reach #4b Avg. Flow Depth=0.23' Max Vel=1.17 fps Inflow=1.15 cfs 0.130 af
n=0.035 L=92.2' S=0.0076 '/' Capacity=21.77 cfs Outflow=1.15 cfs 0.130 af

Reach 4cR: Reach #4c Avg. Flow Depth=0.24' Max Vel=1.46 fps Inflow=1.15 cfs 0.130 af
n=0.080 L=76.2' S=0.0722 '/' Capacity=24.96 cfs Outflow=1.14 cfs 0.130 af

Reach 5R: Reach #5 Avg. Flow Depth=0.08' Max Vel=0.56 fps Inflow=0.16 cfs 0.014 af
n=0.035 L=80.0' S=0.0094 '/' Capacity=41.65 cfs Outflow=0.15 cfs 0.014 af

Reach 12aR: Overland Flow Avg. Flow Depth=0.38' Max Vel=0.74 fps Inflow=2.40 cfs 0.396 af
n=0.080 L=74.8' S=0.0100 '/' Capacity=4.46 cfs Outflow=2.40 cfs 0.395 af

Reach 12bR: Overland Flow Avg. Flow Depth=0.24' Max Vel=1.42 fps Inflow=2.40 cfs 0.395 af
n=0.080 L=115.3' S=0.0672 '/' Capacity=11.55 cfs Outflow=2.39 cfs 0.395 af

Reach 100R: Final Reach #100 Inflow=2.44 cfs 0.335 af
Outflow=2.44 cfs 0.335 af

Reach 102aR: Reach #102a Avg. Flow Depth=0.05' Max Vel=1.04 fps Inflow=0.14 cfs 0.067 af
n=0.035 L=21.0' S=0.0595 '/' Capacity=104.94 cfs Outflow=0.14 cfs 0.067 af

Reach 102bR: Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=64.5' S=0.0698 '/' Capacity=17.89 cfs Outflow=0.00 cfs 0.000 af

Reach 102cR: Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=26.5' S=0.0283 '/' Capacity=4.99 cfs Outflow=0.00 cfs 0.000 af

Reach 200R: Final Reach #200 Inflow=5.15 cfs 0.749 af
Outflow=5.15 cfs 0.749 af

Reach 300R: Final Reach #300 Inflow=3.16 cfs 0.393 af
Outflow=3.16 cfs 0.393 af

Pond 4P: Wetland Ponding Peak Elev=583.83' Storage=2,882 cf Inflow=2.40 cfs 0.184 af
Outflow=1.15 cfs 0.130 af

Pond 5P: Drop Inlet #1 Peak Elev=574.70' Storage=1 cf Inflow=0.16 cfs 0.014 af
15.0" Round Culvert n=0.012 L=50.0' S=0.0100 '/' Outflow=0.16 cfs 0.014 af

Pond 11P: Inlet Sump #1 Peak Elev=575.27' Storage=49 cf Inflow=0.74 cfs 0.053 af
15.0" Round Culvert n=0.012 L=42.0' S=0.0119 '/' Outflow=0.74 cfs 0.052 af

Pond 12P: Inlet Sump #2 Peak Elev=569.02' Storage=1,622 cf Inflow=3.54 cfs 0.397 af
12.0" Round Culvert n=0.012 L=40.0' S=0.0063 '/' Outflow=2.40 cfs 0.396 af

Pond 101P: Rain Garden #101 Peak Elev=577.40' Storage=5,277 cf Inflow=1.91 cfs 0.164 af
Primary=0.06 cfs 0.048 af Secondary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.048 af

Pond 102P: Rain Garden #102 Peak Elev=575.27' Storage=5,280 cf Inflow=2.43 cfs 0.182 af
Primary=0.14 cfs 0.067 af Secondary=0.00 cfs 0.000 af Outflow=0.14 cfs 0.067 af

Total Runoff Area = 11.482 ac Runoff Volume = 1.766 af Average Runoff Depth = 1.85"
91.82% Pervious = 10.542 ac 8.18% Impervious = 0.939 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=51,278 sf 7.62% Impervious Runoff Depth>2.28"
Flow Length=385' Tc=14.4 min CN=67 Runoff=2.36 cfs 0.223 af

Subcatchment 2S: Subcatchment #2 Runoff Area=98,229 sf 0.81% Impervious Runoff Depth>2.80"
Flow Length=462' Tc=30.7 min CN=73 Runoff=4.14 cfs 0.526 af

Subcatchment 3S: Subcatchment #3 Runoff Area=141,322 sf 2.80% Impervious Runoff Depth>2.27"
Flow Length=530' Tc=26.1 min UI Adjusted CN=67 Runoff=5.09 cfs 0.614 af

Subcatchment 4S: Subcatchment #4 Runoff Area=45,221 sf 9.42% Impervious Runoff Depth>3.09"
Flow Length=93' Slope=0.0349 '/' Tc=7.7 min CN=76 Runoff=3.51 cfs 0.268 af

Subcatchment 5S: Subcatchment #5 Runoff Area=6,203 sf 23.04% Impervious Runoff Depth>1.95"
Flow Length=124' Tc=9.0 min CN=63 Runoff=0.28 cfs 0.023 af

Subcatchment 11S: Subcatchment #11 Runoff Area=11,729 sf 18.01% Impervious Runoff Depth>3.38"
Tc=6.0 min CN=79 Runoff=1.05 cfs 0.076 af

Subcatchment 12S: Subcatchment #12 Runoff Area=81,393 sf 13.10% Impervious Runoff Depth>3.09"
Flow Length=406' Tc=15.0 min CN=76 Runoff=5.11 cfs 0.481 af

Subcatchment 101S: Subcatchment #101 Runoff Area=36,192 sf 21.67% Impervious Runoff Depth>3.38"
Flow Length=269' Tc=11.6 min CN=79 Runoff=2.72 cfs 0.234 af

Subcatchment 102S: Subcatchment #102 Runoff Area=28,572 sf 20.82% Impervious Runoff Depth>3.38"
Flow Length=156' Tc=7.7 min CN=79 Runoff=2.42 cfs 0.185 af

Reach 4aR: Reach #4a Avg. Flow Depth=0.43' Max Vel=1.21 fps Inflow=2.58 cfs 0.214 af
n=0.080 L=100.8' S=0.0209 '/' Capacity=14.55 cfs Outflow=2.55 cfs 0.213 af

Reach 4bR: Reach #4b Avg. Flow Depth=0.35' Max Vel=1.48 fps Inflow=2.55 cfs 0.213 af
n=0.035 L=92.2' S=0.0076 '/' Capacity=21.77 cfs Outflow=2.55 cfs 0.213 af

Reach 4cR: Reach #4c Avg. Flow Depth=0.35' Max Vel=1.87 fps Inflow=2.55 cfs 0.213 af
n=0.080 L=76.2' S=0.0722 '/' Capacity=24.96 cfs Outflow=2.55 cfs 0.213 af

Reach 5R: Reach #5 Avg. Flow Depth=0.10' Max Vel=0.66 fps Inflow=0.28 cfs 0.023 af
n=0.035 L=80.0' S=0.0094 '/' Capacity=41.65 cfs Outflow=0.27 cfs 0.023 af

Reach 12aR: Overland Flow Avg. Flow Depth=0.42' Max Vel=0.79 fps Inflow=3.04 cfs 0.621 af
n=0.080 L=74.8' S=0.0100 '/' Capacity=4.46 cfs Outflow=3.04 cfs 0.620 af

Reach 12bR: Overland Flow Avg. Flow Depth=0.27' Max Vel=1.53 fps Inflow=3.04 cfs 0.620 af
n=0.080 L=115.3' S=0.0672 '/' Capacity=11.55 cfs Outflow=3.04 cfs 0.619 af

Reach 100R: Final Reach #100 Inflow=5.11 cfs 0.574 af
Outflow=5.11 cfs 0.574 af

Reach 102aR: Reach #102a Avg. Flow Depth=0.12' Max Vel=1.88 fps Inflow=0.99 cfs 0.141 af
n=0.035 L=21.0' S=0.0595 '/' Capacity=104.94 cfs Outflow=0.99 cfs 0.141 af

Reach 102bR: Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=64.5' S=0.0698 '/' Capacity=17.89 cfs Outflow=0.00 cfs 0.000 af

Reach 102cR: Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=26.5' S=0.0283 '/' Capacity=4.99 cfs Outflow=0.00 cfs 0.000 af

Reach 200R: Final Reach #200 Inflow=7.15 cfs 1.145 af
Outflow=7.15 cfs 1.145 af

Reach 300R: Final Reach #300 Inflow=5.09 cfs 0.614 af
Outflow=5.09 cfs 0.614 af

Pond 4P: Wetland Ponding Peak Elev=583.90' Storage=3,358 cf Inflow=3.51 cfs 0.268 af
Outflow=2.58 cfs 0.214 af

Pond 5P: Drop Inlet #1 Peak Elev=574.76' Storage=1 cf Inflow=0.28 cfs 0.023 af
15.0" Round Culvert n=0.012 L=50.0' S=0.0100 '/' Outflow=0.28 cfs 0.023 af

Pond 11P: Inlet Sump #1 Peak Elev=575.34' Storage=57 cf Inflow=1.05 cfs 0.076 af
15.0" Round Culvert n=0.012 L=42.0' S=0.0119 '/' Outflow=1.03 cfs 0.075 af

Pond 12P: Inlet Sump #2 Peak Elev=569.32' Storage=3,447 cf Inflow=5.16 cfs 0.622 af
12.0" Round Culvert n=0.012 L=40.0' S=0.0063 '/' Outflow=3.04 cfs 0.621 af

Pond 101P: Rain Garden #101 Peak Elev=577.45' Storage=5,495 cf Inflow=2.72 cfs 0.234 af
Primary=0.55 cfs 0.114 af Secondary=0.00 cfs 0.000 af Outflow=0.55 cfs 0.114 af

Pond 102P: Rain Garden #102 Peak Elev=575.33' Storage=5,550 cf Inflow=3.44 cfs 0.260 af
Primary=0.99 cfs 0.141 af Secondary=0.00 cfs 0.000 af Outflow=0.99 cfs 0.141 af

Total Runoff Area = 11.482 ac Runoff Volume = 2.629 af Average Runoff Depth = 2.75"
91.82% Pervious = 10.542 ac 8.18% Impervious = 0.939 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=51,278 sf 7.62% Impervious Runoff Depth>3.12"
Flow Length=385' Tc=14.4 min CN=67 Runoff=3.27 cfs 0.306 af

Subcatchment 2S: Subcatchment #2 Runoff Area=98,229 sf 0.81% Impervious Runoff Depth>3.71"
Flow Length=462' Tc=30.7 min CN=73 Runoff=5.52 cfs 0.698 af

Subcatchment 3S: Subcatchment #3 Runoff Area=141,322 sf 2.80% Impervious Runoff Depth>3.11"
Flow Length=530' Tc=26.1 min UI Adjusted CN=67 Runoff=7.07 cfs 0.840 af

Subcatchment 4S: Subcatchment #4 Runoff Area=45,221 sf 9.42% Impervious Runoff Depth>4.05"
Flow Length=93' Slope=0.0349 '/' Tc=7.7 min CN=76 Runoff=4.59 cfs 0.350 af

Subcatchment 5S: Subcatchment #5 Runoff Area=6,203 sf 23.04% Impervious Runoff Depth>2.73"
Flow Length=124' Tc=9.0 min CN=63 Runoff=0.40 cfs 0.032 af

Subcatchment 11S: Subcatchment #11 Runoff Area=11,729 sf 18.01% Impervious Runoff Depth>4.37"
Tc=6.0 min CN=79 Runoff=1.34 cfs 0.098 af

Subcatchment 12S: Subcatchment #12 Runoff Area=81,393 sf 13.10% Impervious Runoff Depth>4.04"
Flow Length=406' Tc=15.0 min CN=76 Runoff=6.69 cfs 0.629 af

Subcatchment 101S: Subcatchment #101 Runoff Area=36,192 sf 21.67% Impervious Runoff Depth>4.37"
Flow Length=269' Tc=11.6 min CN=79 Runoff=3.51 cfs 0.302 af

Subcatchment 102S: Subcatchment #102 Runoff Area=28,572 sf 20.82% Impervious Runoff Depth>4.37"
Flow Length=156' Tc=7.7 min CN=79 Runoff=3.12 cfs 0.239 af

Reach 4aR: Reach #4a Avg. Flow Depth=0.52' Max Vel=1.35 fps Inflow=3.73 cfs 0.296 af
n=0.080 L=100.8' S=0.0209 '/' Capacity=14.55 cfs Outflow=3.73 cfs 0.296 af

Reach 4bR: Reach #4b Avg. Flow Depth=0.43' Max Vel=1.65 fps Inflow=3.73 cfs 0.296 af
n=0.035 L=92.2' S=0.0076 '/' Capacity=21.77 cfs Outflow=3.73 cfs 0.295 af

Reach 4cR: Reach #4c Avg. Flow Depth=0.41' Max Vel=2.09 fps Inflow=3.73 cfs 0.295 af
n=0.080 L=76.2' S=0.0722 '/' Capacity=24.96 cfs Outflow=3.73 cfs 0.295 af

Reach 5R: Reach #5 Avg. Flow Depth=0.12' Max Vel=0.74 fps Inflow=0.40 cfs 0.032 af
n=0.035 L=80.0' S=0.0094 '/' Capacity=41.65 cfs Outflow=0.39 cfs 0.032 af

Reach 12aR: Overland Flow Avg. Flow Depth=0.47' Max Vel=0.86 fps Inflow=3.91 cfs 0.844 af
n=0.080 L=74.8' S=0.0100 '/' Capacity=4.46 cfs Outflow=3.91 cfs 0.843 af

Reach 12bR: Overland Flow Avg. Flow Depth=0.30' Max Vel=1.66 fps Inflow=3.91 cfs 0.843 af
n=0.080 L=115.3' S=0.0672 '/' Capacity=11.55 cfs Outflow=3.91 cfs 0.843 af

Reach 100R: Final Reach #100 Inflow=7.39 cfs 0.815 af
Outflow=7.39 cfs 0.815 af

Reach 102aR: Reach #102a Avg. Flow Depth=0.18' Max Vel=2.49 fps Inflow=2.44 cfs 0.216 af
n=0.035 L=21.0' S=0.0595 '/' Capacity=104.94 cfs Outflow=2.50 cfs 0.216 af

Reach 102bR: Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=64.5' S=0.0698 '/' Capacity=17.89 cfs Outflow=0.00 cfs 0.000 af

Reach 102cR: Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=26.5' S=0.0283 '/' Capacity=4.99 cfs Outflow=0.00 cfs 0.000 af

Reach 200R: Final Reach #200 Inflow=9.29 cfs 1.541 af
Outflow=9.29 cfs 1.541 af

Reach 300R: Final Reach #300 Inflow=7.07 cfs 0.840 af
Outflow=7.07 cfs 0.840 af

Pond 4P: Wetland Ponding Peak Elev=583.94' Storage=3,702 cf Inflow=4.59 cfs 0.350 af
Outflow=3.73 cfs 0.296 af

Pond 5P: Drop Inlet #1 Peak Elev=574.81' Storage=1 cf Inflow=0.40 cfs 0.032 af
15.0" Round Culvert n=0.012 L=50.0' S=0.0100 '/' Outflow=0.40 cfs 0.032 af

Pond 11P: Inlet Sump #1 Peak Elev=575.42' Storage=68 cf Inflow=1.34 cfs 0.098 af
15.0" Round Culvert n=0.012 L=42.0' S=0.0119 '/' Outflow=1.31 cfs 0.097 af

Pond 12P: Inlet Sump #2 Peak Elev=569.74' Storage=6,798 cf Inflow=8.88 cfs 0.846 af
12.0" Round Culvert n=0.012 L=40.0' S=0.0063 '/' Outflow=3.91 cfs 0.844 af

Pond 101P: Rain Garden #101 Peak Elev=577.52' Storage=5,805 cf Inflow=3.51 cfs 0.302 af
Primary=1.75 cfs 0.181 af Secondary=0.07 cfs 0.001 af Outflow=1.82 cfs 0.182 af

Pond 102P: Rain Garden #102 Peak Elev=575.40' Storage=5,850 cf Inflow=4.41 cfs 0.336 af
Primary=2.44 cfs 0.216 af Secondary=0.00 cfs 0.000 af Outflow=2.44 cfs 0.216 af

Total Runoff Area = 11.482 ac Runoff Volume = 3.495 af Average Runoff Depth = 3.65"
91.82% Pervious = 10.542 ac 8.18% Impervious = 0.939 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=51,278 sf 7.62% Impervious Runoff Depth>4.18"
Flow Length=385' Tc=14.4 min CN=67 Runoff=4.41 cfs 0.410 af

Subcatchment 2S: Subcatchment #2 Runoff Area=98,229 sf 0.81% Impervious Runoff Depth>4.85"
Flow Length=462' Tc=30.7 min CN=73 Runoff=7.21 cfs 0.912 af

Subcatchment 3S: Subcatchment #3 Runoff Area=141,322 sf 2.80% Impervious Runoff Depth>4.17"
Flow Length=530' Tc=26.1 min UI Adjusted CN=67 Runoff=9.55 cfs 1.126 af

Subcatchment 4S: Subcatchment #4 Runoff Area=45,221 sf 9.42% Impervious Runoff Depth>5.22"
Flow Length=93' Slope=0.0349 '/' Tc=7.7 min CN=76 Runoff=5.90 cfs 0.452 af

Subcatchment 5S: Subcatchment #5 Runoff Area=6,203 sf 23.04% Impervious Runoff Depth>3.73"
Flow Length=124' Tc=9.0 min CN=63 Runoff=0.55 cfs 0.044 af

Subcatchment 11S: Subcatchment #11 Runoff Area=11,729 sf 18.01% Impervious Runoff Depth>5.58"
Tc=6.0 min CN=79 Runoff=1.70 cfs 0.125 af

Subcatchment 12S: Subcatchment #12 Runoff Area=81,393 sf 13.10% Impervious Runoff Depth>5.22"
Flow Length=406' Tc=15.0 min CN=76 Runoff=8.60 cfs 0.812 af

Subcatchment 101S: Subcatchment #101 Runoff Area=36,192 sf 21.67% Impervious Runoff Depth>5.57"
Flow Length=269' Tc=11.6 min CN=79 Runoff=4.44 cfs 0.386 af

Subcatchment 102S: Subcatchment #102 Runoff Area=28,572 sf 20.82% Impervious Runoff Depth>5.58"
Flow Length=156' Tc=7.7 min CN=79 Runoff=3.95 cfs 0.305 af

Reach 4aR: Reach #4a Avg. Flow Depth=0.59' Max Vel=1.45 fps Inflow=4.95 cfs 0.397 af
n=0.080 L=100.8' S=0.0209 '/' Capacity=14.55 cfs Outflow=4.91 cfs 0.397 af

Reach 4bR: Reach #4b Avg. Flow Depth=0.49' Max Vel=1.78 fps Inflow=4.91 cfs 0.397 af
n=0.035 L=92.2' S=0.0076 '/' Capacity=21.77 cfs Outflow=4.91 cfs 0.397 af

Reach 4cR: Reach #4c Avg. Flow Depth=0.47' Max Vel=2.28 fps Inflow=4.91 cfs 0.397 af
n=0.080 L=76.2' S=0.0722 '/' Capacity=24.96 cfs Outflow=4.91 cfs 0.397 af

Reach 5R: Reach #5 Avg. Flow Depth=0.13' Max Vel=0.82 fps Inflow=0.55 cfs 0.044 af
n=0.035 L=80.0' S=0.0094 '/' Capacity=41.65 cfs Outflow=0.54 cfs 0.044 af

Reach 12aR: Overland Flow Avg. Flow Depth=0.51' Max Vel=0.90 fps Inflow=4.65 cfs 1.120 af
n=0.080 L=74.8' S=0.0100 '/' Capacity=4.46 cfs Outflow=4.65 cfs 1.119 af

Reach 12bR: Overland Flow Avg. Flow Depth=0.33' Max Vel=1.75 fps Inflow=4.65 cfs 1.119 af
n=0.080 L=115.3' S=0.0672 '/' Capacity=11.55 cfs Outflow=4.65 cfs 1.118 af

Reach 100R: Final Reach #100 Inflow=12.91 cfs 1.115 af
Outflow=12.91 cfs 1.115 af

Reach 102aR: Reach #102a Avg. Flow Depth=0.24' Max Vel=3.01 fps Inflow=4.70 cfs 0.309 af
n=0.035 L=21.0' S=0.0595 '/' Capacity=104.94 cfs Outflow=4.77 cfs 0.309 af

Reach 102bR: Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=64.5' S=0.0698 '/' Capacity=17.89 cfs Outflow=0.00 cfs 0.000 af

Reach 102cR: Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=26.5' S=0.0283 '/' Capacity=4.99 cfs Outflow=0.00 cfs 0.000 af

Reach 200R: Final Reach #200 Inflow=11.70 cfs 2.030 af
Outflow=11.70 cfs 2.030 af

Reach 300R: Final Reach #300 Inflow=9.55 cfs 1.126 af
Outflow=9.55 cfs 1.126 af

Pond 4P: Wetland Ponding Peak Elev=583.97' Storage=4,042 cf Inflow=5.90 cfs 0.452 af
Outflow=4.95 cfs 0.397 af

Pond 5P: Drop Inlet #1 Peak Elev=574.86' Storage=1 cf Inflow=0.55 cfs 0.044 af
15.0" Round Culvert n=0.012 L=50.0' S=0.0100 '/' Outflow=0.55 cfs 0.044 af

Pond 11P: Inlet Sump #1 Peak Elev=575.53' Storage=84 cf Inflow=1.70 cfs 0.125 af
15.0" Round Culvert n=0.012 L=42.0' S=0.0119 '/' Outflow=1.61 cfs 0.124 af

Pond 12P: Inlet Sump #2 Peak Elev=570.15' Storage=11,114 cf Inflow=12.95 cfs 1.121 af
12.0" Round Culvert n=0.012 L=40.0' S=0.0063 '/' Outflow=4.65 cfs 1.120 af

Pond 101P: Rain Garden #101 Peak Elev=577.58' Storage=6,085 cf Inflow=4.44 cfs 0.386 af
Primary=3.11 cfs 0.256 af Secondary=0.53 cfs 0.008 af Outflow=3.64 cfs 0.265 af

Pond 102P: Rain Garden #102 Peak Elev=575.48' Storage=6,221 cf Inflow=5.55 cfs 0.429 af
Primary=4.70 cfs 0.309 af Secondary=0.00 cfs 0.000 af Outflow=4.70 cfs 0.309 af

Total Runoff Area = 11.482 ac Runoff Volume = 4.572 af Average Runoff Depth = 4.78"
91.82% Pervious = 10.542 ac 8.18% Impervious = 0.939 ac

Appendix III - Calculations, Charts, & Graphs

Extreme Precipitation Tables
Rip Rap Calculations
AoT Stormwater Treatment Spreadsheets
NCRS USDA Web-soil Map
Ksat Values for New Hampshire Soils, SSSNNE Special Publication #5, 2009
Stormwater System Management: Inspection & Maintenance Manual, Plan,
Invasive Species & NHDES Green SnoPro Utilization Chart
Watershed Report Card, 303(d) List, & ORW List

Extreme Precipitation Tables

Northeast Regional Climate Center

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

Metadata for Point	
Smoothing	Yes
State	
Location	
Latitude	43.215 degrees North
Longitude	71.13 degrees West
Elevation	160 feet
Date/Time	Wed Oct 01 2025 14:45:07 GMT-0400 (Eastern Daylight Time)

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.26	0.40	0.49	0.65	0.81	1.02	**1yr**	0.70	0.98	1.19	1.51	1.94	2.50	2.75	**1yr**	2.21	2.64	3.06	3.77	4.34	**1yr**
2yr	0.32	0.49	0.61	0.80	1.01	1.28	**2yr**	0.87	1.16	1.48	1.87	2.36	2.99	3.34	**2yr**	2.65	3.21	3.71	4.43	5.05	**2yr**
5yr	0.37	0.58	0.72	0.97	1.24	1.58	**5yr**	1.07	1.44	1.84	2.34	2.97	3.77	4.26	**5yr**	3.34	4.09	4.71	5.56	6.29	**5yr**
10yr	0.41	0.64	0.81	1.11	1.44	1.86	**10yr**	1.24	1.70	2.18	2.79	3.54	4.50	5.12	**10yr**	3.98	4.92	5.65	6.61	7.44	**10yr**
25yr	0.48	0.76	0.96	1.33	1.77	2.31	**25yr**	1.53	2.11	2.72	3.50	4.47	5.67	6.54	**25yr**	5.02	6.29	7.18	8.32	9.28	**25yr**
50yr	0.54	0.86	1.10	1.54	2.07	2.73	**50yr**	1.79	2.48	3.23	4.17	5.33	6.77	7.87	**50yr**	5.99	7.57	8.62	9.90	10.98	**50yr**
100yr	0.60	0.97	1.25	1.78	2.42	3.23	**100yr**	2.09	2.93	3.84	4.97	6.36	8.08	9.48	**100yr**	7.15	9.12	10.34	11.79	13.01	**100yr**
200yr	0.68	1.11	1.44	2.06	2.84	3.81	**200yr**	2.45	3.46	4.55	5.90	7.58	9.65	11.42	**200yr**	8.54	10.99	12.41	14.05	15.40	**200yr**
500yr	0.81	1.33	1.73	2.51	3.51	4.75	**500yr**	3.03	4.31	5.69	7.42	9.56	12.22	14.63	**500yr**	10.81	14.06	15.81	17.73	19.28	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.23	0.35	0.43	0.58	0.71	0.89	**1yr**	0.62	0.87	0.96	1.27	1.52	1.99	2.46	**1yr**	1.76	2.36	2.79	3.35	3.70	**1yr**
2yr	0.31	0.48	0.59	0.80	0.99	1.17	**2yr**	0.85	1.15	1.34	1.79	2.29	2.88	3.19	**2yr**	2.55	3.07	3.57	4.32	4.93	**2yr**
5yr	0.35	0.54	0.67	0.92	1.17	1.40	**5yr**	1.01	1.36	1.59	2.10	2.71	3.38	3.78	**5yr**	2.99	3.64	4.21	5.22	5.70	**5yr**
10yr	0.39	0.59	0.74	1.03	1.33	1.59	**10yr**	1.15	1.56	1.80	2.38	3.06	3.78	4.27	**10yr**	3.35	4.10	4.77	6.01	6.35	**10yr**
25yr	0.44	0.68	0.84	1.20	1.58	1.90	**25yr**	1.37	1.86	2.11	2.77	3.56	4.36	4.99	**25yr**	3.86	4.80	5.63	7.28	8.06	**25yr**
50yr	0.49	0.75	0.94	1.34	1.81	2.17	**50yr**	1.56	2.12	2.38	3.12	4.00	4.84	5.59	**50yr**	4.28	5.37	6.36	8.40	9.30	**50yr**
100yr	0.55	0.84	1.05	1.52	2.08	2.49	**100yr**	1.79	2.44	2.69	3.51	4.47	5.35	6.24	**100yr**	4.74	6.00	7.22	9.69	10.63	**100yr**
200yr	0.62	0.93	1.18	1.71	2.38	2.85	**200yr**	2.06	2.79	3.03	3.93	5.01	5.87	8.56	**200yr**	5.20	8.23	8.18	11.18	12.17	**200yr**
500yr	0.73	1.08	1.39	2.02	2.88	3.43	**500yr**	2.48	3.36	3.57	4.59	5.84	6.60	10.37	**500yr**	5.84	9.97	9.64	13.53	14.52	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.28	0.44	0.53	0.72	0.88	1.07	**1yr**	0.76	1.05	1.23	1.68	2.11	2.75	3.16	**1yr**	2.44	3.04	3.45	4.07	4.80	**1yr**
2yr	0.33	0.50	0.62	0.84	1.04	1.24	**2yr**	0.89	1.21	1.44	1.91	2.45	3.18	3.54	**2yr**	2.82	3.40	3.92	4.55	5.19	**2yr**
5yr	0.39	0.61	0.76	1.04	1.32	1.57	**5yr**	1.14	1.54	1.82	2.42	3.09	4.20	4.77	**5yr**	3.71	4.58	5.24	5.91	6.91	**5yr**
10yr	0.46	0.71	0.88	1.24	1.60	1.90	**10yr**	1.38	1.86	2.19	2.92	3.72	5.23	6.01	**10yr**	4.62	5.78	6.56	7.19	8.53	**10yr**
25yr	0.57	0.87	1.08	1.55	2.04	2.45	**25yr**	1.76	2.40	2.82	3.76	4.75	7.01	8.22	**25yr**	6.20	7.90	8.83	9.41	10.42	**25yr**
50yr	0.67	1.02	1.27	1.82	2.45	2.97	**50yr**	2.12	2.90	3.41	4.55	5.73	8.76	10.44	**50yr**	7.75	10.03	11.07	11.51	12.68	**50yr**
100yr	0.79	1.19	1.49	2.15	2.96	3.59	**100yr**	2.55	3.51	4.14	5.53	6.92	10.97	13.25	**100yr**	9.71	12.74	13.89	14.08	15.42	**100yr**
200yr	0.92	1.39	1.76	2.55	3.56	4.35	**200yr**	3.07	4.26	5.02	6.71	8.36	13.79	14.52	**200yr**	12.20	13.96	17.41	17.23	18.77	**200yr**
500yr	1.15	1.71	2.20	3.19	4.54	5.61	**500yr**	3.91	5.48	6.46	8.68	10.75	18.66	19.41	**500yr**	16.52	18.66	23.49	22.55	24.39	**500yr**

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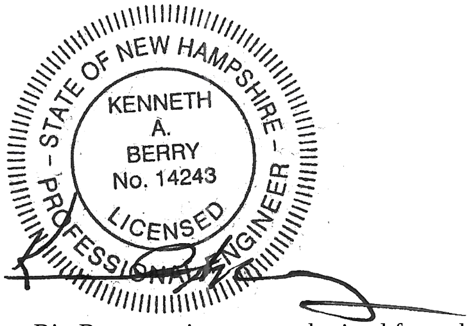


RIP RAP CALCULATIONS

25-024 20 Back Canaan Road
Lovely Revocable Living Trust
Barrington, NH

Berry Surveying & Engineering
335 Second Crown Point Road
Barrington, NH

10/14/2025/Revised: December 4, 2025

Rip Rap equations were obtained from the *Stormwater Management and Erosion Control Handbook for Urban and Developing Areas in New Hampshire.* Rip Rap was sized for the 25 year storm event. (Some d50 sizes and T values have been modified)

TAILWATER < HALF THE Do

La = (1.8 x Q) / Do 1.5 + (7 x Do)   Q = Peak Flow & Do is Pipe Diameter
W = La + 3*Do or defined channel width
d50 = (0.02 x Q4/3) / (Tw x Do)   Tw = Tailwater Depth
T = Largest Stone Size x 1.5

Culvert or Catch Basin	Tailwater (Feet) Tw	Discharge (C.F.S.) Q	Diameter of Pipe Do	Length of Rip Rap La (feet)	Width of Rip Rap W (feet)	d50-Stone Rip Rap d50(ft.)	Actual Size	Thickness
15" RCP (Pond #5P)	0.25	0.27	1.25	9.0	12.8	0.01	0.50	1.20
15" HDPE (Pond #101P)	0.25	0.55	1.25	9.3	13.0	0.03	0.50	1.20
15" HDPE (Pond #102P)	0.25	0.99	1.25	9.7	13.5	0.06	0.50	1.20
12" HDPE (Pond #12P)	0.20	3.04	1.00	10.6	13.6	0.42	0.50	1.20

TAILWATER > HALF THE Do

La = (3.0 x Q) / Do 3/2 + (7 x Do)   Q = Peak Flow & Do is Pipe Diameter
W = 0.4La + 3*Do or defined channel width
d50 = (0.02 x Q4/3) / (Tw x Do)   Tw = Tailwater Depth
T = Largest Stone Size x 1.5

Culvert or Catch Basin	Tailwater (Feet) Tw	Discharge (C.F.S.) Q	Diameter of Pipe Do	Length of Rip Rap La (feet)	Width of Rip Rap W (feet)	d50-Stone Rip Rap d50(ft.)	Actual Size	Thickness
15" HDPE (Pond #11P)	1.33	1.03	1.25	10.4	7.9	0.01	0.50	1.20

Please note that the designer chose to use the 25 Year Event for the dimensional calculations.

Table 7-24 -- Recommended Rip Rap Gradation Ranges				
d50 Size =	0.5	Feet	6	Inches
% of Weight Smaller Than the Given d50 Size		Size of Stone (Inches) From		To
100%		9		12
85%		8		11
50%		6		9
15%		2		3

FILTRATION PRACTICE DESIGN CRITERIA
(Env-Wq 1508.08)

Type/Node Name: **Rain Garden #101**

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.

Yes		Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.08(a).	
0.83	ac	A = Area draining to the practice	
0.18	ac	A_I = Impervious area draining to the practice	
0.22	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.25	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.20	ac-in	WQV= 1" x Rv x A	
739	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
185	cf	25% x WQV (check calc for sediment forebay volume)	
554	cf	75% x WQV (check calc for surface sand filter volume)	
Sediment Forebay		Method of Pretreatment? (not required for clean or roof runoff)	
1,167	cf	V_{SED} = Sediment forebay volume, if used for pretreatment	**$\geq$ 25%WQV**
Calculate time to drain if system IS NOT underdrained:			
	sf	A_{SA} = Surface area of the practice	
	iph	$Ksat_{DESIGN}$ = Design infiltration rate[1]	
	Yes/No	If Ksat (prior to factor of safety) is < 0.50 iph, has an underdrain been provided? (Use the calculations below)	
-	hours	T_{DRAIN} = Drain time = V / (A_{SA} * I_{DESIGN})	**$\leq$ 72-hrs**
Calculate time to drain if system IS underdrained:			
576.47	ft	E_{WQV} = Elevation of WQV (attach stage-storage table)	
0.04	cfs	Q_{WQV} = Discharge at the E_{WQV} (attach stage-discharge table)	
10.27	hours	T_{DRAIN} = Drain time = 2WQV/Q_{WQV}	**$\leq$ 72-hrs**
575.00	feet	E_{FC} = Elevation of the bottom of the filter course material[2]	
574.00	feet	E_{UD} = Invert elevation of the underdrain (UD), if applicable	
578.93	feet	E_{SHWT} = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
573.93	feet	E_{ROCK} = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
1.00	feet	$D_{FC\ to\ UD}$ = Depth to UD from the bottom of the filter course	**$\geq$ 1'**
1.07	feet	$D_{FC\ to\ ROCK}$ = Depth to bedrock from the bottom of the filter course	**$\geq$ 1'**
(3.93)	feet	$D_{FC\ to\ SHWT}$ = Depth to SHWT from the bottom of the filter course	**$\geq$ 1'**
577.52	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
578.00	ft	Elevation of the top of the practice	
YES		50 peak elevation $\leq$ Elevation of the top of the practice	**← yes**
If a surface sand filter or underground sand filter is proposed:			
YES	ac	Drainage Area check.	**< 10 ac**
	cf	V = Volume of storage[3] (attach a stage-storage table)	**$\geq$ 75%WQV**
	inches	D_{FC} = Filter course thickness	**18", or 24" if within GPA**
Sheet		Note what sheet in the plan set contains the filter course specification.	
	Yes/No	Access grate provided?	**← yes**
If a bioretention area is proposed:			
YES	ac	Drainage Area no larger than 5 ac?	**← yes**
4,248	cf	V = Volume of storage[3] (attach a stage-storage table)	**$\geq$ WQV**

18.0	inches	D_{FC} = Filter course thickness	**18", or 24" if within GPA**
Sheet	P-101	Note what sheet in the plan set contains the filter course specification	
3.0	:1	Pond side slopes	**> 3:1**
Sheet	P-101	Note what sheet in the plan set contains the planting plans and surface cover	
If porous pavement is proposed:			
		Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.)	
	acres	A_{SA} = Surface area of the pervious pavement	
	:1	Ratio of the contributing area to the pervious surface area	**≤ 5:1**
	inches	D_{FC} = Filter course thickness	**12", or 18" if within GPA**
Sheet		Note what sheet in the plan set contains the filter course spec.	**mod. 304.1 (see spec)**

1. Rate of the limiting layer (either the filter course or the underlying soil). $Ksat_{design}$ includes factor of safey. See Env-Wq 1504.14 for guidance on determining the infiltration rate.

2. See lines 34, 40 and 48 for required depths of filter media.

3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet stucture, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes: Test Pit #1B is located uphill of Rain Garden #101 and has a ESHWT of 30" and a termination depth of 90"

Summary for Pond 101P: Rain Garden #101

Inflow Area = 0.831 ac, 21.67% Impervious, Inflow Depth > 4.37" for 50Yr-24Hr event
Inflow = 3.47 cfs @ 12.16 hrs, Volume= 0.302 af
Outflow = 1.83 cfs @ 12.41 hrs, Volume= 0.182 af, Atten= 47%, Lag= 15.0 min
Primary = 1.76 cfs @ 12.41 hrs, Volume= 0.181 af
Secondary = 0.07 cfs @ 12.41 hrs, Volume= 0.001 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 577.52' @ 12.41 hrs Surf.Area= 2,525 sf Storage= 5,806 cf
Flood Elev= 578.00' Surf.Area= 2,525 sf Storage= 8,229 cf

Plug-Flow detention time= 189.7 min calculated for 0.181 af (60% of inflow)
Center-of-Mass det. time= 86.9 min (902.9 - 816.0)

Volume	Invert	Avail.Storage	Storage Description
#1	576.50'	1,167 cf	**Sediment Forebay (Irregular)**Listed below (Recalc) -Impervious
#2	574.00'	1,010 cf	**Stone (Irregular)**Listed below (Recalc) -Impervious 2,525 cf Overall x 40.0% Voids
#3	575.00'	758 cf	**BioMedia (Irregular)**Listed below (Recalc) 3,788 cf Overall x 20.0% Voids
#4	576.50'	2,775 cf	**Cell (Irregular)**Listed below (Recalc) -Impervious
#5	577.50'	2,520 cf	**Open Water Storage (Irregular)**Listed below (Recalc) -Impervious
		8,229 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
576.50	808	244.5	0	0	808
577.00	1,167	259.1	491	491	1,406
577.50	1,544	272.8	676	1,167	2,001

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
574.00	2,525	200.7	0	0	2,525
575.00	2,525	200.7	2,525	2,525	2,726

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
575.00	2,525	200.7	0	0	2,525
576.50	2,525	200.7	3,788	3,788	2,826

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
576.50	2,525	200.7	0	0	2,525
577.00	2,773	208.8	1,324	1,324	2,808
577.50	3,033	217.1	1,451	2,775	3,109

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
577.50	4,827	257.4	0	0	4,827
578.00	5,257	267.9	2,520	2,520	5,285

Device	Routing	Invert	Outlet Devices
#1	Primary	574.00'	**15.0" Round 15" HDPE N-12** L= 19.2' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 574.00' / 573.75' S= 0.0130 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	574.00'	**1.0" Vert. 1" Orifice** C= 0.600
#3	Device 2	575.00'	**10.000 in/hr 10in/HR Biomedia over Surface area**
#4	Device 1	577.40'	**48.0" Horiz. 4' Structure** C= 0.600 Limited to weir flow at low heads
#5	Secondary	577.50'	**10.0' long x 9.0' breadth E Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.46 2.55 2.70 2.69 2.68 2.68 2.67 2.64 2.64 2.64 2.65 2.64 2.65 2.65 2.66 2.67 2.69

Primary OutFlow Max=1.73 cfs @ 12.41 hrs HW=577.52' TW=0.00' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Passes 1.73 cfs of 10.05 cfs potential flow)
  ├─**2=1" Orifice** (Orifice Controls 0.05 cfs @ 8.98 fps)
  │ └─**3=10in/HR Biomedia** (Passes 0.05 cfs of 0.58 cfs potential flow)
  └─**4=4' Structure** (Weir Controls 1.68 cfs @ 1.13 fps)

Secondary OutFlow Max=0.06 cfs @ 12.41 hrs HW=577.52' TW=0.00' (Dynamic Tailwater)
└─**5=E Spillway** (Weir Controls 0.06 cfs @ 0.34 fps)

Stage-Area-Storage for Pond 101P: Rain Garden #101

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
574.00	0	0
574.05	0	50
574.10	0	101
574.15	0	151
574.20	0	202
574.25	0	253
574.30	0	303
574.35	0	354
574.40	0	404
574.45	0	455
574.50	0	505
574.55	0	555
574.60	0	606
574.65	0	656
574.70	0	707
574.75	0	758
574.80	0	808
574.85	0	859
574.90	0	909
574.95	0	960
575.00	**2,525**	1,010
575.05	2,525	1,035
575.10	2,525	1,061
575.15	2,525	1,086
575.20	2,525	1,111
575.25	2,525	1,136
575.30	2,525	1,161
575.35	2,525	1,187
575.40	2,525	1,212
575.45	2,525	1,237
575.50	2,525	1,263
575.55	2,525	1,288
575.60	2,525	1,313
575.65	2,525	1,338
575.70	2,525	1,364
575.75	2,525	1,389
575.80	2,525	1,414
575.85	2,525	1,439
575.90	2,525	1,464
575.95	2,525	1,490
576.00	2,525	1,515
576.05	2,525	1,540
576.10	2,525	1,566
576.15	2,525	1,591
576.20	2,525	1,616
576.25	2,525	1,641
576.30	2,525	1,666
576.35	2,525	1,692
576.40	2,525	1,717
576.45	2,525	1,742
576.50	2,525	1,768
576.55	2,525	1,936
576.60	2,525	2,107
576.65	2,525	2,280
576.70	2,525	2,457
576.75	2,525	2,637
576.80	2,525	2,820
576.85	2,525	3,006
576.90	2,525	3,195
576.95	2,525	3,387
577.00	2,525	3,583
577.05	2,525	3,781
577.10	2,525	3,983
577.15	2,525	4,187
577.20	2,525	4,395
577.25	2,525	4,606
577.30	2,525	4,820
577.35	2,525	5,037
577.40	2,525	5,258
577.45	2,525	5,482
577.50	2,525	5,709
577.55	2,525	5,951
577.60	2,525	6,196
577.65	2,525	6,443
577.70	2,525	6,691
577.75	2,525	6,942
577.80	2,525	7,195
577.85	2,525	7,451
577.90	2,525	7,708
577.95	2,525	7,968
578.00	2,525	**8,229**

576.47 = 1,752 cu. ft.
\- 1,010 cu. ft.
742 cu. ft.
WQV = 739 cu. ft.

Stage-Discharge for Pond 101P: Rain Garden #101

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
574.00	0.00	0.00	0.00
574.05	0.00	0.00	0.00
574.10	0.00	0.00	0.00
574.15	0.00	0.00	0.00
574.20	0.00	0.00	0.00
574.25	0.00	0.00	0.00
574.30	0.00	0.00	0.00
574.35	0.00	0.00	0.00
574.40	0.00	0.00	0.00
574.45	0.00	0.00	0.00
574.50	0.00	0.00	0.00
574.55	0.00	0.00	0.00
574.60	0.00	0.00	0.00
574.65	0.00	0.00	0.00
574.70	0.00	0.00	0.00
574.75	0.00	0.00	0.00
574.80	0.00	0.00	0.00
574.85	0.00	0.00	0.00
574.90	0.00	0.00	0.00
574.95	0.00	0.00	0.00
575.00	0.03	0.03	0.00
575.05	0.03	0.03	0.00
575.10	0.03	0.03	0.00
575.15	0.03	0.03	0.00
575.20	0.03	0.03	0.00
575.25	0.03	0.03	0.00
575.30	0.03	0.03	0.00
575.35	0.03	0.03	0.00
575.40	0.03	0.03	0.00
575.45	0.03	0.03	0.00
575.50	0.03	0.03	0.00
575.55	0.03	0.03	0.00
575.60	0.03	0.03	0.00
575.65	0.03	0.03	0.00
575.70	0.03	0.03	0.00
575.75	0.03	0.03	0.00
575.80	0.03	0.03	0.00
575.85	0.04	0.04	0.00
575.90	0.04	0.04	0.00
575.95	0.04	0.04	0.00
576.00	0.04	0.04	0.00
576.05	0.04	0.04	0.00
576.10	0.04	0.04	0.00
576.15	0.04	0.04	0.00
576.20	0.04	0.04	0.00
576.25	0.04	0.04	0.00
576.30	0.04	0.04	0.00
576.35	0.04	0.04	0.00
576.40	0.04	0.04	0.00
576.45	0.04	0.04	0.00
576.50	0.04	0.04	0.00
576.55	0.04	0.04	0.00
576.60	0.04	0.04	0.00
576.65	0.04	0.04	0.00
576.70	0.04	0.04	0.00
576.75	0.04	0.04	0.00
576.80	0.04	0.04	0.00
576.85	0.04	0.04	0.00
576.90	0.04	0.04	0.00
576.95	0.04	0.04	0.00
577.00	0.05	0.05	0.00
577.05	0.05	0.05	0.00
577.10	0.05	0.05	0.00
577.15	0.05	0.05	0.00
577.20	0.05	0.05	0.00
577.25	0.05	0.05	0.00
577.30	0.05	0.05	0.00
577.35	0.05	0.05	0.00
577.40	0.05	0.05	0.00
577.45	0.51	0.51	0.00
577.50	1.35	1.35	0.00
577.55	2.71	2.44	0.28
577.60	4.50	3.72	0.78
577.65	6.62	5.19	1.43
577.70	9.00	6.80	2.20
577.75	11.66	8.56	3.10
577.80	14.56	10.45	4.12
577.85	15.84	10.61	5.23
577.90	17.14	10.69	6.45
577.95	18.59	10.77	7.81
578.00	**20.14**	**10.86**	**9.28**

576.47 = 0.04 cfs

Stage-Area-Storage for Pond 101P: Rain Garden #101

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
574.00	0	0
574.05	0	50
574.10	0	101
574.15	0	151
574.20	0	202
574.25	0	253
574.30	0	303
574.35	0	354
574.40	0	404
574.45	0	455
574.50	0	505
574.55	0	555
574.60	0	606
574.65	0	656
574.70	0	707
574.75	0	758
574.80	0	808
574.85	0	859
574.90	0	909
574.95	0	960
575.00	**2,525**	1,010
575.05	2,525	1,035
575.10	2,525	1,061
575.15	2,525	1,086
575.20	2,525	1,111
575.25	2,525	1,136
575.30	2,525	1,161
575.35	2,525	1,187
575.40	2,525	1,212
575.45	2,525	1,237
575.50	2,525	1,263
575.55	2,525	1,288
575.60	2,525	1,313
575.65	2,525	1,338
575.70	2,525	1,364
575.75	2,525	1,389
575.80	2,525	1,414
575.85	2,525	1,439
575.90	2,525	1,464
575.95	2,525	1,490
576.00	2,525	1,515
576.05	2,525	1,540
576.10	2,525	1,566
576.15	2,525	1,591
576.20	2,525	1,616
576.25	2,525	1,641
576.30	2,525	1,666
576.35	2,525	1,692
576.40	2,525	1,717
576.45	2,525	1,742
576.50	2,525	1,768
576.55	2,525	1,936
576.60	2,525	2,107
576.65	2,525	2,280
576.70	2,525	2,457
576.75	2,525	2,637
576.80	2,525	2,820
576.85	2,525	3,006
576.90	2,525	3,195
576.95	2,525	3,387
577.00	2,525	3,583
577.05	2,525	3,781
577.10	2,525	3,983
577.15	2,525	4,187
577.20	2,525	4,395
577.25	2,525	4,606
577.30	2,525	4,820
577.35	2,525	5,037
577.40	2,525	5,258
577.45	2,525	5,482
577.50	2,525	5,709
577.55	2,525	5,951
577.60	2,525	6,196
577.65	2,525	6,443
577.70	2,525	6,691
577.75	2,525	6,942
577.80	2,525	7,195
577.85	2,525	7,451
577.90	2,525	7,708
577.95	2,525	7,968
578.00	2,525	**8,229**

5,258 cu. ft.
- 1,010 cu. ft.
4,248 cu. ft.

FILTRATION PRACTICE DESIGN CRITERIA
(Env-Wq 1508.08)

Type/Node Name: **Rain Garden #102**

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.

Yes		Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.08(a).	
0.93	ac	A = Area draining to the practice	
0.19	ac	A_I = Impervious area draining to the practice	
0.20	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.23	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.21	ac-in	WQV= 1" x Rv x A	
772	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
193	cf	25% x WQV (check calc for sediment forebay volume)	
579	cf	75% x WQV (check calc for surface sand filter volume)	
Sediment Forebay		Method of Pretreatment? (not required for clean or roof runoff)	
925	cf	V_{SED} = Sediment forebay volume, if used for pretreatment	**≥ 25%WQV**
Calculate time to drain if system IS NOT underdrained:			
	sf	A_{SA} = Surface area of the practice	
	iph	$Ksat_{DESIGN}$ = Design infiltration rate[1]	
	Yes/No	If Ksat (prior to factor of safety) is < 0.50 iph, has an underdrain been provided? (Use the calculations below)	
-	hours	T_{DRAIN} = Drain time = V / (A_{SA} * I_{DESIGN})	**≤ 72-hrs**
Calculate time to drain if system IS underdrained:			
574.11	ft	E_{WQV} = Elevation of WQV (attach stage-storage table)	
0.04	cfs	Q_{WQV} = Discharge at the E_{WQV} (attach stage-discharge table)	
10.73	hours	T_{DRAIN} = Drain time = 2WQV/Q_{WQV}	**≤ 72-hrs**
572.50	feet	E_{FC} = Elevation of the bottom of the filter course material[2]	
571.50	feet	E_{UD} = Invert elevation of the underdrain (UD), if applicable	
573.70	feet	E_{SHWT} = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
568.95	feet	E_{ROCK} = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
1.00	feet	$D_{FC\ to\ UD}$ = Depth to UD from the bottom of the filter course	**≥ 1'**
3.55	feet	$D_{FC\ to\ ROCK}$ = Depth to bedrock from the bottom of the filter course	**≥ 1'**
(1.20)	feet	$D_{FC\ to\ SHWT}$ = Depth to SHWT from the bottom of the filter course	**≥ 1'**
575.40	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
576.00	ft	Elevation of the top of the practice	
YES		50 peak elevation ≤ Elevation of the top of the practice	**← yes**
If a surface sand filter or underground sand filter is proposed:			
YES	ac	Drainage Area check.	**< 10 ac**
	cf	V = Volume of storage[3] (attach a stage-storage table)	**≥ 75%WQV**
	inches	D_{FC} = Filter course thickness	**18", or 24" if within GPA**
Sheet		Note what sheet in the plan set contains the filter course specification.	
	Yes/No	Access grate provided?	**← yes**
If a bioretention area is proposed:			
YES	ac	Drainage Area no larger than 5 ac?	**← yes**
4,530	cf	V = Volume of storage[3] (attach a stage-storage table)	**≥ WQV**

18.0	inches	D_{FC} = Filter course thickness	**18", or 24" if within GPA**
Sheet	P-102	Note what sheet in the plan set contains the filter course specification	
3.0	:1	Pond side slopes	**> 3:1**
Sheet	P-102	Note what sheet in the plan set contains the planting plans and surface cover	
If porous pavement is proposed:			
		Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.)	
	acres	A_{SA} = Surface area of the pervious pavement	
	:1	Ratio of the contributing area to the pervious surface area	**≤ 5:1**
	inches	D_{FC} = Filter course thickness	**12", or 18" if within GPA**
Sheet		Note what sheet in the plan set contains the filter course spec.	**mod. 304.1 (see spec)**

1. Rate of the limiting layer (either the filter course or the underlying soil). $Ksat_{design}$ includes factor of safey. See Env-Wq 1504.14 for guidance on determining the infiltration rate.

2. See lines 34, 40 and 48 for required depths of filter media.

3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet stucture, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes:

Summary for Pond 102P: Rain Garden #102

[80] Warning: Exceeded Pond 11P by 0.06' @ 12.20 hrs (0.82 cfs 0.006 af)

Inflow Area = 0.925 ac, 20.00% Impervious, Inflow Depth > 4.35" for 50Yr-24Hr event
Inflow = 4.18 cfs @ 12.12 hrs, Volume= 0.336 af
Outflow = 2.36 cfs @ 12.30 hrs, Volume= 0.216 af, Atten= 44%, Lag= 11.0 min
Primary = 2.36 cfs @ 12.30 hrs, Volume= 0.216 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 575.40' @ 12.30 hrs Surf.Area= 1,698 sf Storage= 5,835 cf
Flood Elev= 576.00' Surf.Area= 1,698 sf Storage= 8,678 cf

Plug-Flow detention time= 174.0 min calculated for 0.216 af (64% of inflow)
Center-of-Mass det. time= 74.7 min (888.3 - 813.6)

Volume	Invert	Avail.Storage	Storage Description
#1	574.00'	925 cf	**Forebay (Irregular)** Listed below (Recalc) -Impervious
#2	571.50'	679 cf	**Stone (Irregular)** Listed below (Recalc) -Impervious 1,698 cf Overall x 40.0% Voids
#3	572.50'	509 cf	**BioMedia (Irregular)** Listed below (Recalc) 2,547 cf Overall x 20.0% Voids
#4	574.00'	2,085 cf	**Cell (Irregular)** Listed below (Recalc) -Impervious
#5	575.00'	4,480 cf	**Open Water Storage (Irregular)** Listed below (Recalc) -Impervious
		8,678 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
574.00	718	157.2	0	0	718
575.00	1,149	176.1	925	925	1,246

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
571.50	1,698	208.0	0	0	1,698
572.50	1,698	208.0	1,698	1,698	1,906

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
572.50	1,698	208.0	0	0	1,698
574.00	1,698	208.0	2,547	2,547	2,010

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
574.00	1,698	208.0	0	0	1,698
575.00	2,498	307.4	2,085	2,085	5,783

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
575.00	3,902	326.8	0	0	3,902
576.00	5,083	365.7	4,480	4,480	6,073

Device	Routing	Invert	Outlet Devices
#1	Primary	571.50'	**15.0" Round 15" HDPE N-12** L= 77.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 571.50' / 571.00' S= 0.0065 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	571.50'	**1.0" Vert. 1" Orifice** C= 0.600
#3	Device 2	572.50'	**10.000 in/hr 10"/HR Bio Media over Surface area**
#4	Device 1	575.25'	**48.0" Horiz. 4' Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	575.50'	**10.0' long x 9.0' breadth E Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.46 2.55 2.70 2.69 2.68 2.68 2.67 2.64 2.64 2.64 2.65 2.64 2.65 2.65 2.66 2.67 2.69

Primary OutFlow Max=2.36 cfs @ 12.30 hrs HW=575.40' TW=571.17' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Passes 2.36 cfs of 10.02 cfs potential flow)
  ├─**2=1" Orifice** (Orifice Controls 0.05 cfs @ 9.45 fps)
  │ └─**3=10"/HR Bio Media** (Passes 0.05 cfs of 0.39 cfs potential flow)
  └─**4=4' Grate** (Weir Controls 2.31 cfs @ 1.25 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=571.50' TW=575.00' (Dynamic Tailwater)
└─**5=E Spillway** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 102P: Rain Garden #102

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
571.50	0	0	574.15	1,698	1,564
571.55	0	34	574.20	1,698	1,694
571.60	0	68	574.25	1,698	1,828
571.65	0	102	574.30	1,698	1,964
571.70	0	136	574.35	1,698	2,104
571.75	0	170	574.40	1,698	2,246
571.80	0	204	574.45	1,698	2,391
571.85	0	238	574.50	1,698	2,540
571.90	0	272	574.55	1,698	2,691
571.95	0	306	574.60	1,698	2,846
572.00	0	340	574.65	1,698	3,004
572.05	0	374	574.70	1,698	3,165
572.10	0	408	574.75	1,698	3,329
572.15	0	441	574.80	1,698	3,496
572.20	0	475	574.85	1,698	3,667
572.25	0	509	574.90	1,698	3,841
572.30	0	543	574.95	1,698	4,018
572.35	0	577	575.00	1,698	4,199
572.40	0	611	575.05	1,698	4,395
572.45	0	645	575.10	1,698	4,595
572.50	1,698	679	575.15	1,698	4,797
572.55	1,698	696	575.20	1,698	5,002
572.60	1,698	713	575.25	1,698	5,209
572.65	1,698	730	575.30	1,698	5,420
572.70	1,698	747	575.35	1,698	5,633
572.75	1,698	764	575.40	1,698	5,850
572.80	1,698	781	575.45	1,698	6,069
572.85	1,698	798	575.50	1,698	6,291
572.90	1,698	815	575.55	1,698	6,516
572.95	1,698	832	575.60	1,698	6,744
573.00	1,698	849	575.65	1,698	6,975
573.05	1,698	866	575.70	1,698	7,209
573.10	1,698	883	575.75	1,698	7,447
573.15	1,698	900	575.80	1,698	7,687
573.20	1,698	917	575.85	1,698	7,930
573.25	1,698	934	575.90	1,698	8,176
573.30	1,698	951	575.95	1,698	8,426
573.35	1,698	968	576.00	1,698	**8,678**
573.40	1,698	985			
573.45	1,698	1,002			
573.50	1,698	1,019			
573.55	1,698	1,036			
573.60	1,698	1,053			
573.65	1,698	1,070			
573.70	1,698	1,087			
573.75	1,698	1,104			
573.80	1,698	1,121			
573.85	1,698	1,138			
573.90	1,698	1,155			
573.95	1,698	1,172			
574.00	**1,698**	1,189			
574.05	1,698	1,311			
574.10	1,698	1,436			

574.11 = 1,461 cu. ft.
\- 679 cu. ft.
782 cu. ft.
WQV = 772 cu. ft.

Stage-Discharge for Pond 102P: Rain Garden #102

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
571.50	0.00	0.00	0.00
571.55	0.00	0.00	0.00
571.60	0.00	0.00	0.00
571.65	0.00	0.00	0.00
571.70	0.00	0.00	0.00
571.75	0.00	0.00	0.00
571.80	0.00	0.00	0.00
571.85	0.00	0.00	0.00
571.90	0.00	0.00	0.00
571.95	0.00	0.00	0.00
572.00	0.00	0.00	0.00
572.05	0.00	0.00	0.00
572.10	0.00	0.00	0.00
572.15	0.00	0.00	0.00
572.20	0.00	0.00	0.00
572.25	0.00	0.00	0.00
572.30	0.00	0.00	0.00
572.35	0.00	0.00	0.00
572.40	0.00	0.00	0.00
572.45	0.00	0.00	0.00
572.50	0.03	0.03	0.00
572.55	0.03	0.03	0.00
572.60	0.03	0.03	0.00
572.65	0.03	0.03	0.00
572.70	0.03	0.03	0.00
572.75	0.03	0.03	0.00
572.80	0.03	0.03	0.00
572.85	0.03	0.03	0.00
572.90	0.03	0.03	0.00
572.95	0.03	0.03	0.00
573.00	0.03	0.03	0.00
573.05	0.03	0.03	0.00
573.10	0.03	0.03	0.00
573.15	0.03	0.03	0.00
573.20	0.03	0.03	0.00
573.25	0.03	0.03	0.00
573.30	0.03	0.03	0.00
573.35	0.04	0.04	0.00
573.40	0.04	0.04	0.00
573.45	0.04	0.04	0.00
573.50	0.04	0.04	0.00
573.55	0.04	0.04	0.00
573.60	0.04	0.04	0.00
573.65	0.04	0.04	0.00
573.70	0.04	0.04	0.00
573.75	0.04	0.04	0.00
573.80	0.04	0.04	0.00
573.85	0.04	0.04	0.00
573.90	0.04	0.04	0.00
573.95	0.04	0.04	0.00
574.00	0.04	0.04	0.00
574.05	0.04	0.04	0.00
574.10	0.04	0.04	0.00
574.15	0.04	0.04	0.00
574.20	0.04	0.04	0.00
574.25	0.04	0.04	0.00
574.30	0.04	0.04	0.00
574.35	0.04	0.04	0.00
574.40	0.04	0.04	0.00
574.45	0.04	0.04	0.00
574.50	0.05	0.05	0.00
574.55	0.05	0.05	0.00
574.60	0.05	0.05	0.00
574.65	0.05	0.05	0.00
574.70	0.05	0.05	0.00
574.75	0.05	0.05	0.00
574.80	0.05	0.05	0.00
574.85	0.05	0.05	0.00
574.90	0.05	0.05	0.00
574.95	0.05	0.05	0.00
575.00	0.05	0.05	0.00
575.05	0.05	0.05	0.00
575.10	0.05	0.05	0.00
575.15	0.05	0.05	0.00
575.20	0.05	0.05	0.00
575.25	0.05	0.05	0.00
575.30	0.51	0.51	0.00
575.35	1.35	1.35	0.00
575.40	2.44	2.44	0.00
575.45	3.73	3.73	0.00
575.50	5.19	5.19	0.00
575.55	7.08	6.80	0.28
575.60	9.34	8.56	0.78
575.65	11.84	10.42	1.43
575.70	12.69	10.49	2.20
575.75	13.67	10.57	3.10
575.80	14.76	10.64	4.12
575.85	15.95	10.72	5.23
575.90	17.24	10.79	6.45
575.95	18.68	10.86	7.81
576.00	**20.22**	**10.94**	**9.28**

574.11 = 0.04 cfs

Stage-Area-Storage for Pond 102P: Rain Garden #102

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
571.50	0	0
571.55	0	34
571.60	0	68
571.65	0	102
571.70	0	136
571.75	0	170
571.80	0	204
571.85	0	238
571.90	0	272
571.95	0	306
572.00	0	340
572.05	0	374
572.10	0	408
572.15	0	441
572.20	0	475
572.25	0	509
572.30	0	543
572.35	0	577
572.40	0	611
572.45	0	645
572.50	1,698	679
572.55	1,698	696
572.60	1,698	713
572.65	1,698	730
572.70	1,698	747
572.75	1,698	764
572.80	1,698	781
572.85	1,698	798
572.90	1,698	815
572.95	1,698	832
573.00	1,698	849
573.05	1,698	866
573.10	1,698	883
573.15	1,698	900
573.20	1,698	917
573.25	1,698	934
573.30	1,698	951
573.35	1,698	968
573.40	1,698	985
573.45	1,698	1,002
573.50	1,698	1,019
573.55	1,698	1,036
573.60	1,698	1,053
573.65	1,698	1,070
573.70	1,698	1,087
573.75	1,698	1,104
573.80	1,698	1,121
573.85	1,698	1,138
573.90	1,698	1,155
573.95	1,698	1,172
574.00	**1,698**	1,189
574.05	1,698	1,311
574.10	1,698	1,436
574.15	1,698	1,564
574.20	1,698	1,694
574.25	1,698	1,828
574.30	1,698	1,964
574.35	1,698	2,104
574.40	1,698	2,246
574.45	1,698	2,391
574.50	1,698	2,540
574.55	1,698	2,691
574.60	1,698	2,846
574.65	1,698	3,004
574.70	1,698	3,165
574.75	1,698	3,329
574.80	1,698	3,496
574.85	1,698	3,667
574.90	1,698	3,841
574.95	1,698	4,018
575.00	1,698	4,199
575.05	1,698	4,395
575.10	1,698	4,595
575.15	1,698	4,797
575.20	1,698	5,002
575.25	1,698	5,209
575.30	1,698	5,420
575.35	1,698	5,633
575.40	1,698	5,850
575.45	1,698	6,069
575.50	1,698	6,291
575.55	1,698	6,516
575.60	1,698	6,744
575.65	1,698	6,975
575.70	1,698	7,209
575.75	1,698	7,447
575.80	1,698	7,687
575.85	1,698	7,930
575.90	1,698	8,176
575.95	1,698	8,426
576.00	1,698	**8,678**

5,209 cu. ft.
- 679 cu. ft.
4,530 cu. ft.

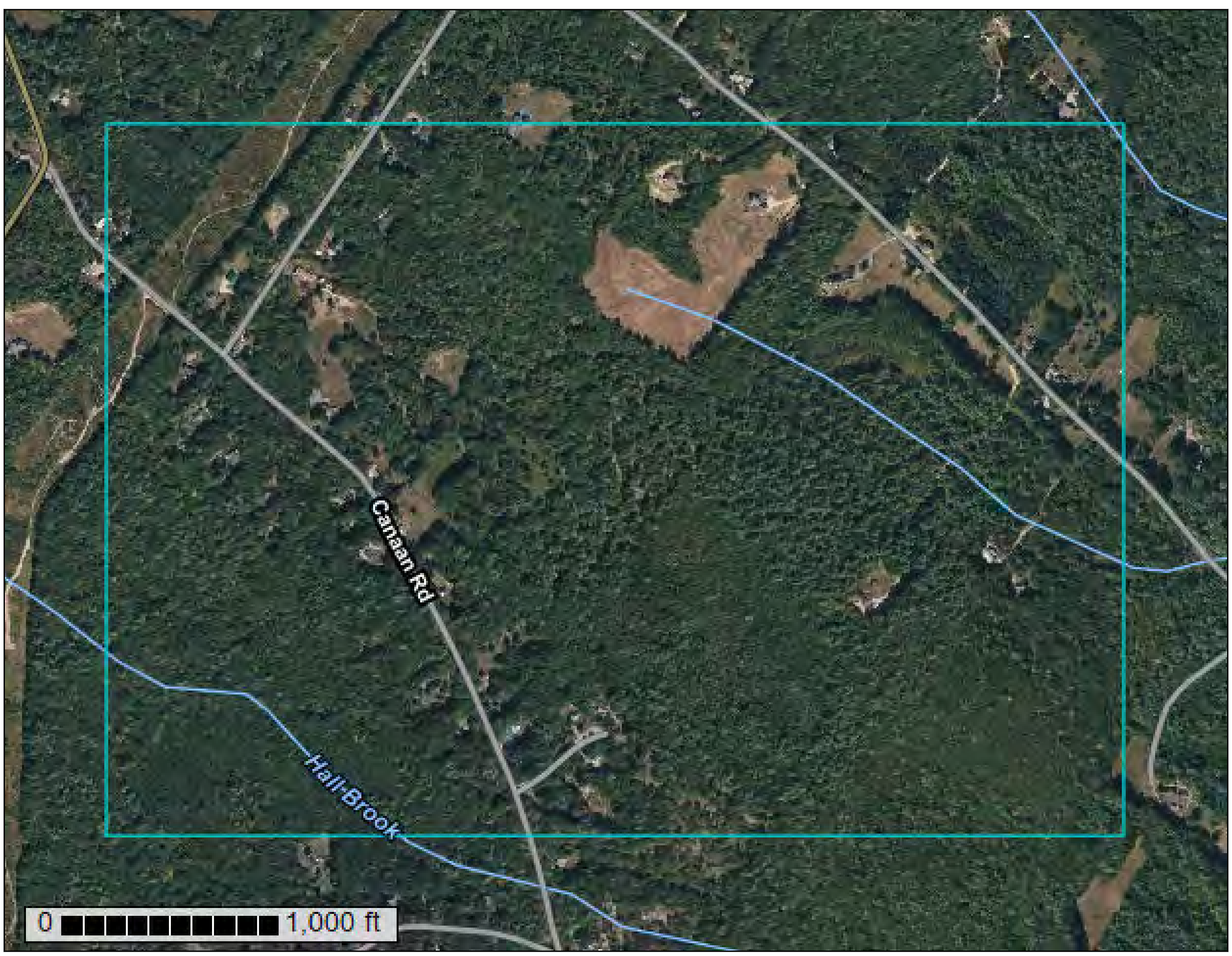
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for
Strafford County, New Hampshire



September 25, 2025

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:8,470 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 100, 200, 400, 600

Feet: 0, 400, 800, 1600, 2400

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

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

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

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

Soil Survey Area: Strafford County, New Hampshire
Survey Area Data: Version 25, Sep 3, 2024

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

Date(s) aerial images were photographed: Data not available.

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AdC	Acton very stony fine sandy loam, 8 to 15 percent slopes	1.2	0.3%
GlB	Gloucester fine sandy loam, 3 to 8 percent slopes	8.4	2.4%
GsB	Gloucester very stony fine sandy loam, 3 to 8 percent slopes	13.7	3.8%
GsC	Gloucester very stony fine sandy loam, 8 to 15 percent slopes	102.8	28.9%
LeA	Leicester very stony fine sandy loam, 0 to 3 percent slopes	28.2	7.9%
Mp	Freetown and Swansea mucky peats, 0 to 2 percent slopes	1.8	0.5%
PbB	Paxton fine sandy loam, 3 to 8 percent slopes	35.2	9.9%
PbC	Paxton fine sandy loam, 8 to 15 percent slopes	13.0	3.6%
PdB	Paxton fine sandy loam, 0 to 8 percent slopes, very stony	35.8	10.1%
PdC	Paxton fine sandy loam, 8 to 15 percent slopes, very stony	90.3	25.4%
PdD	Paxton fine sandy loam, 15 to 25 percent slopes, very stony	13.7	3.8%
RlB	Ridgebury fine sandy loam, 3 to 8 percent slopes, very stony	5.3	1.5%
WgB	Woodbridge fine sandy loam, 3 to 8 percent slopes	5.3	1.5%
WsB	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	1.0	0.3%
Totals for Area of Interest		**355.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Strafford County, New Hampshire

AdC—Acton very stony fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9d6l
Elevation: 130 to 970 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Acton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Acton

Setting

Parent material: Till

Typical profile

H1 - 0 to 6 inches: very stony fine sandy loam
H2 - 6 to 23 inches: very gravelly loamy sand
H3 - 23 to 42 inches: very cobbly loamy coarse sand

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A/D
Ecological site: F144BY602ME - Sandy Toeslope
Hydric soil rating: No

Minor Components

Not named pan

Percent of map unit: 10 percent
Hydric soil rating: No

Gloucester

Percent of map unit: 5 percent
Hydric soil rating: No

GlB—Gloucester fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9d73
Elevation: 70 to 1,100 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Gloucester and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gloucester

Setting

Parent material: Till

Typical profile

H1 - 0 to 14 inches: fine sandy loam
H2 - 14 to 28 inches: very gravelly loamy sand
H3 - 28 to 40 inches: very gravelly coarse sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F144AY032NH - Dry Till Uplands
Hydric soil rating: No

Minor Components

Not named pan

Percent of map unit: 5 percent
Hydric soil rating: No

Hollis

Percent of map unit: 5 percent
Hydric soil rating: No

Acton

Percent of map unit: 5 percent
Hydric soil rating: No

GsB—Gloucester very stony fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9d75
Elevation: 30 to 1,260 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Gloucester and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gloucester

Setting

Parent material: Till

Typical profile

H1 - 0 to 14 inches: very stony fine sandy loam
H2 - 14 to 28 inches: very gravelly loamy sand
H3 - 28 to 40 inches: very gravelly coarse sand

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: F144BY601ME - Dry Sand

Hydric soil rating: No

Minor Components

Not named

Percent of map unit: 5 percent
Hydric soil rating: No

Hollis

Percent of map unit: 5 percent
Hydric soil rating: No

Acton

Percent of map unit: 5 percent
Hydric soil rating: No

GsC—Gloucester very stony fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9d76
Elevation: 0 to 1,440 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Gloucester and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gloucester

Setting

Parent material: Till

Typical profile

H1 - 0 to 14 inches: very stony fine sandy loam
H2 - 14 to 28 inches: very gravelly loamy sand
H3 - 28 to 40 inches: very gravelly coarse sand

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: F144BY601ME - Dry Sand
Hydric soil rating: No

Minor Components

Not named

Percent of map unit: 5 percent
Hydric soil rating: No

Hollis

Percent of map unit: 5 percent
Hydric soil rating: No

Acton

Percent of map unit: 5 percent
Hydric soil rating: No

LeA—Leicester very stony fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9d81
Elevation: 0 to 2,100 feet
Mean annual precipitation: 28 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 100 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Leicester and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Leicester

Setting

Landform: Depressions
Parent material: Till

Typical profile

H1 - 0 to 5 inches: very stony fine sandy loam
H2 - 5 to 44 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A/D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Whitman

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Ridgebury

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Not named wet

Percent of map unit: 5 percent
Landform: Outwash terraces
Hydric soil rating: Yes

Mp—Freetown and Swansea mucky peats, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w68w
Elevation: 10 to 940 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Freetown and similar soils: 50 percent
Swansea and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Freetown

Setting

Landform: Depressions, kettles, marshes, bogs, swamps
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Moderately decomposed organic material

Typical profile

Oe1 - 0 to 2 inches: mucky peat
Oe2 - 2 to 79 inches: mucky peat

Properties and qualities

Slope: 0 to 2 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Very high (about 20.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: B/D
Ecological site: F144AY043MA - Acidic Organic Wetlands
Hydric soil rating: Yes

Description of Swansea

Setting

Landform: Marshes, depressions, bogs, swamps, kettles
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Moderately decomposed organic material over sandy and gravelly glaciofluvial deposits

Typical profile

Oe1 - 0 to 12 inches: mucky peat
Oe2 - 12 to 25 inches: mucky peat
Cg - 25 to 79 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: B/D
Ecological site: F144AY043MA - Acidic Organic Wetlands
Hydric soil rating: Yes

Minor Components

Natchaug

Percent of map unit: 10 percent
Landform: Depressions, depressions, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 4 percent
Landform: Outwash terraces, drainageways, outwash deltas, depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman

Percent of map unit: 4 percent
Landform: Depressions, hills
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Maybid

Percent of map unit: 2 percent
Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

PbB—Paxton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2qp
Elevation: 0 to 1,570 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Paxton and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton

Setting

Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 39 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge

Percent of map unit: 9 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury

Percent of map unit: 6 percent

Landform: Depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Toeslope, backslope, footslope
Landform position (three-dimensional): Base slope, head slope, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Charlton

Percent of map unit: 5 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

PbC—Paxton fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w66y
Elevation: 0 to 1,320 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Paxton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton

Setting

Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Well drained
Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Charlton

Percent of map unit: 7 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge

Percent of map unit: 6 percent
Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury

Percent of map unit: 2 percent
Landform: Drumlins, drainageways, depressions, ground moraines, hills
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

PdB—Paxton fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w673
Elevation: 0 to 1,340 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days
Farmland classification: Farmland of local importance

Map Unit Composition

Paxton, very stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Very Stony

Setting

Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge, very stony

Percent of map unit: 8 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 4 percent
Landform: Drumlins, drainageways, depressions, hills, ground moraines
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Charlton, very stony

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

PdC—Paxton fine sandy loam, 8 to 15 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w677
Elevation: 0 to 1,330 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton, very stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Very Stony

Setting

Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge, very stony

Percent of map unit: 8 percent
Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Charlton, very stony

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 2 percent
Landform: Depressions, ground moraines, hills, drainageways, drumlins
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

PdD—Paxton fine sandy loam, 15 to 25 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w67h
Elevation: 0 to 1,400 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton, very stony, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Very Stony

Setting

Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge, very stony

Percent of map unit: 5 percent
Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Charlton, very stony

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 1 percent
Landform: Drumlins, depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

RIB—Ridgebury fine sandy loam, 3 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2xffx
Elevation: 40 to 1,320 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Ridgebury, very stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgebury, Very Stony

Setting

Landform: Drumlins, depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 6 inches: fine sandy loam
Bw - 6 to 10 inches: sandy loam
Bg - 10 to 19 inches: gravelly sandy loam
Cd - 19 to 66 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 15 to 35 inches to densic material
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Woodbridge, very stony

Percent of map unit: 7 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Whitman, very stony

Percent of map unit: 4 percent
Landform: Drumlins, ground moraines, hills, drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave

Across-slope shape: Concave
Hydric soil rating: Yes

Scituate, very stony

Percent of map unit: 2 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Walpole

Percent of map unit: 2 percent
Landform: Drainageways, outwash terraces, depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

WgB—Woodbridge fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2ql
Elevation: 0 to 1,470 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Woodbridge, fine sandy loam, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Fine Sandy Loam

Setting

Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 18 inches: fine sandy loam
Bw2 - 18 to 30 inches: fine sandy loam
Cd - 30 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Paxton

Percent of map unit: 10 percent
Landform: Drumlins, ground moraines, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury

Percent of map unit: 8 percent
Landform: Depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Toeslope, backslope, footslope
Landform position (three-dimensional): Base slope, head slope, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

WsB—Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2t2qr
Elevation: 0 to 1,440 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Woodbridge, very stony, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Very Stony

Setting

Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 9 inches: fine sandy loam
Bw1 - 9 to 20 inches: fine sandy loam
Bw2 - 20 to 32 inches: fine sandy loam
Cd - 32 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 19 to 27 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Paxton, very stony

Percent of map unit: 10 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 8 percent
Landform: Hills, drainageways, drumlins, depressions, ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

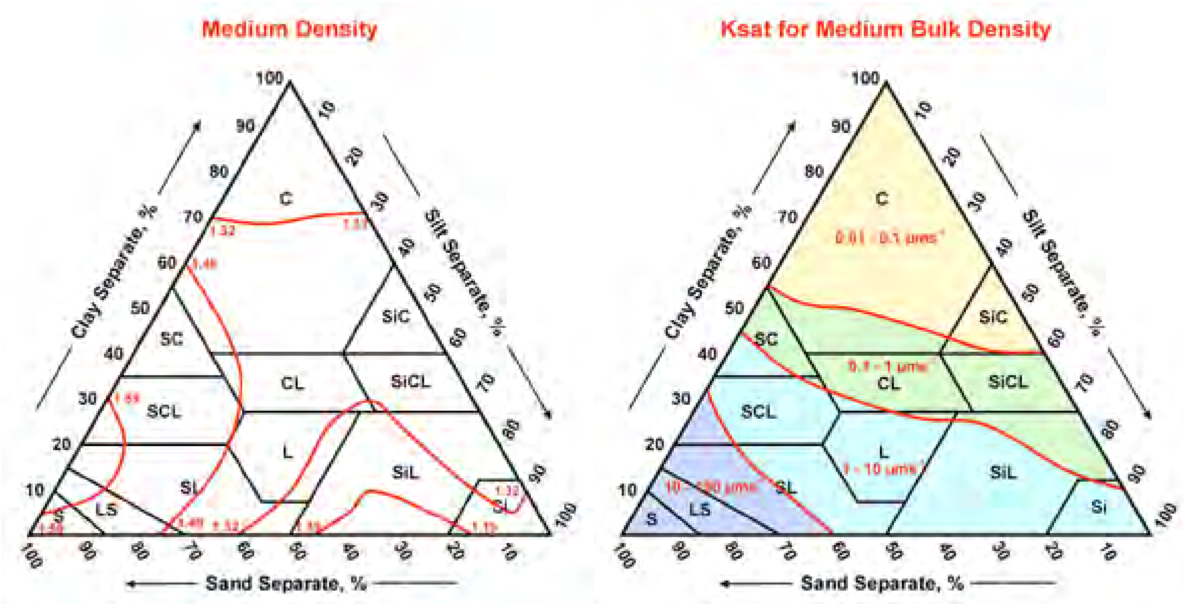
United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

K_{sat} VALUES
FOR
NEW HAMPSHIRE SOILS
(Including Hydrologic and DES Soil Lot Sizing Groups)



From: **Guide for Estimating Ksat from Soil Properties** (**Exhibit 618-9**). (http://soils.usda.gov/technical/handbook/contents/part618ex.html)

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K_{sat} VALUES
FOR
NEW HAMPSHIRE SOILS

ABOUT THE SOCIETY OF SOIL SCIENTISTS OF NORTHERN NEW ENGLAND

The Society of Soil Scientists of Northern New England (SSSNNE) is a non-profit professional organization of soil scientists, both in the private and public sectors, which is dedicated to the advancement of soil science. The Society fosters the profession of soil classification, mapping and interpretation, and encourages the dissemination of information concerning soil science. With the intent of contributing to the general human welfare, the Society seeks to educate the public on the wise use of soils and the associated natural resources.

INTRODUCTION

The publication "K_{sat} Values for New Hampshire Soils" is designed to assist soil scientists, engineers, and other professionals by assembling tables of existing data for all soil series currently on the state soil legend with regard to K_{sat} values and hydrologic groupings (Hyd.Grp.). The need for this information has become more important since the adoption by the New Hampshire Department of Environmental Services of the revised Alteration of Terrain rules for stormwater management. Additional information has been provided for each soil series with regard to landform, temperature regime (Temp.), soil textures, NHDES Soil Lot Size Groupings (Group), whether the soil is a Spodosol (Spodosol?) and other information which will be valuable to a variety of soil information users.

The data for each soil series has been sorted 3 ways for ease of searching:

Table A-Sorted by Numerical Legend
Table B-Sorted by Soil Series Name
Table C-Sorted by NHDES Soil Group for Establishing Lot Size

The report represents cumulative efforts by private soil scientists and NHDES staff with assistance from the USDA Natural Resource Conservation Service.

Comments or inquires on the information in this publication may be directed to the Board of Directors at the following address:

Society of Soil Scientists
of Northern New England
PO Box 76
Durham, NH 03824

SATURATED HYDRAULIC CONDUCTIVITY (K_{SAT})

K_{sat} refers to the ease with which pores in a saturated soil transmit water. The estimates presented here are expressed in terms of inches per hour (NRCS official data presents K_{sat} in both micrometers per second and inches per hour). K_{sat} values are based on soil characteristics observed in the field, particularly structure, consistence, porosity, and texture. (USDA NRCS, Web Soil Survey)

Saturated flow occurs when the soil water pressure is positive; that is, when the soil matric potential is zero (satiated wet condition). In most soils this situation takes place when about 95 percent of the total pore space is filled with water. The remaining 5 percent is filled with entrapped air. Saturated hydraulic conductivity cannot be used to describe water movement under unsaturated conditions. (Soil Survey Manual, 1993)

It is commonly known that soil features (and thus data) for a certain soil series name may be slightly different from one county soil survey to the next and the range in characteristics (via the Typical Pedon) may be slightly different. For example – a Marlow soil (series) in Carroll County may have a higher sand content in its B horizon as opposed to a Marlow soil (series) in Coos County; resulting in a slightly different Ksat range for the B horizon.

The K_{sat} data for this publication was obtained from the USDA-NRCS Soil Data Mart using the Typical Pedon from the county that best reflected the soil and/or had the most acres of that soil. This data is presented in B and C horizons only as it is assumed that the topsoil (A or A_p horizon) will be removed in typical construction practices.

References:

Web Soil Survey. *Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/.*

Soil Data Mart. *http://soildatamart.nrcs.usda.gov/*.

Soil Survey Manual. *Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.*

HYDROLOGIC SOIL GROUPS

Hydrologic group is a group of soils having the same runoff potential under similar storm and cover conditions.

Hydrologic groups are used in equations that estimate runoff from rainfall. These estimates are needed for solving hydrologic problems that arise in planning stormwater management, watershed protection, and flood-prevention projects and for planning or designing structures for the use, control, and disposal of water.

Classifications assigned to soils were based on the use of rainfall-runoff data from small watersheds and infiltrometer plots. From these data, relationships between soil properties and hydrologic groups were established. Assignment of soils to hydrologic groups is based on the relationship between soil properties and hydrologic groups. Wetness characteristics, permeability after prolonged wetting, and depth to very slowly permeable layers are properties that assist in estimating hydrologic groups. Minimum annual steady ponded infiltration rate for a bare ground surface determines the hydrologic soil groups.

Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonally high water table, intake rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. (The influence of ground cover is treated independently, not in hydrologic soil groups.).

The soils in the United States are placed into four groups, A, B, C, and D, and three dual classes, *A/D, B/D,* and *C/D.* In the definitions of the classes, infiltration rate is the rate at which water enters the soil at the surface and is controlled by the surface conditions. Transmission rate is the rate at which water moves in the soil and is controlled by soil properties. Definitions of the classes are as follows:

Group A- Saturated hydraulic conductivity is very high or in the upper half of high and internal free water occurrence is very deep. Soils in this group have low runoff potential when thoroughly wet. Water is transmitted freely through the soil. Group A soils typically have less than 10 percent clay and more than 90 percent sand or gravel and have gravel or sand textures. Some soils having loamy sand, sandy loam, loam or silt loam textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The limits on the diagnostic physical characteristics of group A are as follows. The saturated hydraulic conductivity of all soil layers exceeds 40.0 micrometers per second (5.67 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a water impermeable layer are in group A if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 10 micrometers per second (1.42 inches per hour).

Group B- Saturated hydraulic conductivity is in the lower half of high or in the upper half of moderately high and free water occurrence is deep or very deep. Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded. Group B soils typically have between 10 percent and 20 percent clay and 50 percent to 90 percent sand and have loamy sand or sandy loam textures. Some soils having loam, silt loam, silt, or sandy clay loam textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The limits on the diagnostic physical characteristics of group B are as follows. The saturated hydraulic conductivity in the least transmissive layer between the surface and 50 centimeters [20 inches] ranges from 10.0 micrometers per second (1.42 inches per hour) to 40.0 micrometers per second (5.67 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a water impermeable layer or water table are in group B if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 4.0 micrometers per second (0.57 inches per hour) but is less than 10.0 micrometers per second (1.42 inches per hour).

Group C- Saturated hydraulic conductivity is in the lower half of moderately high or in the upper half of moderately low and internal free water occurrence is deeper than shallow. Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted. Group C soils typically have between 20 percent and 40 percent clay and less than 50 percent sand and have loam, silt loam, sandy clay loam, clay loam, and silty clay loam textures. Some soils having clay, silty clay, or sandy clay textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The limits on the diagnostic physical characteristics of group C are as follows. The saturated hydraulic conductivity in the least transmissive layer between the surface and 50 centimeters [20 inches] is between 1.0 micrometers per second (0.14 inches per hour) and 10.0 micrometers per second (1.42 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a restriction or water table are in group C if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 0.40 micrometers per second (0.06 inches per hour) but is less than 4.0 micrometers per second (0.57 inches per hour). .

Group D- Saturated hydraulic conductivity is below the upper half of moderately low, and/or internal free water occurrence is shallow or very shallow and transitory through permanent. Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted. Group D soils typically have greater than 40 percent clay, less than 50 percent sand, and have clayey textures. In some areas, they also have high shrink-swell potential. All soils with a depth to a water impermeable layer less than 50 centimeters [20 inches] and all soils with a water table within 60 centimeters [24 inches] of the surface are in this group, although some may have a dual classification, as described in the next section, if they can be adequately drained. The limits on the physical diagnostic characteristics of group D are as follows. For soils with a water impermeable layer at a depth between 50 centimeters and 100 centimeters [20 and 40 inches], the saturated hydraulic conductivity in the least transmissive soil layer is less than or equal to 1.0 micrometers per second (0.14 inches per hour). For soils that are deeper than 100 centimeters [40 inches] to a restriction or water table, the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface is less than or equal to 0.40 micrometers per second (0.06 inches per hour).

Dual hydrologic soil groups-Certain wet soils are placed in group D based solely on the presence of a water table within 60 centimeters [24 inches] of the surface even though the saturated hydraulic conductivity may be favorable for water transmission. If these soils can be adequately drained, then they are assigned to dual hydrologic soil groups *(A/D, B/D,* and *C/D)* based on their saturated hydraulic conductivity and the water table depth when drained. The first letter applies to the drained condition and the second to the undrained condition. For the purpose of hydrologic soil group, adequately drained means that the seasonal high water table is kept at least 60 centimeters [24 inches] below the surface in a soil where it would be higher in a natural state.

References:

National Engineering Handbook, Natural Resource Conservation Service, U.S. Department of Agriculture.

Soil Data Mart. *http://soildatamart.nrcs.usda.gov/*.

Soil Survey Manual. *Soil Survey Division Staff. 1993. Soil survey manual. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 18.*

TABLE A

NUMERICAL LEGEND

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Occum	1	0.6	2.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	mesic	loamy	no	loamy over loamy sand
Suncook	2	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	occasionally flooded
Lim	3	0.6	2.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Pootatuck	4	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	mesic	loamy	no	single grain in C
Rippowam	5	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Saco	6	0.6	2.0	6.00	20.0	D	6	Flood Plain (Bottom Land)	mesic	silty	no	strata
Hadley	8	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand
Winooski	9	0.6	6.0	0.60	6.0	B		Flood Plain (Bottom Land)	mesic	silty over loamy	no	
Merrimac	10	2.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	gravelly sand	no	loamy cap
Gloucester	11	6.0	20.0	6.00	20.0	A	1	Sandy Till	mesic	sandy-skeletal	no	loamy cap
Hinckley	12	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	
Sheepscot	14	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly coarse sand
Searsport	15	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	frigid	sandy	no	organic over sand
Saugatuck	16	0.06	0.2	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	yes	ortstein
Colton, gravelly	21	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly surface
Colton	22	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	
Masardis	23	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	slate, loamy cap
Agawam	24	6.0	20.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Windsor	26	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	sandy	no	
Groveton	27	0.6	2.0	0.60	6.0	B	2	Outwash and Stream Terraces	frigid	loamy	yes	loamy over sandy
Madawaska	28	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Woodbridge	29	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	mesic	loamy	no	sandy loam in Cd
Unadilla	30	0.6	2.0	2.00	20.0	B	2	Terraces and glacial lake plains	mesic	silty	no	silty over gravelly
Hartland	31	0.6	2.0	0.20	2.0	B	2	Terraces and glacial lake plains	mesic	silty	no	very fine sandy loam
Boxford	32	0.1	0.2	0.00	0.2	C	3	Silt and Clay Deposits	mesic	fine	no	silty clay loam
Scitico	33	0.0	0.2	0.00	0.2	C	5	Silt and Clay Deposits	mesic	fine	no	
Wareham	34	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Champlain	35	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	gravelly sand	no	
Adams	36	6.0	20.0	20.00	99.0	A	1	Outwash and Stream Terraces	frigid	sandy	yes	
Melrose	37	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	silty clay loam in C
Eldridge	38	6.0	20.0	0.06	0.6	C	3	Sandy/loamy over silt/clay	mesic	sandy over loamy	no	
Millis	39					C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Canton	42	2.0	6.0	6.00	20.0	B	2	Loose till, sandy textures	mesic	loamy over sandy	no	loamy over loamy sand
Montauk	44	0.6	6.0	0.06	0.6	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Henniker	46	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Madawaska, aquentic	48	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Whitman	49	0.0	0.2	0.00	0.2	D	6	Firm, platy, loamy till	mesic	loamy	no	mucky loam
Hermon	55	2.0	20.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	loamy cap
Becket	56	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	gravelly sandy loam in Cd
Waumbeck	58	2.0	20.0	6.00	20.0	B	3	Loose till, sandy textures	frigid	sandy-skeletal	yes	very cobbly loamy sand
Charlton	62	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	mesic	loamy	no	fine sandy loam
Paxton	66	0.6	2.0	0.00	0.2	C	3	Firm, platy, loamy till	mesic	loamy	no	
Sutton	68	0.6	6.0	0.60	6.0	B	3	Loose till, loamy textures	mesic	loamy	no	
Berkshire	72	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	fine sandy loam
Marlow	76	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Peru	78	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	
Thorndike	84	0.6	2.0	0.60	2.0	C/D	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	less than 20 in. deep
Hollis	86	0.6	6.0	0.60	6.0	C/D	4	Loose till, bedrock	mesic	loamy	no	less than 20 in. deep
Winnecook	88	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Chatfield	89	0.6	6.0	0.60	6.0	B	4	Loose till, bedrock	mesic	loamy	no	20 to 40 in. deep
Hogback	91	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Lyman	92	2.0	6.0	2.00	6.0	A/D	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Woodstock	93	2.0	6.0	2.00	6.0	C/D	4	Loose till, bedrock	frigid	loamy	no	less than 20 in. deep
Rawsonville	98	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Tunbridge	99	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Ondawa	101	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	loamy over loamy sand
Sunday	102	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	occasionally flooded
Winooski	103	0.6	6.0	0.60	6.0	B	3	Flood Plain (Bottom Land)	mesic	silty	no	very fine sandy loam
Podunk	104	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	frigid	loamy	no	loamy to coarse sand in C
Rumney	105	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	frigid	loamy	no	
Hadley	108	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand, occ flooded
Limerick	109	0.6	2.0	0.60	2.0	C	5	Flood Plain (Bottom Land)	mesic	silty	no	
Scarboro	115	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	mesic	sandy	no	organic over sand, non stony
Finch	116					C	3	Outwash and Stream Terraces	frigid	sandy	yes	cemented (ortstein)
Sudbury	118	2.0	6.0	2.00	20.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	loam over gravelly sand
Telos	123	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Chesuncook	126	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Allagash	127	0.6	2.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy	yes	loamy over sandy
Elliottsville	128	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	20 to 40 in. deep
Hitchcock	130	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam to silt in C
Burnham	131	0.2	6.0	0.02	0.2	D	6	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	organic over silt
Dartmouth	132	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	thin strata silty clay loam
Monson	133	0.6	2.0	0.60	2.0	D	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	less than 20 in. deep
Maybid	134	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	mesic	fine	no	silt over clay
Shapleigh	136					C/D	4	Sandy Till	mesic	sandy	yes	less than 20 in. deep
Monadnock	142	0.6	2.0	2.00	6.0	B	2	Loose till, sandy textures	frigid	loamy over sandy, sandy-skeletal	yes	gravelly loamy sand in C
Acton	146	2.0	20.0	2.00	20.0	B	3	Loose till, sandy textures	mesic	sandy-skeletal	no	cobbly loamy sand
Vassalboro	150					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Success	154	2.0	6.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	cemented
Canterbury	166	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Sunapee	168	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	
Waskish	195					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Ondawa	201	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	occ flood, loamy over l. sand
Sunday	202	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	frequently flooded
Fryeburg	208	0.6	2.0	2.00	6.0	B	2	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Charles	209	0.6	100.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	silty	no	
Warwick	210	2.0	6.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	loamy-skeletal	no	loamy over slate gravel
Naumburg	214	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Boscawen	220	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	no	loamy cap
Bemis	224	0.6	0.2	0.00	0.2	C	5	Firm, platy, loamy till	cryic	loamy	no	
Bice	226	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	no	sandy loam
Lanesboro	228	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	channery silt loam in Cd
Poocham	230	0.6	2.0	0.20	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam in C
Buxton	232	0.1	0.6	0.00	0.2	C	3	Silt and Clay Deposits	frigid	fine	no	silty clay
Scantic	233	0.0	0.2	0.00	0.2	D	5	Silt and Clay Deposits	frigid	fine	no	
Biddeford	234	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	frigid	fine	no	organic over clay
Buckland	237	0.6	2.0	0.06	0.2	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Elmridge	238	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	loamy over clayey	no	
Brayton	240	0.6	2.0	0.06	0.6	C	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Lyme	246	0.6	6.0	0.60	6.0	C	5	Loose till, sandy textures	frigid	loamy	no	
Millsite	251	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	no	20 to 40 in. deep
Macomber	252	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Lombard	259	0.6	6.0	2.00	20.0	C/D	2	Weathered bedrock, phyllite	frigid	loamy	no	very channery
Sunapee var	269	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	frigid dystrudept
Chatfield Var.	289	0.6	6.0	0.60	6.0	B	3	Loose till, bedrock	mesic	loamy	no	mwd to swpd
Greenwood	295					A/D	6	Organic Materials - Freshwater	frigid	hemic	no	deep organic
Catden	296					A/D	6	Organic Materials - Freshwater	mesic	sapric	no	deep organic
Lovewell	307	0.6	2.0	0.60	2.0	B	3	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Quonset	310	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	shale
Deerfield	313	6.0	20.0	20.00	100.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	single grain in C

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Pipestone	314					B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Mashpee	315	6.0	20.0	6.00	20.0	B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Bernardston	330	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Roundabout	333	0.2	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	silt loam in the C
Pittstown	334	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Elmwood	338	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	
Stissing	340	0.6	2.0	0.06	0.2	C	5	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	
Cardigan	357	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	20 to 40 in. deep
Kearsarge	359	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	less than 20 in. deep
Dutchess	366	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	mesic	loamy	no	very channery
Dixfield	378	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Timakwa	393			6.00	100.0	D	6	Organic Materials - Freshwater	mesic	sandy or sandy-skeletal	no	organic over sand
Chocorua	395			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Ipswich	397					D	6	Tidal Flat	mesic	hemic/sapric	no	deep organic
Suncook	402	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	frequent flooding
Metallak	404	6.0	100.0	6.00	100.0	B	3	Flood Plain (Bottom Land)	frigid	loamy over sandy	no	sandy or sandy-skeletal
Medomak	406	0.6	2.0	0.60	2.0	D	6	Flood Plain (Bottom Land)	frigid	silty	no	organic over silt
Haven	410	0.6	2.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Duane	413	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	cemented (ortstein)
Moosilauke	414	6.0	20.0	6.00	20.0	C	5	Loose till, sandy textures	frigid	sandy	no	
Grange	433	0.6	2.0	0.60	2.0	C	5	Outwash and Stream Terraces	frigid	co. loamy over sandy (skeletal)	no	
Swanton	438	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	frigid	co. loamy over clayey	no	
Shaker	439	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	mesic	co. loamy over clayey	no	
Chichester	442	0.6	2.0	2.00	6.0	B		Loose till, sandy textures	frigid	loamy over sandy	no	loamy over loamy sand
Newfields	444	0.6	2.0	0.60	2.0	B	3	Loose till, sandy textures	mesic	loamy over sandy	no	sandy or sandy-skeletal
Scituate	448	0.6	2.0	0.06	0.2	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Metacomet	458	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Pennichuck	460	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy-skeletal	no	20 to 40 in. deep
Gilmanton	478	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	fine sandy loam in Cd
Ossipee	495			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Natchaug	496			0.20	2.0	D	6	Organic Materials - Freshwater	mesic	loamy	no	organic over loam
Pawcatuck	497			20.00	100.0	D	6	Tidal Flat	mesic	sandy or sandy-skeletal	no	organic over sand
Abenaki	501	0.6	2.0	6.00	99.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy-skeletal	no	loamy over gravelly
Cohas	505	0.6	2.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	co. loamy over sandy (skeletal)	no	
Hoosic	510	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	slate, loamy cap
Ninigret	513	0.6	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	mesic	loamy over sandy	no	sandy or sandy-skeletal
Leicester	514	0.6	6.0	0.60	20.0	C	5	Loose till, loamy textures	mesic	loamy	no	
Au Gres	516					B	5	Outwash and Stream Terraces	frigid	sandy	yes	single grain, loose
Machias	520	2.0	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy or sandy-skeletal	yes	strata sand/gravel in C
Stetson	523	0.6	6.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	loamy over gravelly
Caesar	526	20.0	100.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	coarse sand	no	
Scio	531	0.6	2.0	0.60	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	gravelly sand in 2C
Belgrade	532	0.6	2.0	0.06	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	strata of fine sand
Raynham	533	0.2	2.0	0.06	0.2	C	5	Terraces and glacial lake plains	mesic	silty	no	
Binghamville	534	0.2	2.0	0.06	0.2	D	5	Terraces and glacial lake plains	mesic	silty	no	
Suffield	536	0.6	2.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	silty over clayey	no	deep to clay C
Squamscott	538	6.0	20.0	0.06	0.6	C	5	Sandy/loamy over silt/clay	mesic	sandy over loamy	yes	
Raypol	540	0.6	2.0	6.00	100.0	D	5	Outwash and Stream Terraces	mesic	co. loamy over sandy (skeletal)	no	
Walpole	546	2.0	6.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Peacham	549	0.6	2.0	0.00	0.2	D	6	Firm, platy, silty till, schist & phylitte	frigid	loamy	no	organic over loam
Skerry	558	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Plaisted	563	0.6	2.0	0.06	0.6	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Howland	566	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	silt loam, platy in Cd
Monarda	569	0.2	2.0	0.02	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Bangor	572	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Dixmont	578	0.6	2.0	0.60	2.0	C	3	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam, platy in C
Cabot	589	0.6	2.0	0.06	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Westbrook	597			0.00	2.0	D	6	Tidal Flat	mesic	loamy	no	organic over loam
Mundal	610	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	gravelly sandy loam in Cd
Croghan	613	20.0	100.0	20.00	100.0	B	3	Outwash and Stream Terraces	frigid	sandy	yes	single grain in C
Kinsman	614	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Salmon	630	0.6	2.0	0.60	2.0	B	2	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Nicholville	632	0.6	2.0	0.60	2.0	C	3	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Pemi	633	0.6	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	
Pillsbury	646	0.6	2.0	0.06	0.2	C	5	Firm, platy, loamy till	frigid	silty	no	
Ridgebury	656	0.6	6.0	0.00	0.2	C	5	Firm, platy, loamy till	mesic	loamy	no	
Canaan	663	2.0	20.0	2.00	20.0	C	4	Weathered Bedrock Till	frigid	loamy-skeletal	yes	less than 20 in. deep
Redstone	665	2.0	6.0	6.00	20.0	A	1	Weathered Bedrock Till	frigid	fragmental	yes	loamy cap
Sisk	667	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	sandy loam in Cd
Surplus	669	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	mwd, sandy loam in Cd
Glebe	671	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	cryic	loamy	yes	20 to 40 in. deep
Saddleback	673	0.6	2.0	0.60	2.0	C/D	4	Loose till, bedrock	cryic	loamy	yes	less than 20 in. deep
Ricker	674	2.0	6.0	2.00	6.0	A	4	Organic over bedrock (up to 4" of mineral)	cryic	fibric to hemic	no	well drained, less than 20 in. deep
Houghtonville	795	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	cobbly fine sandy loam
Matunuck	797			20.00	100.0	D	6	Tidal Flat	mesic	sandy	no	organic over sand
Meadowsedge	894					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Bucksport	895					D	6	Organic Materials - Freshwater	frigid	sapric	no	deep organic
Colonel	927	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	loam in Cd
Pondicherry	992			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Wonsqueak	995			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Glover	NA	0.6	2.0	0.60	2	D	4	Friable till, silty, schist & phyllite	frigid	loamy	no	less than 20 in. deep

(dark shading)	no longer recognized
(light shading)	organic materials

TABLE B

SOIL SERIES

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Abenaki	501	0.6	2.0	6.00	99.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy-skeletal	no	loamy over gravelly
Acton	146	2.0	20.0	2.00	20.0	B	3	Loose till, sandy textures	mesic	sandy-skeletal	no	cobbly loamy sand
Adams	36	6.0	20.0	20.00	99.0	A	1	Outwash and Stream Terraces	frigid	sandy	yes	
Agawam	24	6.0	20.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Allagash	127	0.6	2.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy	yes	loamy over sandy
Au Gres	516					B	5	Outwash and Stream Terraces	frigid	sandy	yes	single grain, loose
Bangor	572	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam
Becket	56	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	gravelly sandy loam in Cd
Belgrade	532	0.6	2.0	0.06	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	strata of fine sand
Bemis	224	0.6	0.2	0.00	0.2	C	5	Firm, platy, loamy till	cryic	loamy	no	
Berkshire	72	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	fine sandy loam
Bernardston	330	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Bice	226	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	no	sandy loam
Biddeford	234	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	frigid	fine	no	organic over clay
Binghamville	534	0.2	2.0	0.06	0.2	D	5	Terraces and glacial lake plains	mesic	silty	no	
Boscawen	220	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	no	loamy cap
Boxford	32	0.1	0.2	0.00	0.2	C	3	Silt and Clay Deposits	mesic	fine	no	silty clay loam
Brayton	240	0.6	2.0	0.06	0.6	C	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Buckland	237	0.6	2.0	0.06	0.2	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Bucksport	895					D	6	Organic Materials - Freshwater	frigid	sapric	no	deep organic
Burnham	131	0.2	6.0	0.02	0.2	D	6	Firm, platy, silty till, schist & phylite	frigid	loamy	no	organic over silt
Buxton	232	0.1	0.6	0.00	0.2	C	3	Silt and Clay Deposits	frigid	fine	no	silty clay
Cabot	589	0.6	2.0	0.06	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Caesar	526	20.0	100.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	coarse sand	no	
Canaan	663	2.0	20.0	2.00	20.0	C	4	Weathered Bedrock Till	frigid	loamy-skeletal	yes	less than 20 in. deep
Canterbury	166	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Canton	42	2.0	6.0	6.00	20.0	B	2	Loose till, sandy textures	mesic	loamy over sandy	no	loamy over loamy sand
Cardigan	357	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	20 to 40 in. deep
Catden	296					A/D	6	Organic Materials - Freshwater	mesic	sapric	no	deep organic
Champlain	35	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	gravelly sand	no	
Charles	209	0.6	100.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	silty	no	
Charlton	62	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	mesic	loamy	no	fine sandy loam
Chatfield	89	0.6	6.0	0.60	6.0	B	4	Loose till, bedrock	mesic	loamy	no	20 to 40 in. deep
Chatfield Var.	289	0.6	6.0	0.60	6.0	B	3	Loose till, bedrock	mesic	loamy	no	mwd to swpd
Chesuncook	126	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Chichester	442	0.6	2.0	2.00	6.0	B		Loose till, sandy textures	frigid	loamy over sandy	no	loamy over loamy sand
Chocorua	395			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Cohas	505	0.6	2.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	co. loamy over sandy (skeletal)	no	
Colonel	927	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	loam in Cd
Colton	22	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	
Colton, gravelly	21	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly surface
Croghan	613	20.0	100.0	20.00	100.0	B	3	Outwash and Stream Terraces	frigid	sandy	yes	single grain in C
Dartmouth	132	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	thin strata silty clay loam
Deerfield	313	6.0	20.0	20.00	100.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	single grain in C
Dixfield	378	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Dixmont	578	0.6	2.0	0.60	2.0	C	3	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam, platy in C
Duane	413	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	cemented (ortstein)
Dutchess	366	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	mesic	loamy	no	very channery
Eldridge	38	6.0	20.0	0.06	0.6	C	3	Sandy/loamy over silt/clay	mesic	sandy over loamy	no	
Elliottsville	128	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	20 to 40 in. deep
Elmridge	238	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	loamy over clayey	no	
Elmwood	338	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	
Finch	116					C	3	Outwash and Stream Terraces	frigid	sandy	yes	cemented (ortstein)

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Fryeburg	208	0.6	2.0	2.00	6.0	B	2	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Gilmanton	478	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	fine sandy loam in Cd
Glebe	671	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	cryic	loamy	yes	20 to 40 in. deep
Gloucester	11	6.0	20.0	6.00	20.0	A	1	Sandy Till	mesic	sandy-skeletal	no	loamy cap
Glover	NA	0.6	2.0	0.60	2	D	4	Friable till, silty, schist & phyllite	frigid	loamy	no	less than 20 in. deep
Grange	433	0.6	2.0	0.60	2.0	C	5	Outwash and Stream Terraces	frigid	co. loamy over sandy (skeletal)	no	
Greenwood	295					A/D	6	Organic Materials - Freshwater	frigid	hemic	no	deep organic
Groveton	27	0.6	2.0	0.60	6.0	B	2	Outwash and Stream Terraces	frigid	loamy	yes	loamy over sandy
Hadley	8	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand
Hadley	108	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand, occ flooded
Hartland	31	0.6	2.0	0.20	2.0	B	2	Terraces and glacial lake plains	mesic	silty	no	very fine sandy loam
Haven	410	0.6	2.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Henniker	46	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Hermon	55	2.0	20.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	loamy cap
Hinckley	12	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	
Hitchcock	130	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam to silt in C
Hogback	91	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Hollis	86	0.6	6.0	0.60	6.0	C/D	4	Loose till, bedrock	mesic	loamy	no	less than 20 in. deep
Hoosic	510	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	slate, loamy cap
Houghtonville	795	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	cobbly fine sandy loam
Howland	566	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	silt loam, platy in Cd
Ipswich	397					D	6	Tidal Flat	mesic	hemic/sapric	no	deep organic
Kearsarge	359	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	less than 20 in. deep
Kinsman	614	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Lanesboro	228	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	channery silt loam in Cd
Leicester	514	0.6	6.0	0.60	20.0	C	5	Loose till, loamy textures	mesic	loamy	no	
Lim	3	0.6	2.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Limerick	109	0.6	2.0	0.60	2.0	C	5	Flood Plain (Bottom Land)	mesic	silty	no	
Lombard	259	0.6	6.0	2.00	20.0	C/D	2	Weathered bedrock, phyllite	frigid	loamy	no	very channery
Lovewell	307	0.6	2.0	0.60	2.0	B	3	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Lyman	92	2.0	6.0	2.00	6.0	A/D	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Lyme	246	0.6	6.0	0.60	6.0	C	5	Loose till, sandy textures	frigid	loamy	no	
Machias	520	2.0	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy or sandy-skeletal	yes	strata sand/gravel in C
Macomber	252	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Madawaska	28	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
ladawaska, aquer	48	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Marlow	76	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Masardis	23	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	slate, loamy cap
Mashpee	315	6.0	20.0	6.00	20.0	B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Matunuck	797			20.00	100.0	D	6	Tidal Flat	mesic	sandy	no	organic over sand
Maybid	134	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	mesic	fine	no	silt over clay
Meadowsedge	894					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Medomak	406	0.6	2.0	0.60	2.0	D	6	Flood Plain (Bottom Land)	frigid	silty	no	organic over silt
Melrose	37	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	silty clay loam in C
Merrimac	10	2.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	gravelly sand	no	loamy cap
Metacomet	458	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Metallak	404	6.0	100.0	6.00	100.0	B	3	Flood Plain (Bottom Land)	frigid	loamy over sandy	no	sandy or sandy-skeletal
Millis	39					C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Millsite	251	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	no	20 to 40 in. deep
Monadnock	142	0.6	2.0	2.00	6.0	B	2	Loose till, sandy textures	frigid	oamy over sandy, sandy-skeleta	yes	gravelly loamy sand in C
Monarda	569	0.2	2.0	0.02	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Monson	133	0.6	2.0	0.60	2.0	D	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	less than 20 in. deep
Montauk	44	0.6	6.0	0.06	0.6	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Moosilauke	414	6.0	20.0	6.00	20.0	C	5	Loose till, sandy textures	frigid	sandy	no	

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Mundal	610	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	gravelly sandy loam in Cd
Natchaug	496			0.20	2.0	D	6	Organic Materials - Freshwater	mesic	loamy	no	organic over loam
Naumburg	214	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Newfields	444	0.6	2.0	0.60	2.0	B	3	Loose till, sandy textures	mesic	loamy over sandy	no	sandy or sandy-skeletal
Nicholville	632	0.6	2.0	0.60	2.0	C	3	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Ninigret	513	0.6	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	mesic	loamy over sandy	no	sandy or sandy-skeletal
Occum	1	0.6	2.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	mesic	loamy	no	loamy over loamy sand
Ondawa	101	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	loamy over loamy sand
Ondawa	201	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	occ flood, loamy over l. sand
Ossipee	495			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Pawcatuck	497			20.00	100.0	D	6	Tidal Flat	mesic	sandy or sandy-skeletal	no	organic over sand
Paxton	66	0.6	2.0	0.00	0.2	C	3	Firm, platy, loamy till	mesic	loamy	no	
Peacham	549	0.6	2.0	0.00	0.2	D	6	Firm, platy, silty till, schist & phylitte	frigid	loamy	no	organic over loam
Pemi	633	0.6	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	
Pennichuck	460	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy-skeletal	no	20 to 40 in. deep
Peru	78	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	
Pillsbury	646	0.6	2.0	0.06	0.2	C	5	Firm, platy, loamy till	frigid	silty	no	
Pipestone	314					B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Pittstown	334	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Plaisted	563	0.6	2.0	0.06	0.6	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Podunk	104	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	frigid	loamy	no	loamy to coarse sand in C
Pondicherry	992			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Poocham	230	0.6	2.0	0.20	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam in C
Pootatuck	4	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	mesic	loamy	no	single grain in C
Quonset	310	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	shale
Rawsonville	98	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Raynham	533	0.2	2.0	0.06	0.2	C	5	Terraces and glacial lake plains	mesic	silty	no	
Raypol	540	0.6	2.0	6.00	100.0	D	5	Outwash and Stream Terraces	mesic	co. loamy over sandy (skeletal)	no	
Redstone	665	2.0	6.0	6.00	20.0	A	1	Weathered Bedrock Till	frigid	fragmental	yes	loamy cap
Ricker	674	2.0	6.0	2.00	6.0	A	4	rganic over bedrock (up to 4" of minera	cryic	fibric to hemic	no	well drained, less than 20 in. deep
Ridgebury	656	0.6	6.0	0.00	0.2	C	5	Firm, platy, loamy till	mesic	loamy	no	
Rippowam	5	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Roundabout	333	0.2	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	silt loam in the C
Rumney	105	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	frigid	loamy	no	
Saco	6	0.6	2.0	6.00	20.0	D	6	Flood Plain (Bottom Land)	mesic	silty	no	strata
Saddleback	673	0.6	2.0	0.60	2.0	C/D	4	Loose till, bedrock	cryic	loamy	yes	less than 20 in. deep
Salmon	630	0.6	2.0	0.60	2.0	B	2	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Saugatuck	16	0.06	0.2	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	yes	ortstein
Scantic	233	0.0	0.2	0.00	0.2	D	5	Silt and Clay Deposits	frigid	fine	no	
Scarboro	115	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	mesic	sandy	no	organic over sand, non stony
Scio	531	0.6	2.0	0.60	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	gravelly sand in 2C
Scitico	33	0.0	0.2	0.00	0.2	C	5	Silt and Clay Deposits	mesic	fine	no	
Scituate	448	0.6	2.0	0.06	0.2	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Searsport	15	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	frigid	sandy	no	organic over sand
Shaker	439	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	mesic	co. loamy over clayey	no	
Shapleigh	136					C/D	4	Sandy Till	mesic	sandy	yes	less than 20 in. deep
Sheepscot	14	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly coarse sand
Sisk	667	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	sandy loam in Cd
Skerry	558	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Squamscott	538	6.0	20.0	0.06	0.6	C	5	Sandy/loamy over silt/clay	mesic	sandy over loamy	yes	
Stetson	523	0.6	6.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	loamy over gravelly
Stissing	340	0.6	2.0	0.06	0.2	C	5	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	
Success	154	2.0	6.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	cemented
Sudbury	118	2.0	6.0	2.00	20.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	loam over gravelly sand

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Suffield	536	0.6	2.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	silty over clayey	no	deep to clay C
Sunapee	168	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	
Sunapee var	269	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	frigid dystrudept
Suncook	2	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	occasionally flooded
Suncook	402	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	frequent flooding
Sunday	102	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	occasionally flooded
Sunday	202	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	frequently flooded
Surplus	669	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	mwd, sandy loam in Cd
Sutton	68	0.6	6.0	0.60	6.0	B	3	Loose till, loamy textures	mesic	loamy	no	
Swanton	438	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	frigid	co. loamy over clayey	no	
Telos	123	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Thorndike	84	0.6	2.0	0.60	2.0	C/D	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	less than 20 in. deep
Timakwa	393			6.00	100.0	D	6	Organic Materials - Freshwater	mesic	sandy or sandy-skeletal	no	organic over sand
Tunbridge	99	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Unadilla	30	0.6	2.0	2.00	20.0	B	2	Terraces and glacial lake plains	mesic	silty	no	silty over gravelly
Vassalboro	150					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Walpole	546	2.0	6.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Wareham	34	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Warwick	210	2.0	6.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	loamy-skeletal	no	loamy over slate gravel
Waskish	195					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Waumbeck	58	2.0	20.0	6.00	20.0	B	3	Loose till, sandy textures	frigid	sandy-skeletal	yes	very cobbly loamy sand
Westbrook	597			0.00	2.0	D	6	Tidal Flat	mesic	loamy	no	organic over loam
Whitman	49	0.0	0.2	0.00	0.2	D	6	Firm, platy, loamy till	mesic	loamy	no	mucky loam
Windsor	26	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	sandy	no	
Winnecook	88	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Winooski	9	0.6	6.0	0.60	6.0	B		Flood Plain (Bottom Land)	mesic	silty over loamy	no	
Winooski	103	0.6	6.0	0.60	6.0	B	3	Flood Plain (Bottom Land)	mesic	silty	no	very fine sandy loam
Wonsqueak	995			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Woodbridge	29	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	mesic	loamy	no	sandy loam in Cd
Woodstock	93	2.0	6.0	2.00	6.0	C/D	4	Loose till, bedrock	frigid	loamy	no	less than 20 in. deep

no longer recognized
organic materials

TABLE C

NHDES SOIL GROUPINGS

Soil Series	number	NHDES Soil Group	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Adams	36	1	6.0	20.0	20.00	99.0	A	Outwash and Stream Terraces	frigid	sandy	yes	
Boscawen	220	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	no	loamy cap
Caesar	526	1	20.0	100.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	coarse sand	no	
Champlain	35	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	gravelly sand	no	
Colton	22	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	
Colton, gravelly	21	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly surface
Gloucester	11	1	6.0	20.0	6.00	20.0	A	Sandy Till	mesic	sandy-skeletal	no	loamy cap
Hermon	55	1	2.0	20.0	6.00	20.0	A	Sandy Till	frigid	sandy-skeletal	yes	loamy cap
Hinckley	12	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	sandy-skeletal	no	
Hoosic	510	1	2.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	sandy-skeletal	no	slate, loamy cap
Masardis	23	1	6.0	20.0	6.00	20.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	slate, loamy cap
Merrimac	10	1	2.0	20.0	6.00	20.0	A	Outwash and Stream Terraces	mesic	gravelly sand	no	loamy cap
Quonset	310	1	2.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	sandy-skeletal	no	shale
Redstone	665	1	2.0	6.0	6.00	20.0	A	Weathered Bedrock Till	frigid	fragmental	yes	loamy cap
Success	154	1	2.0	6.0	6.00	20.0	A	Sandy Till	frigid	sandy-skeletal	yes	cemented
Suncook	2	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	mesic	sandy	no	occasionally flooded
Suncook	402	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	mesic	sandy	no	frequent flooding
Sunday	102	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	frigid	sandy	no	occasionally flooded
Sunday	202	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	frigid	sandy	no	frequently flooded
Warwick	210	1	2.0	6.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	loamy-skeletal	no	loamy over slate gravel
Windsor	26	1	6.0	20.0	6.00	20.0	A	Outwash and Stream Terraces	mesic	sandy	no	
Abenaki	501	2	0.6	2.0	6.00	99.0	B	Outwash and Stream Terraces	frigid	loamy over sandy-skeletal	no	loamy over gravelly
Agawam	24	2	6.0	20.0	20.00	100.0	B	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Allagash	127	2	0.6	2.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	loamy over sandy	yes	loamy over sandy
Bangor	572	2	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam
Berkshire	72	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	fine sandy loam
Bice	226	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	no	sandy loam
Canton	42	2	2.0	6.0	6.00	20.0	B	Loose till, sandy textures	mesic	loamy over sandy	no	loamy over loamy sand
Charlton	62	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	mesic	loamy	no	fine sandy loam
Dutchess	366	2	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	mesic	loamy	no	very channery
Fryeburg	208	2	0.6	2.0	2.00	6.0	B	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Groveton	27	2	0.6	2.0	0.60	6.0	B	Outwash and Stream Terraces	frigid	loamy	yes	loamy over sandy
Hadley	8	2	0.6	2.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand
Hadley	108	2	0.6	2.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand, occ flooded
Hartland	31	2	0.6	2.0	0.20	2.0	B	Terraces and glacial lake plains	mesic	silty	no	very fine sandy loam
Haven	410	2	0.6	2.0	20.00	100.0	B	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Houghtonville	795	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	cobbly fine sandy loam
Lombard	259	2	0.6	6.0	2.00	20.0	C/D	Weathered bedrock, phyllite	frigid	loamy	no	very channery
Monadnock	142	2	0.6	2.0	2.00	6.0	B	Loose till, sandy textures	frigid	oamy over sandy, sandy-skeleta	yes	gravelly loamy sand in C
Occum	1	2	0.6	2.0	6.00	20.0	B	Flood Plain (Bottom Land)	mesic	loamy	no	loamy over loamy sand
Ondawa	101	2	0.6	6.0	6.00	20.0	B	Flood Plain (Bottom Land)	frigid	loamy	no	loamy over loamy sand
Ondawa	201	2	0.6	6.0	6.00	20.0	B	Flood Plain (Bottom Land)	frigid	loamy	no	occ flood, loamy over l. sand
Salmon	630	2	0.6	2.0	0.60	2.0	B	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Stetson	523	2	0.6	6.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	loamy over gravelly
Unadilla	30	2	0.6	2.0	2.00	20.0	B	Terraces and glacial lake plains	mesic	silty	no	silty over gravelly
Chichester	442	2	0.6	2.0	2.00	6.0	B	Loose till, sandy textures	frigid	loamy over sandy	no	loamy over loamy sand
Acton	146	3	2.0	20.0	2.00	20.0	B	Loose till, sandy textures	mesic	sandy-skeletal	no	cobbly loamy sand
Becket	56	3	0.6	2.0	0.06	0.6	C	Firm, platy, sandy till	frigid	loamy	yes	gravelly sandy loam in Cd
Belgrade	532	3	0.6	2.0	0.06	2.0	B	Terraces and glacial lake plains	mesic	silty	no	strata of fine sand
Bernardston	330	3	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Boxford	32	3	0.1	0.2	0.00	0.2	C	Silt and Clay Deposits	mesic	fine	no	silty clay loam

Soil Series	number	NHDES Soil Group	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Buckland	237	3	0.6	2.0	0.06	0.2	C	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Buxton	232	3	0.1	0.6	0.00	0.2	C	Silt and Clay Deposits	frigid	fine	no	silty clay
Canterbury	166	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Chatfield Var.	289	3	0.6	6.0	0.60	6.0	B	Loose till, bedrock	mesic	loamy	no	mwd to swpd
Chesuncook	126	3	0.6	2.0	0.02	0.2	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Colonel	927	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	loam in Cd
Croghan	613	3	20.0	100.0	20.00	100.0	B	Outwash and Stream Terraces	frigid	sandy	yes	single grain in C
Dartmouth	132	3	0.6	2.0	0.06	0.6	B	Terraces and glacial lake plains	mesic	silty	no	thin strata silty clay loam
Deerfield	313	3	6.0	20.0	20.00	100.0	B	Outwash and Stream Terraces	mesic	sandy	no	single grain in C
Dixfield	378	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Dixmont	578	3	0.6	2.0	0.60	2.0	C	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam, platy in C
Duane	413	3	6.0	20.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	cemented (ortstein)
Eldridge	38	3	6.0	20.0	0.06	0.6	C	Sandy/loamy over silt/clay	mesic	sandy over loamy	no	
Elmridge	238	3	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	mesic	loamy over clayey	no	
Elmwood	338	3	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	
Finch	116	3					C	Outwash and Stream Terraces	frigid	sandy	yes	cemented (ortstein)
Gilmanton	478	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	no	fine sandy loam in Cd
Henniker	46	3	0.6	2.0	0.06	0.6	C	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Hitchcock	130	3	0.6	2.0	0.06	0.6	B	Terraces and glacial lake plains	mesic	silty	no	silt loam to silt in C
Howland	566	3	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	silt loam, platy in Cd
Lanesboro	228	3	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	channery silt loam in Cd
Lovewell	307	3	0.6	2.0	0.60	2.0	B	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Machias	520	3	2.0	6.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	sandy or sandy-skeletal	yes	strata sand/gravel in C
Madawaska	28	3	0.6	2.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
ladawaska, aquer	48	3	0.6	2.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Marlow	76	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Melrose	37	3	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	silty clay loam in C
Metacomet	458	3	0.6	2.0	0.06	0.6	C	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Metallak	404	3	6.0	100.0	6.00	100.0	B	Flood Plain (Bottom Land)	frigid	loamy over sandy	no	sandy or sandy-skeletal
Millis	39	3					C	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Montauk	44	3	0.6	6.0	0.06	0.6	C	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Mundal	610	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	gravelly sandy loam in Cd
Newfields	444	3	0.6	2.0	0.60	2.0	B	Loose till, sandy textures	mesic	loamy over sandy	no	sandy or sandy-skeletal
Nicholville	632	3	0.6	2.0	0.60	2.0	C	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Ninigret	513	3	0.6	6.0	6.00	20.0	B	Outwash and Stream Terraces	mesic	loamy over sandy	no	sandy or sandy-skeletal
Paxton	66	3	0.6	2.0	0.00	0.2	C	Firm, platy, loamy till	mesic	loamy	no	
Peru	78	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	
Pittstown	334	3	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Plaisted	563	3	0.6	2.0	0.06	0.6	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Podunk	104	3	0.6	6.0	6.00	20.0	B	Flood Plain (Bottom Land)	frigid	loamy	no	loamy to coarse sand in C
Poocham	230	3	0.6	2.0	0.20	2.0	B	Terraces and glacial lake plains	mesic	silty	no	silt loam in C
Pootatuck	4	3	0.6	6.0	6.00	20.0	B	Flood Plain (Bottom Land)	mesic	loamy	no	single grain in C
Scio	531	3	0.6	2.0	0.60	2.0	B	Terraces and glacial lake plains	mesic	silty	no	gravelly sand in 2C
Scituate	448	3	0.6	2.0	0.06	0.2	C	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Sheepscot	14	3	6.0	20.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly coarse sand
Sisk	667	3	0.6	2.0	0.00	0.6	C	Firm, platy, loamy till	cryic	loamy	yes	sandy loam in Cd
Skerry	558	3	0.6	2.0	0.06	0.6	C	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Sudbury	118	3	2.0	6.0	2.00	20.0	B	Outwash and Stream Terraces	mesic	sandy	no	loam over gravelly sand
Suffield	536	3	0.6	2.0	0.00	0.2	C	Sandy/loamy over silt/clay	mesic	silty over clayey	no	deep to clay C
Sunapee	168	3	0.6	2.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	
Sunapee var	269	3	0.6	2.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	frigid dystrudept
Surplus	669	3	0.6	2.0	0.00	0.6	C	Firm, platy, loamy till	cryic	loamy	yes	mwd, sandy loam in Cd
Sutton	68	3	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	mesic	loamy	no	
Telos	123	3	0.6	2.0	0.02	0.2	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd

Soil Series	number	NHDES Soil Group	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Waumbeck	58	3	2.0	20.0	6.00	20.0	B	Loose till, sandy textures	frigid	sandy-skeletal	yes	very cobbly loamy sand
Winooski	103	3	0.6	6.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty	no	very fine sandy loam
Woodbridge	29	3	0.6	2.0	0.00	0.6	C	Firm, platy, loamy till	mesic	loamy	no	sandy loam in Cd
Winooski	9	3	0.6	6.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty over loamy	no	
Canaan	663	4	2.0	20.0	2.00	20.0	C	Weathered Bedrock Till	frigid	loamy-skeletal	yes	less than 20 in. deep
Cardigan	357	4	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	mesic	loamy	no	20 to 40 in. deep
Chatfield	89	4	0.6	6.0	0.60	6.0	B	Loose till, bedrock	mesic	loamy	no	20 to 40 in. deep
Elliottsville	128	4	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	frigid	loamy	yes	20 to 40 in. deep
Glebe	671	4	2.0	6.0	2.00	6.0	C	Loose till, bedrock	cryic	loamy	yes	20 to 40 in. deep
Glover	NA	4	0.6	2.0	0.60	2	D	Friable till, silty, schist & phyllite	frigid	loamy	no	less than 20 in. deep
Hogback	91	4	2.0	6.0	2.00	6.0	C	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Hollis	86	4	0.6	6.0	0.60	6.0	C/D	Loose till, bedrock	mesic	loamy	no	less than 20 in. deep
Kearsarge	359	4	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	mesic	loamy	no	less than 20 in. deep
Lyman	92	4	2.0	6.0	2.00	6.0	A/D	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Macomber	252	4	0.6	2.0	0.60	2.0	C	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Millsite	251	4	0.6	6.0	0.60	6.0	C	Loose till, bedrock	frigid	loamy	no	20 to 40 in. deep
Monson	133	4	0.6	2.0	0.60	2.0	D	Friable till, silty, schist & phyllite	frigid	loamy	yes	less than 20 in. deep
Pennichuck	460	4	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	mesic	loamy-skeletal	no	20 to 40 in. deep
Rawsonville	98	4	0.6	6.0	0.60	6.0	C	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Ricker	674	4	2.0	6.0	2.00	6.0	A	rganic over bedrock (up to 4" of minera	cryic	fibric to hemic	no	well drained, less than 20 in. deep
Saddleback	673	4	0.6	2.0	0.60	2.0	C/D	Loose till, bedrock	cryic	loamy	yes	less than 20 in. deep
Shapleigh	136	4					C/D	Sandy Till	mesic	sandy	yes	less than 20 in. deep
Thorndike	84	4	0.6	2.0	0.60	2.0	C/D	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	less than 20 in. deep
Tunbridge	99	4	0.6	6.0	0.60	6.0	C	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Winnecook	88	4	0.6	2.0	0.60	2.0	C	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Woodstock	93	4	2.0	6.0	2.00	6.0	C/D	Loose till, bedrock	frigid	loamy	no	less than 20 in. deep
Au Gres	516	5					B	Outwash and Stream Terraces	frigid	sandy	yes	single grain, loose
Bemis	224	5	0.6	0.2	0.00	0.2	C	Firm, platy, loamy till	cryic	loamy	no	
Binghamville	534	5	0.2	2.0	0.06	0.2	D	Terraces and glacial lake plains	mesic	silty	no	
Brayton	240	5	0.6	2.0	0.06	0.6	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Cabot	589	5	0.6	2.0	0.06	0.2	D	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Charles	209	5	0.6	100.0	0.60	100.0	C	Flood Plain (Bottom Land)	frigid	silty	no	
Cohas	505	5	0.6	2.0	0.60	100.0	C	Flood Plain (Bottom Land)	frigid	co. loamy over sandy (skeletal)	no	
Grange	433	5	0.6	2.0	0.60	2.0	C	Outwash and Stream Terraces	frigid	co. loamy over sandy (skeletal)	no	
Kinsman	614	5	6.0	20.0	6.00	20.0	C	Outwash and Stream Terraces	frigid	sandy	yes	
Leicester	514	5	0.6	6.0	0.60	20.0	C	Loose till, loamy textures	mesic	loamy	no	
Lim	3	5	0.6	2.0	6.00	20.0	C	Flood Plain (Bottom Land)	mesic	loamy	no	
Limerick	109	5	0.6	2.0	0.60	2.0	C	Flood Plain (Bottom Land)	mesic	silty	no	
Lyme	246	5	0.6	6.0	0.60	6.0	C	Loose till, sandy textures	frigid	loamy	no	
Mashpee	315	5	6.0	20.0	6.00	20.0	B	Outwash and Stream Terraces	mesic	sandy	yes	
Monarda	569	5	0.2	2.0	0.02	0.2	D	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Moosilauke	414	5	6.0	20.0	6.00	20.0	C	Loose till, sandy textures	frigid	sandy	no	
Naumburg	214	5	6.0	20.0	6.00	20.0	C	Outwash and Stream Terraces	frigid	sandy	yes	
Pemi	633	5	0.6	2.0	0.06	0.6	C	Terraces and glacial lake plains	frigid	silty	no	
Pillsbury	646	5	0.6	2.0	0.06	0.2	C	Firm, platy, loamy till	frigid	silty	no	
Pipestone	314	5					B	Outwash and Stream Terraces	mesic	sandy	yes	
Raynham	533	5	0.2	2.0	0.06	0.2	C	Terraces and glacial lake plains	mesic	silty	no	
Raypol	540	5	0.6	2.0	6.00	100.0	D	Outwash and Stream Terraces	mesic	co. loamy over sandy (skeletal)	no	
Ridgebury	656	5	0.6	6.0	0.00	0.2	C	Firm, platy, loamy till	mesic	loamy	no	
Rippowam	5	5	0.6	6.0	6.00	20.0	C	Flood Plain (Bottom Land)	mesic	loamy	no	
Roundabout	333	5	0.2	2.0	0.06	0.6	C	Terraces and glacial lake plains	frigid	silty	no	silt loam in the C
Rumney	105	5	0.6	6.0	6.00	20.0	C	Flood Plain (Bottom Land)	frigid	loamy	no	

Soil Series	number	NHDES Soil Group	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Saugatuck	16	5	0.06	0.2	6.00	20.0	C	Outwash and Stream Terraces	mesic	sandy	yes	ortstein
Scantic	233	5	0.0	0.2	0.00	0.2	D	Silt and Clay Deposits	frigid	fine	no	
Scitico	33	5	0.0	0.2	0.00	0.2	C	Silt and Clay Deposits	mesic	fine	no	
Shaker	439	5	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	mesic	co. loamy over clayey	no	
Squamscott	538	5	6.0	20.0	0.06	0.6	C	Sandy/loamy over silt/clay	mesic	sandy over loamy	yes	
Stissing	340	5	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	
Swanton	438	5	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	frigid	co. loamy over clayey	no	
Walpole	546	5	2.0	6.0	6.00	20.0	C	Outwash and Stream Terraces	mesic	sandy	no	
Wareham	34	5	6.0	20.0	6.00	20.0	C	Outwash and Stream Terraces	mesic	sandy	no	
Biddeford	234	6	0.0	0.2	0.00	0.2	D	Silt and Clay Deposits	frigid	fine	no	organic over clay
Bucksport	895	6					D	Organic Materials - Freshwater	frigid	sapric	no	deep organic
Burnham	131	6	0.2	6.0	0.02	0.2	D	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	organic over silt
Catden	296	6					A/D	Organic Materials - Freshwater	mesic	sapric	no	deep organic
Chocorua	395	6			6.00	20.0	D	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Greenwood	295	6					A/D	Organic Materials - Freshwater	frigid	hemic	no	deep organic
Ipswich	397	6					D	Tidal Flat	mesic	hemic/sapric	no	deep organic
Matunuck	797	6			20.00	100.0	D	Tidal Flat	mesic	sandy	no	organic over sand
Maybid	134	6	0.0	0.2	0.00	0.2	D	Silt and Clay Deposits	mesic	fine	no	silt over clay
Meadowsedge	894	6					D	Organic Materials - Freshwater	frigid	peat	no	deep organic
Medomak	406	6	0.6	2.0	0.60	2.0	D	Flood Plain (Bottom Land)	frigid	silty	no	organic over silt
Natchaug	496	6			0.20	2.0	D	Organic Materials - Freshwater	mesic	loamy	no	organic over loam
Ossipee	495	6			0.20	2.0	D	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Pawcatuck	497	6			20.00	100.0	D	Tidal Flat	mesic	sandy or sandy-skeletal	no	organic over sand
Peacham	549	6	0.6	2.0	0.00	0.2	D	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	organic over loam
Pondicherry	992	6			6.00	20.0	D	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Saco	6	6	0.6	2.0	6.00	20.0	D	Flood Plain (Bottom Land)	mesic	silty	no	strata
Scarboro	115	6	6.0	20.0	6.00	20.0	D	Outwash and Stream Terraces	mesic	sandy	no	organic over sand, non stony
Searsport	15	6	6.0	20.0	6.00	20.0	D	Outwash and Stream Terraces	frigid	sandy	no	organic over sand
Timakwa	393	6			6.00	100.0	D	Organic Materials - Freshwater	mesic	sandy or sandy-skeletal	no	organic over sand
Vassalboro	150	6					D	Organic Materials - Freshwater	frigid	peat	no	deep organic
Waskish	195	6					D	Organic Materials - Freshwater	frigid	peat	no	deep organic
Westbrook	597	6			0.00	2.0	D	Tidal Flat	mesic	loamy	no	organic over loam
Whitman	49	6	0.0	0.2	0.00	0.2	D	Firm, platy, loamy till	mesic	loamy	no	mucky loam
Wonsqueak	995	6			0.20	2.0	D	Organic Materials - Freshwater	frigid	loamy	no	organic over loam

no longer recognized

organic materials

denotes break betweenSoil Group

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EXISTING LEGEND:

- 3/4" REBAR W/ID CAP (TBS)
- IRON BOUND/IRON ROD (FND)
- IRON PIPE (FND)
- DRILL HOLE (FND)
- STEEL STAKE (FND)
- UTILITY POLE / GUY WIRE
- SINGLE POST SIGN
- TEMPORARY BENCHMARK (T.B.M.)
- TEST PIT
- STONE WALL
- ABUTTING PROPERTY LINE
- BUILDING SETBACK LINE
- EDGE OF POORLY DRAINED WETLAND
- 25' NO DISTURB WETLAND BUFFER
- 50' WETLAND BUILDING SETBACK
- OHU — OHU — OHU — OVERHEAD UTILITIES
- -116- EXISTING CONTOUR MINOR
- -115- EXISTING CONTOUR MAJOR
- FND FOUND
- TYP TYPICAL

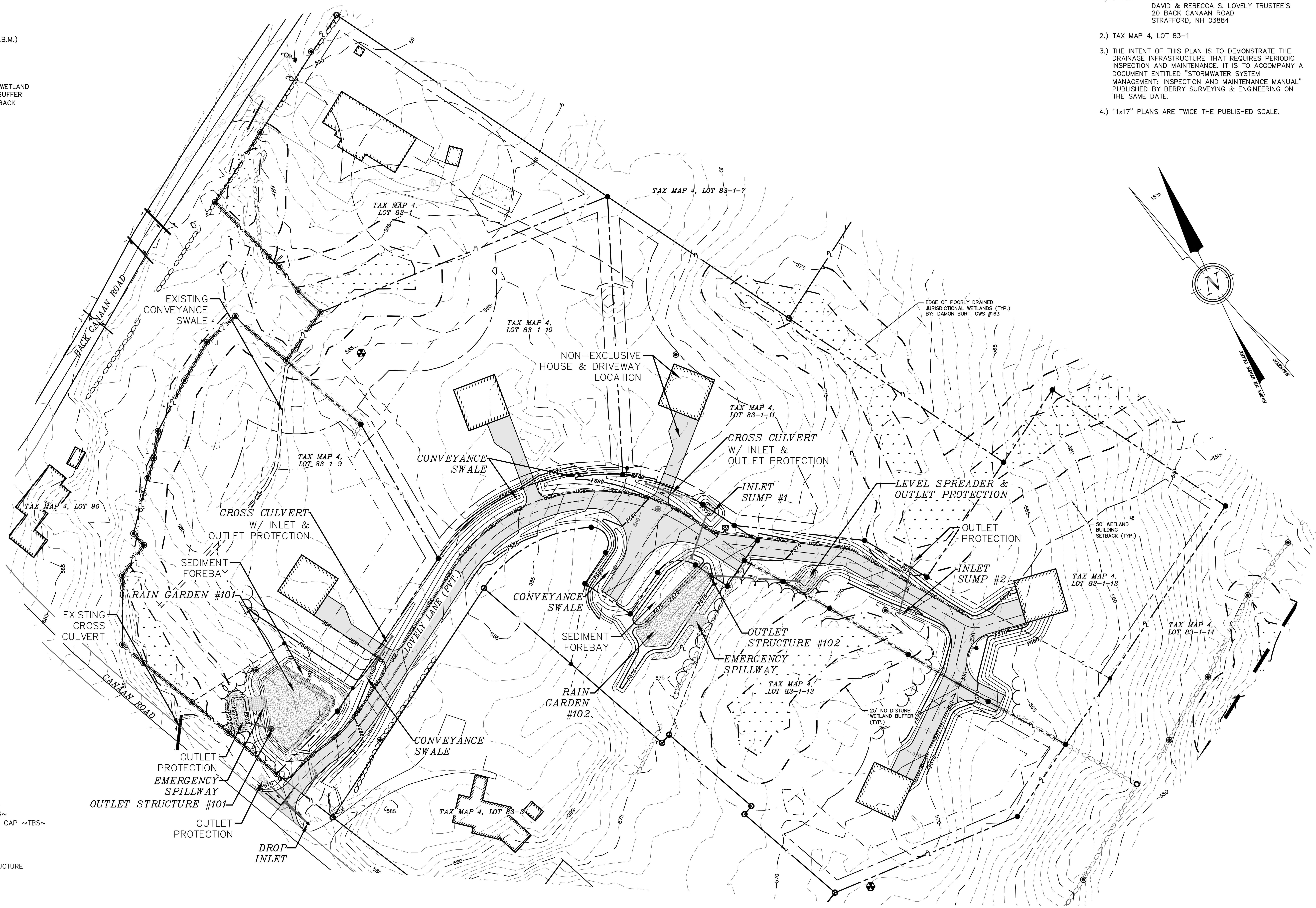
NOTES:

1.) OWNER: LOVELY REVOCABLE LIVING TRUST
DAVID & REBECCA S. LOVELY TRUSTEE'S
20 BACK CANAAN ROAD
STRAFFORD, NH 03884

2.) TAX MAP 4, LOT 83-1

3.) THE INTENT OF THIS PLAN IS TO DEMONSTRATE THE DRAINAGE INFRASTRUCTURE THAT REQUIRES PERIODIC INSPECTION AND MAINTENANCE. IT IS TO ACCOMPANY A DOCUMENT ENTITLED "STORMWATER SYSTEM MANAGEMENT: INSPECTION AND MAINTENANCE MANUAL" PUBLISHED BY BERRY SURVEYING & ENGINEERING ON THE SAME DATE.

4.) 11x17" PLANS ARE TWICE THE PUBLISHED SCALE.



PROPOSED LEGEND:

- 4"X4" GRANITE BOUND ~TBS~
- 3/4" REBAR W/ ID CAP ~TBS~
- 1/2" EASEMENT REBAR W/ ID CAP ~TBS~
- PROPOSED SUBDIVISION LINE
- PROPOSED EASEMENT LINE
- STORMWATER BMP OUTLET STRUCTURE
- DROP INLET
- F331 CONTOUR MINOR, PROPOSED
- F330 CONTOUR MAJOR, PROPOSED
- DRAIN CULVERT W/ FLARED END SECTION (F.E.S.)
- SHOULDER
- CENTER LINE
- RIP RAP
- STORMWATER CONTROL MEASURE (SCM)
- BERM
- PROPOSED PAVEMENT

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REVISION	DATE	DESCRIPTION
#1	12-04-25	DESIGN REVISION

INSPECTION & MAINTENANCE PLAN
LAND OF
LOVELY REVOCABLE LIVING TRUST
DAVID & REBECCA S. LOVELY TRUSTEES
20 BACK CANAAN ROAD
STRAFFORD, N.H.
TAX MAP 4, LOT 83-1

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : OCTOBER 14, 2025
FILE NO. : DB 2025-024

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14247
LICENSED
PROFESSIONAL ENGINEER

NOT FOR CONSTRUCTION

BIORETENTION FILTER MEDIA MIXTURES			
Component Material	Percent of Mixture by Volume	Gradation of material	
		Sieve No.	Percent by Weight Passing Standard Sieve
Bioretention Filter Media Option A			
ASTM C-33 concrete sand	50 to 55		
Loamy sand topsoil, with fines as indicated	20 to 30	200	15 to 25
Moderately fine shredded bark or wood fiber mulch, with fines as indicated	20 to 30	200	< 5

3/8" WASHED CRUSHED STONE*

SIEVE SIZE	% PASSING BY WEIGHT
1/2"	100
3/8"	95 – 100
# 4	22 – 55
# 8	0 – 10

* EQUIVALENT TO STANDARD WASHED STONE – SECTION 702 OF NHDOT NHDOT STANDARD SPECIFICATIONS

1-1/2" WASHED CRUSHED STONE*

SIEVE SIZE	% PASSING BY WEIGHT
2"	100
1-1/2"	90 – 100
1"	20 – 55
1/2"	0 –15
3/8"	0 –5

* EQUIVALENT TO STANDARD WASHED STONE – SECTION 702 OF NHDOT NHDOT STANDARD SPECIFICATIONS

NOTES

WHEN CONTRACTOR EXCAVATES RAIN GARDEN AREA TO SUBGRADE, DESIGN ENGINEER SHALL PERFORM SUBSURFACE EVALUATION PRIOR TO THE PLACEMENT OF ANY SELECT MATERIAL OR OTHER BACKFILL.

1. SOIL BIORETENTION FILTER MEDIA SHALL BE AS SHOWN ABOVE. "BIO MEDIA" MEANS BIORETENTION FILTER MEDIA.
2. COMPACTION IS NOT TO OCCUR IN THE RAIN GARDEN AREAS PRIOR TO CONSTRUCTION. SCARIFICATION REQUIRED IN THE EVENT COMPACTION TAKES PLACE.
3. DO NOT PLACE THE BIORETENTION SYSTEM INTO SERVICE UNTIL THE BMP HAS BEEN PLANTED AND ITS CONTRIBUTING AREAS HAVE BEEN FULLY STABILIZED.
4. DO NOT DISCHARGE SEDIMENT-LADEN WATERS FROM CONSTRUCTION ACTIVITIES (RUNOFF WATER FROM EXCAVATIONS) TO THE BIORETENTION AREA DURING ANY STAGE OF CONSTRUCTION.
5. DO NOT TRAFFIC EXPOSED SOIL SURFACE WITH CONSTRUCTION EQUIPMENT. IF FEASIBLE PERFORM EXCAVATIONS WITH EQUIPMENT POSITIONED OUTSIDE THE LIMITS OF THE INFILTRATION COMPONENTS OF THE SYSTEM.

MAINTENANCE REQUIREMENTS

1 SYSTEMS SHOULD BE INSPECTED AT LEAST TWICE ANNUALLY, AND FOLLOWING ANY RAINFALL EXCEEDING 2.5 INCHES IN A 24-HOUR PERIOD, WITH MAINTENANCE OR REHABILITATION CONDUCTED AS A WARRANTED BY SUCH INSPECTION.

2 PRETREATMENT MEASURES SHOULD BE INSPECTED AT LEAST TWICE ANNUALLY, AND CLEANED OF ACCUMULATED SEDIMENT AS WARRANTED BY INSPECTION, BUT NO LESS THAN ONCE ANNUALLY.

3 AT LEAST ONCE ANNUALLY, SYSTEM SHOULD BE INSPECTED FOR DRAWDOWN TIME. IF BIORETENTION SYSTEM DOES NOT DRAIN WITHIN 72-HOURS FOLLOWING A RAINFALL EVENT, THEN A QUALIFIED PROFESSIONAL SHOULD ASSESS THE CONDITION OF THE FACILITY TO DETERMINE MEASURES REQUIRED TO RESTORE FILTRATION FUNCTION OR INFILTRATION FUNCTION (AS APPLICABLE), INCLUDING BUT NOT LIMITED TO REMOVAL OF ACCUMULATED SEDIMENTS OR RECONSTRUCTION OF THE FILTER MEDIA.

4 VEGETATION SHOULD BE INSPECTED AT LEAST ANNUALLY, AND MAINTAINED IN HEALTHY CONDITION, INCLUDING, PRUNING, REMOVAL, AND REPLACEMENT OF DEAD OR DISEASED VEGETATION, AND REMOVAL OF INVASIVE SPECIES.

DESIGN REFERENCES

1 UNH STORMWATER CENTER
2 NEW HAMPSHIRE STORMWATER MANAGEMENT MANUAL, FEBRUARY 2025 AS AMENDED.

CONSTRUCTION SEQUENCE NOTE:

EROSION, SEDIMENT AND DETENTION CONTROL FACILITIES SHALL BE INSTALLED & STABILIZED PRIOR TO DIRECTING RUNOFF TO THEM. TEMPORARY DIVERSIONS MAY BE REQUIRED. POST CONSTRUCTION STORM WATER MANAGEMENT PRACTICES MUST BE INITIATED AND STABILIZED EARLY IN THE PROCESS. RUNOFF MUST BE DIRECTED TO TEMPORARY PRACTICES UNTIL STORMWATER BMPs ARE STABILIZED. SWALES CONVEYING RUNOFF TO STORMWATER BMPs WILL BE CONSTRUCTED AND PUT INTO SERVICE ONCE THE RECEIVING STORMWATER BMP IS STABILIZED. SEE DETAIL E14, SHEET E-102 FOR FULL CONSTRUCTION SEQUENCE.

P1

RAIN GARDEN MIX

THE GRASS THAT IS PLANTED WITHIN A RAIN GARDEN BIO-FILTRATION SYSTEM WITHIN THE BIO-MEDIA MUST CONSIST OF A COMBINATION OF WARM SEASON GRASS SEED AND COLD SEASON GRASS SEED IN ORDER FOR THE GRASS TO START GROWING FOR STABILIZATION AND CONTINUE GROWING IN THE SANDY WELL-DRAINED ENVIRONMENT. PLANTING SPECIFICATION WILL MEET THE REQUIREMENTS AS OUTLINED IN 'VEGETATION NEW HAMPSHIRE SAND AND GRAVEL PITS' MIX 1 (WARM SEASON GRASSES) (15 LBS/AC) AND INCLUDE ANNUAL AND PERENNIAL RYE GRASS SEED (15 LBS/AC); THE NEW ENGLAND NATIVE WARM SEASON GRASS MIX (23 LBS/AC) BY NEW ENGLAND WETLAND PLANTS, INC.; RAIN GARDEN MIX 180 (15 LBS/AC & 15 LBS/AC OF RYE) / RAIN GARDEN GRASS MIX 180-1 (20 LBS/AC & 10 LBS/AC OF RYE) BY ERNST CONSERVATION SEEDS; OR APPROVED EQUAL.

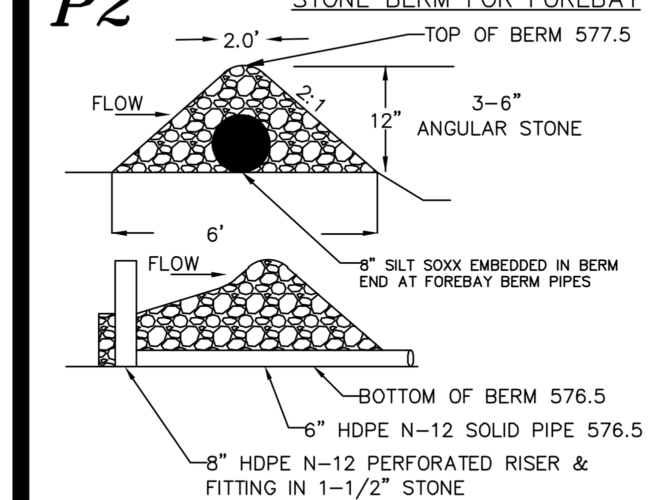
BIOMEDIA SURFACE PROTECTION NOTE:

SEE EROSION AND SEDIMENT CONTROL PLAN
IT IS RECOMMENDED THAT THE CONTRACTOR TAKE MEASURES TO PROTECT THE BIOMEDIA SURFACE FROM SEDIMENTATION CAUSED BY EROSION ON THE SIDE SLOPES.

STABILIZATION NOTE:

SEE NOTE #6, SHEET E-102, DETAIL E-15
SIDE SLOPES ARE TO BE STABILIZED WITHIN THREE WORKING DAY UPON COMPLETION OF FINAL GRADE.

P2

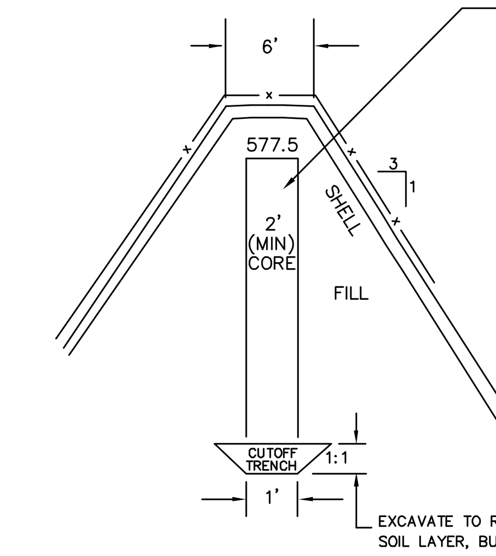


FOREBAY STONE BERM AND DRAIN SYSTEM

P3

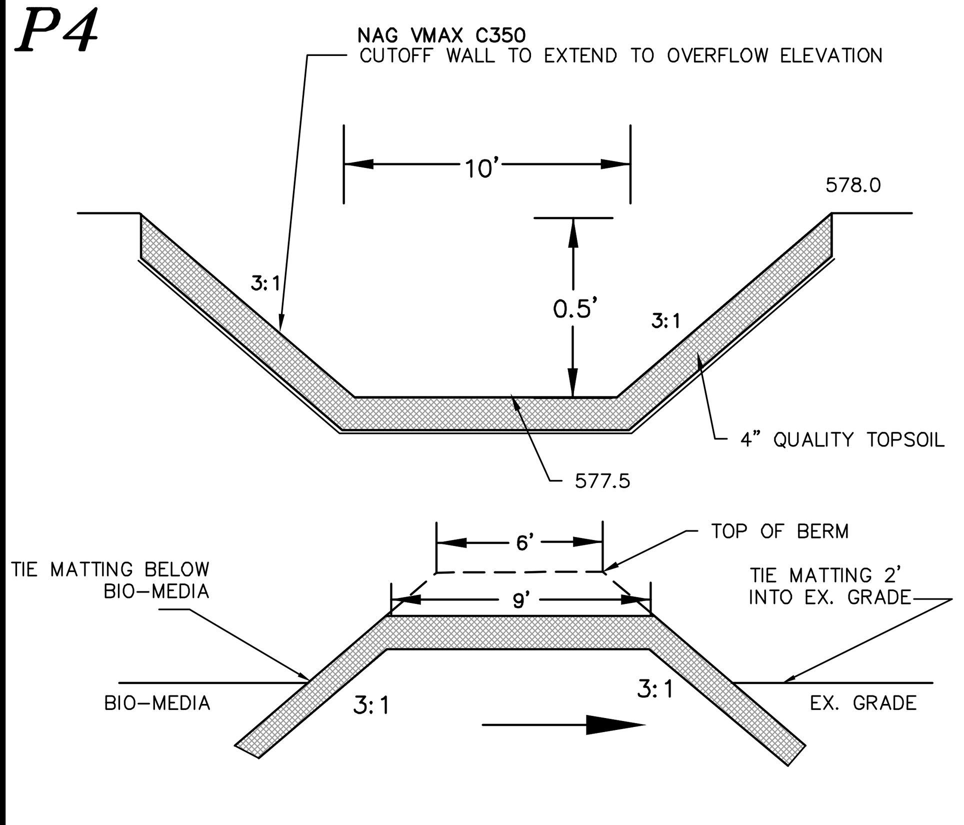
LOW PERMEABILITY MATERIAL GRADATION

SIEVE SIZE	% PASSING BY WEIGHT
#4	95 – 100
#40	60 – 95
#100	40 – 60
#200	25 – 45



1.) 2' CORE IS TO BE CONSTRUCTED OF COMPACTED LOAM MATERIAL.
2.) CORE IS TO BE INSTALLED & COMPACTED IN 12" LIFTS.
3.) INSTALLATION OF ENTIRE DRAINAGE STRUCTURE IS TO BE OVERSEEN BY DESIGN ENGINEER.
4.) GENERAL FILL MATERIALS ARE TO PLACED & COMPACTED IN 12" LIFTS.
5.) GENERAL FILL MATERIAL MAY BE INSTALLED USING ONSITE MATERIALS.
6.) CORE IS TO BE CONSTRUCTED UNDERNEATH THE PROPOSED SPILLWAY.

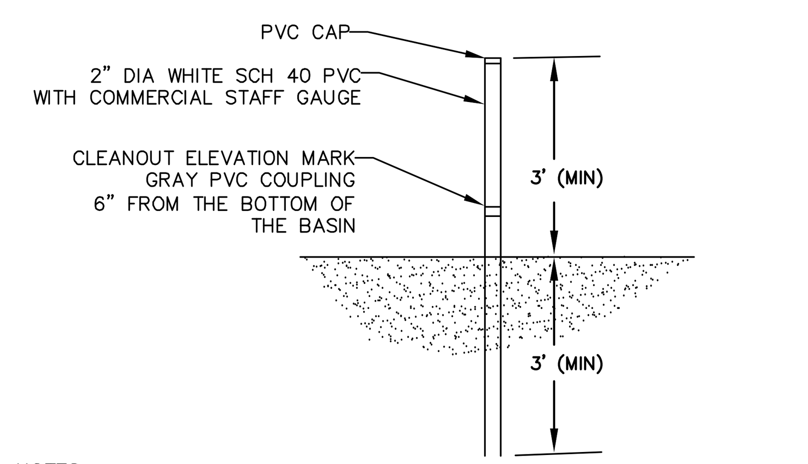
P4



EMERGENCY SPILLWAY PROFILE

NOT TO SCALE

P5



NOTES:

1. STAFF GAUGE TO BE TWO-INCH WHITE SCHEDULE 40 PVC PIPE DRIVEN INTO THE GROUND A MINIMUM OF 3-FEET.
2. A CLEANOUT MARK ON THE STAFF TO BE GRAY PVC COUPLING SET SIX-INCHES FROM THE BOTTOM OF THE BASIN.
3. A COMMERCIAL STAFF GAUGE WILL BE ATTACHED TO THE 2-INCH PVC PIPE WITH STAINLESS STEEL SCREWS.
4. SEDIMENT FOREBAY INSPECTION REQUIREMENTS: AT LEAST ANNUALLY OR MORE IF THE SEDIMENT LOAD EXCEEDS THE CLEANOUT MARK, CONDUCT PERIODIC MOWING OF THE SEDIMENT FOREBAY SLOPES AND EMBANKMENTS SEMI-ANNUALLY, REMOVE DEBRIS FROM THE OUTLET BERM AND DRAINS ANNUALLY, REMOVE AND DISPOSE OF ACCUMULATED SEDIMENT BASED ON INSPECTION ACCUMULATING NO MORE THAN SIX-INCHES IN DEPTH.

DEPTH GAUGE – SEDIMENT FOREBAY

NOT TO SCALE

P6

Rain Garden Grass Mix - ERNMX-180-1

	Botanical Name	Common Name	Price/Lb
40.40 %	*Schizachyrium scoparium, Fort Indiantown Gap-PA Ecotype*	Little Bluestem, Fort Indiantown Gap-PA Ecotype	14.65
20.00 %	*Carex vulpinoidea, PA Ecotype*	Fox Sedge, PA Ecotype	31.20
20.00 %	*Elymus virginicus, Madison-NY Ecotype*	Virginia Wildrye, Madison-NY Ecotype	10.46
9.00 %	*Panicum clandestinum, Tioga*	Deertongue, Tioga	22.27
5.50 %	*Panicum rigidulum, PA Ecotype*	Redtop Panicgrass, PA Ecotype	72.00
4.00 %	*Chasmanthium latifolium, WV Ecotype*	River Oats, WV Ecotype	96.00
0.50 %	*Carex scoparia, PA Ecotype*	Blunt Broom Sedge, PA Ecotype	96.00
0.30 %	*Juncus effusus*	Soft Rush	48.00
0.30 %	*Juncus tenuis, PA Ecotype*	Path Rush, PA Ecotype	48.00
100.00 %		**Mix Price/Lb Bulk:**	**$24.82**

Seeding Rate: 15 lb per acre with a cover crop. For sites that drain within 24 hours of a rain event use one of the following cover crops:Oats (1 Jan to 31 Jul; 30 lbs/acre), Japanese Millet (1 May to 31 Aug; 10 lbs/acre), or grain rye (1 Aug to 31 Dec; 30 lbs/acre).

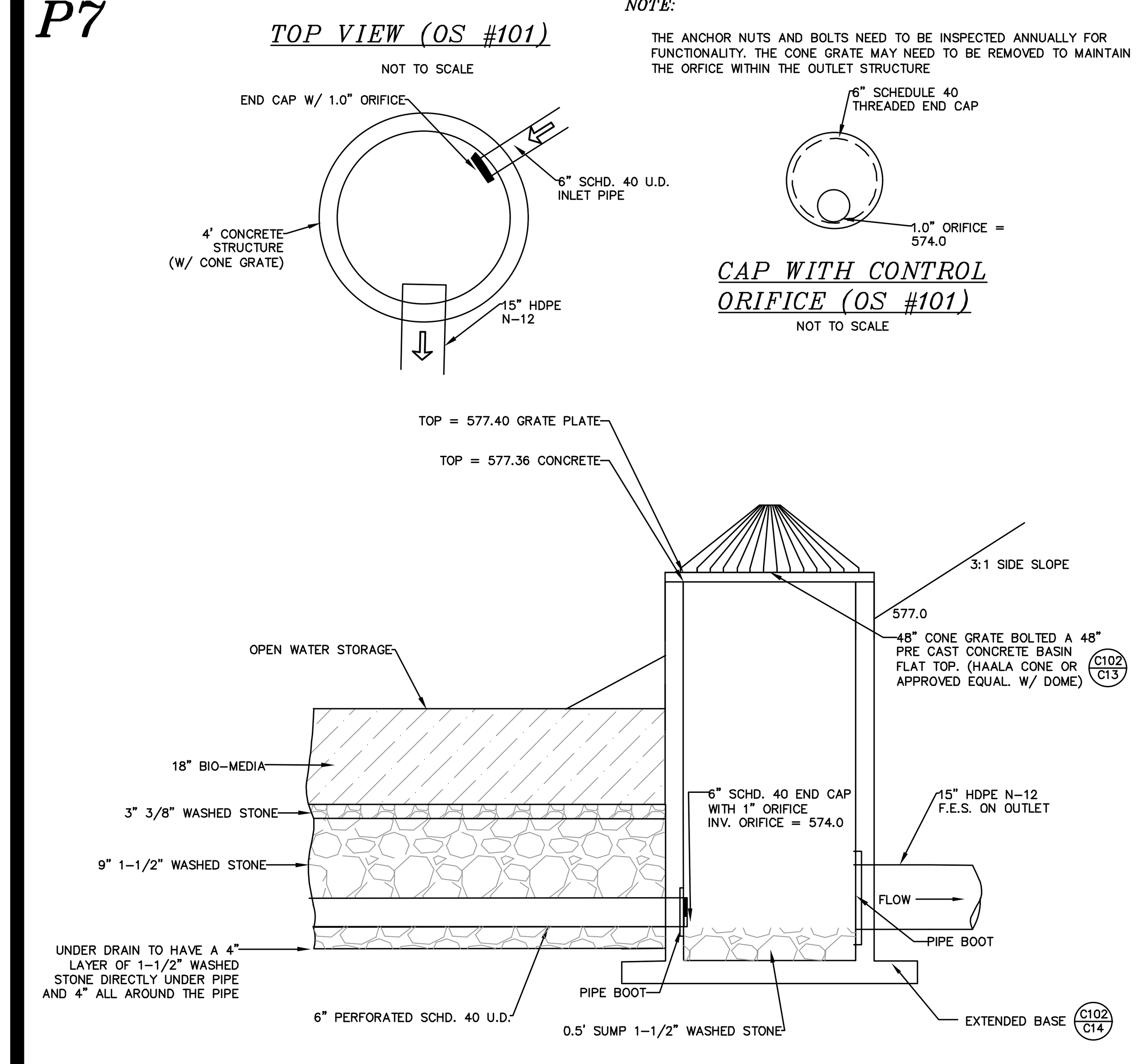
NOTE: TO BE USED FOR STORMWATER BMPS

BUTTERFLY MILK WEED IS A REQUIRED ADDITION TO ANY SEEDING DONE ON SITE.

Grasses & Grass-like Species - Herbaceous Perennial; Stormwater Management

Mix formulations are subject to change without notice depending on the availability of existing and new products. While the formula may change, the guiding philosophy and function of the mix will not.

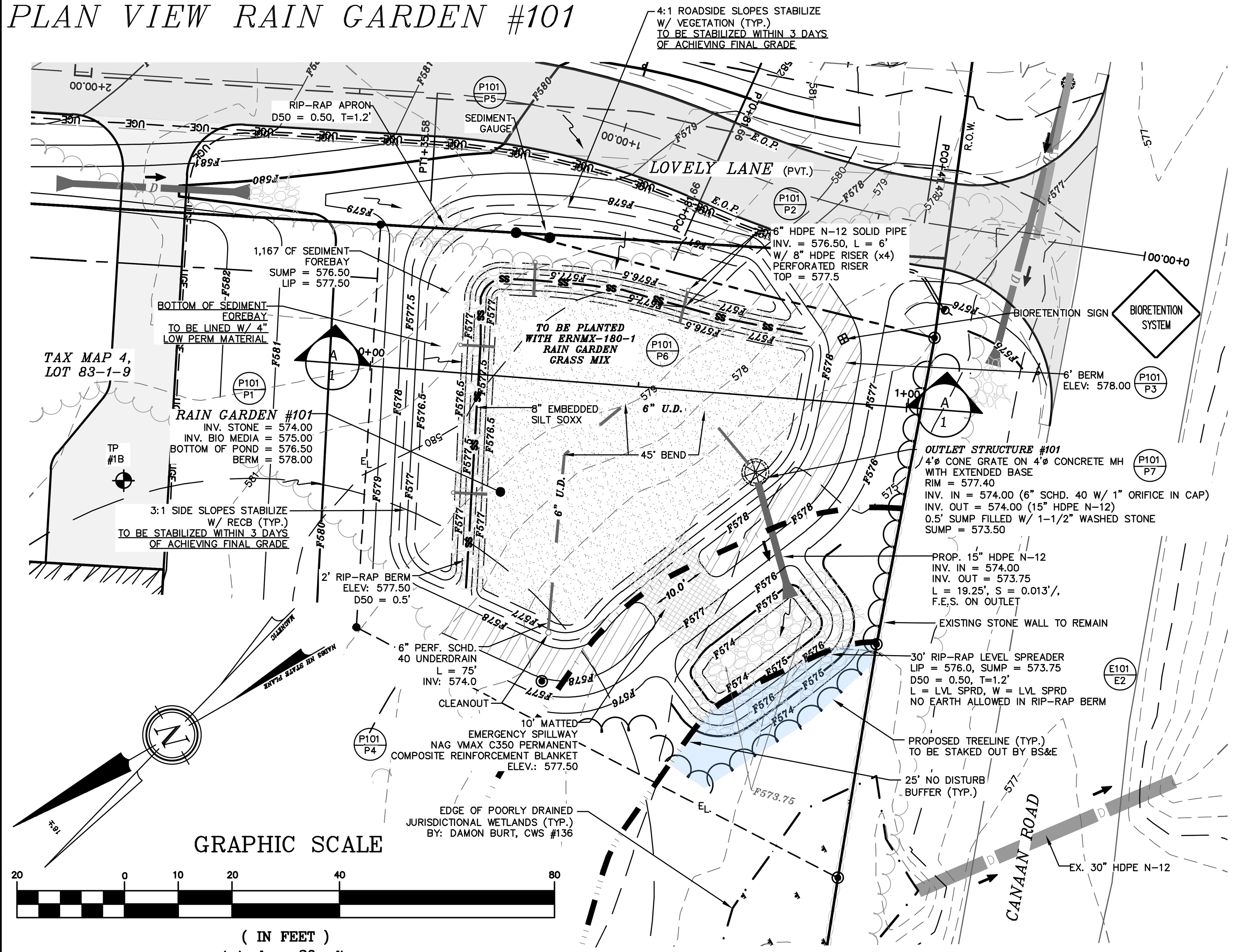
P7



NOTE:

THE ANCHOR NUTS AND BOLTS NEED TO BE INSPECTED ANNUALLY FOR FUNCTIONALITY. THE CONE GRATE MAY NEED TO BE REMOVED TO MAINTAIN THE ORIFICE WITHIN THE OUTLET STRUCTURE

PLAN VIEW RAIN GARDEN #101



EXISTING LEGEND:

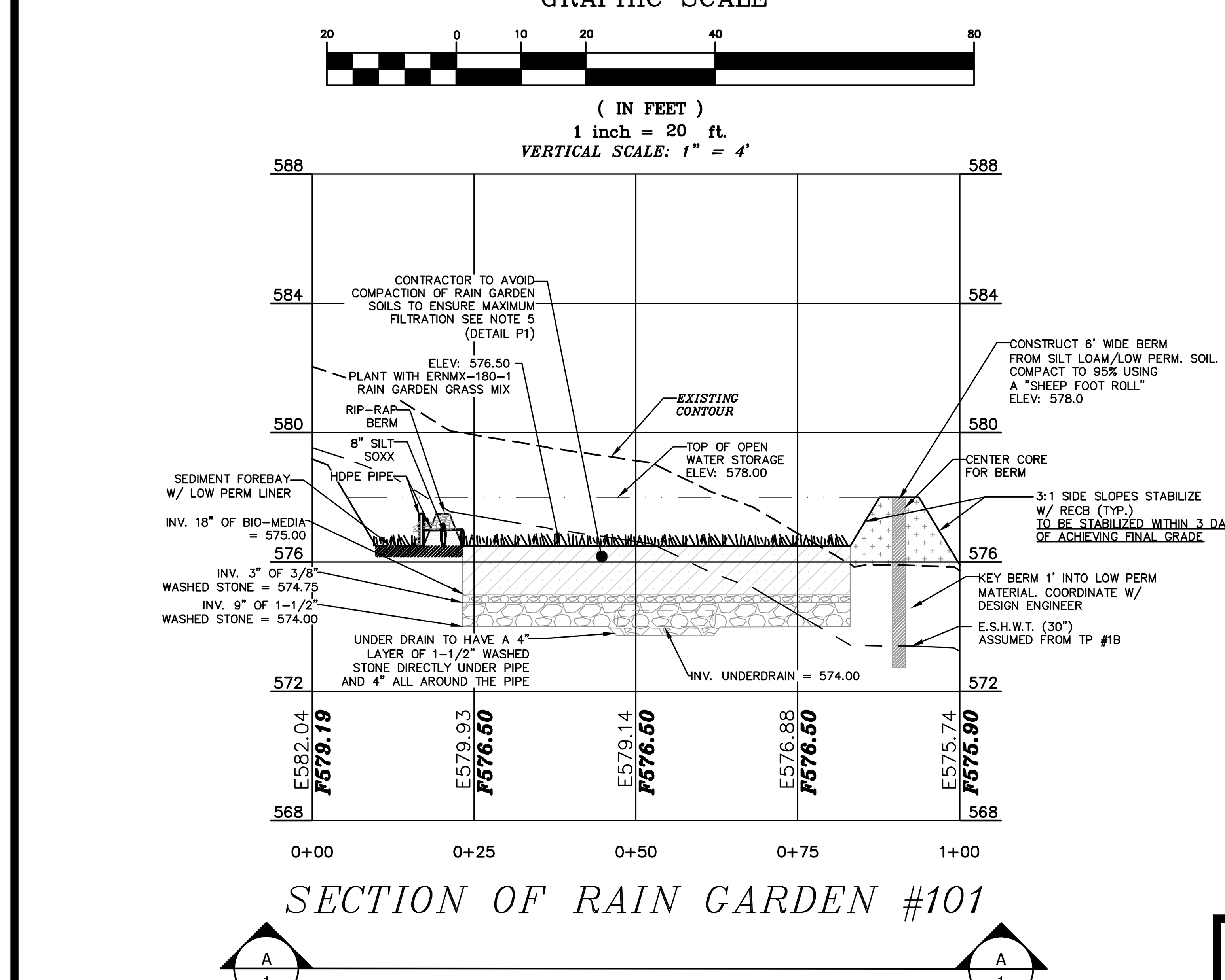
- IRON BOUND/IRON ROD (FND)
- IRON PIPE (FND)
- DRILL HOLE (FND)
- STEEL STAKE (FND)
- UTILITY POLE / GUY WIRE
- SINGLE POST SIGN
- TEMPORARY BENCHMARK (T.B.M.)
- TEST PIT
- TREE W/ BARBED WIRE
- STONE WALL
- ABUTTING PROPERTY LINE
- BUILDING SETBACK LINE
- EDGE OF POORLY DRAINED WETLAND
- 25' NO DISTURB WETLAND BUFFER
- 50' BUILDING TO WETLAND SETBACK
- SEPTIC SETBACK
- OVERHEAD UTILITIES
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR

FND FOUND
TYP TYPICAL
TBS TO BE SET
S.C.R.D. STRAFFORD COUNTY REGISTRY OF DEEDS

PROPOSED LEGEND:

- 4"X4" GRANITE BOUND ~TBS~
- 3/4" REBAR W/ ID CAP ~TBS~
- 1/2" EASEMENT REBAR W/ ID CAP ~TBS~
- PROPOSED SUBDIVISION LINE
- PROPOSED EASEMENT LINE
- STORMWATER BMP OUTLET STRUCTURE
- DROP INLET W/ STRUCUTRE
- FLOW ARROW
- WELL
- TEMPORARY BENCHMARK (T.B.M.)
- DETAIL SHEET / DETAIL
- MATCH POINT
- MATCH LINE
- CONTOUR MINOR, PROPOSED
- CONTOUR MAJOR, PROPOSED
- DRAIN CULVERT W/ FLARED END SECTION (F.E.S.)
- SHOULDER
- CENTER LINE
- BUILDING SETBACK LINE
- UNDERGROUND UTILITIES / TRANSFORMER
- RIP RAP
- STORMWATER BEST MANAGEMENT PRACTICE (BMP)
- BERM
- PROPOSED PAVEMENT/GRAVEL SURFACE
- CONDITIONAL USE PERMIT AREA

SECTION OF RAIN GARDEN #101



DESIGN REVISION		
REVISION	DATE	DESCRIPTION
#1	12-04-25	

RAIN GARDEN #101
LAND OF
LOVELY REVOCABLE LIVING TRUST
DAVID & REBECCA LOVELY TRUSTEES
20 BACK CANAAN ROAD
STRAFFORD, N.H.
TAX MAP 4, LOT 83-1

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : OCTOBER 14, 2025
FILE NO. : DB 2025-024

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14243
LICENSED
PROFESSIONAL ENGINEER

P-101

NOT FOR CONSTRUCTION

BIORETENTION FILTER MEDIA MIXTURES				
Component Material	Percent of Mixture by Volume	Gradation of material		
		Sieve No.	Percent by Weight Passing Standard Sieve	
Bioretention Filter Media Option A				
ASTM C-33 concrete sand	50 to 55			
Loamy sand topsoil, with fines as indicated	20 to 30	200	15 to 25	
Moderately fine shredded bark or wood fiber mulch, with fines as indicated	20 to 30	200	< 5	

3/8" WASHED CRUSHED STONE*

SIEVE SIZE	% PASSING BY WEIGHT
1/2"	100
3/8"	95 – 100
# 4	22 – 55
# 8	0 – 10

* EQUIVALENT TO STANDARD WASHED STONE – SECTION 702 OF NHDOT NHDOT STANDARD SPECIFICATIONS

1-1/2" WASHED CRUSHED STONE*

SIEVE SIZE	% PASSING BY WEIGHT
2"	100
1-1/2"	90 – 100
1"	20 – 55
1/2"	0 –15
3/8"	0 –5

* EQUIVALENT TO STANDARD WASHED STONE – SECTION 702 OF NHDOT NHDOT STANDARD SPECIFICATIONS

NOTES

WHEN CONTRACTOR EXCAVATES RAIN GARDEN AREA TO SUBGRADE, DESIGN ENGINEER SHALL PERFORM SUBSURFACE EVALUATION PRIOR TO THE PLACEMENT OF ANY SELECT MATERIAL OR OTHER BACKFILL.

1. SOIL BIORETENTION FILTER MEDIA SHALL BE AS SHOWN ABOVE. "BIO MEDIA" MEANS BIORETENTION FILTER MEDIA.
2. COMPACTION IS NOT TO OCCUR IN THE RAIN GARDEN AREAS PRIOR TO CONSTRUCTION. SCARIFICATION REQUIRED IN THE EVENT COMPACTION TAKES PLACE.
3. DO NOT PLACE THE BIORETENTION SYSTEM INTO SERVICE UNTIL THE BMP HAS BEEN PLANTED AND ITS CONTRIBUTING AREAS HAVE BEEN FULLY STABILIZED.
4. DO NOT DISCHARGE SEDIMENT-LADEN WATERS FROM CONSTRUCTION ACTIVITIES (RUNOFF WATER FROM EXCAVATIONS) TO THE BIORETENTION AREA DURING ANY STAGE OF CONSTRUCTION.
5. DO NOT TRAFFIC EXPOSED SOIL SURFACE WITH CONSTRUCTION EQUIPMENT. IF FEASIBLE PERFORM EXCAVATIONS WITH EQUIPMENT POSITIONED OUTSIDE THE LIMITS OF THE INFILTRATION COMPONENTS OF THE SYSTEM.

MAINTENANCE REQUIREMENTS

1 SYSTEMS SHOULD BE INSPECTED AT LEAST TWICE ANNUALLY, AND FOLLOWING ANY RAINFALL EXCEEDING 2.5 INCHES IN A 24-HOUR PERIOD, WITH MAINTENANCE OR REHABILITATION CONDUCTED AS A WARRANTED BY SUCH INSPECTION.

2 PRETREATMENT MEASURES SHOULD BE INSPECTED AT LEAST TWICE ANNUALLY, AND CLEANED OF ACCUMULATED SEDIMENT AS WARRANTED BY INSPECTION, BUT NO LESS THAN ONCE ANNUALLY.

3 AT LEAST ONCE ANNUALLY, SYSTEM SHOULD BE INSPECTED FOR DRAWDOWN TIME. IF BIORETENTION SYSTEM DOES NOT DRAIN WITHIN 72-HOURS FOLLOWING A RAINFALL EVENT, THEN A QUALIFIED PROFESSIONAL SHOULD ASSESS THE CONDITION OF THE FACILITY TO DETERMINE MEASURES REQUIRED TO RESTORE FILTRATION FUNCTION OR INFILTRATION FUNCTION (AS APPLICABLE), INCLUDING BUT NOT LIMITED TO REMOVAL OF ACCUMULATED SEDIMENTS OR RECONSTRUCTION OF THE FILTER MEDIA.

4 VEGETATION SHOULD BE INSPECTED AT LEAST ANNUALLY, AND MAINTAINED IN HEALTHY CONDITION, INCLUDING, PRUNING, REMOVAL, AND REPLACEMENT OF DEAD OR DISEASED VEGETATION, AND REMOVAL OF INVASIVE SPECIES.

DESIGN REFERENCES

1 UNH STORMWATER CENTER
2 NEW HAMPSHIRE STORMWATER MANAGEMENT MANUAL, FEBRUARY 2025 AS AMENDED.

CONSTRUCTION SEQUENCE NOTE:

EROSION, SEDIMENT AND DETENTION CONTROL FACILITIES SHALL BE INSTALLED & STABILIZED PRIOR TO DIRECTING RUNOFF TO THEM. TEMPORARY DIVERSIONS MAY BE REQUIRED. POST CONSTRUCTION STORM WATER MANAGEMENT PRACTICES MUST BE INITIATED AND STABILIZED EARLY IN THE PROCESS. RUNOFF MUST BE DIRECTED TO TEMPORARY PRACTICES UNTIL STORMWATER BMPs ARE STABILIZED. SWALES CONVEYING RUNOFF TO STORMWATER BMPs WILL BE CONSTRUCTED AND PUT INTO SERVICE ONCE THE RECEIVING STORMWATER BMP IS STABILIZED. SEE DETAIL E14, SHEET E-102 FOR FULL CONSTRUCTION SEQUENCE.

RAIN GARDEN MIX

THE GRASS THAT IS PLANTED WITHIN A RAIN GARDEN BIO-FILTRATION SYSTEM WITHIN THE BIO-MEDIA MUST CONSIST OF A COMBINATION OF WARM SEASON GRASS SEED AND COLD SEASON GRASS SEED IN ORDER FOR THE GRASS TO START GROWING FOR STABILIZATION AND CONTINUE GROWING IN THE SANDY WELL-DRAINED ENVIRONMENT. PLANTING SPECIFICATION WILL MEET THE REQUIREMENTS AS OUTLINED IN 'VEGETATION NEW HAMPSHIRE SAND AND GRAVEL PITS' MIX 1 (WARM SEASON GRASSES) (15 LBS/AC) AND INCLUDE ANNUAL AND PERENNIAL RYE GRASS SEED (15 LBS/AC); THE NEW ENGLAND NATIVE WARM SEASON GRASS MIX (23 LBS/AC) BY NEW ENGLAND WETLAND PLANTS, INC.; RAIN GARDEN MIX 180 (15 LBS/AC & 15 LBS/AC OF RYE) / RAIN GARDEN GRASS MIX 180-1 (20 LBS/AC & 10 LBS/AC OF RYE) BY ERNST CONSERVATION SEEDS; OR APPROVED EQUAL.

P1

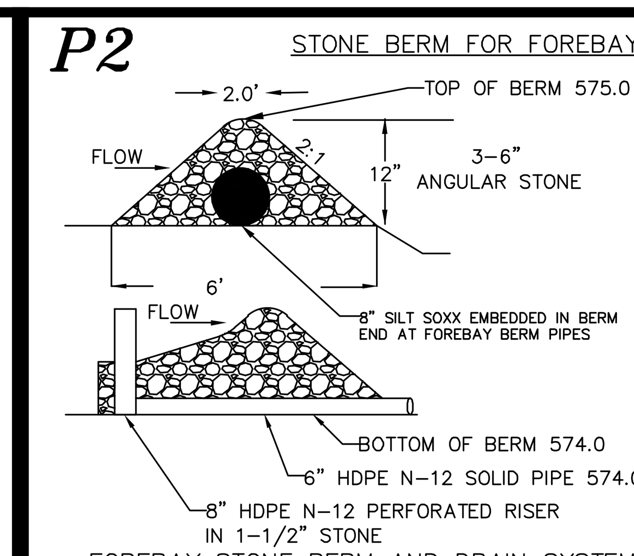
BIOMEDIA SURFACE PROTECTION NOTE:

SEE EROSION AND SEDIMENT CONTROL PLAN
IT IS RECOMMENDED THAT THE CONTRACTOR TAKE MEASURES TO PROTECT THE BIOMEDIA SURFACE FROM SEDIMENTATION CAUSED BY EROSION ON THE SIDE SLOPES.

STABILIZATION NOTE:

SEE NOTE #6, SHEET E-102, DETAIL E-15
SIDE SLOPES ARE TO BE STABILIZED WITHIN THREE WORKING DAY UPON COMPLETION OF FINAL GRADE.

P2

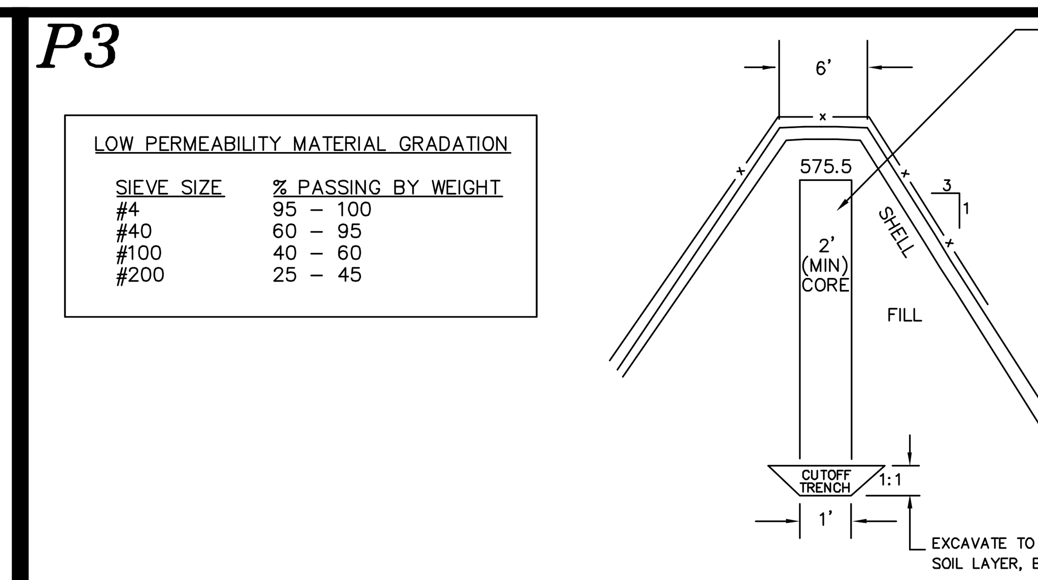


FOREBAY STONE BERM AND DRAIN SYSTEM

P3

LOW PERMEABILITY MATERIAL GRADATION

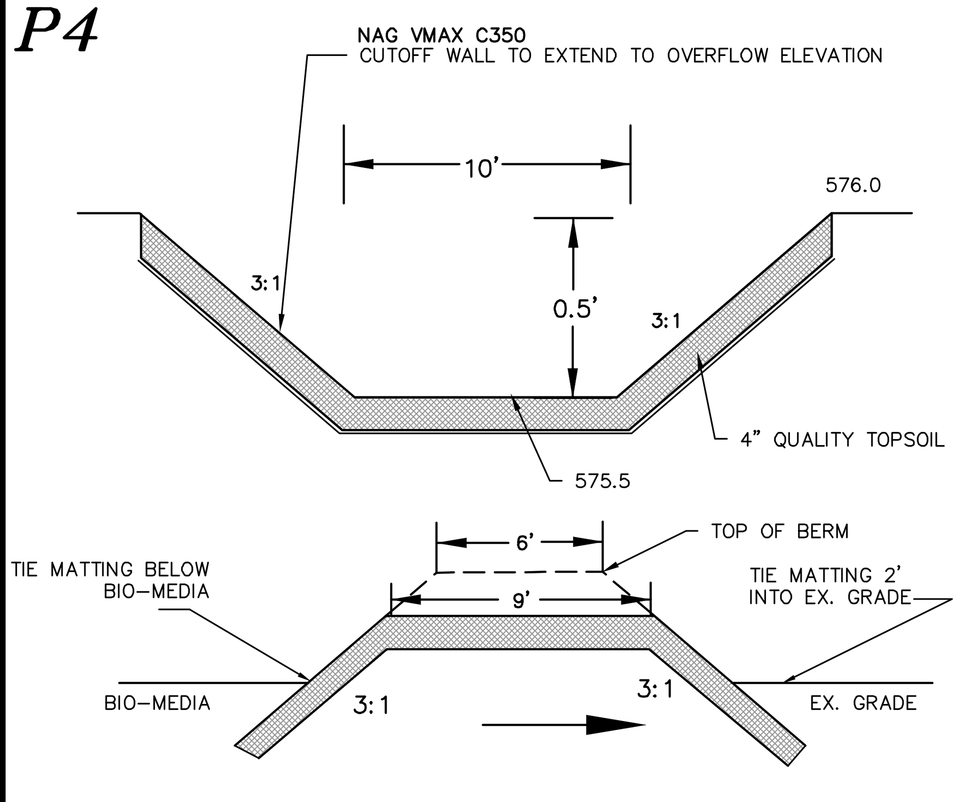
SIEVE SIZE	% PASSING BY WEIGHT
#4	95 – 100
#40	60 – 95
#100	40 – 60
#200	25 – 45



1.) 2' CORE IS TO BE CONSTRUCTED OF COMPACTED LOAM MATERIAL.
2.) CORE IS TO BE INSTALLED & COMPACTED IN 12" LIFTS.
3.) INSTALLATION OF ENTIRE DRAINAGE STRUCTURE IS TO BE OVERSEEN BY DESIGN ENGINEER.
4.) GENERAL FILL MATERIALS ARE TO PLACED & COMPACTED IN 12" LIFTS.
5.) GENERAL FILL MATERIAL MAY BE INSTALLED USING ONSITE MATERIALS.
6.) CORE IS TO BE CONSTRUCTED UNDERNEATH THE PROPOSED SPILLWAY.

P6

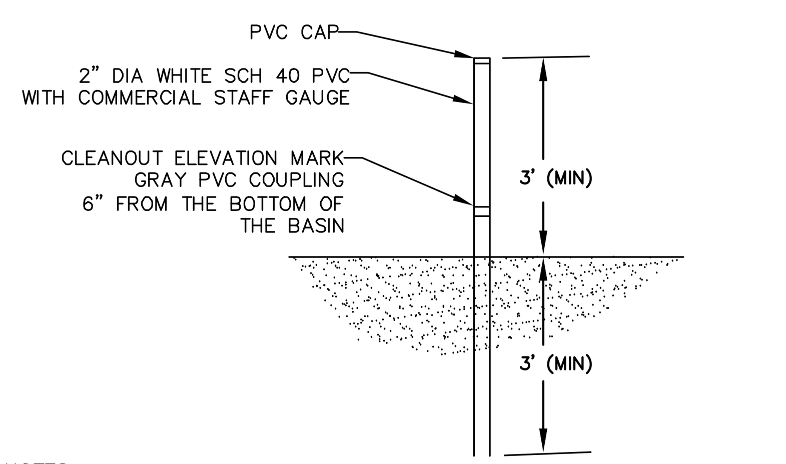
P4



EMERGENCY SPILLWAY PROFILE

NOT TO SCALE

P5



NOTES:
1. STAFF GAUGE TO BE TWO-INCH WHITE SCHEDULE 40 PVC PIPE DRIVEN INTO THE GROUND A MINIMUM OF 3-FEET.
2. A CLEANOUT MARK ON THE STAFF TO BE GRAY PVC COUPLING SET SIX-INCHES FROM THE BOTTOM OF THE BASIN.
3. A COMMERCIAL STAFF GAUGE WILL BE ATTACHED TO THE 2-INCH PVC PIPE WITH STAINLESS STEEL SCREWS.
4. SEDIMENT FOREBAY INSPECTION REQUIREMENTS: AT LEAST ANNUALLY OR MORE IF THE SEDIMENT LOAD EXCEEDS THE CLEANOUT MARK, CONDUCT PERIODIC MOWING OF THE SEDIMENT FOREBAY SLOPES AND EMBANKMENTS SEMI-ANNUALLY, REMOVE DEBRIS FROM THE OUTLET BERM AND DRAINS ANNUALLY, REMOVE AND DISPOSE OF ACCUMULATED SEDIMENT BASED ON INSPECTION ACCUMULATING NO MORE THAN SIX-INCHES IN DEPTH.

DEPTH GAUGE – SEDIMENT FOREBAY

NOT TO SCALE

Rain Garden Grass Mix - ERNMX-180-1

	Botanical Name	Common Name	Price/Lb
40.40 %	*Schizachyrium scoparium, Fort Indiantown Gap-PA Ecotype*	Little Bluestem, Fort Indiantown Gap-PA Ecotype	14.65
20.00 %	*Carex vulpinoidea, PA Ecotype*	Fox Sedge, PA Ecotype	31.20
20.00 %	*Elymus virginicus, Madison-NY Ecotype*	Virginia Wildrye, Madison-NY Ecotype	10.46
9.00 %	*Panicum clandestinum, Tioga*	Deertongue, Tioga	22.27
5.50 %	*Panicum rigidulum, PA Ecotype*	Redtop Panicgrass, PA Ecotype	72.00
4.00 %	*Chasmanthium latifolium, WV Ecotype*	River Oats, WV Ecotype	96.00
0.50 %	*Carex scoparia, PA Ecotype*	Blunt Broom Sedge, PA Ecotype	96.00
0.30 %	*Juncus effusus*	Soft Rush	48.00
0.30 %	*Juncus tenuis, PA Ecotype*	Path Rush, PA Ecotype	48.00
100.00 %		**Mix Price/Lb Bulk:**	**$24.82**

FOREBAY STONE BERM AND DRAIN SYSTEM

Seeding Rate: 15 lb per acre with a cover crop. For sites that drain within 24 hours of a rainfall event use one of the following cover crops:Oats (1 Jan to 31 Jul; 30 lbs/acre), Japanese Millet (1 May to 31 Aug; 10 lbs/acre), or grain rye (1 Aug to 31 Dec; 30 lbs/acre).

NOTE: TO BE USED FOR STORMWATER BMPS

BUTTERFLY MILK WEED IS A REQUIRED ADDITION TO ANY SEEDING DONE ON SITE.

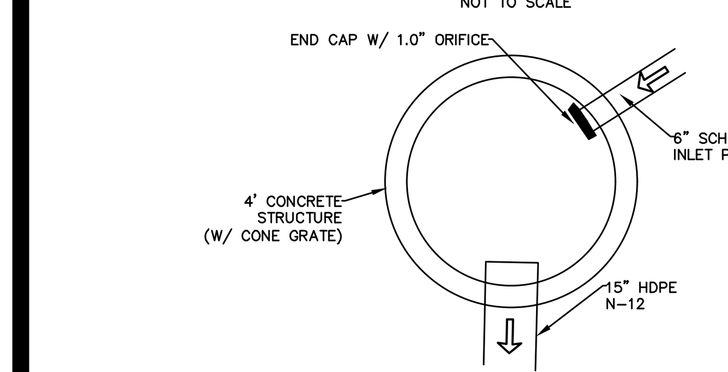
Grasses & Grass-like Species - Herbaceous Perennial; Stormwater Management

Mix formulations are subject to change without notice depending on the availability of existing and new products. While the formula may change, the guiding philosophy and function of the mix will not.

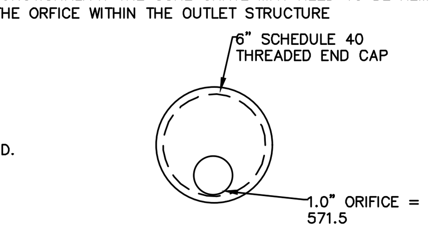
P7

TOP VIEW (OS #102)

NOT TO SCALE

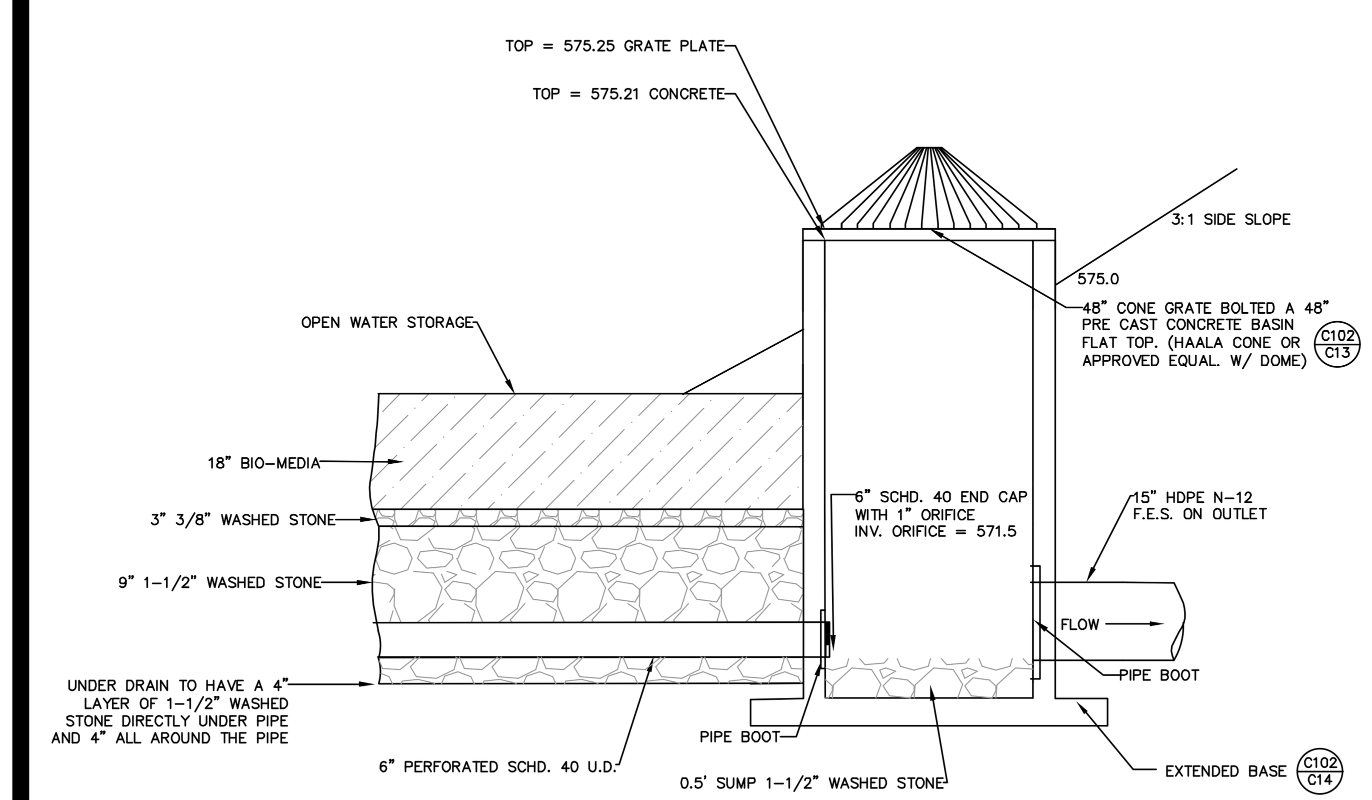


NOTE:
THE ANCHOR NUTS AND BOLTS NEED TO BE INSPECTED ANNUALLY FOR FUNCTIONALITY. THE CONE GRATE MAY NEED TO BE REMOVED TO MAINTAIN THE ORIFICE WITHIN THE OUTLET STRUCTURE

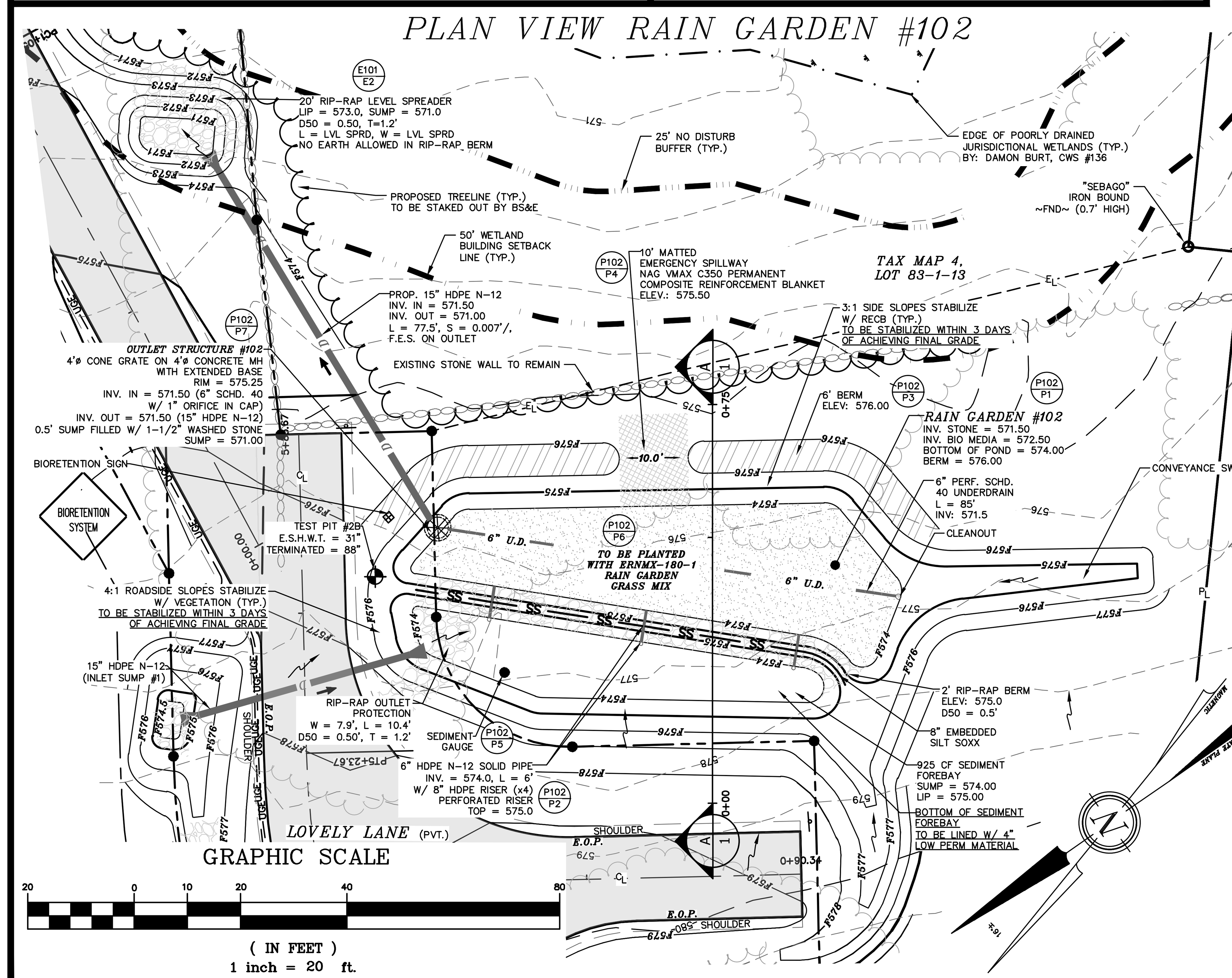


CAP WITH CONTROL ORIFICE (OS #102)

NOT TO SCALE



PLAN VIEW RAIN GARDEN #102



GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

EXISTING LEGEND:

- IRON BOUND/IRON ROD (FND)
- IRON PIPE (FND)
- DRILL HOLE (FND)
- STEEL STAKE (FND)
- UTILITY POLE / GUY WIRE
- SINGLE POST SIGN
- TEMPORARY BENCHMARK (T.B.M.)
- TEST PIT
- TREE W/ BARBED WIRE
- STONE WALL
- ABUTTING PROPERTY LINE
- BUILDING SETBACK LINE
- EDGE OF POORLY DRAINED WETLAND
- 25' NO DISTURB WETLAND BUFFER
- 50' BUILDING TO WETLAND SETBACK
- SEPTIC SETBACK
- OVERHEAD UTILITIES
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR

FND FOUND
TYP TYPICAL
TBS TO BE SET
S.C.R.D. STRAFFORD COUNTY REGISTRY OF DEEDS

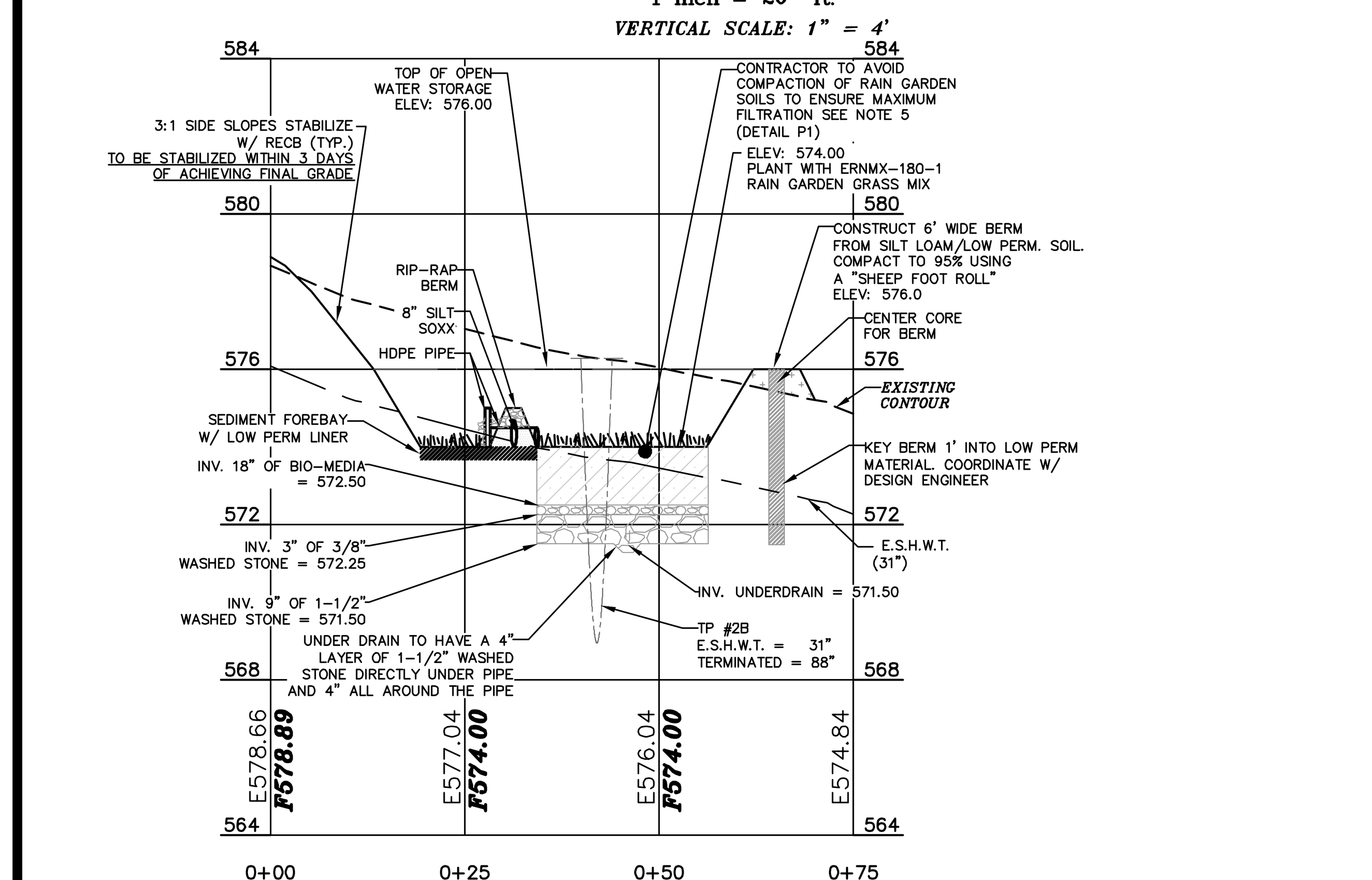
PROPOSED LEGEND:

- 4"X4" GRANITE BOUND ~TBS~
- 3/4" REBAR W/ ID CAP ~TBS~
- 1/2" EASEMENT REBAR W/ ID CAP ~TBS~
- PROPOSED SUBDIVISION LINE
- PROPOSED EASEMENT LINE
- STORMWATER BMP OUTLET STRUCTURE
- DROP INLET W/ STRUCUTRE
- FLOW ARROW
- WELL
- TEMPORARY BENCHMARK (T.B.M.)
- DETAIL SHEET / DETAIL
- MATCH POINT
- MATCH LINE
- CONTOUR MINOR, PROPOSED
- CONTOUR MAJOR, PROPOSED
- DRAIN CULVERT W/ FLARED END SECTION (F.E.S.)
- SHOULDER
- CENTER LINE
- BUILDING SETBACK LINE
- UNDERGROUND UTILITIES / TRANSFORMER
- RIP RAP
- STORMWATER BEST MANAGEMENT PRACTICE (BMP)
- BERM
- PROPOSED PAVEMENT/GRAVEL SURFACE
- CONDITIONAL USE PERMIT AREA

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.
VERTICAL SCALE: 1" = 4'



SECTION OF RAIN GARDEN #102

A 1   A 1

RAIN GARDEN #102
LAND OF
LOVELY REVOCABLE LIVING TRUST
DAVID & REBECCA LOVELY TRUSTEES
20 BACK CANAAN ROAD
STRAFFORD, N.H.
TAX MAP 4, LOT 83-1

REVISION	DATE	DESCRIPTION
#1	12-04-25	DESIGN REVISION

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : OCTOBER 14, 2025
FILE NO. : DB 2025-024

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14243
LICENSED
PROFESSIONAL ENGINEER

P-102

BERRY SURVEYING & ENGINEERING
335 Second Crown Point Road
Barrington, NH 03825
Phone: (603) 332-2863
Fax: (603) 335-4623
www.BerrySurveying.Com

Stormwater System Management:

Inspection and Maintenance Manual

20 Back Canaan Road
Strafford, NH
Tax Map 4, Lot 83-1

Prepared for

Lovely Revocable Living Trust
David & Rebecca S. Lovely, Trustees
20 Back Canaan Road
Strafford, NH 03884

Prepared By

Berry Surveying & Engineering
335 Second Crown Point Road
Barrington, NH 03825
603-332-2863

STATE OF NEW HAMPSHIRE - KENNETH A. BERRY No. 14243 LICENSED - PROFESSIONAL ENGINEER -

File Number
DB2025-024

October 14, 2025
Revised: December 4, 2025

Table of Contents

Introduction

The Stormwater Control Measures (SCMs) described in this manual are specified in more detail within the plan set giving design details and specifications. The New Hampshire Stormwater Manual (February 2025) is included by reference to this manual. Additional details, construction specifications, and example drawings are provided within this reference. (http://des.nh.gov/organization/divisions/water/stormwater/)

The SCMs are covered below in the general order in which the storm water flows. Each SCM has a description and maintenance consideration listed. A checklist table is provided after the narrative to summarize the maintenance responsibilities and schedule. A log form is also provided for the owner's use.

For details regarding the design of the Stormwater System see also Drainage Analysis & Sediment and Erosion Control Plan also published by Berry Surveying & Engineering originally dated October 14th, 2025, as revised. See also plan set completed for David & Rebecca S. Lovely, Trustees originally dated October 14th, 2025, as revised.

David Lovely, Managing Member, is responsible for the Stormwater System Operation and Maintenance. A significant step in this responsibility is the Inspection and Maintenance of each component of the system. Ongoing, semi-annual, and annual inspection and maintenance requirement are documented below and must be taken seriously. Failure of any component of the system can result in surface water run-off ponding and/or freezing in the roadway, leaving the developed site untreated, and/or causing violations to issued permits. The owner must maintain, and have available, plans of the Stormwater System in order to properly inspect and maintain the system. (Reduced copies attached.) David Lovely, as the owner / operator, is responsible to ensure that any subsequent owner, Homeowners Association, or subcontractor has copies of the Log Form and Annual Report records and fully understands the responsibilities of this plan. The grantor owner will ensure this document is provided to the grantee owner by duplicating the Ownership Responsibility Sheet which is found toward the back of this document, which will be maintained with the Inspection & Maintenance Logs, provided to the Town of Strafford, Planning Department, with the Annual Report.

The owners of Tax Map 4, Lot 83-1, David & Rebecca S. Lovely, Trustees, are proposing the development of a new roadway consisting of 585 feet to provide access to six proposed lots. A series of inlet sumps and conveyance swales route runoff to the sediment forebays of two rain gardens for pre-treatment with treatment occurring in the rain gardens.

The following drainage features will all require periodic inspections and maintenance based on this manual, with photo documentation required:

Conveyance Swales (Existing / Proposed)

Inlet Sump #1

Sediment Forebay

Rain Garden #101 – P-101 w/ Outlet Structure, orifice configuration, and Emergency Spillway

Rain Garden #102 – P-102 w/ Outlet Structure, orifice configuration, and Emergency Spillway

Common Driveway Inlet Sump #2

Drop Inlet

Outlet Protection and Level Spreader

Conveyance Swale

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (A115-A117) (Direct Quotes)

Chapter Env-Wq 1508.20 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

Description:

Conveyance swales are stabilized channels designed to convey stormwater runoff at non-erosive velocities. They may be stabilized using vegetation, riprap, or a combination, or with an alternative lining designed to accommodate design flows while protecting the integrity of the sides and bottom of the channel. Conveyance swales may provide incidental water quality benefits, but are not specifically designed to provide treatment. Conveyance swales are not considered a Treatment or Pre-treatment Practice under the AoT regulations, unless they are also designed to meet the requirements of an acceptable Treatment/ Pre-treatment Practice as described elsewhere in this Appendix.

Maintenance Requirements:

• Maintenance activities need to comply with laws that protect wildlife, including but not limited to RSA 209:8, RSA 209:9, RSA 209:10, and RSA 212-A:7.
• Grassed swales 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, debris, and invasive species annually, or more frequently as warranted by inspection.
• Mow vegetated swales 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.

• The existing conveyance swale must be preserved during and after the construction process.

Culvert Inlet Sumps & Cross Culverts w/ Flared End Sections

Description:

To convey the surface water runoff that is trapped within the roadway and runoff from backyards, there are two Inlet Sumps. These culvert pipes, flared end sections, and constructed sumps will collect the runoff that is directed to that location during and after the residential development. The location of the Inlet Sumps will be marked and identified with painted metal fence posts.

Maintenance Considerations:

Vegetation and debris will need to be removed from the culvert inlet several times a year, especially late fall after the majority of the leaves have fallen and in the spring. In addition to the sump and culverts themselves, the drainage channel will need to be inspected to ensure that the runoff intended to get to the inlets is making it to the sump. The identification fence post will be inspected for structural condition and painted condition.

The exit of the culvert pipes should be cleaned of any trash and sediment build-up. Riprap outlet protection shall not prevent the outlet from being free flowing, as applicable. The culvert should be clear to let collected water pass through the culvert unobstructed. Flared end sections and headwalls should be inspected for erosion and destabilization, with repairs made as required. The underdrains will require yearly jetting to ensure full operation.

Permanent Outlet Protection

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (A127-A131) (Direct Quotes)

Description:

Outlet protection is typically provided at stormwater discharge conduits from structural SCMs to reduce the velocity of concentrated stormwater flows to prevent scour and minimize the potential for downstream erosion. Outlet protection is also provided where conduits discharge stormwater runoff into an inground stormwater management practice (e.g., pond or swale) to prevent scour where flow enters the SCM.

Standard engineering practices allow for many different types of outlet protection which provide energy dissipation. Common outlet protection measures include:

• Riprap aprons, the design of which is covered within this section.
• Riprap lined scour holes, stilling basins or plunge pools. Design references for stilling basins are provided under 'References'.
Other outlet protection practices may be used, if documented by applicable technical literature.

Maintenance Requirements:

• Maintenance activities need to comply with laws that protect wildlife, including but not limited to RSA 209:8, RSA 209:9, RSA 209:10, and RSA 212-A:7.

• Inspect the outlet protection annually for damage and deterioration. Repair damages immediately.
• Remove sediment, debris, and woody vegetation.

Sediment Forebay

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (A28-A30) (Direct Quotes)

Chapter Env-Wq 1508.12 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

Description:

A sediment forebay is an impoundment, basin, or other storage structure designed to dissipate the energy of incoming stormwater runoff and allow for initial settling of coarse sediments. Forebays are used for pre-treatment of stormwater runoff prior to discharge into the primary water quality treatment SCM. Forebays are generally integrated into the design of larger stormwater management structures.

Maintenance Requirements:

• Maintenance access must be provided.
• Embankment design must be engineered to meet applicable safety standards (see description of "Detention Basin").
• 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 using a level spreader, spillway, check dam, or other appropriate dissipation techniques.
• The bottom floor may be designed with a concrete pad or hardened bottom to aid in removal of accumulated sediment during maintenance.
• 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.
• For guidance on sizing of riprap, refer to the Federal Highway Administration's Bridge Scour and Stream Instability Countermeasures: Experience, Selection, and Design Guidance- Third Edition, Volume I and II (FHWANHI-09-111 and FHWA-NHI-09-112, Hydraulic Engineering Circular 23, 2009).

Bioretention Systems

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (A35-A47) (Direct Quotes)

Chapter Env-Wq 1508.08 & 1508.06 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

Descriptions:

Bioretention systems collect stormwater runoff in a landscaped depression, where it ponds, filters through the engineered soil media, and infiltrates into the ground or is collected and discharged to the surface. Bioretention systems can reduce sediment, nutrients, oil and grease, and trace metals.

The major difference between bioretention systems and other filtration systems is the composition of the filter media and the use of vegetation. A typical surface sand filter is designed to be maintained with no vegetation, whereas a bioretention cell is planted with a variety of vegetation whose roots assist with pollutant uptake. The use of vegetation allows these systems to blend in with other landscaping features.

The primary types of bioretention systems are:

- **Infiltrating bioretention systems** have an elevated underdrain (or no underdrain) and are configured to infiltrate filtered stormwater runoff directly into the subsoil (preferred). (N/A)
- <u>**Filtering bioretention systems** have an underdrain that is installed in poor soils or is lined where infiltration is not desired (e.g., hot spot areas) such that limited or no infiltration is anticipated. The underdrain collects filtered stormwater runoff and conveys it to a discharge outlet.</u>
- **Bioretention systems with internal storage reservoirs (ISR)** are designed to include a storage reservoir that remains in saturated conditions and creates an anoxic zone suitable for denitrification. Bioretention systems with ISR can be designed as infiltrating or filtering systems. Infiltrating bioretention systems with ISR are also called "hybrid" bioretention systems. (N/A)

Maintenance Requirements:

- Maintenance activities need to comply with laws that protect wildlife, including but not limited to RSA 209:8, RSA 209:9, RSA 209:10, and RSA 212-A:7.

• Special attention should be given to maintenance in the first two years of operation as vegetation is established.
• Systems should be inspected at least twice annually and following any rainfall event exceeding 2.5 inches in a 24- hour period, with maintenance or rehabilitation conducted as warranted by such inspection.
• Pre-treatment measures should be inspected at least twice annually, and cleaned of accumulated sediment as warranted by inspection, but no less than once annually.
• Trash and debris should be removed at each inspection to.
• Ensure the orifice cap is unobstructed. **The outflow is controlled by a 1-inch orifice within the outlet structure. The annual inspection may require access to the structure internals.**
• At least once annually, system should be inspected for drawdown time. If bioretention system does not drain within 72 hours following a rainfall event, then a qualified professional should assess the condition of the facility to determine measures required to restore filtration function or infiltration function (as applicable), including but not limited to removal of accumulated sediments or reconstruction of the bioretention soil mixture. See also orifice above.
• Vegetation should be inspected at least annually, and maintained in healthy condition, including pruning, removal, and replacement of dead or diseased vegetation, and removal of invasive species.
• Refer to UNHSC Maintenance Guidelines and Resources, "Checklist for Inspection of Bioretention Systems/ Tree Filters" for an example inspection checklist.

Stone Berm Level Spreader

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (A132-A134) (Direct Quotes)

Chapter Env-Wq 1508.19 Alteration Of Terrain (RSA 485-A:17)
(As Amended September 4, 2024)

Description:

A stone berm level spreader is an outlet structure constructed at zero percent grade across a slope used to convert concentrated flow to "sheet flow." It disperses or "spreads" flow thinly over a receiving area, usually consisting of undisturbed, vegetated ground. The conversion of concentrated flow to shallow, sheet flow allows stormwater runoff to be discharged at non-erosive velocities onto natural ground. To stabilize the spreader outlet, a stone berm is provided to dissipate flow energy, and help disperse flows along the length of the spreader.

Level spreaders are not designed to remove pollutants from stormwater; however, some suspended sediment and associated phosphorus, nitrogen, metals and hydrocarbons will settle out of the stormwater runoff through settlement, filtration, infiltration, absorption, decomposition and volatilization. There is to be no earth within the berm.

Maintenance Requirements:

• Maintenance activities need to comply with laws that protect wildlife, including but not limited to RSA 209:8, RSA 209:9, RSA 209:10, and RSA 212-A:7.
• Inspect at least once annually for accumulation of sediment and debris and for signs of erosion within approach channel, spreader channel or down-slope of the spreader.
• Remove debris whenever observed during inspection.
• Remove sediment when accumulation exceeds 25 percent of spreader channel depth.
• Remove woody vegetation.
• Snow should not be stored within or down-slope of the level spreader or its approach channel.
• Repair any erosion and re-grade or replace stone berm material, as warranted by inspection.
• Reconstruct the spreader if down-slope channelization indicates that the spreader is not level or that discharge has become concentrated, and corrections cannot be made through minor regrading.

Leaf Litter Pickup

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (A7-A8) (Direct Quotes)

Description:

Leaf litter is a significant source of nutrients (i.e., phosphorus and nitrogen) in stormwater runoff, especially during the fall season. As leaf litter decays on streets or in the storm drain system, it releases excess phosphorus and nitrogen. Leaf litter can be carried by rain and melting snow and washed into storm drains. Once in the storm drain system, leaves may enter nearby waterbodies and harm aquatic plants and animals by smothering natural vegetation. In addition, excessive amounts of nutrients in waterbodies can lead to accelerated effects of eutrophication, contributing to excess algae and odors (USGS, 2019).

Through proper handling and disposal of leaf litter, the amount of phosphorus in stormwater runoff, and the receiving waterbodies, can be minimized.

Design Guidance:

Leaf litter pickup is a major component of street sweeping. Pollutant removal efficiency will vary seasonally with increased leaf-fall and removal during the fall (September to December).

Snow and Ice Management

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (A9-A13) (Direct Quotes)

Chapter Env-Wq 2200

Description:

Rising concentrations of chloride from salt applications/deicing chemicals have been identified in New Hampshire waters, similar to other colder regions of the United States and Canada. A 120 percent increase in the number of chloride contaminated wells in New Hampshire has occurred over the past 30 years. The majority of lakes and ponds that have active sampling programs display worsening trends for chloride concentrations. To protect New Hampshire waters from chloride contamination, the New Hampshire Department of Environmental Services (NHDES), New Hampshire Department of Transportation, and the University of New Hampshire Technology Transfer Center, created the Green SnowPro Program for commercial salt applicators. This program offers snow and ice management training, proficiency testing, and certification in state-of-the-science salt reduction practices that prioritize public safety while mitigating salt usage. For additional incentive, commercial salt applicators certified by NHDES Green SnowPro under RSA 489-C, and property owners or managers who hire them, are granted limited liability protection against damages arising from snow and ice conditions under RSA 508:22. In addition, municipalities also have the opportunity to have their public works departments and snow and ice management crews certified as Green SnowPro under RSA-489-C. Municipalities that implement a comprehensive suite of snow and ice best practices achieve higher levels of Green SnowPro certification by NHDES. For additional information regarding road salt reduction and to become Green SnowPro certified or to engage with one for winter snow and ice property management in New Hampshire, refer to the NHDES Road Salt Reduction website. NHDES also recommends the creation of a Road Salt and Deicing Minimization Plan when a development will create one acre or more of pavement, including parking lots and roadways. The plan should address the policies that the development will keep in place to minimize salt and other deicer use after the project has been completed. A component of the plan should include tracking the use of salt and other deicers for each storm event and compiling salt use data annually.

Design Guidance:

• Snow disposal guidelines to minimize impact to the environment should include the following:

- Snow should be stored near flowing surface waters, but at least 25 feet from the high-water mark of the surface water and/or top of stream bank. Upland sites further from surface waters are acceptable, provided they do not impact water supply sources as described below.
- A silt fence or equivalent barrier should be securely placed between the snow storage area and the highwater mark and/or the top of stream bank.
- Snow storage areas should be at least 75 feet from any private water supply wells, at least 200 feet from any community water supply wells, and at least 400 feet from any municipal wells. Snow storage is prohibited in wellhead protection areas.
- All debris in the snow storage area should be cleared from the site prior to snow storage.
- By May 15 each year, all debris from active snow storage areas should be cleared and properly disposed of.
- Designated snow storage areas should not be located near any SCMs to ensure the SCMs continue to function as designed during melt events and to reduce the amount of debris flowing into SCMs, which can clog and flood drainage areas.
- Snow storage site selection should consider the following:
  - How much snow disposal capacity is needed so an adequate number and size of sites can be selected and prepared.
  - Sites lacking mature tree growth are preferred because trees make collection of debris more difficult after the winter season.

• Municipal open space, parks, recreation fields and parking areas should be considered for potential snow disposal sites. If there are no municipal sites available, securing permissions from landowners of nonmunicipally owned sites should be considered.

• Recommended deicing application rate guidelines are provided in the table below. An example form for tracking salt and other deicer usage is also provided.

Street Sweeping

References:

New Hampshire Stormwater Manual (February 2025) (NH SWM) (A14-A16) (Direct Quotes)

Description:

Street sweeping is a pollution prevention practice that removes sediment, debris and trash that accumulates along streets and roads from winter sanding practices and everyday use. Street sweeping is often performed to improve aesthetics and to reduce the export of sand to the drainage network and receiving waters. In addition to sediment, debris and trash, other pollutants that may be minimized through street sweeping include some nutrients, oxygen-demanding substances and trace metals.

There are three types of commonly used street sweepers:

• **Mechanical sweepers** use rotating brooms to force debris from the street surface into a hopper by a conveyor system. Water is usually sprayed on the pavement surface to control dust. This type of sweeper typically removes only coarse particles and therefore is less effective at removing nutrients, oxygen-demanding materials, and toxic substances that are typically attached to fine particles.
• **Regenerative-air sweepers** combine the rotating brooms of mechanical sweepers with forced air to dislodge the remaining dirt and use a high-power vacuum to pick up the dislodged particles. This allows for greater removal of fine particles and the associated pollutants.
• **Vacuum-assisted sweepers** combine the rotating brooms of mechanical sweepers with a high-power vacuum. Some will spray water to control dust and others operate completely dry with a continuous filtration system.

Vacuum-assisted sweepers and regenerative-air sweepers are considered more effective than the mechanical sweeper at particulate pickup. However, it is understood that the overall effectiveness of street sweeping operations to remove pollutants from a given area will depend on a number of variables and may require a combination of technologies and operational efforts. Other variables include the season, the frequency and location of sweeping, the ability to sweep on heavily traveled roads, the number of passes made and the operation speed of the sweeper.

Design Guidance:

As outlined under 'Design Considerations', street sweeping programs should be developed that accommodate areas of concern based on traffic volume, land use, field observations of sediment and trash accumulation and proximity to surface waters. At a minimum, street sweeping should be performed twice annually, preferably as soon as possible after the snow melts to reduce the amount of sand, grit, debris, and associated pollutants from winter sanding from entering surface waters.

Control of Invasive Plants

During maintenance activities, check for the presence of invasive plants and remove in a safe manner as described on the following pages. They should be controlled as described on the following pages.

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

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

Identification – Professional to identify specific invasive species.

Annual Report

Description: The owner is responsible to keep an **I & M Activity Log** that documents inspection, maintenance and repairs to the storm water management system, and a **Deicing Log** to track the amount and type of deicing material applied to the site. The original owner is responsible to ensure that any subsequent owner(s) have copies of the Stormwater System Operation: Inspection & Maintenance Manual, copies of past logs and check lists. This includes any owner association for potential condominium conversion of the property. The Annual Report will be prepared and submitted to the Town of Strafford Planning Department with copies of both logs and check lists no later than December 15th of each year and made available to NHDES upon request. Upon an ownership change, the Annual Report will include the Transfer of Ownership Responsibility Forms duplicated from the form found below.

The plans that accompany this manual include a plan sheet, "Inspection & Maintenance Plan" and copies of the Stormwater Treatment Design Sheets. The owner will also maintain a complete set of the approved original design plans.

Respectfully
BERRY SURVEYING & ENGINEERING

Kenneth A. Berry, PE, LLS
CPSWQ, CPESC, CESSWI
Principal, VP – Technical Operations

Christopher R. Berry, LLS
Principal - President

Kevin R. Poulin, PE
Design Engineer

STORMWATER SYSTEM OPERATIONS: INSPECTION & MAINTENANCE MANUAL

Inspection & Maintenance Manual Checklist

20 Back Canaan Road, Strafford, NH, Tax Map 4, Lot 83-1
Lovely Revocable Living Trust
20 Back Canaan Road, Strafford, NH 03884

☑	Date	BMP / System	Minimum Inspection Frequency	Minimum Inspection Requirements	Maintenance / Cleanout Threshold
		Pavement Sweeping	Three Times Per Year	Clean Pavement	Pavement areas will be swept and sedimentation removed so the surface is clean
		Litter/Trash Removal	Routinely	Inspect dumpsters, outdoor waste receptacles area, and yard areas.	Parcel will be free of litter/trash.
		Deicing Agents	N/A	N/A	Use salt as the primary agent for roadway safety during winter.
		Invasive Species	Two times per year.	Inspect for Invasive Species	Remove and dispose invasive species.
		Closed Drainage System:			
		Drainage Pipes	1 time per 2 years	Check for sediment accumulation & clogging.	Less than 2" sediment depth

☑	Date	BMP / System	Minimum Inspection Frequency	Minimum Inspection Requirements	Maintenance / Cleanout Threshold
		Inlet Sumps	At least once annually	Check for sediment accumulation & clogging.	Any accumulated Sediment or debris. Mow required
		Inlet Sumps	2 times per year	Check for sediment accumulation & clogging.	Any accumulated Sediment or debris.
		Rain Garden	2 times per year	Check for sediment and debris accumulation buildup.	Remove sediment & debris when required. Remove Invasive Species
		Rain Garden	Annually	Drain completely within 72 hours	Evaluate the surface of the Infiltration Pond for sedimentation and clogging. Remove clogging and restore the pond surface to original conditions.
		Rain Garden	Annually	Orifice evaluation	Orifice anchor nuts/bolts need to be inspected annually for functionality.
		Riprap Outlet Protection	Annually	Check for sediment buildup and structure damage.	Remove excess sediment and repair damage.
		Winter Maintenance	Ongoing	Remove snow as directed.	Ongoing

☑	Date	BMP / System	Minimum Inspection Frequency	Minimum Inspection Requirements	Maintenance / Cleanout Threshold
		Post Winter Maintenance	Annually	Remove excess sand, gross solids, and repair vegetation and plantings	Parcel will be free of excess sand, litter/trash.
		Annual Report	1 time per year	Submit Annual Report to Strafford Planning Dept. and kept on file by the owner.	Report to be submitted on or before December 15th each year.

Inspection Check List: Page 4

The following drainage features will all require periodic inspections and maintenance based on this manual, with photo documentation required:

Conveyance Swales (Existing / Proposed)

Inlet Sump #1

Sediment Forebay

Rain Garden #101 – P-101 w/ Outlet Structure, orifice configuration, and Emergency Spillway

Rain Garden #102 – P-102 w/ Outlet Structure, orifice configuration, and Emergency Spillway

Common Driveway Inlet Sump #2

Drop Inlet

Outlet Protection and Level Spreader

STORMWATER SYSTEM OPERATIONS: INSPECTION & MAINTENANCE MANUAL

Inspection & Maintenance Manual Log Form

20 Back Canaan Road, Strafford, NH, Tax Map 4, Lot 83-1
Lovely Revocable Living Trust
20 Back Canaan Road, Strafford, NH 03884

BMP / System	Date Inspected	Inspector	Cleaning/Repair (List Items & Comments)	Repair Date	Performed By:

STORMWATER SYSTEM OPERATIONS: INSPECTION & MAINTENANCE MANUAL

Deicing Log Form

20 Back Canaan Road, Strafford, NH, Tax Map 4, Lot 83-1
Lovely Revocable Living Trust
20 Back Canaan Road, Strafford, NH 03884

Date	Amount Applied	Performed By:	Date	Amount Applied	Performed By:

STORMWATER SYSTEM OPERATION & MAINTENANCE PLAN CERTIFICATION

Owner	Responsibility
Name: Lovely Revocable Living Trust David Lovely, Managing Member Address: 20 Back Canaan Road Strafford, NH 03884 Telephone: Work: (603)-957-8035 Cell: (603)-919-7196 E-mail: lovely4redd@yahoo.com	The owner is responsible for the conduct of all construction activities, and ultimate compliance with all the provisions of the Stormwater System Operation & Maintenance Plan and the implementation of the Inspection and Maintenance Manual.

20 Back Canaan Road, Strafford, NH, Tax Map 4, Lot 83-1

OWNER CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: ________________________________ Date: _____________________

Printed Name:

Representing:

Pavement Temp. (°F) and Trend (↑ ↓)	Weather Condition	Maintenance Actions	Application Rate (lbs/per 1000 sq.ft.)			
			Salt Prewetted/Pretreated with salt brine	Salt Prewetted/Pretreated with other blends	Dry salt	Winter sand
>30 ↑	Snow	Plow, treat intersections only				Not recommended
	Frz. Rain	Apply chemical				Not recommended
30 ↓	Snow	Plow and apply chemical				Not recommended
	Frz. Rain	Apply chemical				Not recommended
25 - 30 ↑	Snow	Plow and apply chemical				Not recommended
	Frz. Rain	Apply chemical				Not recommended
25 - 30 ↓	Snow	Plow and apply chemical				Not recommended
	Frz. Rain	Apply chemical				3.25
20 - 25 ↑	Snow or frz. Rain	Plow and Apply chemical				3.25 for frz. Rain
20 - 25 ↓	Snow	Plow and apply chemical				Not recommended
	Frz. Rain	Apply chemical				3.25
15 - 20 ↑	Snow	Plow and apply chemical				Not recommended
	Frz. Rain	Apply chemical				3.25
15 - 20 ↓	Snow or Frz. Rain	Plow and apply chemical				3.25 for frz. Rain
0 to 15 ↑↓	Snow	Plow, treat with blends, sand hazardous areas	Not recommended		Not recommended	5.0 and spot-treat as needed
< 0	Snow	Plow, treat with blends, sand hazardous areas	Not recommended		Not recommended	5.0 and spot-treat as needed

Table 19. Application Rates for Deicing

These rates & table format are based on road application guidelines (Mn Snow & Ice Control Field Handbook, Manual 2005-1). Develop your own application rates by adjusting your current rates incrementally downward toward these guidelines. Where temperature categories overlap, select the rate most applicable to your situation.

Control of Invasive Plants

New Hampshire
Department of Agriculture,
Markets & Food
Douglas Cygan
603-271-3488
doug.cygan@agr.nh.gov

This guide lists garden plants and weeds which are already causing significant changes to natural areas in the Mid-Atlantic. **Measures for controlling each species are indicated by number, e.g., (3), in the text with a full explanation at the end of this article.** Click on the word Control: to jump to that section. Then click your "back" button to return to the text. Following each section suggested alternative plants are given. These alternatives are native plants, well adapted and needing little care, attractive to birds and butterflies, and an important part of the food web for our indigenous species.

INVASIVE TREES

NORWAY MAPLE (*Acer platanoides*) has large leaves similar to sugar maple. To easily confirm that the plant is Norway maple, break off a leaf and if it's truly Norway maple it will exude milky white sap. Fall foliage is yellow. (Exception: cultivars such as 'Crimson King,' which have red leaves in spring or summer, may have red autumn leaves.) The leaves turn color late, usually in late October after native trees have dropped their foliage. This tree suppresses growth of grass, garden plants, and forest understory beneath it, at least as far as the drip-line. Its wind-borne seeds can germinate and grow in deep shade. The presence of young Norway maples in our woodlands is increasing.

Control: (1); (7), (8), (9), or (10); (11) in mid-October to early November, before the leaves turn color.

TREE OF HEAVEN (*Ailanthus altissima*), is incredibly tough and can grow in the poorest conditions. It produces huge quantities of wind-borne seeds, grows rapidly, and secretes a toxin that kills other plants. Its long compound leaves, with 11-25 lance-shaped leaflets, smell like peanut butter or burnt coffee when crushed. Once established, this tree cannot be removed by mechanical means alone.

Control: (1) - seedlings only. Herbicide - use Garlon 3a (9) with no more than a 1" gap between cuts, or (10); plus (11) on re-growth. Or paint bottom 12" of bark with Garlon 4 Ultra (in February or March to protect surrounding plants). USE MAXIMUM STRENGTH SPECIFIED ON LABEL for all herbicide applications on Ailanthus. Glyphosate is not effective against Ailanthus.

INVASIVE SHRUBS

AUTUMN OLIVE (*Eleagnus umbellata*): Formerly recommended for erosion control and wildlife value, these have proved highly invasive and diminish the overall quality of wildlife habitat.

Control: (1) - up to 4" diameter trunks; (7) or (10) or bury stump. Do not mow.

MULTIFLORA ROSE (*Rosa multiflora*), formerly recommended for erosion control, hedges, and wildlife habitat, becomes a huge shrub that chokes out all other vegetation and is too dense for many species of birds to nest in, though a few favor it. In shade, it grows up trees like a vine. It is covered with white flowers in June. (Our native roses have fewer flowers, mostly pink.) Distinguish multiflora by its size, and by the presence of very hard, curved thorns, and a fringed edge to the leaf stalk.

Control: (1) - pull seedlings, dig out larger plants at least 6" from the crown and 6" down; (4) on extensive infestations; (10) or (11). It may remain green in winter, so herbicide may *applied when other plants are dormant. For foliar application, mix Rodeo with extra sticker-spreader, or use Roundup Sure Shot Foam on small plants.*

BUSH HONEYSUCKLES (*Lonicera spp.*), including Belle, Amur, Morrow's, and Tatarian honeysuckle. (In our region, assume that any honeysuckle is exotic unless it is a scarlet-flowered vine). Bush honeysuckles create denser shade than native shrubs, reducing plant diversity and eliminating nest sites for many forest interior species.
Control: (2) on ornamentals; (1); on shady sites only, brush cut in early spring and again in early fall (3); (4) during the growing season; (7); or (10) late in the growing season.

BLUNT-LEAVED PRIVET (*Ligustrum* obtusifolium). *Control*: (1); (7) or (10); or trim off all flowers. Do not cut back or mow.

BURNING BUSH, WINGED EUONYMUS (*Euonymus alatus*), identified by wide, corky wings on the branches.
Control: (1); (7) or (10); or trim off all flowers.

JAPANESE BARBERRY (*Berberis thunbergii*), and all cultivars and varieties.
Control: (1); (7) or (10); or trim off all flowers.

INVASIVE WOODY VINES

All of these vines shade out the shrubs and young trees of the forest understory, eventually killing them, and changing the open structure of the forest into a dense tangle. DO NOT PLANT NEXT TO OPEN SPACE.

JAPANESE HONEYSUCKLE (*Lonicera japonica*), including Hall's honeysuckle, has gold-and-white flowers with a heavenly scent and sweet nectar in June. This is probably the familiar honeysuckle of your childhood. It is a rampant grower that spirals around trees, often strangling them.
Control: (1); (3); (10); (11) in fall or early spring when native vegetation is dormant. Plan to re-treat repeatedly.

ORIENTAL BITTERSWEET (*Celastrus orbiculatus*) has almost completely displaced American bittersweet (*C. scandens*). The Asian plant has its flowers and bright orange seed capsules in clusters all along the stem, while the native species bears them only at the branch tips.
Control: (1); keep ornamental plants cut back, remove all fruits as soon as they open, and bag or burn fruits; to eradicate use Garlon 3a (10).

JAPANESE KNOTWEED, MEXICAN BAMBOO (*Polygonum cuspidatum*) can grow in shade. The stems have knotty joints, reminiscent of bamboo. It grows 6-10' tall and has large pointed oval or triangular leaves.
Control: Cut at least 3 times each growing season and/or treat with Rodeo (10) or (11). In gardens, heavy mulch or dense shade may kill it.

INVASIVE HERBACEOUS PLANTS

GARLIC MUSTARD (*Alliaria petiolata*, *A. officinalis*), a white-flowered biennial with rough, scalloped leaves (kidney-, heart- or arrow-shaped), recognizable by the smell of garlic and taste of mustard when its leaves are crushed. (The odor fades by fall.)
Control: Pull before it flowers in spring (1), removing crown and roots. Tamp down soil afterwards. Once it has flowered, cut (2), being careful not to scatter seed, then bag and burn or send to the landfill. (11) may be appropriate in some settings.

JAPANESE STILT GRASS (*Microstegium vimineum*) can be identified by its lime-green color and a line of silvery hairs down the middle of the 2-3" long blade. It tolerates sun or dense shade and quickly invades areas left bare or disturbed by tilling or flooding. An annual grass, it builds up a large seed bank in the soil.

Control: Easily pulled in early to mid-summer (1) - be sure to pull before it goes to seed. If seeds have formed, bag and burn or send to landfill. Mowing weekly or when it has just begun to flower may prevent it from setting seed (3). Use glyphosate (11) or herbicidal soap (less effective) on large infestations. Follow up with (5) in spring.

MILE-A-MINUTE VINE, DEVIL'S TAIL TEARTHUMB (*Polygonum perfoliatum*), a rapidly growing annual vine with triangular leaves, barbed stems, and turquoise berries in August which are spread by birds. It quickly covers and shades out herbaceous plants.
Control: same as for stilt grass.

SPOTTED KNAPWEED (*Centaurea maculosa*), a biennial with thistle-like flowers.
Control: Do NOT pull (1) unless the plant is young and the ground is very soft - the tap root will break off and produce several new plants. Wear sturdy gloves. (2); (6); (10) or (11).

CONTROL MEASURES

(1) PULL seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems. Use a forked spade or weed wrench for trees or shrubs.
(2) DEADHEAD to prevent spread of seeds of invasive plants. Cut off seeds or fruits before they ripen. Bag, and burn or send to a landfill.
(3) MOW or CUTTING at least 4 times a season to deplete plants' store of nutrients and carbohydrates, reduce seed formation, and kill or minimize spread of plants. If necessary, repeat each year.
(4) CONTROLLED BURNING during the spring, repeated over several years, allows native vegetation to compete more effectively with the invasive species. This requires a permit. Spot treatment with glyphosate in late fall can be used to make this method more effective.
(5) Use a CORN-BASED PRE-EMERGENCE HERBICIDE on annual weeds. This product is also an organic fertilizer, i.e., it can stimulate growth of existing plants, including weeds, so it is appropriate for lawns and gardens but may not be appropriate in woodlands.
(6) In lawns, SPOT TREAT with BROAD-LEAF WEEDKILLER. Good lawn-care practices (test soil; use lime and fertilizer only when soil test shows a need; mow high and frequently; leave clippings on lawn) reduce weed infestations.
(7) CUT DOWN the tree. Grind out the stump, or clip off re-growth.
(8) GIRDLE tree: cut through the bark and growing layer (cambium) all around the trunk, about 6" above the ground. Girdling is most effective in spring when the sap is rising, and from middle to late summer when the tree is sending down food to the roots. Clip off sucker sprouts.
(9) FRILL: Using a machete, hatchet or similar device, hack scars (several holes in larger trees) downward into the cambium layer, and squirt in glyphosate (or triclopyr if recommended in text above). Follow label directions for Injection and Frill Applications. This is most effective from middle to late summer. Clip off any sucker sprouts or treat with glyphosate.
(10) CUT STEM / CUT STUMP WITH GLYPHOSATE (or triclopyr if specified above). Follow label directions for Cut Stump Application. Clip off sucker sprouts or paint with glyphosate. See Note on Herbicides.
(11) FOLIAR SPRAY WITH GLYPHOSATE herbicide (see Note on Herbicides). Use a backpack or garden sprayer or mist blower, following label directions. Avoid overspray and/or dripping onto non-target plants, because glyphosate kills most plants except moss. If it rolls off waxy or grass-like foliage, use additional sticker-spreader. Deciduous trees, shrubs, and perennials move nutrients down to the roots in late summer. Glyphosate is particularly effective at this time and when plants have just gone out of flowering. Several invasive species retain their foliage after native plants have lost theirs, and resume growth earlier in spring than most natives. This allows you to treat them without harming the natives. However, the plant must be actively growing for the herbicide to work. Retreatments may be necessary the following year if suckering occurs or the plant hasn't been entirely killed.

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

Welcome to New Hampshire's Watershed Report Cards built from the 2024, 305(b)/303(d)

Each Watershed Report Card covers a single 12-digit Hydrologic Unit Code (HUC12), on average a 34 square mile area. Each Watershed Report Card has three components;

1. REPORT CARD - A one page card that summarizes the overall use support for Aquatic Life Integrity, Primary Contact (i.e. Swimming), and Secondary Contact (i.e. Boating) Designated Uses on every Assessment Unit ID (AUID) within the HUC12.
2. HUC 12 MAP - A map of the watershed with abbreviated labels for each AUID within the HUC12.
3. ASSESSMENT DETAILS - Anywhere from one to forty pages with the detailed assessment information for each and every AUID in the Report Card and Map.

How are the Surface Water Quality Assessment determinations made?

All readily available data with reliable Quality Assurance/Quality Control is used in the biennial surface water quality assessments. For a full understanding of how the Surface Water Quality Standards (Env-Wq 1700) are translated into surface water quality assessments we urge the reader to review the 2024 Consolidated Assessment and Listing Methodology (CALM).

Where can I find more advanced mapping resources?

GIS files are available by assessment cycle at the NHDES FTP site.

I'd like to see the more raw water quality data?

The web mapping tool allows you to download the data used in the assessment of the primary contact and aquatic life designated uses by clicking on the "Data Access Waterbody Data (Aquatic Life and Swimming Uses)" link for any assessment unit.

How are assessments coded in the report card?

Assessment outcomes are displayed on a color scale as well as an alpha numeric scale that provides additional distinctions for the designated use and parameter level assessments as outlined in the table below.

Category	Description	Severe	Poor	Likely Bad	No Data	Likely Good	Marginal	Good
		Not Supporting, Severe	Not Supporting, Marginal	Insufficient Information – Potentially Not Supporting	No Data	Insufficient Information – Potentially Full Supporting	Full Support, Marginal	Full Support, Good
Category 2	Meets standards						2-M or 2-OBS	2-G
Category 3	Insufficient Information			3-PNS	3-ND	3-PAS		
Category 4A	Does not Meet Standards; TMDL* Completed	4A-P	4A-M or 4A-T					
Category 4B	Does not Meet Standards; Other enforceable measure will correct the issue.	4B-P	4B-M or 4B-T					
Category 4C	Does not Meet Standards; Non-pollutant (i.e. exotic weeds)	4C-P	4C-M					
Category 5	Does not Meet Standards; TMDL* Needed	5-P	5-M or 5-T					
Category 5R	Does not Meet Standards; An EPA-approved alternative plan has been completed	5R-P	5R-M					

* TMDL stands for Total Maximum Daily Load studies

Watershed 305(b) Assessment Summary Report:

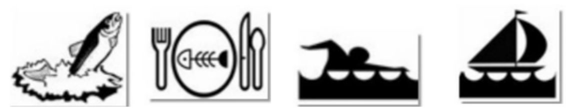
Assessment Cycle: 2024

HUC 12: 010600030605

HUC 12 Name: Nippo Brook-Isinglass River

(Locator map on next page only applies to this HUC12)

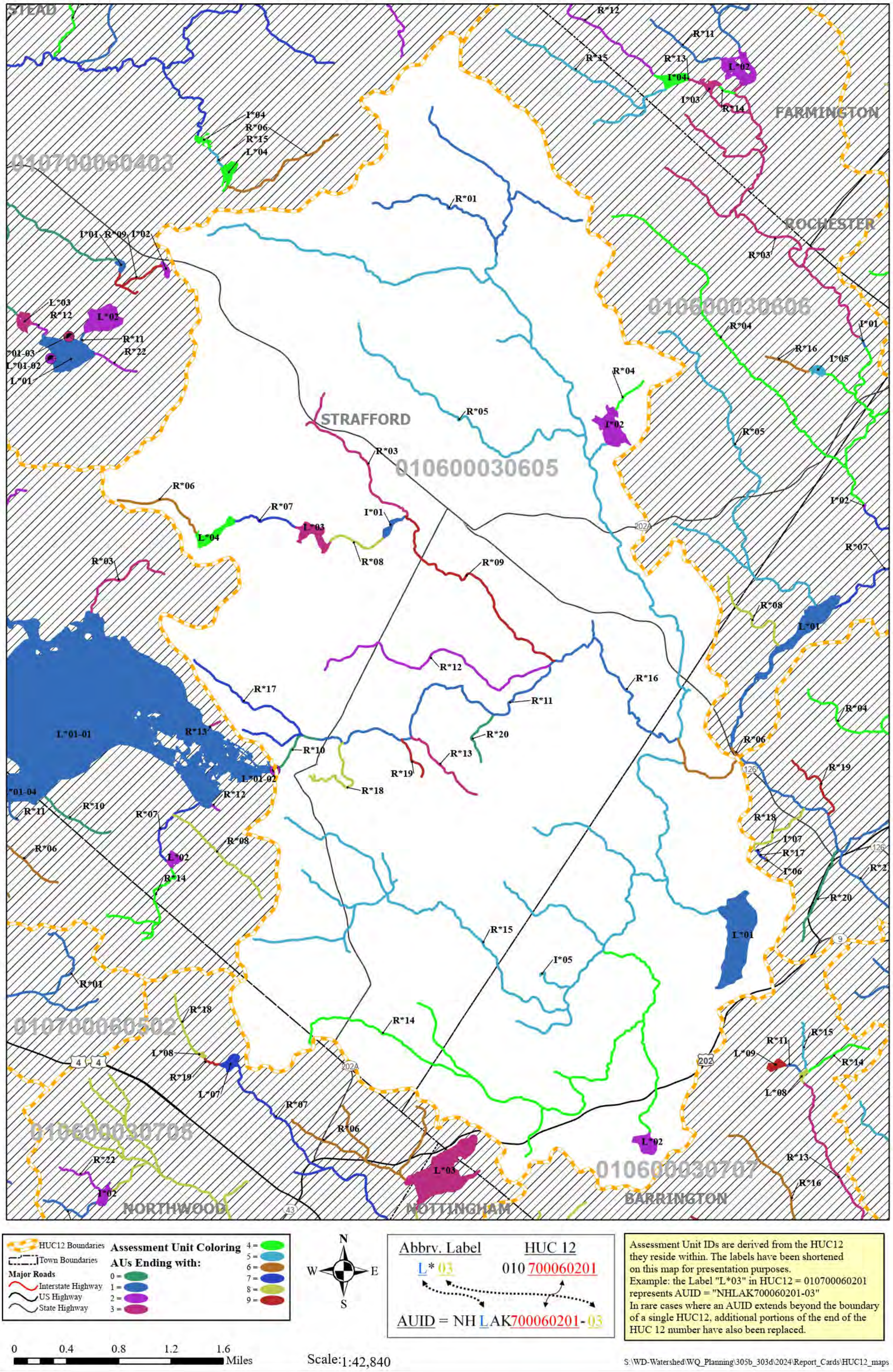
Good	Meets water quality standards/thresholds by a relatively large margin.
Marginal	Meets water quality standards/thresholds but only marginally.
Likely Good	Limited data available, however, the data that is available suggests that the parameter is Potentially Attaining Standards (PAS).
No Current Data	Insufficient information to make an assessment decision.
Likely Bad	Limited data available, however, the data that is available suggests that the parameter is Potentially Not Supporting (PNS) water quality standards.
Poor	Not meeting water quality standards/thresholds. The impairment is marginal.
Severe	Not meeting water quality standards/thresholds. The impairment is more severe and causes poor water quality.



Assessment Unit ID	Map Label	Assessment Unit Name	Aquatic Life	Fish Consump.	Swimming	Boating
NHIMP600030605-01	I*01	Wildlife Pond Dam		4A-M	3-ND	3-ND
NHIMP600030605-02	I*02	Kenneth Hill Pond	3-ND	4A-M	3-ND	3-ND
NHIMP600030605-05	I*05	Unnamed Brook - Farm Pond	3-ND	4A-M	3-ND	3-ND
NHLAK600030605-01	L*01	Nippo Pond	4A-P	4A-M	5-M	3-ND
NHLAK600030605-02	L*02	Stonehouse Pond	3-PNS	4A-M	3-PAS	3-ND
NHLAK600030605-03	L*03	Huckins Mill Pond	3-ND	4A-M	3-ND	3-ND
NHLAK600030605-04	L*04	Unnamed Pond	3-ND	4A-M	3-ND	3-ND
NHRIV600030605-01	R*01	Unnamed Brooks - To Unnamed Pond	3-ND	4A-M	3-ND	3-ND
NHRIV600030605-03	R*03	Unnamed Brook - To Unnamed Pond	3-ND	4A-M	3-ND	3-ND
NHRIV600030605-04	R*04	Unnamed Brook - To Wildlife Pond	3-ND	4A-M	3-ND	3-ND
NHRIV600030605-05	R*05	Mohawk Brook	5-P	4A-M	3-ND	3-ND
NHRIV600030605-06	R*06	Unnamed Brook - To Unnamed Pond	3-ND	4A-M	3-ND	3-ND

NHRIV600030605-07	R*07	Unnamed Brook - To Huckins Mill Pond	3-ND	4A-M	3-ND	3-ND
NHRIV600030605-08	R*08	Unnamed Brook - From Huckins Mill Pond To Wildlife Pond	3-ND	4A-M	3-ND	3-ND
NHRIV600030605-09	R*09	Penny Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030605-10	R*10	Isinglass River	5-M	4A-M	3-PAS	3-ND
NHRIV600030605-11	R*11	Isinglass River	5-M	4A-M	3-ND	3-ND
NHRIV600030605-12	R*12	Unnamed Brook - To Isinglass River	5-P	4A-M	3-ND	3-ND
NHRIV600030605-13	R*13	Unnamed Brook - To Isinglass River	3-ND	4A-M	3-ND	3-ND
NHRIV600030605-14	R*14	Stonehouse Brook - Hall Brook	5-P	4A-M	3-ND	3-ND
NHRIV600030605-15	R*15	Nippo Brook	5-M	4A-M	3-ND	3-ND
NHRIV600030605-16	R*16	Isinglass River	5-M	4A-M	4A-M	3-ND
NHRIV600030605-17	R*17	Unnamed Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030605-18	R*18	Unnamed Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030605-19	R*19	Unnamed Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030605-20	R*20	Unnamed Brook	3-ND	4A-M	3-ND	3-ND

AUIDs For HUC12: 010600030605 - Nippo Brook-Isinglass River



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Assessment Unit ID: NHRIV600030605-14
Assessment Unit Name: Stonehouse Brook - Hall Brook
Town(s) Primary Town is Listed First: Barrington, Northwood, Strafford

Size: 7.02 MILES
Assessment Unit Category: 5-P
Beach: N

Designated Use Description	Desig. Use Category	Parameter Name	Parameter Threatened (Y/N)	Last Sample	Last Exceed	Parameter Category	TMDL Priority
Aquatic Life Integrity	5-P	Benthic-Macroinvertebrate Bioassessments (Streams)	N			3-ND	
		CHLORIDE	N	2009	N/A	3-ND	
		DISSOLVED OXYGEN SATURATION	N	2009	2008	3-ND	
		Fishes Bioassessments (Streams)	N			3-ND	
		OXYGEN, DISSOLVED	N	2009	2009	5-P	LOW
		PH	N	2009	2009	5-P	LOW
		TURBIDITY	N	2009	N/A	3-ND	
Fish Consumption	4A-M	MERCURY - FISH CONSUMPTION ADVISORY	N			4A-M	
Potential Drinking Water Supply	2-G						
Primary Contact Recreation	3-ND	Escherichia coli	N			3-ND	
Secondary Contact Recreation	3-ND	Escherichia coli	N			3-ND	
Wildlife	3-ND						

Good	Marginal	Likely Good	No Current Data	Likely Bad	Poor	Severe
Meets water quality standards/thresholds by a relatively large margin.	Meets water quality standards/thresholds but only marginally.	Limited data available. The data that is available suggests that the parameter is Potentially Attaining Standards (PAS)	Insufficient information to make an assessment decision.	Limited data available The data that is available suggests that the parameter is Potentially Not Supporting (PNS) water quality standards.	Not meeting water quality standards/thresholds. The impairment is marginal.	Not meeting water quality standards/thresholds The impairment is more severe and causes poor water quality.

LEGEND:

- IRON BOUND/IRON ROD (FND)
- IRON PIPE (FND)
- DRILL HOLE (FND)
- STEEL STAKE (FND)
- DROP INLET
- PROPOSED STORMWATER BMP OUTLET STRUCTURE
- TEMPORARY BENCHMARK (T.B.M.)
- E101 / E6 — DETAIL SHEET / DETAIL
- POORLY DRAINED JURISDICTIONAL WETLAND
- 25' NO DISTURB WETLAND BUFFER
- 50' WETLAND BUILDING SETBACK
- 176 — CONTOUR MINOR, EXISTING
- 175 — CONTOUR MAJOR, EXISTING
- F176 — CONTOUR MINOR, PROPOSED
- F175 — CONTOUR MAJOR, PROPOSED
- CENTER LINE
- EXISTING DRAINAGE LINE
- PROPOSED DRAINAGE LINE
- RIP RAP
- STORMWATER BEST MANAGEMENT PRACTICE (BMP)
- BERM
- CONSTRUCTION ENTRANCE
- PAVEMENT / GRAVEL SURFACE
- SF — SILT FENCE / EROSION MIX BERM
- SS — FILTREXX 8" – 12" SILT SOXX AS SPECIFIED
- C — ORANGE CONSTRUCTION PERIMETER FENCE
- P/C — PERIMETER CONTROL
- LIMIT OF PROJECT DISTURBANCE
- (B) STORMWATER BMP PROTECTION
- (P) PERIMETER CONTROL
- (C) ROADWAY CONSTRUCTION

SOILS & DEWATERING:

GlB	GLOUCESTER	FINE SANDY LOAM	K= 0.17
GsC	GLOUCESTER	VERY STONY FINE SANDY LOAM	K= 0.17
LeA	LEICESTER	VERY STONY FINE SANDY LOAM	K= 0.17
PbB	PAXTON	FINE SANDY LOAM	K= 0.43
PdC	PAXTON	FINE SANDY LOAM	K= 0.43

SEE WEBSOILS REPORT
SEE WEBSOIL USDA–NRCS
ERODIBILITY FACTOR – K, CPESC MANUAL, ENVIROCERT INTERNATIONAL INC. & ROCKINGHAM COUNTY SOIL SURVEY, ROCKWEB SOIL ATTRIBUTES.

CONSTRUCTION SEQUENCE NOTE:

EROSION, SEDIMENT AND DETENTION CONTROL FACILITIES SHALL BE INSTALLED & STABILIZED PRIOR TO DIRECTING RUNOFF TO THEM. TEMPORARY DIVERSIONS MAY BE REQUIRED. POST CONSTRUCTION STORM WATER MANAGEMENT PRACTICES MUST BE INITIATED AND STABILIZED EARLY IN THE PROCESS. RUNOFF MUST BE DIRECTED TO TEMPORARY PRACTICES UNTIL STORMWATER BMPs ARE STABILIZED. SWALES CONVEYING RUNOFF TO STORMWATER BMPs WILL BE CONSTRUCTED AND PUT INTO SERVICE ONCE THE RECEIVING STORMWATER BMP IS STABILIZED. SEE DETAIL E14, SHEET E–102 FOR FULL CONSTRUCTION SEQUENCE.

STABILIZATION NOTE:

SEE NOTE #6, SHEET E–102, DETAIL E–15
SIDE SLOPES ARE TO BE STABILIZED WITHIN THREE WORKING DAY UPON COMPLETION OF FINAL GRADE.

NOTES:

1.) OWNER: LOVELY REVOCABLE LIVING TRUST
DAVID & REBECCA S. LOVELY TRUSTEE'S
20 BACK CANAAN ROAD
STRAFFORD, NH 03884

2.) TAX MAP 4, LOT 83–1

3.) LOT AREA: 1,782,914 Sq. Ft., 40.93 Ac.

4.) EROSION AND SEDIMENT CONTROL INSPECTIONS TO BE CONDUCTED ONCE PER EVERY SEVEN DAYS AND AT AN INCREASED FREQUENCY INCLUDING WITHIN 24–HOURS OF A 0.25 INCH RAIN EVENT. INSPECTIONS TO BE CONDUCTED BY A "QUALIFIED PERSON" AS DEFINED BY EPA CGP 4.1.1 AND INSPECTION REPORTS SUBMITTED TO THE TOWN OF STRAFFORD, N.H., PLANNING DEPARTMENT WITHIN 24 HOURS IN ACCORDANCE WITH CGP 4.1.7 AND MAINTAINED BY THE OWNER FOR A PERIOD OF THREE YEARS AFTER THE PROJECT IS COMPLETED AND EPA NOTICE OF TERMINATION IS COMPLETED.

5.) PER EPA CGP Z.1.2.2 (INSTALL PERIMETER CONTROL), "YOU MUST INSTALL SEDIMENT CONTROLS ALONG THOSE PERIMETER AREAS OF YOUR SITE THAT WILL RECEIVE STORMWATER FROM EARTH DISTURBING ACTIVITIES." AS A RESULT OF SWPPP INSPECTIONS, THE CONTRACTOR MAY HAVE TO EXPAND PERIMETER CONTROLS TO MEET THIS REQUIREMENT. THE E&SC PLAN IS INITIAL GUIDANCE AS TO THE ANTICIPATED REQUIREMENTS AND IT THE CONTRACTORS RESPONSIBILITY TO ENSURE THAT STORMWATER VIOLATION DO NOT OCCUR. (CGP – CONSTRUCTION GENERAL PERMIT)

6.) THE CONTRACTOR WILL IN ACCORDANCE WITH EPA NPDES CGP 2022 SECTION 2.2.4 MINIMIZE SEDIMENT TRACK–OUT, SECTION 2.2.5 MANAGE STOCKPILES OR LAND CLEARING DEBRIS PILES COMPOSED, IN WHOLE OR IN PART, OF SEDIMENT AND/OR SOIL, SECTION 2.2.8 PRESERVE NATIVE TOPSOIL, SECTION 2.2.9 MINIMIZE SOIL COMPACTION, SECTION 2.2.10 PROTECT STORM DRAIN INLETS. SEE CONSTRUCTION GENERAL PERMIT DATED FEBRUARY 17, 2022.

7.) THE CONTRACTOR WILL, IN ACCORDANCE WITH EPA NPDES CGP 2022 SECTION 2.3.3 e FOR CONSTRUCTION AND DOMESTIC WASTES, FOLLOW THE CGP REQUIREMENTS FOR DUMPSTER UTILIZATION.

8.) CONTRACTOR CAN USE SILT FENCE, SILT SOXX OR MULCH BERM FOR PERIMETER CONTROL. SPECIFIC PRACTICES MAY BE SPECIFIED, SEE PLAN. SILT FENCE OR SILT SOXX REQUIRED WHEN UPGRADIENT DISTURBED SOIL IS GREATER THAN 5%. MULCH BERM CAN BE USED WHEN THE UPGRADIENT DISTURBED SOIL IS 5% OR LESS.

9.) STUMPS ARE TO BE GROUND AND USED FOR MULCH BERMS OR ARE TO BE TRANSPORTED OFF SITE AND NOT BURIED ON SITE. WOOD CHIPS ARE NOT ALLOWED AS A COMPONENT OF EROSION CONTROL MIX.

10.) CONTRACTOR IS REQUIRED TO HAVE A CONSTRUCTION ENTRANCE. 3" ANGULAR STONE IS REQUIRED.

11.) CONTRACTOR IS RESPONSIBLE FOR SWEEPING THE ROADWAY, AND ANYTHING DISTURBED, TO ENSURE THAT NO SEDIMENT IS BEING TRACKED ONTO CANAAN ROAD ROAD OR SURROUNDING ROADWAYS.

12.) CONTRACTOR IS RESPONSIBLE FOR CLEANING AND MAINTAINING THE INLET PROTECTION ONCE INSTALLED.

13.) FUGITIVE DUST IS TO BE CONTROLLED THROUGHOUT THE CONSTRUCTION PROCESS IN ACCORDANCE WITH ENV–A 1000.

14.) CONTRACTOR IS TO MEET THE REQUIREMENTS SPECIFIED IN RSA 430:51–57 AND AGR 3800, RELATING TO INVASIVE SPECIES.

NOTES (CONT'D):

15.) CONTRACTOR IS RESPONSIBLE FOR PROTECTING THE WATER QUALITY FROM ANY RUN OFF DURING THE CONSTRUCTION PROCESS, IN ACCORDANCE WITH ENV–WQ 1507, IN ORDER TO PREVENT VIOLATIONS OF THE STORM WATER QUALITY STANDARDS.

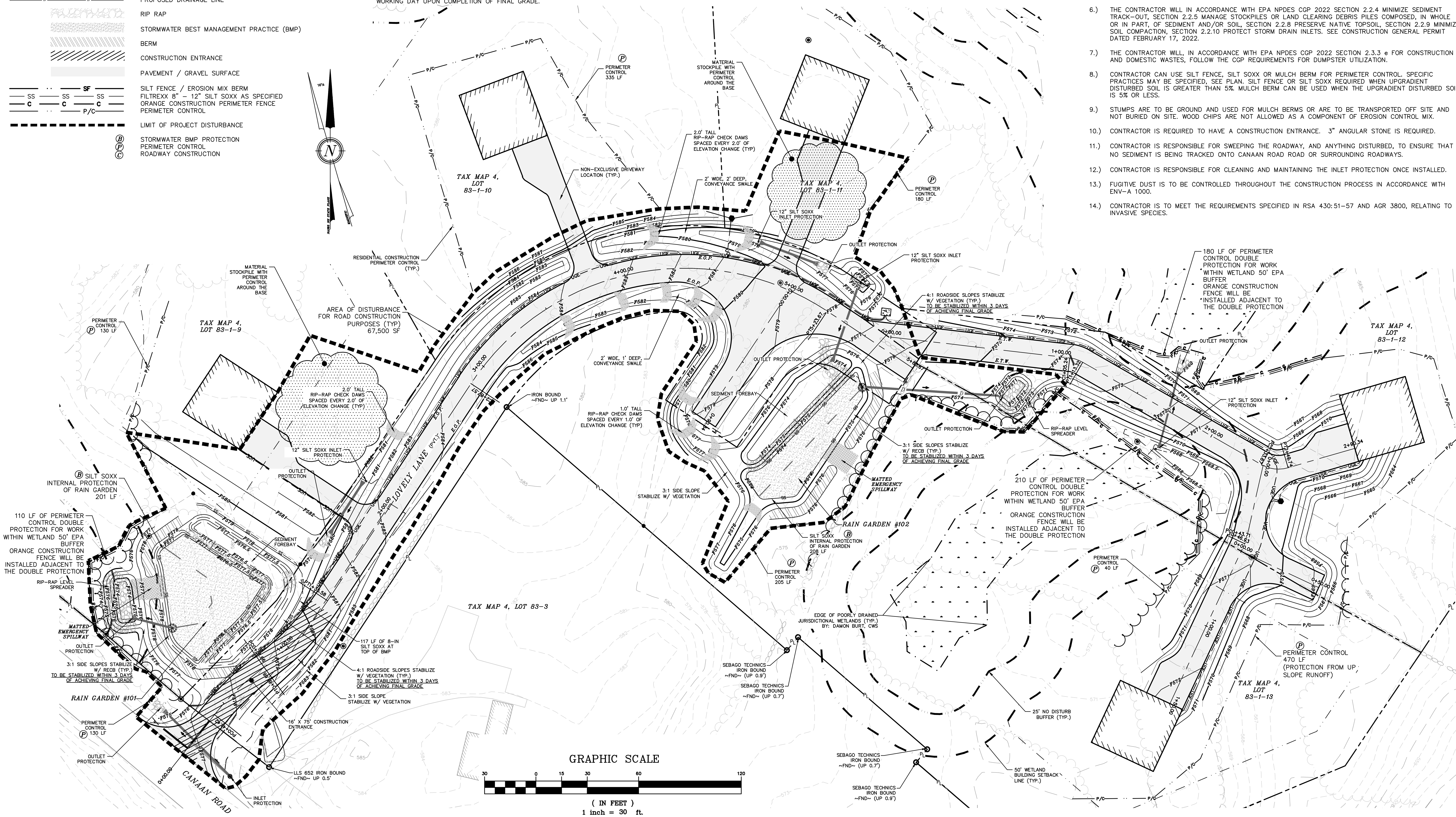
16.) WINTER STABILIZATION NOTES ARE INCLUDED ON SHEET E–102 TO INCLUDE THE LIMIT OF ONE ACRE OF UNSTABILIZED SOIL AFTER OCTOBER 15TH.

17.) CONTRACTOR TO BE AWARE OF THE SOIL PROFILES AND ENSURE THAT PROPER EROSION PREVENTION AND SEDIMENT CONTROL MEASURES ARE TAKEN AT ALL TIMES. ANY DEWATERING REQUIREMENTS IN NEW HAMPSHIRE REQUIRE SPECIAL PROVISIONS IN ACCORDANCE WITH THE "CLARIFICATION OF SECTION 9.1.2 (STATE OF NEW HAMPSHIRE CONDITIONS) AND OTHER NH SPECIFIC INFORMATION FOR THE U.S. EPA 2022 NPDES CONSTRUCTION GENERAL PERMIT (CGP)" DATED FEBRUARY 17, 2022 INCLUDED IN THE SWPPP.

18.) COVER MANAGEMENT DURING CONSTRUCTION FOR EXPOSED SOIL WILL INCLUDE HAY / STRAW APPLIED AT A RATE OF 2.0 TONS PER ACRE, TEMPORARY SEEDING OF ANNUAL RYE GRASS, AND PERMANENT SEEDING AT THE EARLIES OPPORTUNITY. SEE ADDITIONAL REQUIREMENT FOR STABILIZATION ON THE EROSION AND SEDIMENT CONTROL DETAIL SHEETS, E–101 AND E–102. SEE ALSO WINTER CONSTRUCTION NOTES.

19.) THE CONSTRUCTION SCHEDULE WILL BE MANAGED SO THAT ALL STORMWATER STRUCTURES WILL BE BUILT AND STABILIZED PRIOR TO RECEIVING SURFACE WATER RUNOFF. CONTRACTOR TO BE RESPONSIBLE FOR ALL DIVERSIONS DURING CONSTRUCTION AND FOR INTERIM SEDIMENT AND EROSION CONTROL MEASURES.

20.) CONCRETE WASHOUT: THE CONCRETE WASHOUT AREA WILL BE COORDINATED WITH THE GENERAL CONTRACTOR AND SWPPP INSPECTOR IN ORDER TO ENSURE COMPLIANCE.



REVISION	DATE	DESCRIPTION
#1	12–04–25	DESIGN REVISION

EROSION AND SEDIMENT CONTROL PLAN
LAND OF
LOVELY REVOCABLE LIVING TRUST
DAVID & REBECCA S. LOVELY TRUSTEES
20 BACK CANAAN ROAD
STRAFFORD, N.H.
TAX MAP 4, LOT 83–1

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332–2863

SCALE : 1 IN. EQUALS 30 FT.
DATE : OCTOBER 14, 2025
FILE NO. : DB 2025–024

STATE OF NEW HAMPSHIRE — KENNETH A. BERRY No. 14243 LICENSED — PROFESSIONAL ENGINEER

NOT FOR CONSTRUCTION