DRAINAGE ANALYSIS
&
EROSION & SEDIMENT
CONTROL PLAN

Prepared for:

Owl Ridge Builders
104 Raymond Road
Nottingham, NH 03290

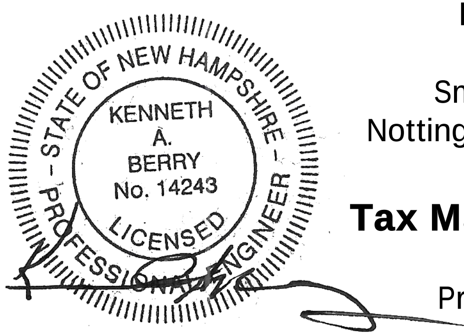
Land of:

Frederick Fernald
PO Box 1805
Wolfeboro, NH 03894

LOCATION

Smoke Street
Nottingham, NH 03290

Tax Map 23, Lot 11



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Project Number:
DB 2020-065

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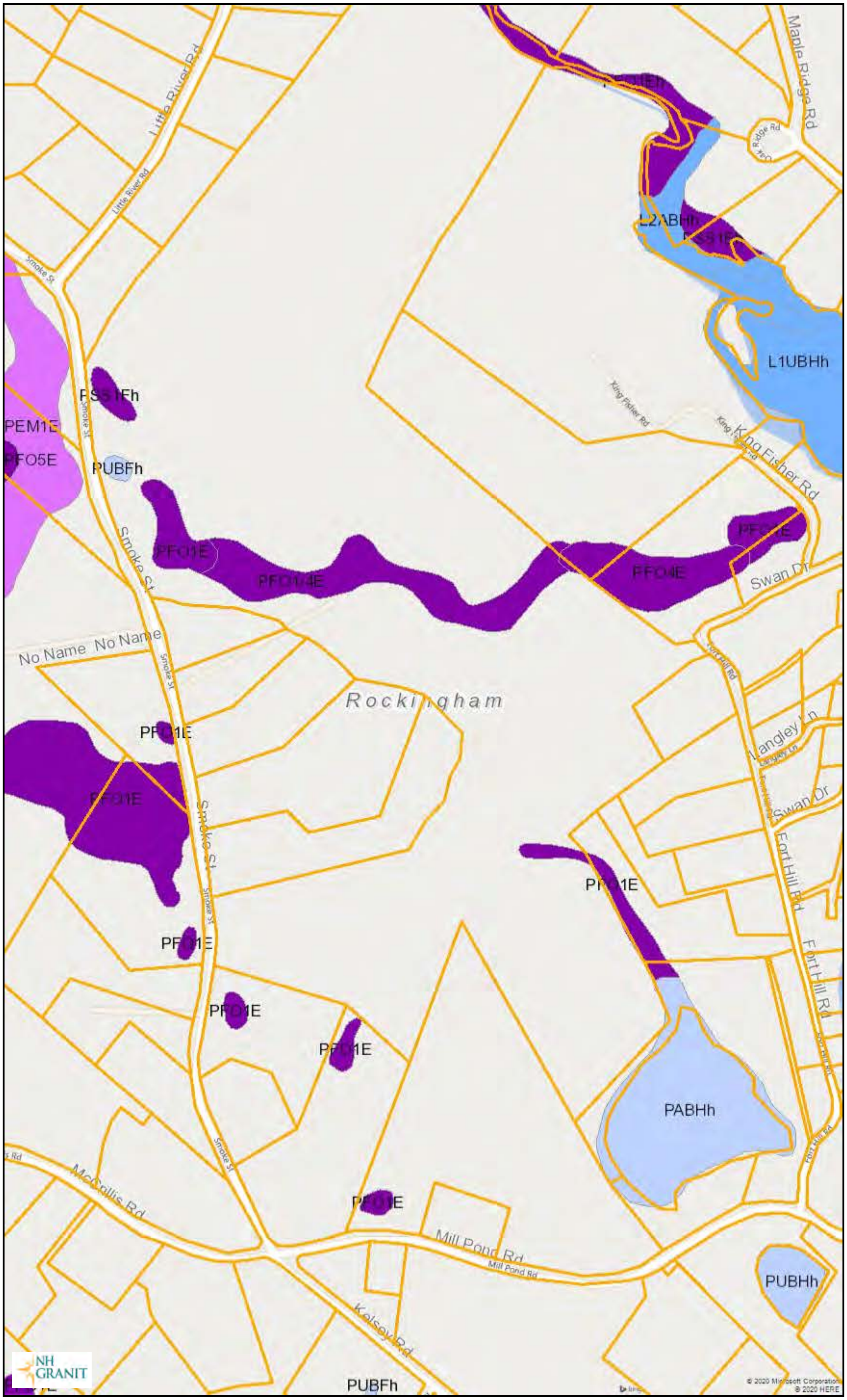
Map by NH GRANIT



Legend

- Polygons
- State
- County
- City/Town
- NWIPlus
  - Estuarine and Marine Deepwater
  - Estuarine and Marine Wetland
  - Freshwater Emergent Wetland
  - Freshwater Forested/Shrub Wetlan
  - Freshwater Pond
  - Lake
  - Other
  - Riverine

Map Scale

1: 6,494

Map Generated: 6/10/2020

Notes

Map by NH GRANIT

Legend

Parcels
- Parcel Polygons
- Attributes for Additional Lines
- State
- County
- City/Town

Map Scale
1: 24,000

Map Generated: 10/22/2021

Notes

Map by NH GRANIT

Legend

Parcels
- Parcel Polygons
- Attributes for Additional Lines
- State
- County
- City/Town

Map Scale

1: 10,000

Map Generated: 10/22/2021

Notes

DESIGN METHOD OBJECTIVES

The applicant of Tax Map 23, Lot 11, Owl Ridge Builders, is proposing to develop the property on Smoke Street. The site is currently wooded vacant land.

An Existing and Proposed Conditions analysis was conducted for the purpose of estimating the peak rate of stormwater run-off and to subsequently design adequate mitigation of drainage. There are nine existing drainage discharge points which were identified in the existing conditions 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 Overview, and the 10 detail layouts, 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 and its 10 detail layouts). The analysis was conducted using data for; 2 Yr-24 Hr (3.06”), 10 Yr-24 Hr (4.63”), 25 Yr-24 Hr (5.86”), 50 Yr-24 Hr (7.01”), and 100 Yr-24 Hr (8.39”) 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: W1 - Existing Conditions Watershed Overview Plan (Enclosed)
W1 - Existing conditions Watershed Detail Layouts
Existing Conditions Plan

The existing parcel is currently vacant land, The soils within the development area are made up of multiple soil types, containing Hydrologic Soil Group (HSG) A, B, C & D. See Site Specific Soils Map and report for more information. The land cover types involved are grassed land, woods, roofs, and road pavement.

Wetland Investigation: The project site was reviewed for Wetlands by John P. Hayes III, CSS, CWS based on the following standards. 1. Regional supplement to the Corps of Engineers Wetland Delineation Manual, Northcentral and Northeast Region, (Version 2.0) dated January 2012, by U.S. Army Corps of Engineers 2. Field Indicators of Hydric Soils in the United States, A Guide For Identifying and Delineating Hydric Soils, Version 8.0 United States Department of Agriculture dated in 2016. 3. National Wetland Plant List (Current Version). Delineation was field located during the spring and summer of 2021 and demonstrated on the Existing Conditions Plan and Existing Watershed Plans.

Soil Investigation: The soils were analyzed by John P. Hayes III, CSS and his report is included with this narrative. Dated November 29, 2022 and amended December 5, 2022. The Site Specific Soil Survey (S.S.S.S.) was conducted in accordance with the New Hampshire Supplement of the Site-Specific Soil Mapping Standard for New

Hampshire and Vermont, Special Publication #3, Version 7.0 dated July 2021 published by the Society of Soil Scientist of Northern New England. Site-Specific Soil Map Units identified are taken from the New Hampshire State-Wide Numerical Soils Legend, Issue #10, Dated January 2011. The Hydrological Soil Groups for each of the soil series was determined using SSSNNE Publication No. 5, Ksat Values for New Hampshire soils, dated September 2009. Erodibility (K) values were determined by BS&E based on the EnviroCert International Inc. CPESC Manual and other USDA / NRCS Public documents and Websoil. Ninety-four test pits were conducted by the Soil Scientist and located by a survey field crew utilizing conventional and RTK / GPS survey methodology oriented to the boundary survey traverse. The analyzed watershed area consists of 106.70 acres, of which 102.77 acres make up the locus parcel. The parcel has been divided into 10 subcatchments which drain to nine separate final reaches at different points surrounding the parcel. All of the runoff drains to the Little River generally to the east.

Receiving Waters and Impairments: The Little River (NHRIV600030707-03) watershed will receive all of the runoff from the site either directly or indirectly. The impairment of the watershed are as follows:

Mercury, NE Regional Mercury TMDL, December 20, 2008, TMDL #33883
pH, Low Priority, Non-ORW.

Existing Vegetation: The property is a mix of Pine & Deciduous Forest.

Drainage Analysis: Ten subcatchments discharging to nine final analysis points:

Final Reach #100

Subcatchment #10 consists of a small portion of the southwestern edge of the parcel as well as a small portion of offsite land along Smoke Street. Runoff flows offsite to a nonpoint area (analyzed as **Final Reach #100**) and subsequently northerly along Smoke Street.

Final Reach #200

Subcatchment #1 is land area in the western corner of the property and extends up the northwestern property line toward Little River. Runoff in this subcatchment is captured by a delineated wetland (**Pond #1**) which drains in the direction of **Subcatchment #2**. Runoff from **Subcatchment #1** flows through **Subcatchment #2** via an overland reach (**Reach #1**) directed to **Final Reach #200**.

Subcatchment #2 makes up a majority of the central portion of the locus parcel. Runoff flows eastward toward **Final Reach #200** which is analyzed as a non-point discharge at the property line on the eastern side of the parcel.

Final Reach #300

Subcatchment #3 consists of a portion of land surrounding a southeastern corner of the locus parcel, extending west to the opposite property line at one of the narrower areas on the property. Runoff flows east into a small wetland where it is directed to the property line which is being analyzed as a non-point discharge, **Final Reach #300**.

Final Reach #400

Subcatchment #4 consists of a portion of land toward the northern edge of the parcel. This subcatchment is divided from the northernmost subcatchment (**Subcatchment #5**) by a natural ridge line which directs runoff flow northwest before it reaches Little River. A portion of the northwestern property line is being analyzed as non-point discharge **Final Reach #400.**

Final Reach #500

Subcatchment #5 consists of the northernmost portion of land along Little River on the northern edge of the parcel. Runoff flows to the river and is being analyzed at **Final Reach #500** along the adjacent jurisdictional wetland to the river bank of the Little River.

Final Reach #600

Subcatchment #6 consists of a portion of land at the southernmost corner of the property. Runoff flows to the southwest property line, partially via a small wetland, and is being analyzed as non-point discharge at **Final Reach #600**.

Final Reach #700

Subcatchment #7 consists of a small portion of land at one of the southern corners of the parcel. Runoff flows south to the property corner; a non-point discharge being analyzed as **Final Reach #700**.

Final Reach #800

Subcatchment #8 consists of a portion of land near a southwestern edge of the parcel. Runoff flows northerly to the property line which is being analyzed as non-point discharge **Final Reach #800**.

Final Reach #900

Subcatchment #9 consists of a portion of land in the southern area of the parcel along Smoke Street. Runoff flows southwest to the southern property line which is analyzed as non-point discharge **Final Reach #900**.

2.0 Proposed Conditions Analysis:

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

The proposal for development includes 25 single family houses on 2 cul-de-sac roads consisting of a total of 2,740 feet of roadway. The proposal is supported by multiple practices including subsurface gravel wetlands, rain gardens, detention ponds, and infiltration ponds.

Final Reach #200

Subcatchment #1 is moderately reduced in size due to the construction of Peekaboo Drive and multiple houses off the street. Runoff in this subcatchment is still captured by a delineated wetland (**Pond #1**) which drains in the direction of **Subcatchment #2**. Runoff from **Subcatchment #1** flows through **Subcatchment #2** via a pair of 24-inch culverts under Peekaboo Drive and a series of overland reaches (**Reach #1 etc.**) directed to **Final Reach #200**.

Subcatchment #2 is reduced in size considerably, yet still makes up a majority of the central portion of the locus parcel. Runoff still flows eastward toward **Final Reach #200** which is analyzed as a non-point discharge at the property line on the eastern side of the parcel.

Subcatchment #33a is made up of a small portion of land along the north side of the mouth of Peekaboo Drive. Runoff is collected in a roadside swale, treatment swale (**Pond #33**) and directed toward **Final Reach #200** through a series of overland reaches.
Subcatchment #33b is made up of a small portion of land over the treatment swale, which in turn is routed toward **Final Reach #200** through a series of overland reaches.

Subcatchment #24 is made up of the cul-de-sac of Peekaboo Drive, consisting of the roadway and the detention pond in the middle of the cul-de-sac (**Pond #104**). Runoff is collected in **Pond #104** and directed to **Pond #107** through an outlet structure and culvert.

Subcatchment #27 consists of a small portion of land adjacent to the cul-de-sac of Peekaboo including a single house and the related driveway. Runoff is collected in a small rain garden (**Pond #107**) and directed toward **Final Reach #200** through an outlet structure and a series of overland reaches.

Subcatchment #22 is made up of a majority of the land along the south side of Peekaboo Drive, encompassing portions of multiple houses as well as their driveways. Runoff flows to a gravel wetland (**Pond #102**) and directed toward **Pond #106** though an outlet structure and culvert.

Subcatchment #26 is made up of a portion of land adjacent to **Subcatchment #22** encompassing portions of multiple houses. Runoff flows to an infiltration pond (**Pond #106**) where it is infiltrated into the soil to fulfill the GRV requirement of the site development. Runoff is routed via a series of reaches (106aR, 106bR, 107bR) to the final analysis point.

Subcatchment #32 is an inlet sump (**32P**) connected to a roadside swale on the left side of Peekaboo Drive that collects a portion of Peekaboo Drive, but primarily residential homes, driveways, and yards. Runoff is routed to Gravel Wetland #102 (**102P**) and subsequently to Infiltration Basin #106 (**106P**) and series of reaches to the final analysis point.

Subcatchment #34 is an inlet sump (**34P**) connected to a roadside swale on the right side of Peekaboo Drive that collects a portion of Peekaboo Drive, but primarily residential homes, driveways, and yards. Runoff is routed to Gravel Wetland #102 (**102P**) and subsequently to Infiltration Basin #106 (**106P**) and series of reaches to the final analysis point.

Subcatchments #41, 42, 43, 44, are the areas of roadway that drain to catch basins on Peekaboo Drive (**C01P, C02P, C03P, C04P**, respectively). Runoff is routed to Gravel Wetland #102 (**102P**) and subsequently to Infiltration Basin #106 (**106P**) and series of reaches to the final analysis point.

Subcatchment #45, is the right side of Peekaboo Drive that drains to a rain guardian turret (C05P). Runoff is routed to the treatment swale forebay (**33P**) and subsequently through Treatment Swale (**33R**). Runoff is routed via a series of reaches (**33aR, 33bR, 22bR, 106bR, 107bR**) to the final analysis point.

<u>Final Reach #300</u>

Subcatchment #3 remains virtually unchanged with a small decrease in overall size due to the construction of the cul-de-sac of Frederick Lane. Runoff still flows to the property line which is being analyzed as a non-point discharge, **Final Reach #300**.

Subcatchment #31 is made up of a small portion of land along the south side of the bend in Frederick Lane leading into the cul-de-sac. Runoff is collected in a cross culvert (**Pond #31**) and directed toward **Pond #103** through a short overland reach (**Reach #31**).

Subcatchment #23 consists of a portion of land surrounding the cul-de-sac of Frederick Lane. Runoff is collected in a small rain garden (**Pond #103**) and directed toward **Final Reach #300** through an outlet structure and an overland reach (**Reach #103**).

Subcatchment #25 is made up of the cul-de-sac of Frederick Lane, consisting of the roadway and the infiltration pond in the middle of the cul-de-sac (**Pond #105**). Runoff is collected in **Pond #105** and infiltrated into the soil.

Subcatchment #30 consists of an area of land along the south side of the middle portion of Frederick Lane including a small portion of one of the houses and its driveway. Runoff is collected in a cross culvert (**Pond #30**) and directed toward **Final Reach #300** through an overland reach (**Reach #30**).

Final Reach #400

Subcatchment #4 is marginally reduced in size by the construction of Peekaboo Drive and multiple houses. There is also a minor increase of the weighted curve number caused by the clearing of lots and the construction of houses. Runoff still flows northwest to **Final Reach #400.**

Final Reach #500

Subcatchment #5 remains unchanged.

Final Reach #600

Subcatchment #6 is also virtually unchanged with a small decrease in overall size due to the construction of the cul-de-sac of Frederick Lane. Runoff continues to flow to the southwest property line, partially via a small wetland, and is still being analyzed as non-point discharge at **Final Reach #600**.

Final Reach #700

Subcatchment #7 is marginally reduced in size by the construction of Frederick Lane and a home. Runoff still flows south to **Final Reach #700.**

Final Reach #800

Subcatchment #8 greatly decreased in size due to the construction of Frederick Lane, multiple houses, and the related drainage treatment practices. Runoff still flows to the property line which is being analyzed as non-point discharge **Final Reach #800**.

Final Reach #900

Subcatchment #9 decreased in size considerably due to the construction of Frederick and multiple related drainage practices. Runoff still flows southwest to the southern property line which is analyzed as non-point discharge **Final Reach #900**.

Subcatchment #29 consists of a small portion of land along the south side of Frederick Lane encompassing a short roadside swale leading to a cross culvert. Runoff is collected in the swale and culvert (**Pond #29**) and directed toward **Pond #108**.

Subcatchment #28 is made up of land along the north side of Frederick Lane encompassing a single house and its driveway. Runoff flows to a gravel wetland (**Pond #108**) and directed toward **Final Reach #900** though an outlet structure and a short overland reach (**Reach #108**).

Final Reach #100

Subcatchment #10 is virtually unchanged aside from a small portion being removed to accommodate the grading of **Pond #108.** Runoff still flows offsite to a nonpoint area (analyzed as **Final Reach #100**) and subsequently northerly along Smoke Street.

3.1 Stormwater Treatment:

Treatment takes place within the subsurface gravel wetlands and rain gardens designed to support the development on site. Pre-treatment will be provided in the sediment forebay's of the Best Management Practices. The stormwater quality volume capability is treated within provided treatment area of the BMPs. It is of note that the Erosion & Sediment Control Plan shows two tree lines. The drainage analysis considers the more conservative treeline within the proposed model. Tree lines were expanded to show tree cutting around the 4k leaching areas. The second, less conservative treeline shown on the Erosion & Sediment control plan is provided as the probable treeline, as the leachfields will most likely not be constructed where the 4k leaching areas are shown in the plan set. The 4k leaching areas are done in this manner to obtain NHDES subdivision approval.

3.2 Infiltration:

See Infiltration Feasibility Study published separately.

3.3 FULL COMPARATIVE ANALYSIS

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

		2 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Final Reach #200	Existing	1.23	9.37	21.52	35.88	55.70
	Proposed	1.01	8.43	20.59	35.04	54.13
Final Reach #300	Existing	0.02	0.60	2.26	4.65	8.30
	Proposed	0.02	0.60	2.24	4.60	8.26
Final Reach #400	Existing	3.57	10.00	15.93	21.89	29.36
	Proposed	3.28	9.19	14.62	20.09	26.95
Final Reach #500	Existing	0.68	4.93	10.18	15.98	23.71
	Proposed	0.68	4.93	10.18	15.98	23.71
Final Reach #600	Existing	0.01	0.24	1.13	2.55	4.83
	Proposed	0.01	0.24	1.13	2.54	4.80
Final Reach #700	Existing	0.00	0.01	0.07	0.23	0.55
	Proposed	0.00	0.01	0.07	0.23	0.55
Final Reach #800	Existing	0.56	2.92	5.53	8.32	11.98
	Proposed	0.22	0.79	1.36	1.95	2.71
Final Reach #900	Existing	0.23	1.20	2.28	3.44	4.97
	Proposed	0.10	0.38	1.11	2.39	3.21
Final Reach #100	Existing	0.06	0.29	0.53	0.78	1.10
	Proposed	0.06	0.26	0.47	0.70	0.98

ANALYSIS COMPONENT: VOLUME (Acre Feet)

		2 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Final Reach #200	Existing	0.662	3.190	6.099	9.304	13.618
	Proposed	0.656	3.313	6.332	9.599	13.992
Final Reach #300	Existing	0.015	0.237	0.557	0.946	1.503
	Proposed	0.015	0.250	0.757	1.252	2.168
Final Reach #400	Existing	0.578	1.427	2.215	3.013	4.026
	Proposed	0.526	1.298	2.015	2.742	3.663
Final Reach #500	Existing	0.200	0.763	1.370	2.032	2.914
	Proposed	0.200	0.763	1.370	2.032	2.914
Final Reach #600	Existing	0.003	0.121	0.310	0.547	0.894
	Proposed	0.003	0.120	0.308	0.544	0.889
Final Reach #700	Existing	0.000	0.007	0.026	0.053	0.096
	Proposed	0.000	0.007	0.026	0.053	0.096
Final Reach #800	Existing	0.133	0.444	0.764	1.106	1.556
	Proposed	0.032	0.091	0.148	0.207	0.283
Final Reach #900	Existing	0.048	0.159	0.273	0.395	0.556
	Proposed	0.013	0.113	0.243	0.381	0.544
Final Reach #100	Existing	0.011	0.033	0.055	0.079	0.110
	Proposed	0.010	0.029	0.049	0.070	0.098

3.4 SWALE CAPACITY ANALYSIS

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

50YR 24-HR Storm Event Used	Area (Ac.)	Swale Depth (ft.)	Bottom Width (Ft.)	Lt. Slope (X:1)	Rt. Slope (X:1)	Peak Rate (CFS)	50Yr Avg. Depth (Ft.)
Reach #28R Frederick Entrance Swale (Lt.)	1.333	2	2	4	3	3.31	0.25
Reach #29R Frederick Entrance Swale (Rt.)	0.138	2	2	3	4	0.61	0.10
Reach #30R Frederick Conveyance Swale	0.918	1	8	3	3	1.87	0.20
Reach #30aR Frederick Conveyance Swale	0.918	1	5	3	3	1.86	0.21
Reach #31R Frederick Conveyance Swale	0.186	2	2	4	3	0.63	0.17
Reach #33a1R Peekaboo Pre-Treatment Swale	0.222	1	2	3	3	1.17	0.21
Reach #32R Peekaboo Swale (Lt.)	2.822	3	3	4	3	11.65	0.63
Reach #34R Peekaboo Swale (Rt.)	0.922	3	3	3	4	4.45	0.38

4.0 EROSION and SEDIMENT CONTROL PLAN & BEST MANAGEMENT PRACTICES (BMP's)

Reference: Proposed Site Plan and Grading Plan
Erosion & Sediment Control Plans
Erosion & Sediment Control Details (E-101 & E-102)

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, Volume 2, Post-Construction Best Management Practices Selection & Design (December 2008, NHDES & US EPA). Any area disturbed by construction will be re-stabilized within 45 days (Env-Wq1504.16) 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. Reference is also made to the Stormwater System Management: Inspection & Maintenance Manual which has been written specifically for this project and available to the owner. 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.

Perimeter Control (e.g., Silt Fence / SiltSoxx / Erosion Control Mix Berm)

The plan set demonstrates the location of perimeter sediment control. The Erosion and Sediment Control Details, Sheet E-101 and E-102, have the specifications for installation and maintenance of the silt fence, Filtrexx mulch filled SiltSoxx (or approved equal), and Erosion Control Mix Berm. There are locations on the site, for example bio-media rain garden protection, where SiltSoxx protection is specified. Please note that the use of the Erosion Control Mix Berm is limited to slopes less than 5% and others to slopes less than 2:1 (50%). See also Slope Interrupter installation on slopes longer than 100=feet of disturbance. (Erosion and Sediment Control Plans)

Detention Ponds

Description: Detention Ponds are also constructed ponds with the purpose of detaining runoff but not necessarily for infiltration purposes. During construction it is important that the ground surface not be exposed to traffic or construction equipment to preserve the infiltration capabilities of the existing soil. Construction specifications are included in the plan set and New Hampshire Stormwater Manual, Volume 2, 4-3 Treatment Practices, 3B, In-ground Infiltration Basin and Section 4-6, Conveyance Practices, 2. Detention Basins.

Maintenance Considerations:

Infiltration Basins and Detention Ponds should be inspected at least twice annually and following any rainfall event exceeding 0.25 inches in a twenty-four-hour period. Maintenance rehabilitation will be conducted as warranted by each inspection. Trash and debris will be removed at each inspection.

On an annual basis the infiltration capabilities need to be confirmed by evaluation the drawdown time. If the infiltration system does not drain within 72-hours following a rainfall event, a qualified professional will assess the condition of the basin to determine measures required to restore the infiltration function. This is normally the direct result of sediment accumulation which will be removed to restore the filter media ratio.

Also, on an annual basis the vegetation should be inspected to ensure healthy condition. Invasive species need to be removed along with dead or diseased vegetation.

Vegetated Stabilization

All areas that are disturbed during construction will be stabilized with vegetated material within 30 days of breaking ground. Construction will be managed in such a manner that erosion is prevented and that no abutter's property will be subjected to any siltation, unless otherwise permitted. All areas to be planted with grass for long-term cover will follow the specification and on Sheet E-102 using seeding mixture C, as follows:

Mixture	Pounds per Acre	Pounds per 1,000 Sq. Ft.
Tall Fescue	24	0.55
Creeping Red Fescue	24	0.55
Total	48	1.10

Conservation Mix

Tall Fescue	15	0.35
Creeping Red Fescue	15	0.35
Annual Ryegrass	5	0.12
Perennial Ryegrass	5	0.12
Kentucky Bluegrass	15	0.35
White Clover	7	0.16
Total	**62**	**1.45**

Conservation Mix will used to stabilize all 2:1 slopes and all land area disturbed within the wetland buffer. (If applicable).

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.

Detention Pond Mix: The grass that is planted within a Detention Pond will be a mix designed for both inundation and dry conditions such as Ernst Seeds, Retention Basin Floor Mix ERNMX-126.

Stabilized Construction Entrance

A temporary crushed stone construction entrance / exit provides an area where mud can be dislodged from tires before the vehicle leaves the construction site to reduce the amount of mud and sediment transported onto paved municipal and state roads. The stone size for the pad should be 3” angular coarse aggregate, and the pad itself constructed to a minimum length of 75’ for the full width of the access road. The aggregate should be placed at least six inches thick. A plan view and profile are shown on Sheet E-101- Erosion & Sediment Control Detail Plan. (If applicable).

Environmental Dust Control

Dust will be controlled on the site by the use of multiple Best Management Practices. Mulching and temporary seeding will be the first line of protection to be utilized where problems occur. If dust problems are not solved by these applications, the use of water and calcium chloride can be applied. Calcium chloride will be applied at a rate that will keep the surface moist but not cause pollution. If used, a MSDS Sheet will be inserted into the project binder / Stormwater Pollution Prevention Plan.

Vegetated Filter Strips / Buffers

Filter strips are areas of land with natural or planted vegetation designed to receive sheet run-off from up gradient development. These natural areas, preferably wooded, are effective in removing sediment and sediment-laden pollutants from such run-off, although their effectiveness is severely diminished when forced to deal with concentrated flow and must therefore be equipped with a level-spreading device. Filter strips should not have a slope exceeding fifteen percent and have a minimum length of seventy-five feet. Each buffer is individually specified and limits are located on the Sediment & Erosion Control Plan

Drainage Swales / Stormwater Conveyance Channels

Drainage swales will be stabilized with vegetation for long term cover as outlined below, and on Sheet E-102 using seed mixture C. As a general rule, velocities in the swale should not exceed 3.0 feet per second for a vegetated swale although velocities as high as 4.5 FPS are allowed under certain soil conditions (If applicable).

Construction Sequence

1. Cut and remove trees in construction area only as required.

2. Construct and/or install temporary and permanent sediment erosion and detention control facilities as required.

3. Erosion, sediment and detention control facility shall be installed & stabilized prior to any earth moving operation & or directing runoff to them.

4. Clear, cut and dispose of debris in approved facility.

5. Construct temporary culverts as required, or directed.

6. Construct roadways for access to desired construction areas. All roads shall be stabilized immediately.

7. Install pipe and construction associated appurtenances as required or directed. Install rain gardens. All disturbed areas shall stabilized immediately after grading.

8. Begin permanent and temporary seeding and mulching. All cut and fill slopes and disturbed areas shall be seeded or mulched as required, or directed. No area is allowed to be disturbed for a length of time that exceeds 45 days before being stabilized. Daily, or as required. 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. Additional time constraints regarding stabilization can be found in the EPA 2022 CGP.

9. Construct temporary berms, drains ditches, silt fences, sediment traps, etc. mulch and seed as required.

10. Inspect and maintain all erosion and sediment control measures during construction.

11. Complete permanent seeding and landscaping.

12. Remove temporary erosion control measures after seeding areas have established themselves and site improvements are complete.

13. Smooth and revegetate all disturbed areas.

14. Finish paving all roadways.

Temporary Erosion Control Measures

1. The smallest practical area of land shall be exposed at any one time.

2. Erosion, sediment control measures shall be installed as shown on the plans and at locations as required, or 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 1.10 pound of seed per 1,000 square feet (48 pounds per acre) of area.

4. Silt fences and other barriers shall be inspected periodically and after every rainstorm during the life of the project. All damaged areas shall be repaired, sediment deposits shall periodically be removed and properly disposed of.

5. After all disturbed areas have been stabilized, the temporary erosion control measures are to be removed and the area disturbed by the removal smoothed and re-vegetated.

6. Areas must be seeded and mulched within 5 days of final grading, permanently stabilized within 15 days of final grading, or temporarily stabilized within 30 days of initial disturbance of soil.

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 and after storm events. Inspection reports must be submitted to Town of Nottingham Planning Department. See also Stormwater System Management: Inspection & Maintenance Manual published separately also by Berry Surveying & Engineering. See also Storm Water Pollution Prevention Plan (SWPPP) developed in accordance with EPA NPDES 2022 CGP requirements. In accordance with US EPA 2022 Construction General Permit, Inspections will be conducted by a qualified person. This requirement includes Erosion and Sediment Control Education and Professional Certification.

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 equal or reduced in the post-construction analysis / condition, as compared to the pre-construction peak rates of runoff flow during all storm events due to the installation of the Best Management Practices and stormwater devices, specifically Subsurface Gravel Wetlands, Rain Gardens, Treatment Swales and Detention Ponds.

Channel protection volume conforms to the requirements of RSA 485: A-17 and Env.-Wq. 1500.

A Site Specific, Terrain Alteration Permit (RSA 485: A-17) is required for this site plan due to the area of disturbance being greater than 100,000 SF. The impact is approximately 744,285 square feet, so that an EPA Notice of Intent will be required to be filed two weeks prior to construction initiation and a Stormwater Pollution Prevention Plan is required to be prepared.

Respectfully Submitted,
BERRY SURVEYING & ENGINEERING

Christopher R. Berry, SIT 567
Principal, President
Project Manager

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

Kevin R. Poulin, PE
Project Engineer

SITE SPECIFIC SOILS LEGEND

SYMBOL	SLOPES	SOIL TAXONOMIC NAME	HYDROLOGIC SOIL GROUP
12	B,C,D,E	HINCKLEY	A
26	B,D	WINDSOR	A
29	B,C,D,E	WOODBRIDGE	C
40	B,C	CHATFIELD HOLLIS COMPLEX	C/D
43	B,C,D,E	CANTON (VERY STONY)	B
67	B,C,D,E	PAXTON (VERY STONY)	C
68	B,C	SUTTON	B
115	A	SCARBORO	D
118	B,C,D,E	SUDBURY	B
313	B,C,D,E	DEERFIELD	B
400	A,B,C,D	UDORTHENTS (SANDY OR GRAVELLY)	A
496	A	NATCHAUG VARIANT	D
500	B	UDORTHENTS (LOAMY)	C
547	B	WALPOLE (VERY STONY)	C
900	A	ENDOQUENTS (SANDY OR GRAVELLY)	A

SLOPE: A = 0–3% B = 3–8% C = 8–15% D = 15–25% E = 25–50% F = 50%+

DENOMINATOR: /VP = VERY POORLY DRAINED /P = POORLY DRAINED
/SWP = SOMEWHAT POORLY DRAINED /MW = MODERATELY WELL DRAINED

WETLAND NOTE:

WETLANDS WERE DELINEATED BY JOHN P. HAYES, CWS, IN THE SUMMER OF 2022 USING THE FOLLOWING CRITERIA:

1. USACE. 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. 2012. VICKSBURG, MS.

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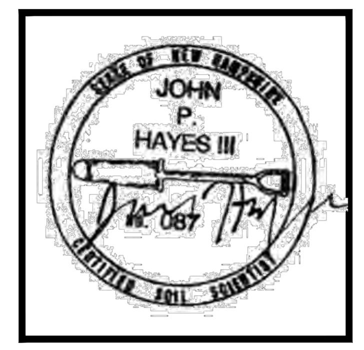
JOHN P. HAYES, CWS



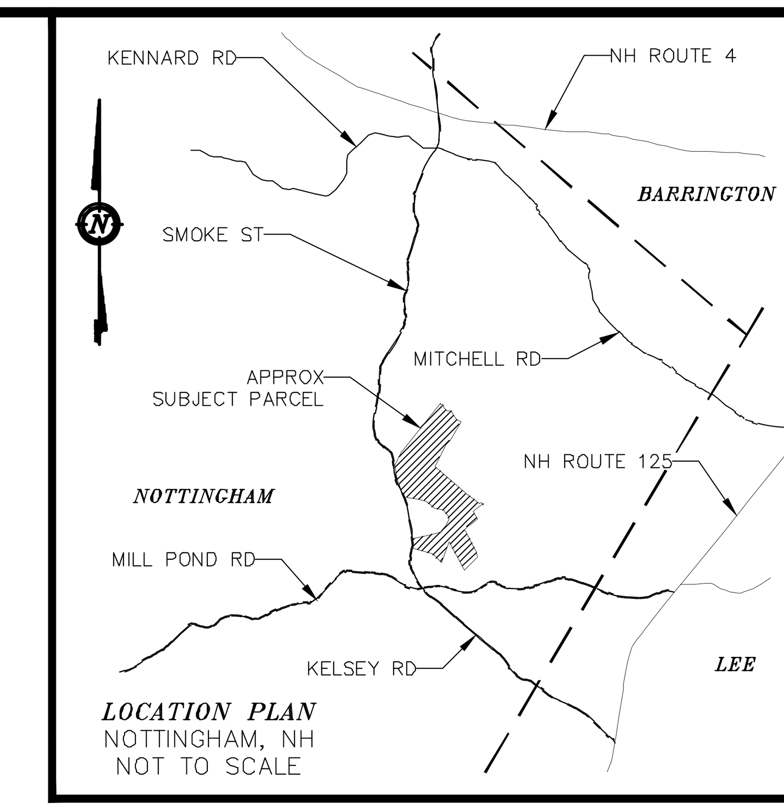
JOHN P. HAYES, CSS

LEGEND:

299 EXISTING CONTOUR MINOR
300 EXISTING CONTOUR MAJOR
STONE WALL
WETLAND LINE
LIMIT OF SITE SPECIFIC SOILS SURVEY
SOIL LINE
448A SOIL SERIES
NRCS SOIL LINE
HfB NRCS SOIL LABEL
LIMIT OF WATERSHED
TIME OF CONCENTRATION PATH
FLOW REACH
MATCH LINE
R.C.R.D. ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND
TBR TO BE REMOVED

SYMBOLS LEGEND:

\# SUBCATCHMENT AREA SYMBOL
\# FLOW REACH SYMBOL
\# POND DEVICE SYMBOL
Tc. # TIME OF CONCENTRATION SEGMENT



LOCATION PLAN
NOTTINGHAM, NH
NOT TO SCALE

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

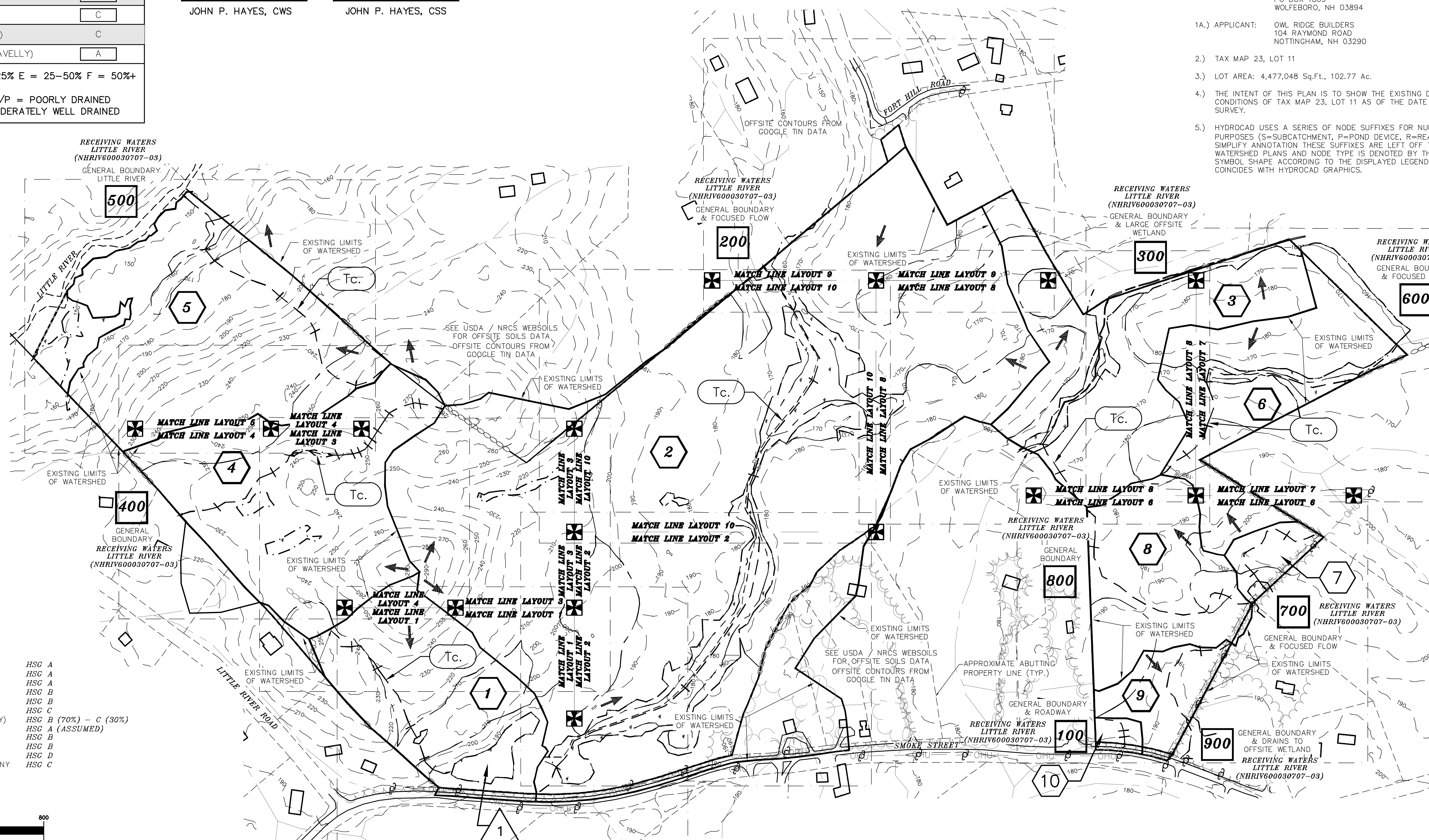
1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING DRAINAGE CONDITIONS OF TAX MAP 23, LOT 11 AS OF THE DATE OF THE SURVEY.

5.) 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.



NRCS SOILS DATA:

12A ~ HINCKLEY LOAMY SAND (0–3% SLOPES) *HSG A*
12B ~ HINCKLEY LOAMY SAND (3–8% SLOPES) *HSG A*
12C ~ HINCKLEY LOAMY SAND (8–15% SLOPES) *HSG A*
43C ~ CANTON FINE SANDY LOAM (8–15% SLOPES) *HSG B*
43D ~ CANTON FINE SANDY LOAM (15–25% SLOPES) *HSG B*
67D ~ PAXTON FINE SANDY LOAM (15–25% SLOPES) *HSG C*
140C ~ CHATFIELD-HOLLIS-CANTON COMPLEX (8–15% SLOPES, ROCKY) *HSG B (70%) – C (30%)*
298 ~ PITS, SAND AND GRAVEL *HSG A (ASSUMED)*
299 ~ UDORTHENTS, SMOOTHED *HSG B*
313B ~ DEERFIELD LOAMY FINE SAND (3–8% SLOPES) *HSG B*
395 ~ SWANSEA MUCKY PEAT (0–2% SLOPES) *HSG D*
547B ~ WALPOLE VERY FINE SANDY LOAM (3–8% SLOPES) VERY STONY *HSG C*

SEE USDA / NRCS WEBSOILS FOR OFFSITE SOILS DATA

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

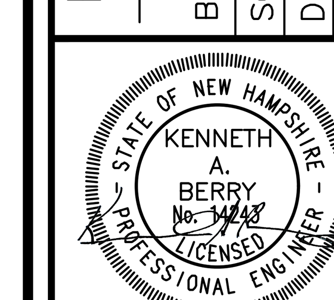
SWPPP EPA SITE MAP (EXISTING)

W-1 EXISTING CONDITION WATERSHED OVERVIEW PLAN

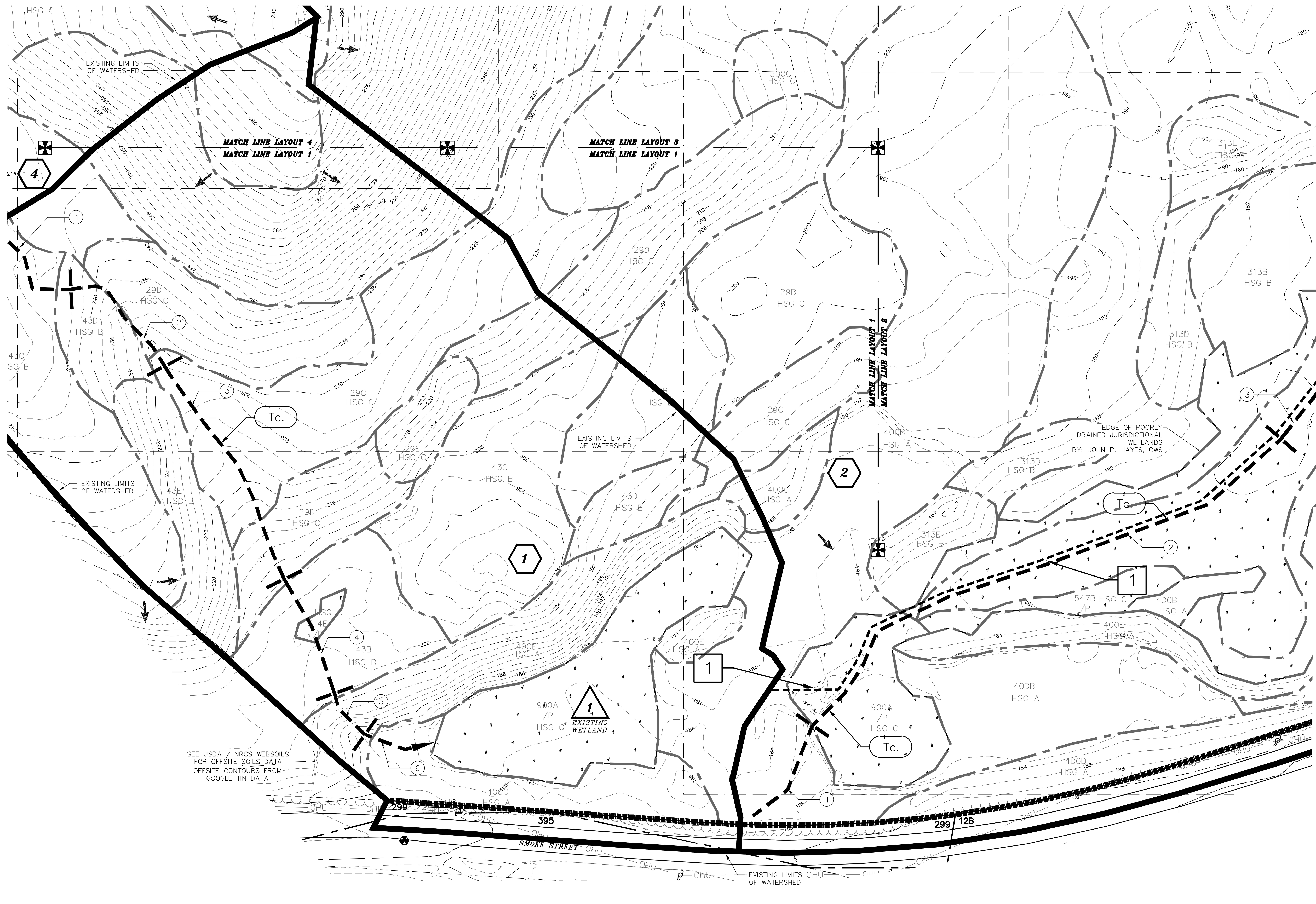
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

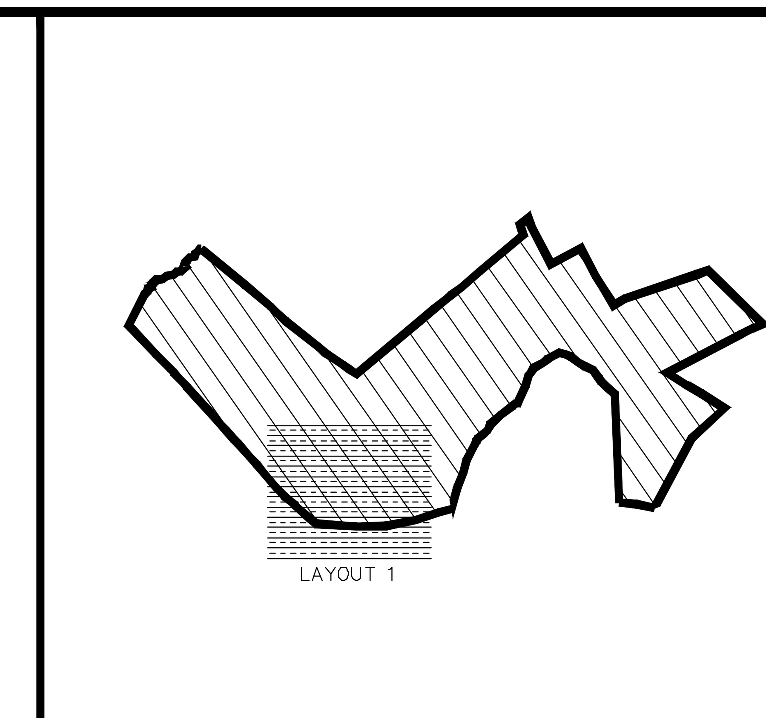
BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 200 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065



NOT FOR CONSTRUCTION





LAYOUT LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

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LEGEND:

299	EXISTING CONTOUR MINOR
300	EXISTING CONTOUR MAJOR
	STONE WALL
	WETLAND LINE
	LIMIT OF SITE SPECIFIC SOILS SURVEY
	SOIL LINE
448A	SOIL SERIES
	NRCS SOIL LINE
HfB	NRCS SOIL LABEL
	LIMIT OF WATERSHED
	TIME OF CONCENTRATION PATH
	FLOW REACH
	MATCH LINE
R.C.R.D.	ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP.	TYPICAL
FND	FOUND
TBR	TO BE REMOVED

SYMBOLS LEGEND:

#	SUBCATCHMENT AREA SYMBOL
#	FLOW REACH SYMBOL
#	POND DEVICE SYMBOL
Tc. #	TIME OF CONCENTRATION SEGMENT

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

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STATE OF NEW HAMPSHIRE JOHN P. HAYES, III CERTIFIED WETLAND SCIENTIST

JOHN P. HAYES, CWS

JOHN P. HAYES III No. 087 CERTIFIED SOIL SCIENTIST

JOHN P. HAYES, CSS

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SWPPP EPA SITE MAP (EXISTING)

W-1 EXISTING CONDITIONS WATERSHED PLAN - LAYOUT 1

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065

STATE OF NEW HAMPSHIRE KENNETH A. BERRY No. 14248 LICENSED PROFESSIONAL ENGINEER

WETLAND NOTE:

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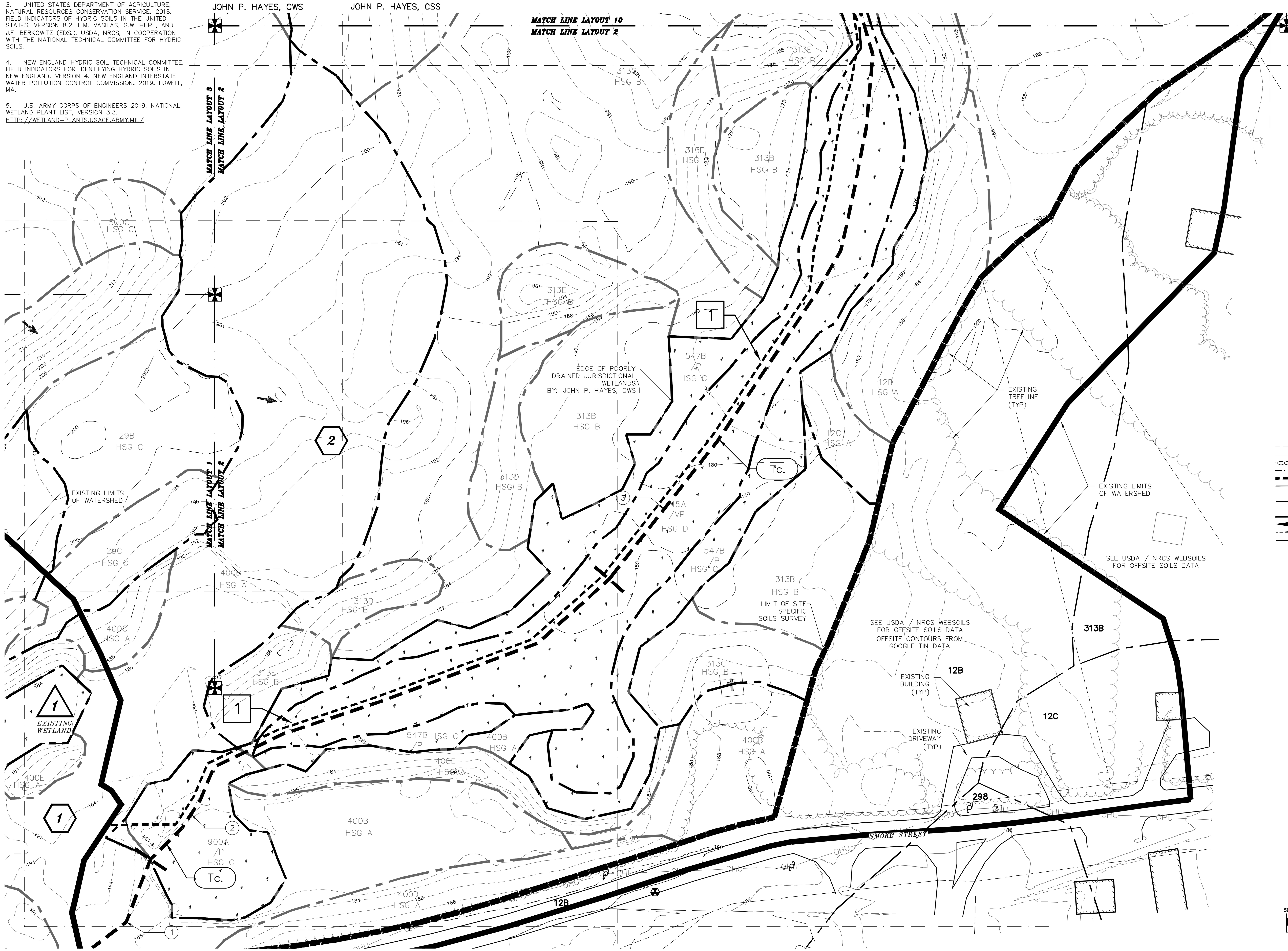
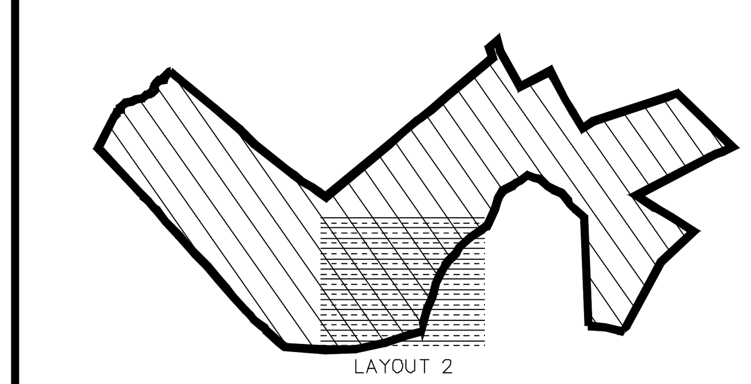
JOHN P. HAYES, CWS

JOHN P. HAYES, CSS





LAYOUT LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

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3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

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LEGEND:

299	EXISTING CONTOUR MINOR
300	EXISTING CONTOUR MAJOR
	STONE WALL
	WETLAND LINE
	LIMIT OF SITE SPECIFIC SOILS SURVEY
	SOIL LINE
448A	SOIL SERIES
	NRCS SOIL LINE
HB	NRCS SOIL LABEL
	LIMIT OF WATERSHED
	TIME OF CONCENTRATION PATH
	FLOW REACH
	MATCH LINE
R.C.R.D.	ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP.	TYPICAL
FND	FOUND
TBR	TO BE REMOVED

SYMBOLS LEGEND:

#	SUBCATCHMENT AREA SYMBOL
#	FLOW REACH SYMBOL
#	POND DEVICE SYMBOL
Tc. #	TIME OF CONCENTRATION SEGMENT

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SWPPP EPA SITE MAP (EXISTING)

W-1 EXISTING CONDITIONS WATERSHED PLAN – LAYOUT 2

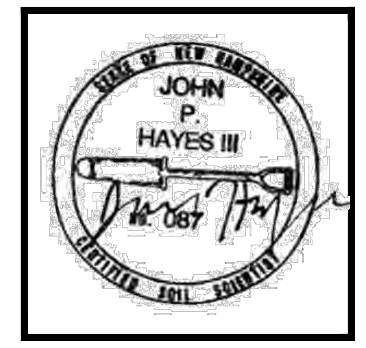
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 – 065

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

NOT FOR CONSTRUCTION

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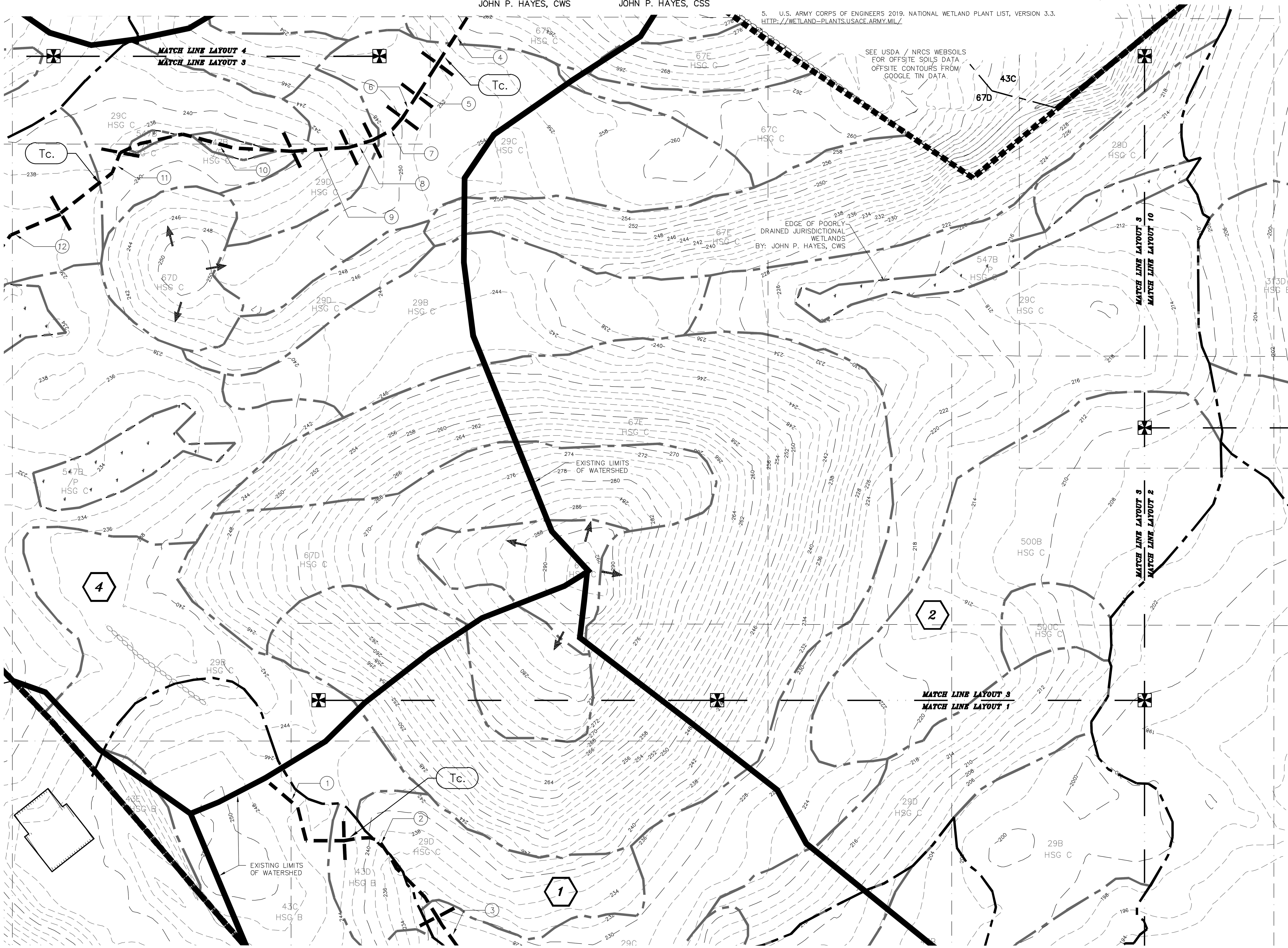

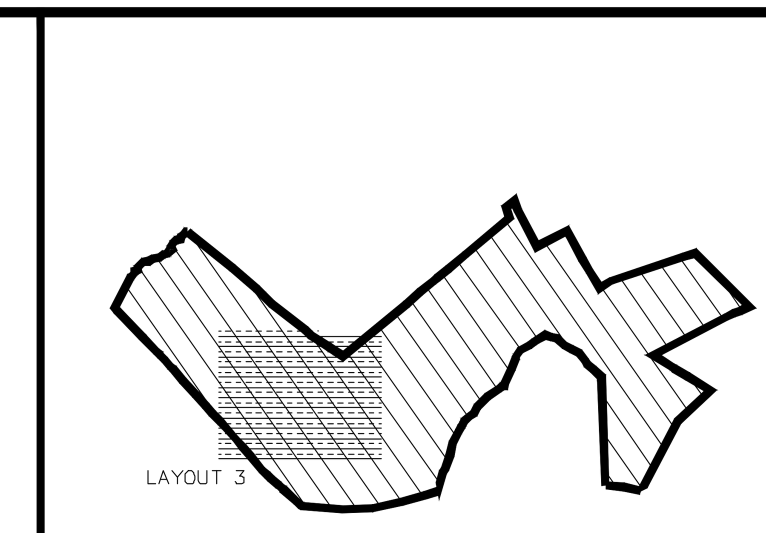

LAYOUT LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
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EXISTING CONTOUR MAJOR
STONE WALL
WETLAND LINE
LIMIT OF SITE SPECIFIC SOILS SURVEY
SOIL LINE
448A SOIL SERIES
NRCS SOIL LINE
HfB NRCS SOIL LABEL
LIMIT OF WATERSHED
TIME OF CONCENTRATION PATH
FLOW REACH
MATCH LINE
R.C.R.D. ROCKINGHAM 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

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

SWPPP EPA SITE MAP (EXISTING)

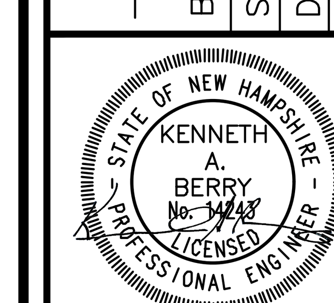
REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

W-1 EXISTING CONDITIONS WATERSHED PLAN - LAYOUT 3

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065



NOT FOR CONSTRUCTION

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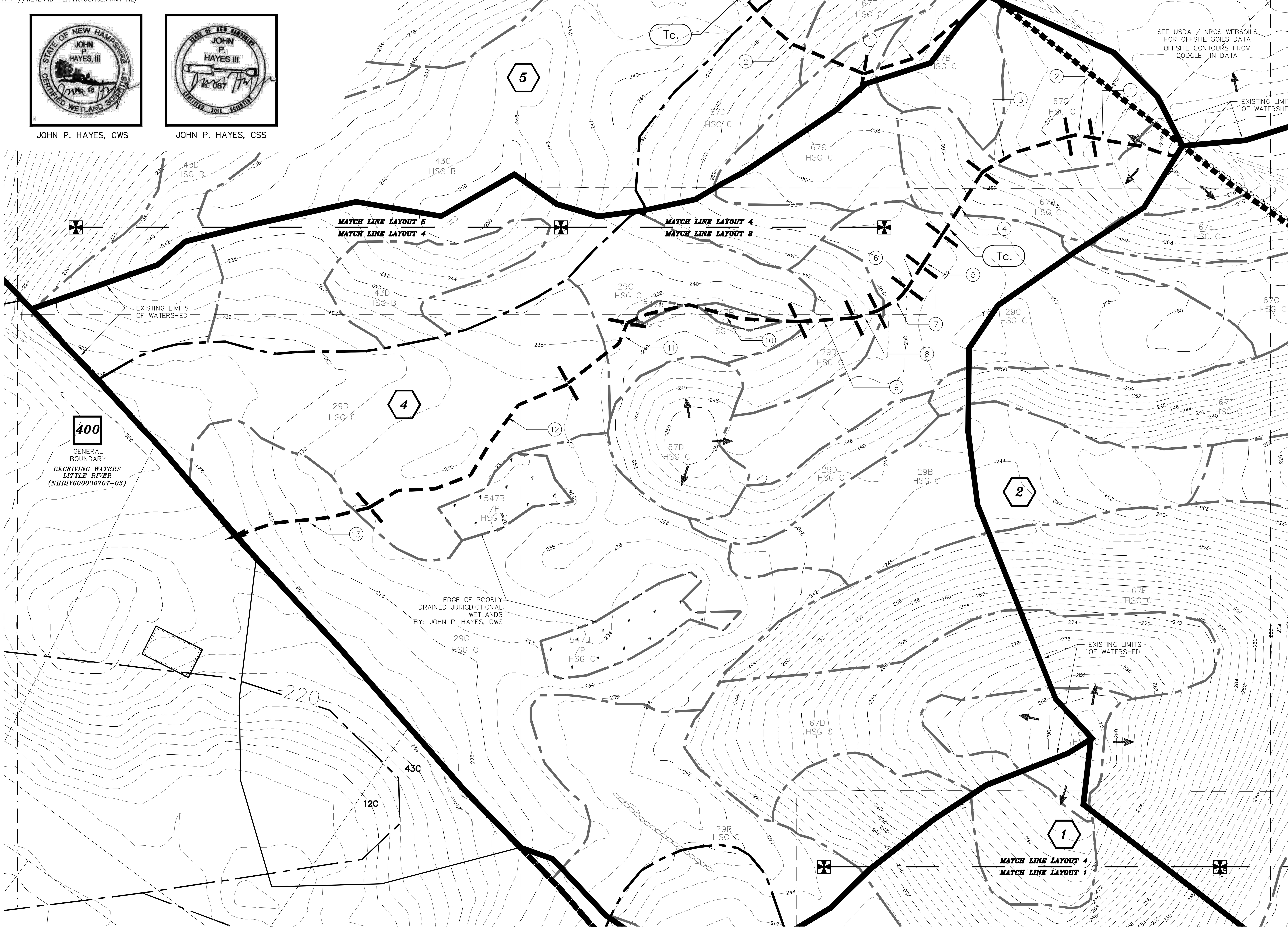
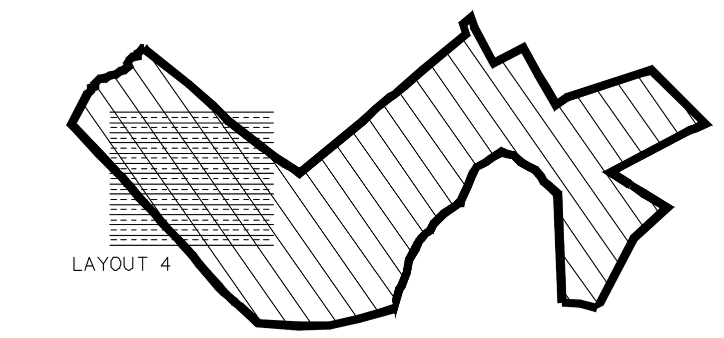
JOHN P. HAYES, CSS





LAYOUT LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING DRAINAGE CONDITIONS OF TAX MAP 23, LOT 11 AS OF THE DATE OF THE SURVEY.

5.) 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
- LIMIT OF SITE SPECIFIC SOILS SURVEY
- SOIL LINE
- 448A SOIL SERIES
- NRCS SOIL LINE
- HfB NRCS SOIL LABEL
- LIMIT OF WATERSHED
- TIME OF CONCENTRATION PATH
- FLOW REACH
- MATCH LINE
- R.C.R.D. ROCKINGHAM 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

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

SWPPP EPA SITE MAP (EXISTING)

W-1 EXISTING CONDITIONS WATERSHED PLAN - LAYOUT 4

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

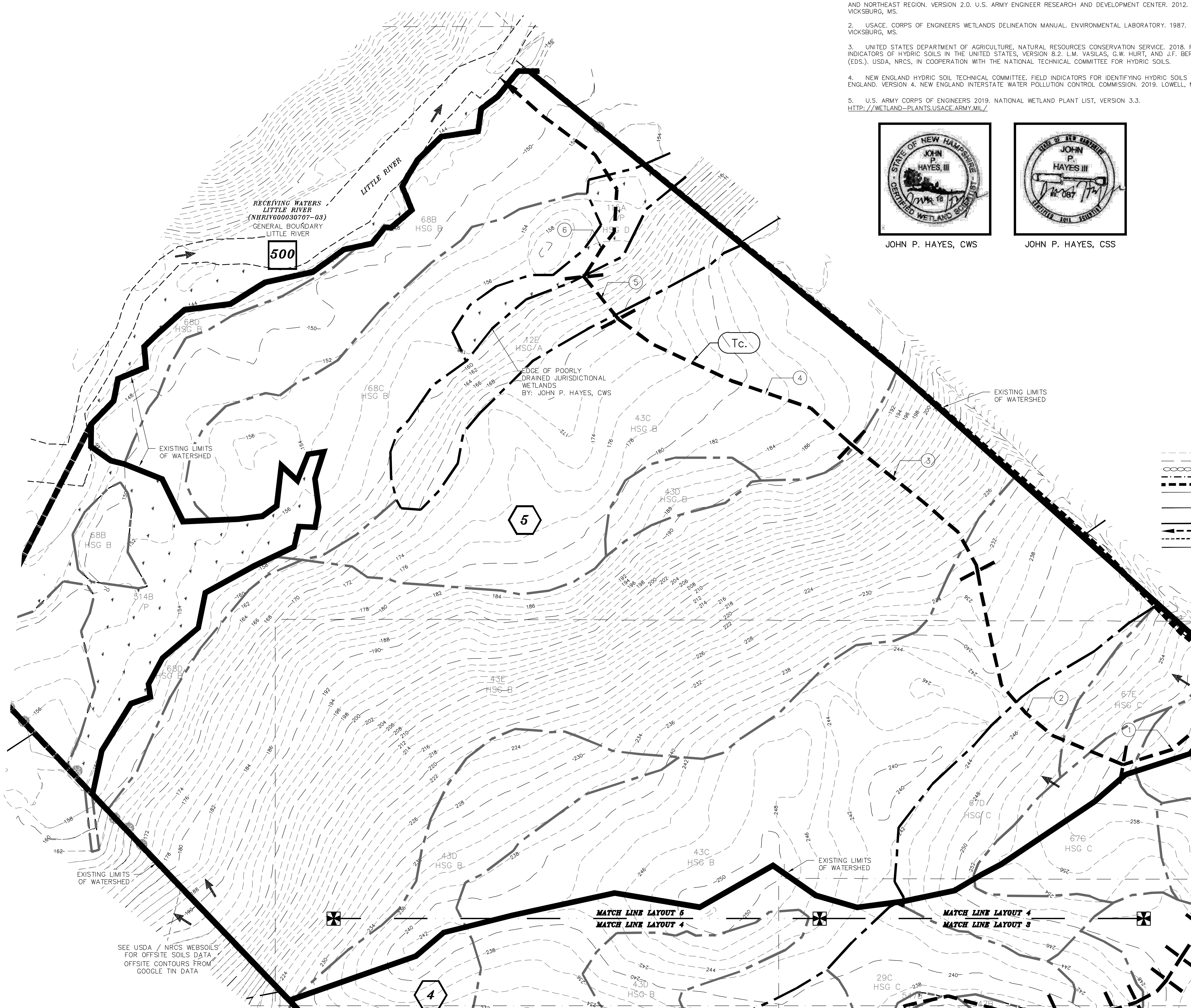
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065

STATE OF NEW HAMPSHIRE KENNETH A. BERRY No. 14248 LICENSED PROFESSIONAL ENGINEER

NOT FOR CONSTRUCTION



WETLAND NOTE:

WETLANDS WERE DELINEATED BY JOHN P. HAYES, CWS, IN THE SUMMER OF 2022 USING THE FOLLOWING CRITERIA:

1. USACE. 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. 2012. VICKSBURG, MS.

2. USACE. CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. ENVIRONMENTAL LABORATORY. 1987. VICKSBURG, MS.

3. UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE. 2018. FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 8.2. L.M. VASILAS, G.W. HURT, AND J.F. BERKOWITZ (EDS.). USDA, NRCS, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.

4. NEW ENGLAND HYDRIC SOIL TECHNICAL COMMITTEE. FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 4. NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION. 2019. LOWELL, MA.

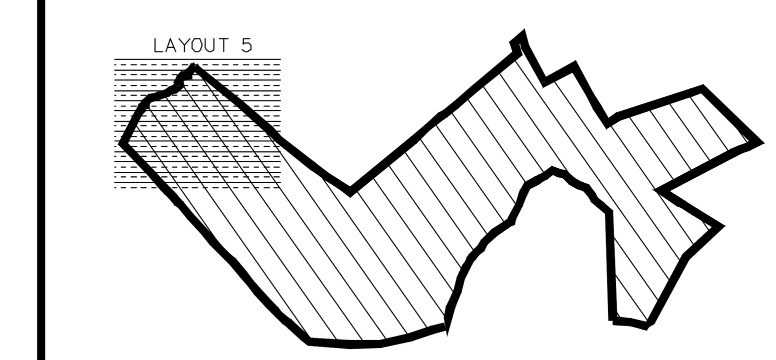
5. U.S. ARMY CORPS OF ENGINEERS 2019. NATIONAL WETLAND PLANT LIST, VERSION 3.3. HTTP://WETLAND-PLANTS.USACE.ARMY.MIL/

STATE OF NEW HAMPSHIRE
JOHN P. HAYES, III
CERTIFIED WETLAND SCIENTIST

JOHN P. HAYES, CWS

STATE OF NEW HAMPSHIRE
JOHN P. HAYES III
CERTIFIED SOIL SCIENTIST

JOHN P. HAYES, CSS



LAYOUT LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING DRAINAGE CONDITIONS OF TAX MAP 23, LOT 11 AS OF THE DATE OF THE SURVEY.

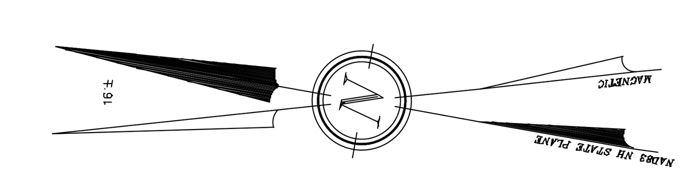
5.) HYDROCAD USES A SERIES OF NODE SUFFIXES FOR NUMBERING PURPOSES (S=SUBCATCHMENT, P=POND DEVICE, R=REACH), TO SIMPLIFY ANNOTATION THESE SUFFIXES ARE LEFT OFF THE WATERSHED PLANS AND NODE TYPE IS DENOTED BY THE SYMBOL SHAPE ACCORDING TO THE DISPLAYED LEGEND WHICH COINCIDES WITH HYDROCAD GRAPHICS.

LEGEND:

299	EXISTING CONTOUR MINOR
300	EXISTING CONTOUR MAJOR
	STONE WALL
	WETLAND LINE
	LIMIT OF SITE SPECIFIC SOILS SURVEY
	SOIL LINE
448A	SOIL SERIES
	NRCS SOIL LINE
HfB	NRCS SOIL LABEL
	LIMIT OF WATERSHED
	TIME OF CONCENTRATION PATH
	FLOW REACH
	MATCH LINE
R.C.R.D.	ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP.	TYPICAL
FND	FOUND
TBR	TO BE REMOVED

SYMBOLS LEGEND:

#	SUBCATCHMENT AREA SYMBOL
#	FLOW REACH SYMBOL
#	POND DEVICE SYMBOL
Tc. / #	TIME OF CONCENTRATION SEGMENT



GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

SWPPP EPA SITE MAP (EXISTING)

W-1 EXISTING CONDITIONS WATERSHED PLAN – LAYOUT 5
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

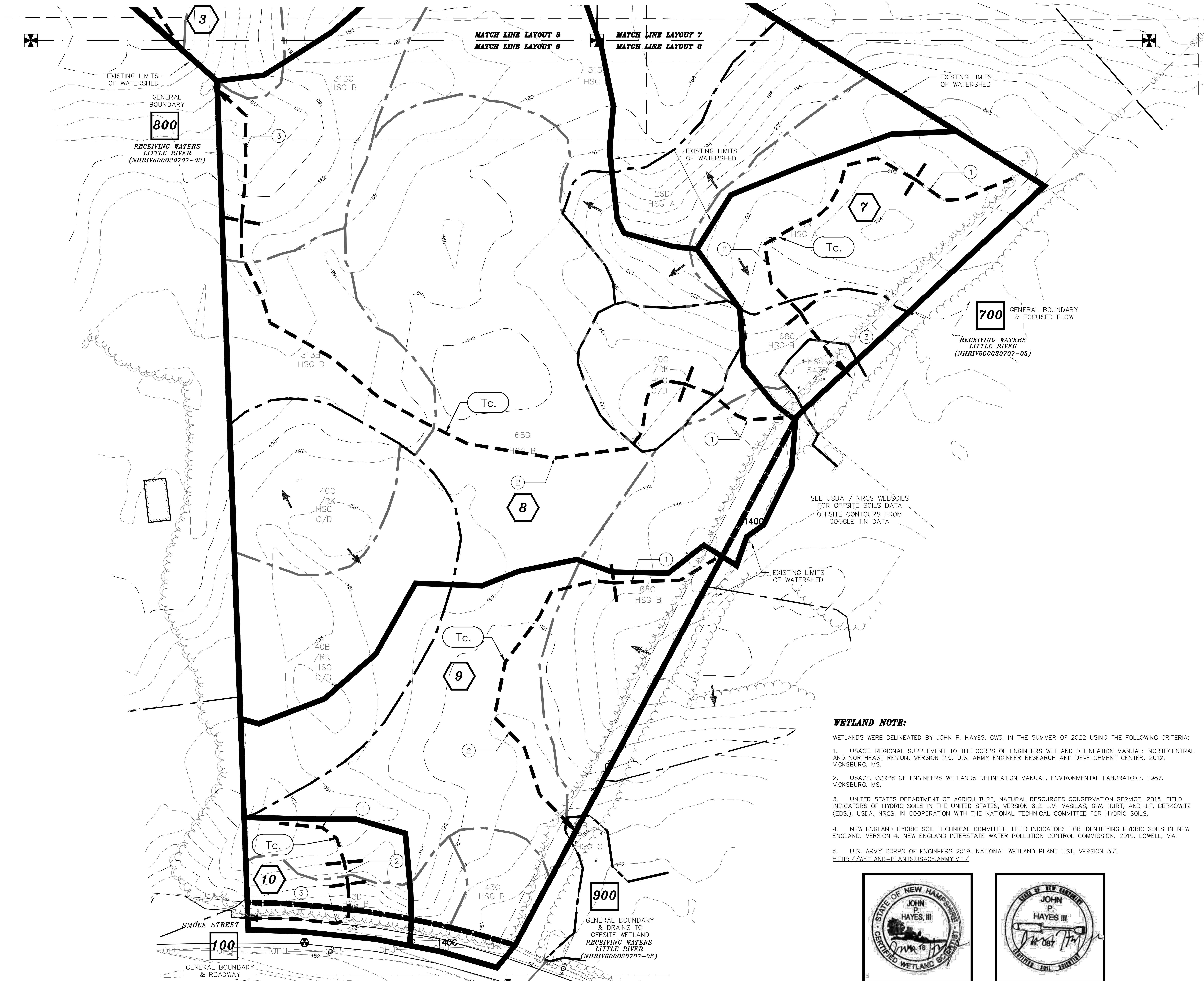
REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 – 065

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

NOT FOR CONSTRUCTION



LAYOUT LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING DRAINAGE CONDITIONS OF TAX MAP 23, LOT 11 AS OF THE DATE OF THE SURVEY.

5.) 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
- LIMIT OF SITE SPECIFIC SOILS SURVEY
- SOIL LINE
- SOIL SERIES
- NRCS SOIL LINE
- NRCS SOIL LABEL
- LIMIT OF WATERSHED
- TIME OF CONCENTRATION PATH
- FLOW REACH
- MATCH LINE
- R.C.R.D. ROCKINGHAM 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

WETLAND NOTE:

WETLANDS WERE DELINEATED BY JOHN P. HAYES, CWS, IN THE SUMMER OF 2022 USING THE FOLLOWING CRITERIA:

1. USACE. 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. 2012. VICKSBURG, MS.

2. USACE. CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. ENVIRONMENTAL LABORATORY. 1987. VICKSBURG, MS.

3. UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE. 2018. FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 8.2. L.M. VASILAS, G.W. HURT, AND J.F. BERKOWITZ (EDS.). USDA, NRCS, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.

4. NEW ENGLAND HYDRIC SOIL TECHNICAL COMMITTEE. FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 4. NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION. 2019. LOWELL, MA.

5. U.S. ARMY CORPS OF ENGINEERS 2019. NATIONAL WETLAND PLANT LIST, VERSION 3.3. HTTP://WETLAND-PLANTS.USACE.ARMY.MIL/

STATE OF NEW HAMPSHIRE — JOHN P. HAYES, III — CERTIFIED WETLAND SCIENTIST

JOHN P. HAYES, CWS

STATE OF NEW HAMPSHIRE — JOHN P. HAYES III — CERTIFIED SOIL SCIENTIST

JOHN P. HAYES, CSS

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SWPPP EPA SITE MAP (EXISTING)

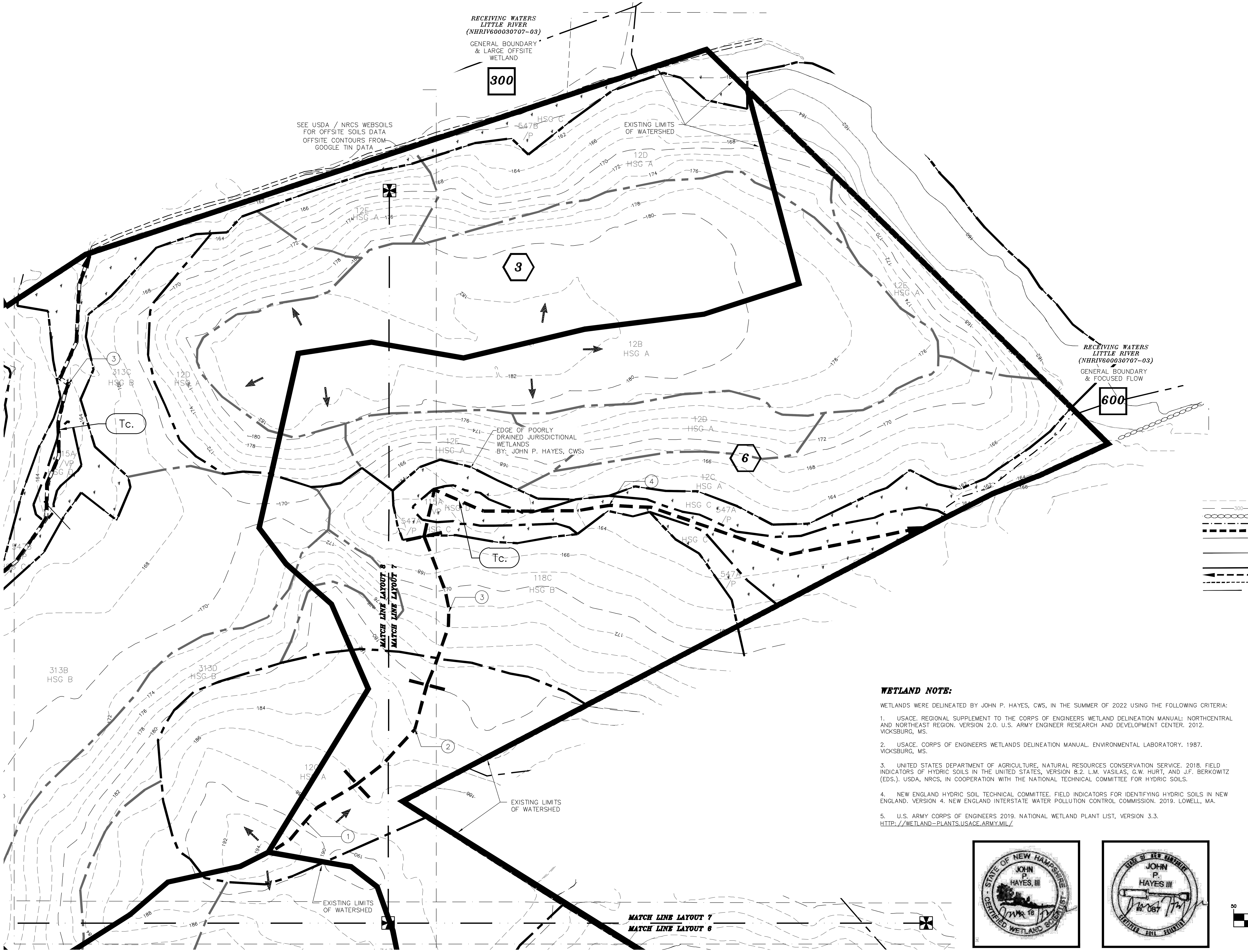
W-1 EXISTING CONDITIONS WATERSHED PLAN – LAYOUT 6

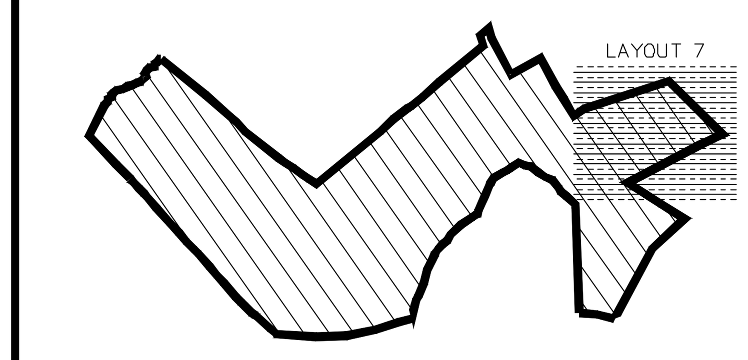
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065

STATE OF NEW HAMPSHIRE — KENNETH A. BERRY No. 14248 — LICENSED PROFESSIONAL ENGINEER





LAYOUT
LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING DRAINAGE CONDITIONS OF TAX MAP 23, LOT 11 AS OF THE DATE OF THE SURVEY.

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LEGEND:

- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR
- STONE WALL
- WETLAND LINE
- LIMIT OF SITE SPECIFIC SOILS SURVEY
- SOIL LINE
- 448A SOIL SERIES
- NRCS SOIL LINE
- HfB NRCS SOIL LABEL
- LIMIT OF WATERSHED
- TIME OF CONCENTRATION PATH
- FLOW REACH
- MATCH LINE
- R.C.R.D. ROCKINGHAM 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

GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

WETLAND NOTE:

WETLANDS WERE DELINEATED BY JOHN P. HAYES, CWS, IN THE SUMMER OF 2022 USING THE FOLLOWING CRITERIA:

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3. UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE. 2018. FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 8.2. L.M. VASILAS, G.W. HURT, AND J.F. BERKOWITZ (EDS.). USDA, NRCS, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.

4. NEW ENGLAND HYDRIC SOIL TECHNICAL COMMITTEE. FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 4. NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION. 2019. LOWELL, MA.

5. U.S. ARMY CORPS OF ENGINEERS 2019. NATIONAL WETLAND PLANT LIST, VERSION 3.3. HTTP://WETLAND-PLANTS.USACE.ARMY.MIL/

JOHN P. HAYES, CWS

JOHN P. HAYES, CSS

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SWPPP EPA SITE MAP (EXISTING)

W-1 EXISTING CONDITIONS WATERSHED PLAN - LAYOUT 7

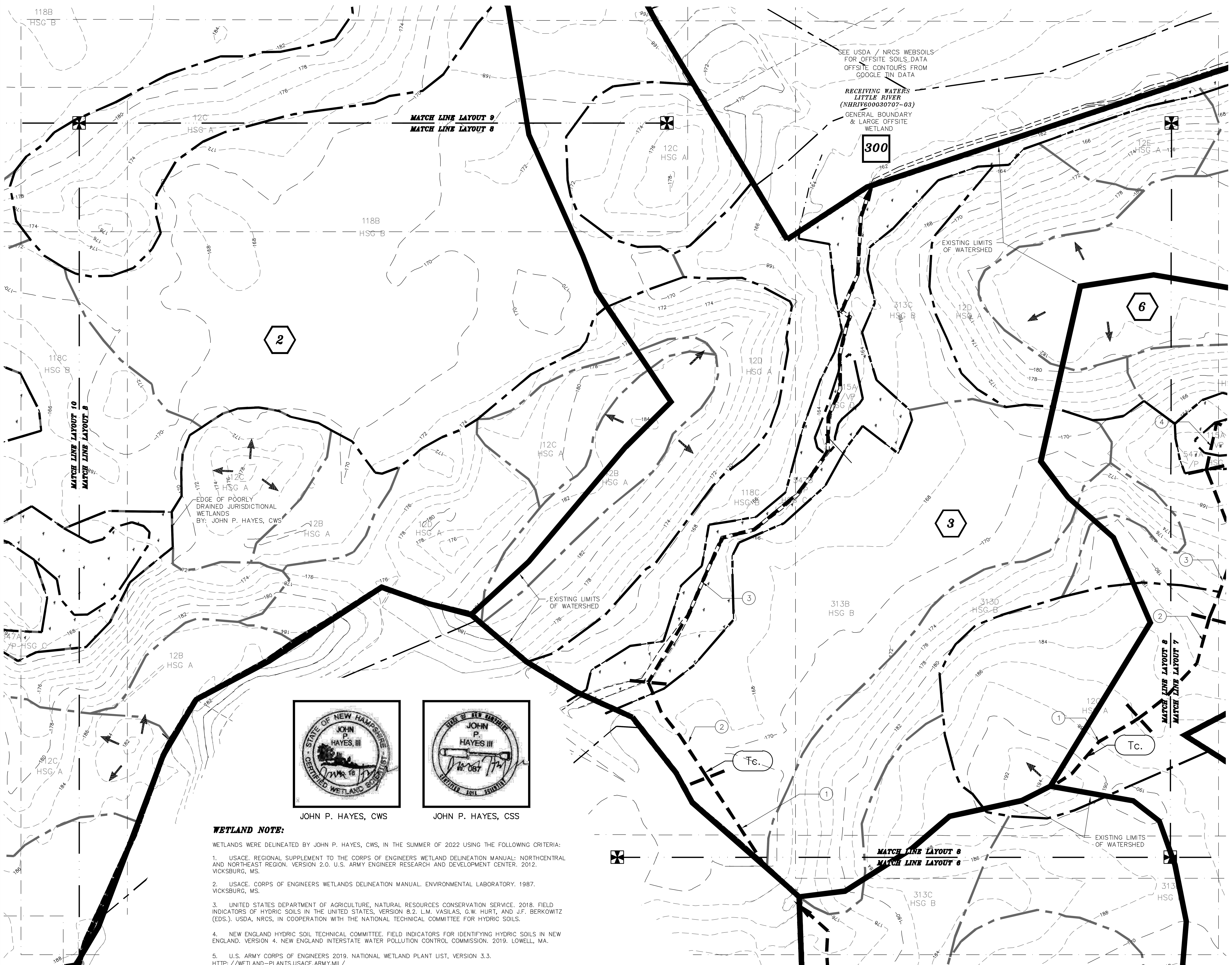
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065

STATE OF NEW HAMPSHIRE KENNETH A. BERRY LICENSED PROFESSIONAL ENGINEER

NOT FOR CONSTRUCTION



WETLAND NOTE:

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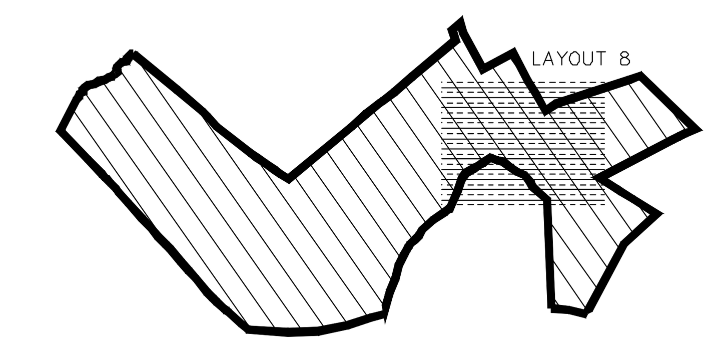

LAYOUT LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

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LEGEND:

299	EXISTING CONTOUR MINOR
300	EXISTING CONTOUR MAJOR
	STONE WALL
	WETLAND LINE
	LIMIT OF SITE SPECIFIC SOILS SURVEY
	SOIL LINE
448A	SOIL SERIES
	NRCS SOIL LINE
HfB	NRCS SOIL LABEL
	LIMIT OF WATERSHED
	TIME OF CONCENTRATION PATH
	FLOW REACH
	MATCH LINE
R.C.R.D.	ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP.	TYPICAL
FND	FOUND
TBR	TO BE REMOVED

SYMBOLS LEGEND:

#	SUBCATCHMENT AREA SYMBOL
#	FLOW REACH SYMBOL
#	POND DEVICE SYMBOL
Tc. #	TIME OF CONCENTRATION SEGMENT

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SWPPP EPA SITE MAP (EXISTING)
W-1 EXISTING CONDITIONS WATERSHED PLAN - LAYOUT 8

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14848
LICENSED
PROFESSIONAL ENGINEER

WETLAND NOTE:

WETLANDS WERE DELINEATED BY JOHN P. HAYES, CWS, IN THE SUMMER OF 2022 USING THE FOLLOWING CRITERIA:

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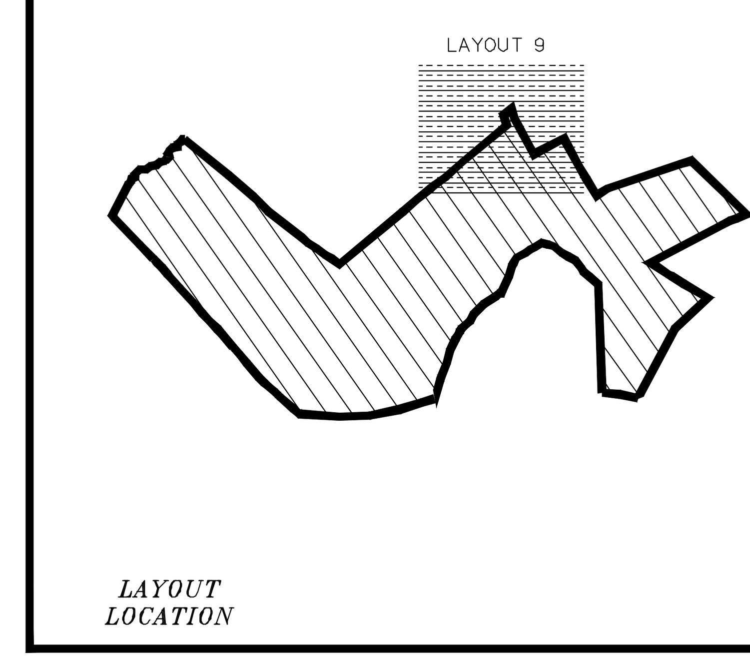
5. U.S. ARMY CORPS OF ENGINEERS 2019. NATIONAL WETLAND PLANT LIST, VERSION 3.3. HTTP://WETLAND-PLANTS.USACE.ARMY.MIL/

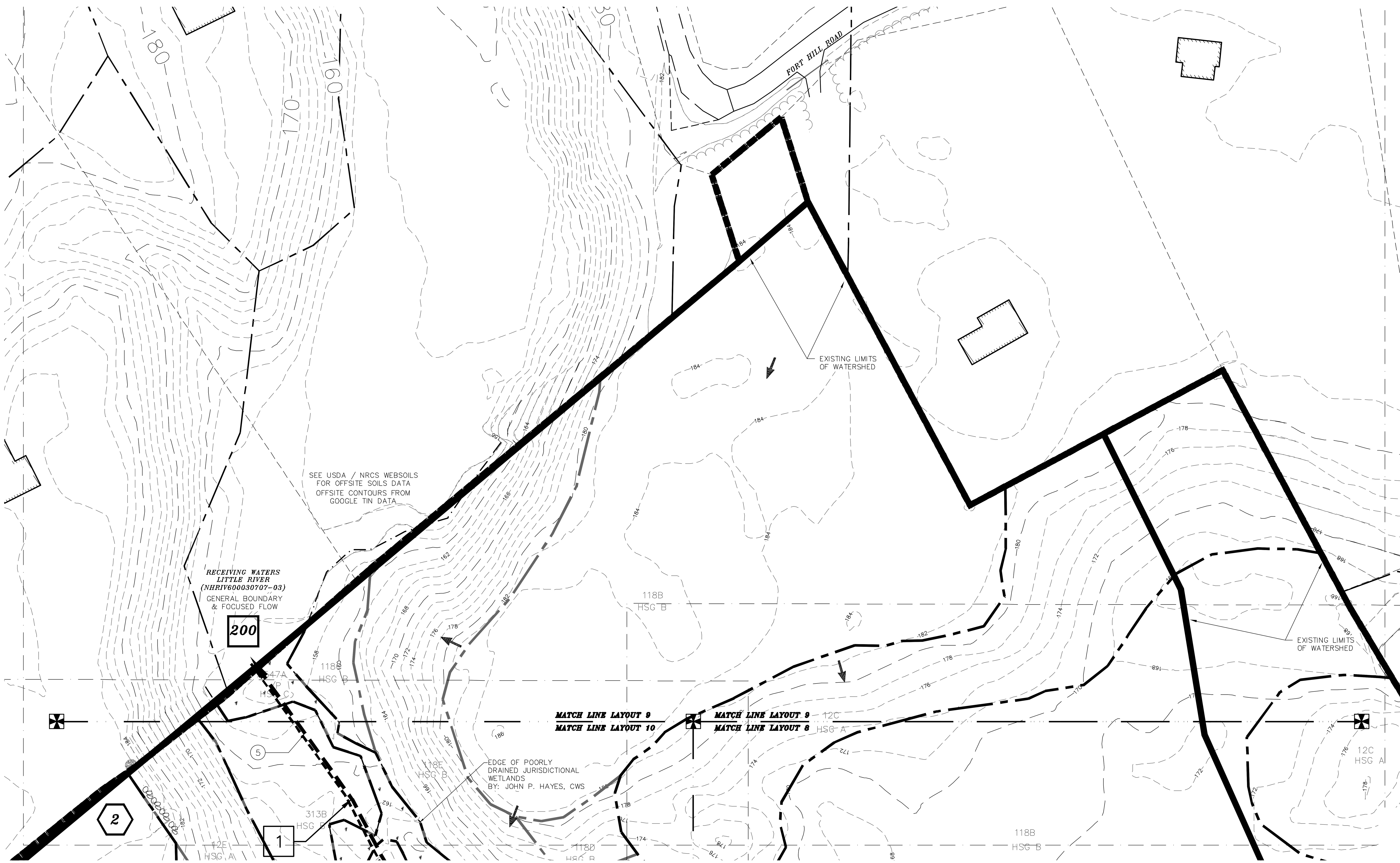
STATE OF NEW HAMPSHIRE JOHN P. HAYES, III CERTIFIED WETLAND SCIENTIST

JOHN P. HAYES, CWS

JOHN P. HAYES III CERTIFIED SOIL SCIENTIST

JOHN P. HAYES, CSS





NOTES:

1.) OWNER: FREDERICK FERNALD, PO BOX 1805, WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS, 104 RAYMOND ROAD, NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING DRAINAGE CONDITIONS OF TAX MAP 23, LOT 11 AS OF THE DATE OF THE SURVEY.

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LEGEND:

EXISTING CONTOUR MINOR
EXISTING CONTOUR MAJOR
STONE WALL
WETLAND LINE
LIMIT OF SITE SPECIFIC SOILS SURVEY
SOIL LINE
448A SOIL SERIES
NRCS SOIL LINE
HfB NRCS SOIL LABEL
LIMIT OF WATERSHED
TIME OF CONCENTRATION PATH
FLOW REACH
MATCH LINE
R.C.R.D. ROCKINGHAM 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

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SWPPP EPA SITE MAP (EXISTING)

W-1 EXISTING CONDITIONS WATERSHED PLAN – LAYOUT 9

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065

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

NOT FOR CONSTRUCTION

WETLAND NOTE:

WETLANDS WERE DELINEATED BY JOHN P. HAYES, CWS, IN THE SUMMER OF 2022 USING THE FOLLOWING CRITERIA:

1. USACE. 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. 2012. VICKSBURG, MS.

2. USACE. CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. ENVIRONMENTAL LABORATORY. 1987. VICKSBURG, MS.

3. UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE. 2018. FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 8.2. L.M. VASILAS, G.W. HURT, AND J.F. BERKOWITZ (EDS.). USDA, NRCS, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.

4. NEW ENGLAND HYDRIC SOIL TECHNICAL COMMITTEE. FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 4. NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION. 2019. LOWELL, MA.

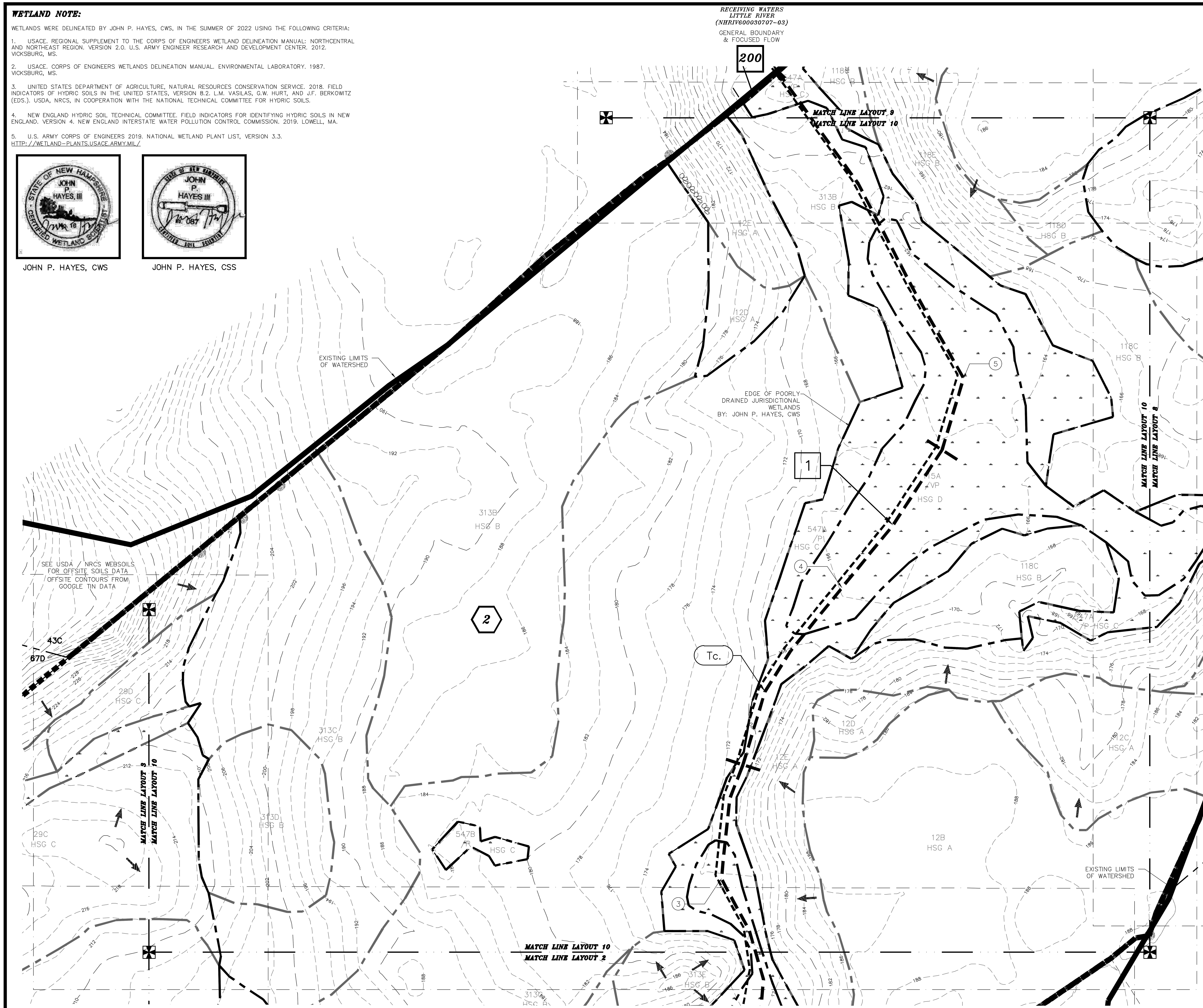
5. U.S. ARMY CORPS OF ENGINEERS 2019. NATIONAL WETLAND PLANT LIST, VERSION 3.3. HTTP://WETLAND-PLANTS.USACE.ARMY.MIL/

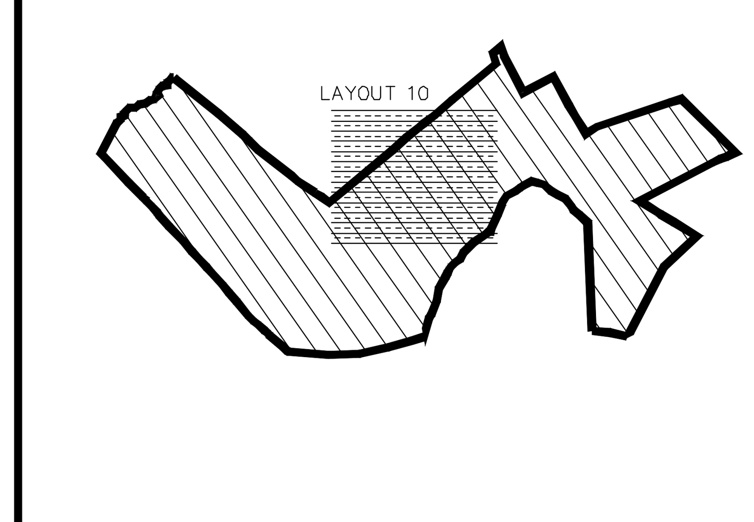
STATE OF NEW HAMPSHIRE JOHN P. HAYES, III CERTIFIED WETLAND SCIENTIST

JOHN P. HAYES, CWS

STATE OF NEW HAMPSHIRE JOHN P. HAYES III CERTIFIED SOIL SCIENTIST

JOHN P. HAYES, CSS





LAYOUT LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING DRAINAGE CONDITIONS OF TAX MAP 23, LOT 11 AS OF THE DATE OF THE SURVEY.

5.) 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:

299	EXISTING CONTOUR MINOR
300	EXISTING CONTOUR MAJOR
	STONE WALL
	WETLAND LINE
	LIMIT OF SITE SPECIFIC SOILS SURVEY
	SOIL LINE
448A	SOIL SERIES
	NRCS SOIL LINE
HfB	NRCS SOIL LABEL
	LIMIT OF WATERSHED
	TIME OF CONCENTRATION PATH
	FLOW REACH
	MATCH LINE
R.C.R.D.	ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP.	TYPICAL
FND	FOUND
TBR	TO BE REMOVED

SYMBOLS LEGEND:

SUBCATCHMENT AREA SYMBOL

FLOW REACH SYMBOL

POND DEVICE SYMBOL

Tc. TIME OF CONCENTRATION SEGMENT

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SWPPP EPA SITE MAP (EXISTING)

W-1 EXISTING CONDITIONS WATERSHED PLAN – LAYOUT 10

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.

DATE : FEBRUARY 15, 2023

FILE NO. : DB 2020 - 065

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

NOT FOR CONSTRUCTION

Routing Diagram for 20-065 Existing Analysis
Prepared by Berry Surveying & Engineering, Printed 12/7/2023
HydroCAD® 10.00-25 s/n 07605 © 2019 HydroCAD Software Solutions LLC

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points x 3
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=321,010 sf 1.12% Impervious Runoff Depth>0.32"
Flow Length=663' Tc=24.8 min CN=59 Runoff=0.97 cfs 0.197 af

Subcatchment 2S: Subcatchment #2 Runoff Area=2,247,467 sf 0.82% Impervious Runoff Depth>0.15"
Flow Length=2,208' Tc=87.6 min CN=53 Runoff=1.23 cfs 0.662 af

Subcatchment 3S: Subcatchment #3 Runoff Area=433,657 sf 0.00% Impervious Runoff Depth>0.02"
Flow Length=753' Tc=46.0 min CN=44 Runoff=0.02 cfs 0.015 af

Subcatchment 4S: Subcatchment #4 Runoff Area=464,510 sf 0.00% Impervious Runoff Depth>0.65"
Flow Length=1,007' Tc=36.5 min CN=68 Runoff=3.57 cfs 0.578 af

Subcatchment 5S: Subcatchment #5 Runoff Area=502,048 sf 0.00% Impervious Runoff Depth>0.21"
Flow Length=1,017' Tc=26.5 min CN=55 Runoff=0.68 cfs 0.200 af

Subcatchment 6S: Subcatchment #6 Runoff Area=291,221 sf 0.00% Impervious Runoff Depth>0.01"
Flow Length=888' Tc=44.0 min CN=42 Runoff=0.01 cfs 0.003 af

Subcatchment 7S: Subcatchment #7 Runoff Area=44,849 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=424' Tc=25.7 min CN=37 Runoff=0.00 cfs 0.000 af

Subcatchment 8S: Subcatchment #8 Runoff Area=241,146 sf 0.00% Impervious Runoff Depth>0.29"
Flow Length=792' Tc=31.1 min CN=58 Runoff=0.56 cfs 0.133 af

Subcatchment 9S: Subcatchment #9 Runoff Area=85,918 sf 1.13% Impervious Runoff Depth>0.29"
Flow Length=417' Tc=21.9 min CN=58 Runoff=0.23 cfs 0.048 af

Subcatchment 10S: Subcatchment #10 Runoff Area=15,853 sf 10.22% Impervious Runoff Depth>0.35"
Flow Length=226' Tc=16.6 min CN=60 Runoff=0.06 cfs 0.011 af

Reach 1R: Reach #1 Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=2,168.8' S=0.0127 '/' Capacity=25.14 cfs Outflow=0.00 cfs 0.000 af

Reach 100R: Final Reach #100 Inflow=0.06 cfs 0.011 af
Outflow=0.06 cfs 0.011 af

Reach 200R: Final Reach #200 Inflow=1.23 cfs 0.662 af
Outflow=1.23 cfs 0.662 af

Reach 300R: Final Reach #300 Inflow=0.02 cfs 0.015 af
Outflow=0.02 cfs 0.015 af

Reach 400R: Final Reach #400 Inflow=3.57 cfs 0.578 af
Outflow=3.57 cfs 0.578 af

Reach 500R: Final Reach #500 Inflow=0.68 cfs 0.200 af
Outflow=0.68 cfs 0.200 af

Reach 600R: Final Reach #600 Inflow=0.01 cfs 0.003 af
Outflow=0.01 cfs 0.003 af

Reach 700R: Final Reach #700 Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach 800R: Final Reach #800 Inflow=0.56 cfs 0.133 af
Outflow=0.56 cfs 0.133 af

Reach 900R: Final Reach #900 Inflow=0.23 cfs 0.048 af
Outflow=0.23 cfs 0.048 af

Pond 1P: Pond #1 Peak Elev=183.37' Storage=8,117 cf Inflow=0.97 cfs 0.197 af
Discarded=0.01 cfs 0.010 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.010 af

Total Runoff Area = 106.696 ac Runoff Volume = 1.847 af Average Runoff Depth = 0.21"
99.47% Pervious = 106.133 ac 0.53% Impervious = 0.563 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points x 3
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=321,010 sf 1.12% Impervious Runoff Depth>1.02"
Flow Length=663' Tc=24.8 min CN=59 Runoff=4.64 cfs 0.628 af

Subcatchment 2S: Subcatchment #2 Runoff Area=2,247,467 sf 0.82% Impervious Runoff Depth>0.67"
Flow Length=2,208' Tc=87.6 min CN=53 Runoff=9.31 cfs 2.886 af

Subcatchment 3S: Subcatchment #3 Runoff Area=433,657 sf 0.00% Impervious Runoff Depth>0.29"
Flow Length=753' Tc=46.0 min CN=44 Runoff=0.60 cfs 0.237 af

Subcatchment 4S: Subcatchment #4 Runoff Area=464,510 sf 0.00% Impervious Runoff Depth>1.61"
Flow Length=1,007' Tc=36.5 min CN=68 Runoff=10.00 cfs 1.427 af

Subcatchment 5S: Subcatchment #5 Runoff Area=502,048 sf 0.00% Impervious Runoff Depth>0.79"
Flow Length=1,017' Tc=26.5 min CN=55 Runoff=4.93 cfs 0.763 af

Subcatchment 6S: Subcatchment #6 Runoff Area=291,221 sf 0.00% Impervious Runoff Depth>0.22"
Flow Length=888' Tc=44.0 min CN=42 Runoff=0.24 cfs 0.121 af

Subcatchment 7S: Subcatchment #7 Runoff Area=44,849 sf 0.00% Impervious Runoff Depth>0.08"
Flow Length=424' Tc=25.7 min CN=37 Runoff=0.01 cfs 0.007 af

Subcatchment 8S: Subcatchment #8 Runoff Area=241,146 sf 0.00% Impervious Runoff Depth>0.96"
Flow Length=792' Tc=31.1 min CN=58 Runoff=2.92 cfs 0.444 af

Subcatchment 9S: Subcatchment #9 Runoff Area=85,918 sf 1.13% Impervious Runoff Depth>0.96"
Flow Length=417' Tc=21.9 min CN=58 Runoff=1.20 cfs 0.159 af

Subcatchment 10S: Subcatchment #10 Runoff Area=15,853 sf 10.22% Impervious Runoff Depth>1.09"
Flow Length=226' Tc=16.6 min CN=60 Runoff=0.29 cfs 0.033 af

Reach 1R: Reach #1 Avg. Flow Depth=0.08' Max Vel=0.30 fps Inflow=0.84 cfs 0.348 af
n=0.080 L=2,168.8' S=0.0127 '/' Capacity=25.14 cfs Outflow=0.52 cfs 0.304 af

Reach 100R: Final Reach #100 Inflow=0.29 cfs 0.033 af
Outflow=0.29 cfs 0.033 af

Reach 200R: Final Reach #200 Inflow=9.37 cfs 3.190 af
Outflow=9.37 cfs 3.190 af

Reach 300R: Final Reach #300 Inflow=0.60 cfs 0.237 af
Outflow=0.60 cfs 0.237 af

Reach 400R: Final Reach #400 Inflow=10.00 cfs 1.427 af
Outflow=10.00 cfs 1.427 af

Reach 500R: Final Reach #500 Inflow=4.93 cfs 0.763 af
Outflow=4.93 cfs 0.763 af

Reach 600R: Final Reach #600 Inflow=0.24 cfs 0.121 af
Outflow=0.24 cfs 0.121 af

Reach 700R: Final Reach #700 Inflow=0.01 cfs 0.007 af
Outflow=0.01 cfs 0.007 af

Reach 800R: Final Reach #800 Inflow=2.92 cfs 0.444 af
Outflow=2.92 cfs 0.444 af

Reach 900R: Final Reach #900 Inflow=1.20 cfs 0.159 af
Outflow=1.20 cfs 0.159 af

Pond 1P: Pond #1 Peak Elev=183.59' Storage=12,367 cf Inflow=4.64 cfs 0.628 af
Discarded=0.01 cfs 0.014 af Primary=0.84 cfs 0.348 af Outflow=0.86 cfs 0.362 af

Total Runoff Area = 106.696 ac Runoff Volume = 6.704 af Average Runoff Depth = 0.75"
99.47% Pervious = 106.133 ac 0.53% Impervious = 0.563 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points x 3
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=321,010 sf 1.12% Impervious Runoff Depth>1.74"
Flow Length=663' Tc=24.8 min CN=59 Runoff=8.59 cfs 1.068 af

Subcatchment 2S: Subcatchment #2 Runoff Area=2,247,467 sf 0.82% Impervious Runoff Depth>1.25"
Flow Length=2,208' Tc=87.6 min CN=53 Runoff=20.12 cfs 5.376 af

Subcatchment 3S: Subcatchment #3 Runoff Area=433,657 sf 0.00% Impervious Runoff Depth>0.67"
Flow Length=753' Tc=46.0 min CN=44 Runoff=2.26 cfs 0.557 af

Subcatchment 4S: Subcatchment #4 Runoff Area=464,510 sf 0.00% Impervious Runoff Depth>2.49"
Flow Length=1,007' Tc=36.5 min CN=68 Runoff=15.93 cfs 2.215 af

Subcatchment 5S: Subcatchment #5 Runoff Area=502,048 sf 0.00% Impervious Runoff Depth>1.43"
Flow Length=1,017' Tc=26.5 min CN=55 Runoff=10.18 cfs 1.370 af

Subcatchment 6S: Subcatchment #6 Runoff Area=291,221 sf 0.00% Impervious Runoff Depth>0.56"
Flow Length=888' Tc=44.0 min CN=42 Runoff=1.13 cfs 0.310 af

Subcatchment 7S: Subcatchment #7 Runoff Area=44,849 sf 0.00% Impervious Runoff Depth>0.30"
Flow Length=424' Tc=25.7 min CN=37 Runoff=0.07 cfs 0.026 af

Subcatchment 8S: Subcatchment #8 Runoff Area=241,146 sf 0.00% Impervious Runoff Depth>1.66"
Flow Length=792' Tc=31.1 min CN=58 Runoff=5.53 cfs 0.764 af

Subcatchment 9S: Subcatchment #9 Runoff Area=85,918 sf 1.13% Impervious Runoff Depth>1.66"
Flow Length=417' Tc=21.9 min CN=58 Runoff=2.28 cfs 0.273 af

Subcatchment 10S: Subcatchment #10 Runoff Area=15,853 sf 10.22% Impervious Runoff Depth>1.82"
Flow Length=226' Tc=16.6 min CN=60 Runoff=0.53 cfs 0.055 af

Reach 1R: Reach #1 Avg. Flow Depth=0.14' Max Vel=0.43 fps Inflow=3.96 cfs 0.781 af
n=0.080 L=2,168.8' S=0.0127 '/' Capacity=25.14 cfs Outflow=1.56 cfs 0.723 af

Reach 100R: Final Reach #100 Inflow=0.53 cfs 0.055 af
Outflow=0.53 cfs 0.055 af

Reach 200R: Final Reach #200 Inflow=21.52 cfs 6.099 af
Outflow=21.52 cfs 6.099 af

Reach 300R: Final Reach #300 Inflow=2.26 cfs 0.557 af
Outflow=2.26 cfs 0.557 af

Reach 400R: Final Reach #400 Inflow=15.93 cfs 2.215 af
Outflow=15.93 cfs 2.215 af

Reach 500R: Final Reach #500 Inflow=10.18 cfs 1.370 af
Outflow=10.18 cfs 1.370 af

Reach 600R: Final Reach #600 Inflow=1.13 cfs 0.310 af
Outflow=1.13 cfs 0.310 af

Reach 700R: Final Reach #700 Inflow=0.07 cfs 0.026 af
Outflow=0.07 cfs 0.026 af

Reach 800R: Final Reach #800 Inflow=5.53 cfs 0.764 af
Outflow=5.53 cfs 0.764 af

Reach 900R: Final Reach #900 Inflow=2.28 cfs 0.273 af
Outflow=2.28 cfs 0.273 af

Pond 1P: Pond #1 Peak Elev=183.73' Storage=15,315 cf Inflow=8.59 cfs 1.068 af
Discarded=0.02 cfs 0.015 af Primary=3.96 cfs 0.781 af Outflow=3.98 cfs 0.796 af

Total Runoff Area = 106.696 ac Runoff Volume = 12.014 af Average Runoff Depth = 1.35"
99.47% Pervious = 106.133 ac 0.53% Impervious = 0.563 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points x 3
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=321,010 sf 1.12% Impervious Runoff Depth>2.50"
Flow Length=663' Tc=24.8 min CN=59 Runoff=12.81 cfs 1.534 af

Subcatchment 2S: Subcatchment #2 Runoff Area=2,247,467 sf 0.82% Impervious Runoff Depth>1.89"
Flow Length=2,208' Tc=87.6 min CN=53 Runoff=32.55 cfs 8.132 af

Subcatchment 3S: Subcatchment #3 Runoff Area=433,657 sf 0.00% Impervious Runoff Depth>1.14"
Flow Length=753' Tc=46.0 min CN=44 Runoff=4.65 cfs 0.946 af

Subcatchment 4S: Subcatchment #4 Runoff Area=464,510 sf 0.00% Impervious Runoff Depth>3.39"
Flow Length=1,007' Tc=36.5 min CN=68 Runoff=21.89 cfs 3.013 af

Subcatchment 5S: Subcatchment #5 Runoff Area=502,048 sf 0.00% Impervious Runoff Depth>2.12"
Flow Length=1,017' Tc=26.5 min CN=55 Runoff=15.98 cfs 2.032 af

Subcatchment 6S: Subcatchment #6 Runoff Area=291,221 sf 0.00% Impervious Runoff Depth>0.98"
Flow Length=888' Tc=44.0 min CN=42 Runoff=2.55 cfs 0.547 af

Subcatchment 7S: Subcatchment #7 Runoff Area=44,849 sf 0.00% Impervious Runoff Depth>0.62"
Flow Length=424' Tc=25.7 min CN=37 Runoff=0.23 cfs 0.053 af

Subcatchment 8S: Subcatchment #8 Runoff Area=241,146 sf 0.00% Impervious Runoff Depth>2.40"
Flow Length=792' Tc=31.1 min CN=58 Runoff=8.32 cfs 1.106 af

Subcatchment 9S: Subcatchment #9 Runoff Area=85,918 sf 1.13% Impervious Runoff Depth>2.40"
Flow Length=417' Tc=21.9 min CN=58 Runoff=3.44 cfs 0.395 af

Subcatchment 10S: Subcatchment #10 Runoff Area=15,853 sf 10.22% Impervious Runoff Depth>2.60"
Flow Length=226' Tc=16.6 min CN=60 Runoff=0.78 cfs 0.079 af

Reach 1R: Reach #1 Avg. Flow Depth=0.20' Max Vel=0.54 fps Inflow=8.03 cfs 1.242 af
n=0.080 L=2,168.8' S=0.0127 '/' Capacity=25.14 cfs Outflow=3.33 cfs 1.172 af

Reach 100R: Final Reach #100 Inflow=0.78 cfs 0.079 af
Outflow=0.78 cfs 0.079 af

Reach 200R: Final Reach #200 Inflow=35.88 cfs 9.304 af
Outflow=35.88 cfs 9.304 af

Reach 300R: Final Reach #300 Inflow=4.65 cfs 0.946 af
Outflow=4.65 cfs 0.946 af

Reach 400R: Final Reach #400 Inflow=21.89 cfs 3.013 af
Outflow=21.89 cfs 3.013 af

Reach 500R: Final Reach #500 Inflow=15.98 cfs 2.032 af
Outflow=15.98 cfs 2.032 af

Reach 600R: Final Reach #600 Inflow=2.55 cfs 0.547 af
Outflow=2.55 cfs 0.547 af

Reach 700R: Final Reach #700 Inflow=0.23 cfs 0.053 af
Outflow=0.23 cfs 0.053 af

Reach 800R: Final Reach #800 Inflow=8.32 cfs 1.106 af
Outflow=8.32 cfs 1.106 af

Reach 900R: Final Reach #900 Inflow=3.44 cfs 0.395 af
Outflow=3.44 cfs 0.395 af

Pond 1P: Pond #1 Peak Elev=183.86' Storage=18,638 cf Inflow=12.81 cfs 1.534 af
Discarded=0.02 cfs 0.015 af Primary=8.03 cfs 1.242 af Outflow=8.04 cfs 1.258 af

Total Runoff Area = 106.696 ac Runoff Volume = 17.837 af Average Runoff Depth = 2.01"
99.47% Pervious = 106.133 ac 0.53% Impervious = 0.563 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points x 3
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=321,010 sf 1.12% Impervious Runoff Depth>3.49"
Flow Length=663' Tc=24.8 min CN=59 Runoff=18.29 cfs 2.145 af

Subcatchment 2S: Subcatchment #2 Runoff Area=2,247,467 sf 0.82% Impervious Runoff Depth>2.76"
Flow Length=2,208' Tc=87.6 min CN=53 Runoff=49.58 cfs 11.853 af

Subcatchment 3S: Subcatchment #3 Runoff Area=433,657 sf 0.00% Impervious Runoff Depth>1.81"
Flow Length=753' Tc=46.0 min CN=44 Runoff=8.30 cfs 1.503 af

Subcatchment 4S: Subcatchment #4 Runoff Area=464,510 sf 0.00% Impervious Runoff Depth>4.53"
Flow Length=1,007' Tc=36.5 min CN=68 Runoff=29.36 cfs 4.026 af

Subcatchment 5S: Subcatchment #5 Runoff Area=502,048 sf 0.00% Impervious Runoff Depth>3.03"
Flow Length=1,017' Tc=26.5 min CN=55 Runoff=23.71 cfs 2.914 af

Subcatchment 6S: Subcatchment #6 Runoff Area=291,221 sf 0.00% Impervious Runoff Depth>1.61"
Flow Length=888' Tc=44.0 min CN=42 Runoff=4.83 cfs 0.894 af

Subcatchment 7S: Subcatchment #7 Runoff Area=44,849 sf 0.00% Impervious Runoff Depth>1.12"
Flow Length=424' Tc=25.7 min CN=37 Runoff=0.55 cfs 0.096 af

Subcatchment 8S: Subcatchment #8 Runoff Area=241,146 sf 0.00% Impervious Runoff Depth>3.37"
Flow Length=792' Tc=31.1 min CN=58 Runoff=11.98 cfs 1.556 af

Subcatchment 9S: Subcatchment #9 Runoff Area=85,918 sf 1.13% Impervious Runoff Depth>3.38"
Flow Length=417' Tc=21.9 min CN=58 Runoff=4.97 cfs 0.556 af

Subcatchment 10S: Subcatchment #10 Runoff Area=15,853 sf 10.22% Impervious Runoff Depth>3.62"
Flow Length=226' Tc=16.6 min CN=60 Runoff=1.10 cfs 0.110 af

Reach 1R: Reach #1 Avg. Flow Depth=0.26' Max Vel=0.65 fps Inflow=14.18 cfs 1.848 af
n=0.080 L=2,168.8' S=0.0127 '/' Capacity=25.14 cfs Outflow=6.22 cfs 1.764 af

Reach 100R: Final Reach #100 Inflow=1.10 cfs 0.110 af
Outflow=1.10 cfs 0.110 af

Reach 200R: Final Reach #200 Inflow=55.70 cfs 13.618 af
Outflow=55.70 cfs 13.618 af

Reach 300R: Final Reach #300 Inflow=8.30 cfs 1.503 af
Outflow=8.30 cfs 1.503 af

Reach 400R: Final Reach #400 Inflow=29.36 cfs 4.026 af
Outflow=29.36 cfs 4.026 af

Reach 500R: Final Reach #500 Inflow=23.71 cfs 2.914 af
Outflow=23.71 cfs 2.914 af

Reach 600R: Final Reach #600 Inflow=4.83 cfs 0.894 af
Outflow=4.83 cfs 0.894 af

Reach 700R: Final Reach #700 Inflow=0.55 cfs 0.096 af
Outflow=0.55 cfs 0.096 af

Reach 800R: Final Reach #800 Inflow=11.98 cfs 1.556 af
Outflow=11.98 cfs 1.556 af

Reach 900R: Final Reach #900 Inflow=4.97 cfs 0.556 af
Outflow=4.97 cfs 0.556 af

Pond 1P: Pond #1 Peak Elev=184.03' Storage=22,461 cf Inflow=18.29 cfs 2.145 af
Discarded=0.02 cfs 0.016 af Primary=14.18 cfs 1.848 af Outflow=14.20 cfs 1.864 af

Total Runoff Area = 106.696 ac Runoff Volume = 25.653 af Average Runoff Depth = 2.89"
99.47% Pervious = 106.133 ac 0.53% Impervious = 0.563 ac

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.282	39	>75% Grass cover, Good, HSG A (2S)
0.194	61	>75% Grass cover, Good, HSG B (2S, 10S)
0.008	74	>75% Grass cover, Good, HSG C (10S)
0.040	80	>75% Grass cover, Good, HSG D (1S)
0.089	30	Meadow, non-grazed, HSG A (7S)
0.214	58	Meadow, non-grazed, HSG B (7S, 9S)
0.031	71	Meadow, non-grazed, HSG C (7S, 9S)
0.052	98	Paved parking, HSG B (1S, 9S, 10S)
0.018	98	Paved parking, HSG C (9S, 10S)
0.072	98	Paved parking, HSG D (1S)
0.306	98	Unconnected pavement, HSG A (2S)
0.048	98	Unconnected pavement, HSG B (2S)
0.046	98	Unconnected roofs, HSG A (2S)
0.022	98	Unconnected roofs, HSG B (2S)
25.092	30	Woods, Good, HSG A (1S, 2S, 3S, 5S, 6S, 7S, 8S)
46.953	55	Woods, Good, HSG B (1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S)
29.098	70	Woods, Good, HSG C (1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S)
3.130	77	Woods, Good, HSG D (2S, 3S, 5S, 6S)
106.696	**54**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
26.814	HSG A	1S, 2S, 3S, 5S, 6S, 7S, 8S
47.483	HSG B	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S
29.156	HSG C	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S
3.243	HSG D	1S, 2S, 3S, 5S, 6S
0.000	Other	
106.696		**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
1.282	0.194	0.008	0.040	0.000	1.525	>75% Grass cover, Good	1S, 2S, 10S
0.089	0.214	0.031	0.000	0.000	0.335	Meadow, non-grazed	7S, 9S
0.000	0.052	0.018	0.072	0.000	0.142	Paved parking	1S, 9S, 10S
0.306	0.048	0.000	0.000	0.000	0.354	Unconnected pavement	2S
0.046	0.022	0.000	0.000	0.000	0.067	Unconnected roofs	2S
25.092	46.953	29.098	3.130	0.000	104.273	Woods, Good	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S
26.814	**47.483**	**29.156**	**3.243**	**0.000**	**106.696**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points x 3
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=321,010 sf 1.12% Impervious Runoff Depth>1.74"
Flow Length=663' Tc=24.8 min CN=59 Runoff=8.59 cfs 1.068 af

Subcatchment 2S: Subcatchment #2 Runoff Area=2,247,467 sf 0.82% Impervious Runoff Depth>1.25"
Flow Length=2,208' Tc=87.6 min CN=53 Runoff=20.12 cfs 5.376 af

Subcatchment 3S: Subcatchment #3 Runoff Area=433,657 sf 0.00% Impervious Runoff Depth>0.67"
Flow Length=753' Tc=46.0 min CN=44 Runoff=2.26 cfs 0.557 af

Subcatchment 4S: Subcatchment #4 Runoff Area=464,510 sf 0.00% Impervious Runoff Depth>2.49"
Flow Length=1,007' Tc=36.5 min CN=68 Runoff=15.93 cfs 2.215 af

Subcatchment 5S: Subcatchment #5 Runoff Area=502,048 sf 0.00% Impervious Runoff Depth>1.43"
Flow Length=1,017' Tc=26.5 min CN=55 Runoff=10.18 cfs 1.370 af

Subcatchment 6S: Subcatchment #6 Runoff Area=291,221 sf 0.00% Impervious Runoff Depth>0.56"
Flow Length=888' Tc=44.0 min CN=42 Runoff=1.13 cfs 0.310 af

Subcatchment 7S: Subcatchment #7 Runoff Area=44,849 sf 0.00% Impervious Runoff Depth>0.30"
Flow Length=424' Tc=25.7 min CN=37 Runoff=0.07 cfs 0.026 af

Subcatchment 8S: Subcatchment #8 Runoff Area=241,146 sf 0.00% Impervious Runoff Depth>1.66"
Flow Length=792' Tc=31.1 min CN=58 Runoff=5.53 cfs 0.764 af

Subcatchment 9S: Subcatchment #9 Runoff Area=85,918 sf 1.13% Impervious Runoff Depth>1.66"
Flow Length=417' Tc=21.9 min CN=58 Runoff=2.28 cfs 0.273 af

Subcatchment 10S: Subcatchment #10 Runoff Area=15,853 sf 10.22% Impervious Runoff Depth>1.82"
Flow Length=226' Tc=16.6 min CN=60 Runoff=0.53 cfs 0.055 af

Reach 1R: Reach #1 Avg. Flow Depth=0.14' Max Vel=0.43 fps Inflow=3.96 cfs 0.781 af
n=0.080 L=2,168.8' S=0.0127 '/' Capacity=25.14 cfs Outflow=1.56 cfs 0.723 af

Reach 100R: Final Reach #100 Inflow=0.53 cfs 0.055 af
Outflow=0.53 cfs 0.055 af

Reach 200R: Final Reach #200 Inflow=21.52 cfs 6.099 af
Outflow=21.52 cfs 6.099 af

Reach 300R: Final Reach #300 Inflow=2.26 cfs 0.557 af
Outflow=2.26 cfs 0.557 af

Reach 400R: Final Reach #400 Inflow=15.93 cfs 2.215 af
Outflow=15.93 cfs 2.215 af

Reach 500R: Final Reach #500 Inflow=10.18 cfs 1.370 af
Outflow=10.18 cfs 1.370 af

Reach 600R: Final Reach #600 Inflow=1.13 cfs 0.310 af
Outflow=1.13 cfs 0.310 af

Reach 700R: Final Reach #700 Inflow=0.07 cfs 0.026 af
Outflow=0.07 cfs 0.026 af

Reach 800R: Final Reach #800 Inflow=5.53 cfs 0.764 af
Outflow=5.53 cfs 0.764 af

Reach 900R: Final Reach #900 Inflow=2.28 cfs 0.273 af
Outflow=2.28 cfs 0.273 af

Pond 1P: Pond #1 Peak Elev=183.73' Storage=15,315 cf Inflow=8.59 cfs 1.068 af
Discarded=0.02 cfs 0.015 af Primary=3.96 cfs 0.781 af Outflow=3.98 cfs 0.796 af

Total Runoff Area = 106.696 ac Runoff Volume = 12.014 af Average Runoff Depth = 1.35"
99.47% Pervious = 106.133 ac 0.53% Impervious = 0.563 ac

Summary for Subcatchment 1S: Subcatchment #1

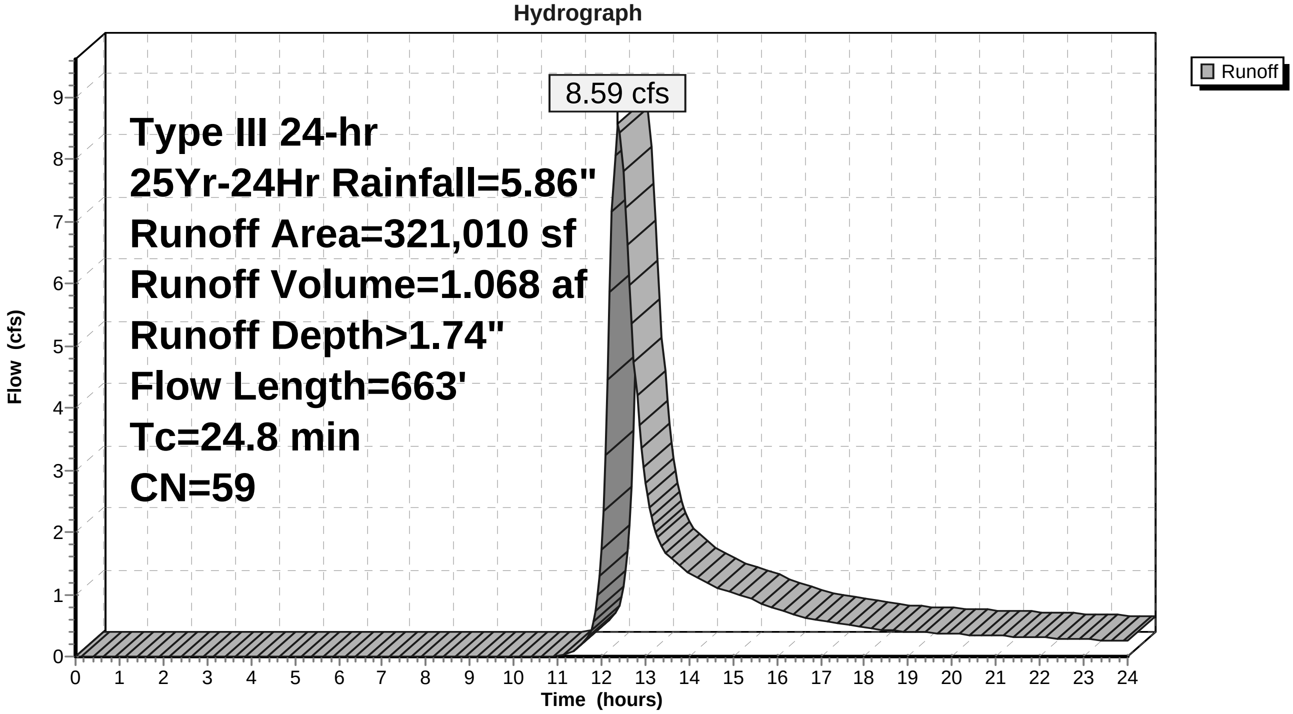
Runoff = 8.59 cfs @ 12.38 hrs, Volume= 1.068 af, Depth> 1.74"

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=5.86"

Area (sf)	CN	Description
435	98	Paved parking, HSG B
3,156	98	Paved parking, HSG D
51,043	30	Woods, Good, HSG A
111,534	55	Woods, Good, HSG B
153,082	70	Woods, Good, HSG C
1,760	80	>75% Grass cover, Good, HSG D
321,010	59	Weighted Average
317,419		98.88% Pervious Area
3,591		1.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0300	0.09		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
1.1	129	0.1512	1.94		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
2.4	219	0.0913	1.51		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
1.6	112	0.0538	1.16		**Shallow Concentrated Flow, Segment #4** Woodland Kv= 5.0 fps
0.3	47	0.3389	2.91		**Shallow Concentrated Flow, Segment #5** Woodland Kv= 5.0 fps
0.7	56	0.0710	1.33		**Shallow Concentrated Flow, Segment #6** Woodland Kv= 5.0 fps
24.8	663	Total			

Subcatchment 1S: Subcatchment #1



Summary for Subcatchment 2S: Subcatchment #2

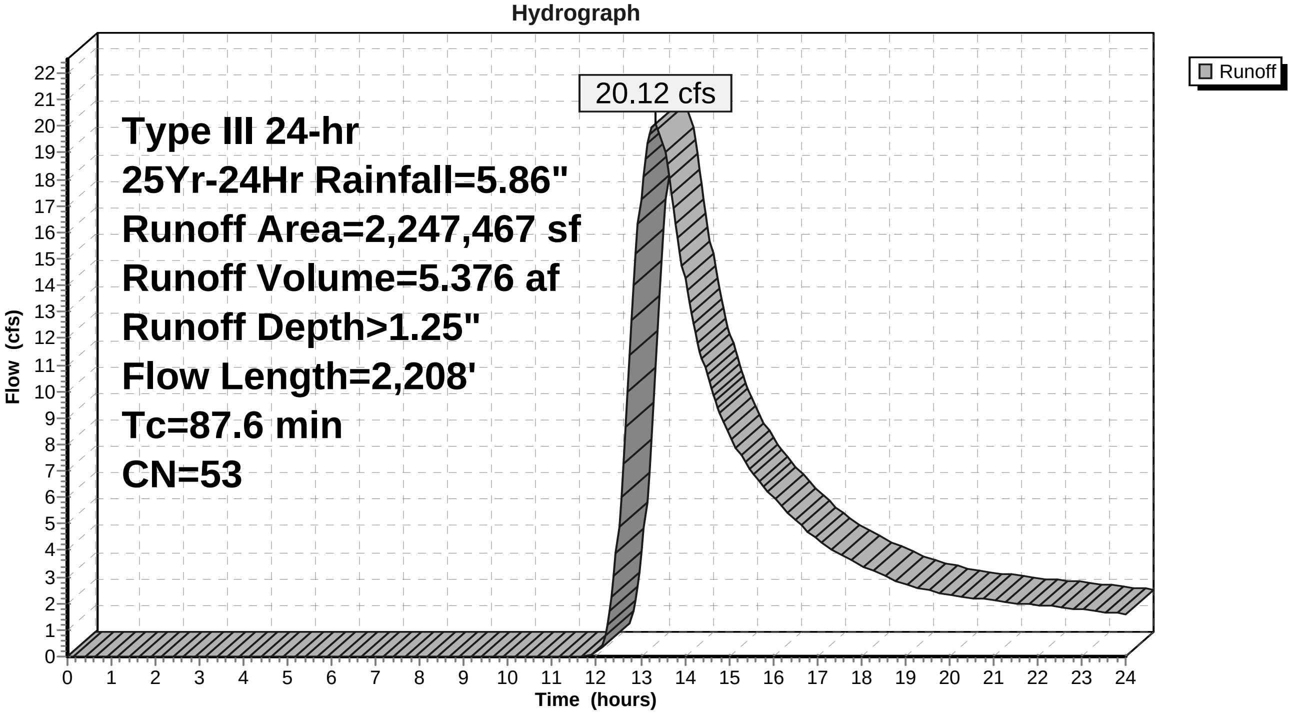
Runoff = 20.12 cfs @ 13.34 hrs, Volume= 5.376 af, Depth> 1.25"

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=5.86"

Area (sf)	CN	Description
1,982	98	Unconnected roofs, HSG A
55,833	39	>75% Grass cover, Good, HSG A
13,331	98	Unconnected pavement, HSG A
580,879	30	Woods, Good, HSG A
952	98	Unconnected roofs, HSG B
7,608	61	>75% Grass cover, Good, HSG B
2,097	98	Unconnected pavement, HSG B
925,073	55	Woods, Good, HSG B
546,670	70	Woods, Good, HSG C
113,042	77	Woods, Good, HSG D
2,247,467	53	Weighted Average
2,229,105		99.18% Pervious Area
18,362		0.82% Impervious Area
18,362		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.0	100	0.0200	0.08		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
19.0	506	0.0079	0.44		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
27.4	813	0.0098	0.49		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
8.3	367	0.0218	0.74		**Shallow Concentrated Flow, Segment #4** Woodland Kv= 5.0 fps
10.9	422	0.0166	0.64		**Shallow Concentrated Flow, Segment #5** Woodland Kv= 5.0 fps
87.6	2,208	Total			

Subcatchment 2S: Subcatchment #2



Summary for Subcatchment 3S: Subcatchment #3

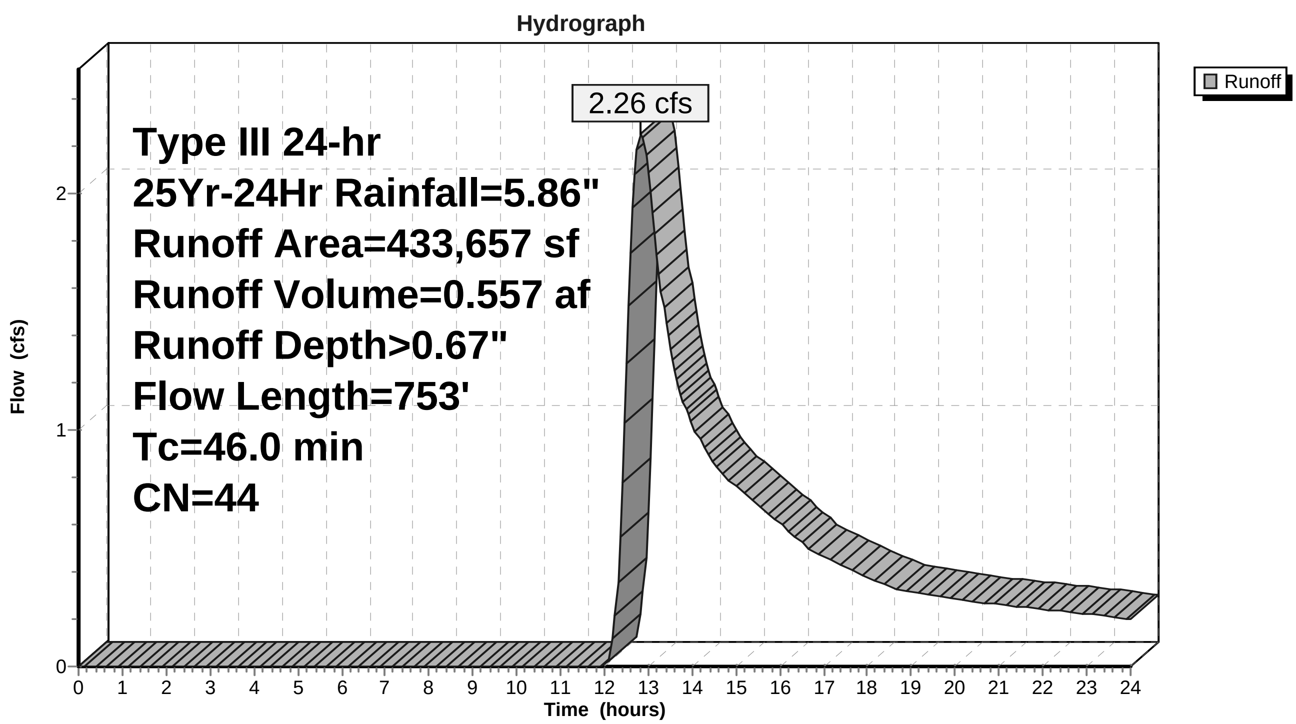
Runoff = 2.26 cfs @ 12.84 hrs, Volume= 0.557 af, Depth> 0.67"

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=5.86"

Area (sf)	CN	Description
220,867	30	Woods, Good, HSG A
175,802	55	Woods, Good, HSG B
35,137	70	Woods, Good, HSG C
1,851	77	Woods, Good, HSG D
433,657	44	Weighted Average
433,657		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.6	100	0.0150	0.07		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
2.3	106	0.0236	0.77		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
19.1	547	0.0091	0.48		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
46.0	753	Total			

Subcatchment 3S: Subcatchment #3



Summary for Subcatchment 4S: Subcatchment #4

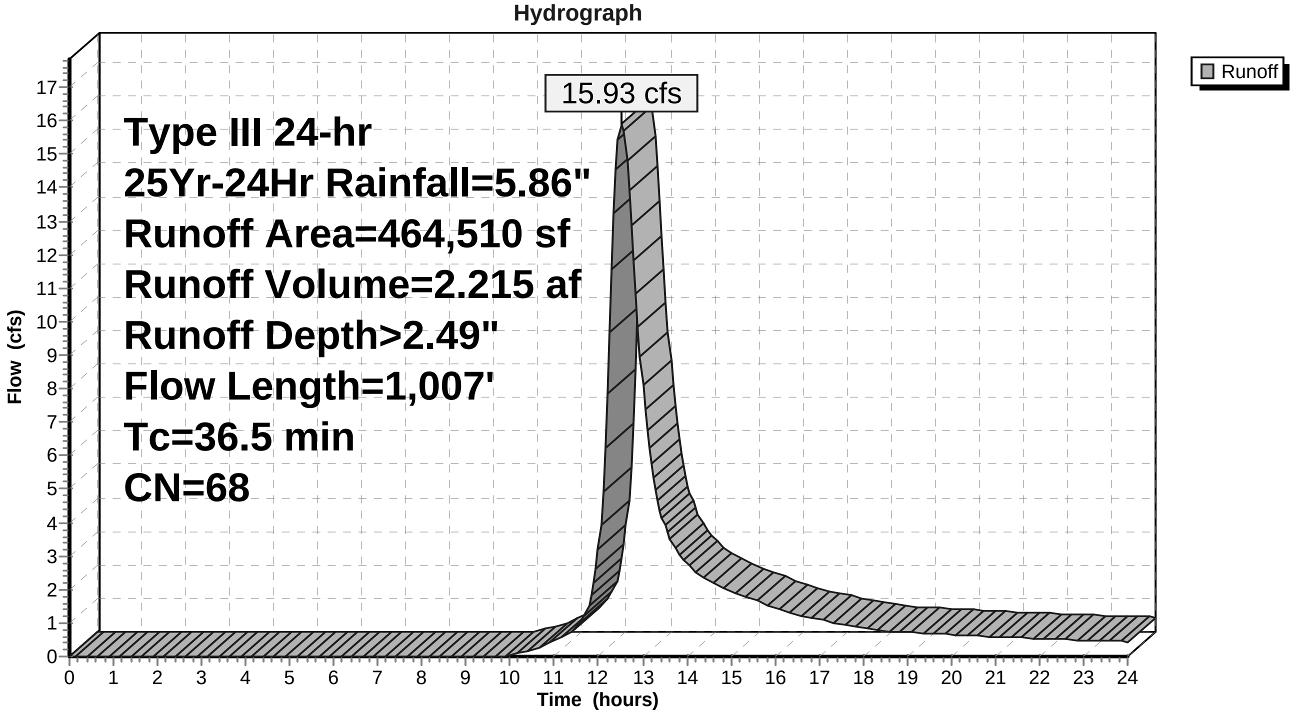
Runoff = 15.93 cfs @ 12.53 hrs, Volume= 2.215 af, Depth> 2.49"

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=5.86"

Area (sf)	CN	Description
62,739	55	Woods, Good, HSG B
401,771	70	Woods, Good, HSG C
464,510	68	Weighted Average
464,510		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	78	0.1150	0.15		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 3.06"
5.0	23	0.0434	0.08		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 3.06"
1.0	85	0.0823	1.43		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	67	0.1791	2.12		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.7	34	0.0294	0.86		**Shallow Concentrated Flow, 5** Woodland Kv= 5.0 fps
0.4	23	0.0434	1.04		**Shallow Concentrated Flow, 6** Woodland Kv= 5.0 fps
0.8	35	0.0200	0.71		**Shallow Concentrated Flow, 7** Woodland Kv= 5.0 fps
0.2	23	0.1363	1.85		**Shallow Concentrated Flow, 8** Woodland Kv= 5.0 fps
0.5	52	0.1176	1.71		**Shallow Concentrated Flow, 9** Woodland Kv= 5.0 fps
7.5	159	0.0050	0.35		**Shallow Concentrated Flow, 10** Woodland Kv= 5.0 fps
1.6	79	0.0256	0.80		**Shallow Concentrated Flow, 11** Woodland Kv= 5.0 fps
7.9	224	0.0089	0.47		**Shallow Concentrated Flow, 12** Woodland Kv= 5.0 fps
1.5	125	0.0725	1.35		**Shallow Concentrated Flow, 13** Woodland Kv= 5.0 fps
36.5	1,007	Total			

Subcatchment 4S: Subcatchment #4



Summary for Subcatchment 5S: Subcatchment #5

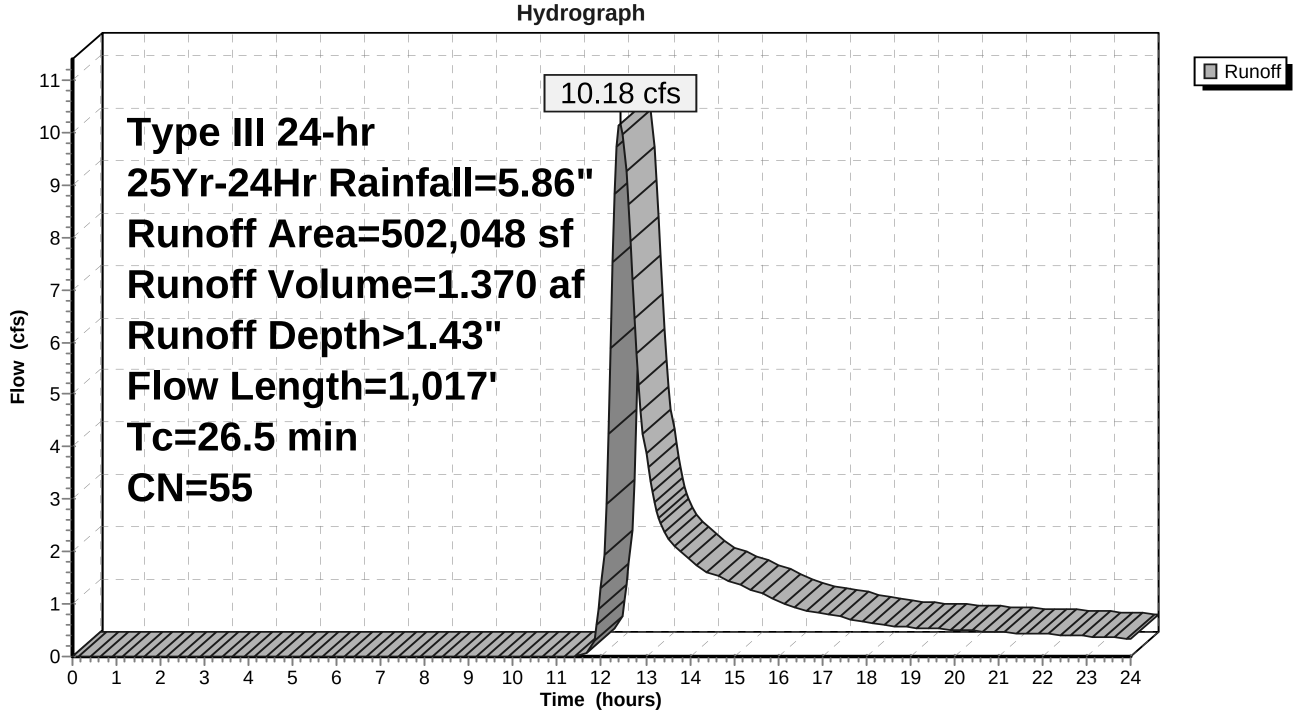
Runoff = 10.18 cfs @ 12.43 hrs, Volume= 1.370 af, Depth> 1.43"

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=5.86"

Area (sf)	CN	Description
19,851	30	Woods, Good, HSG A
439,083	55	Woods, Good, HSG B
35,954	70	Woods, Good, HSG C
7,160	77	Woods, Good, HSG D
502,048	55	Weighted Average
502,048		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.6	100	0.0400	0.10		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
2.4	239	0.1129	1.68		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
1.0	164	0.2808	2.65		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
3.0	242	0.0743	1.36		**Shallow Concentrated Flow, Segment #4** Woodland Kv= 5.0 fps
0.3	48	0.2496	2.50		**Shallow Concentrated Flow, Segment #5** Woodland Kv= 5.0 fps
3.2	224	0.0535	1.16		**Shallow Concentrated Flow, Segment #6** Woodland Kv= 5.0 fps
26.5	1,017	Total			

Subcatchment 5S: Subcatchment #5



Summary for Subcatchment 6S: Subcatchment #6

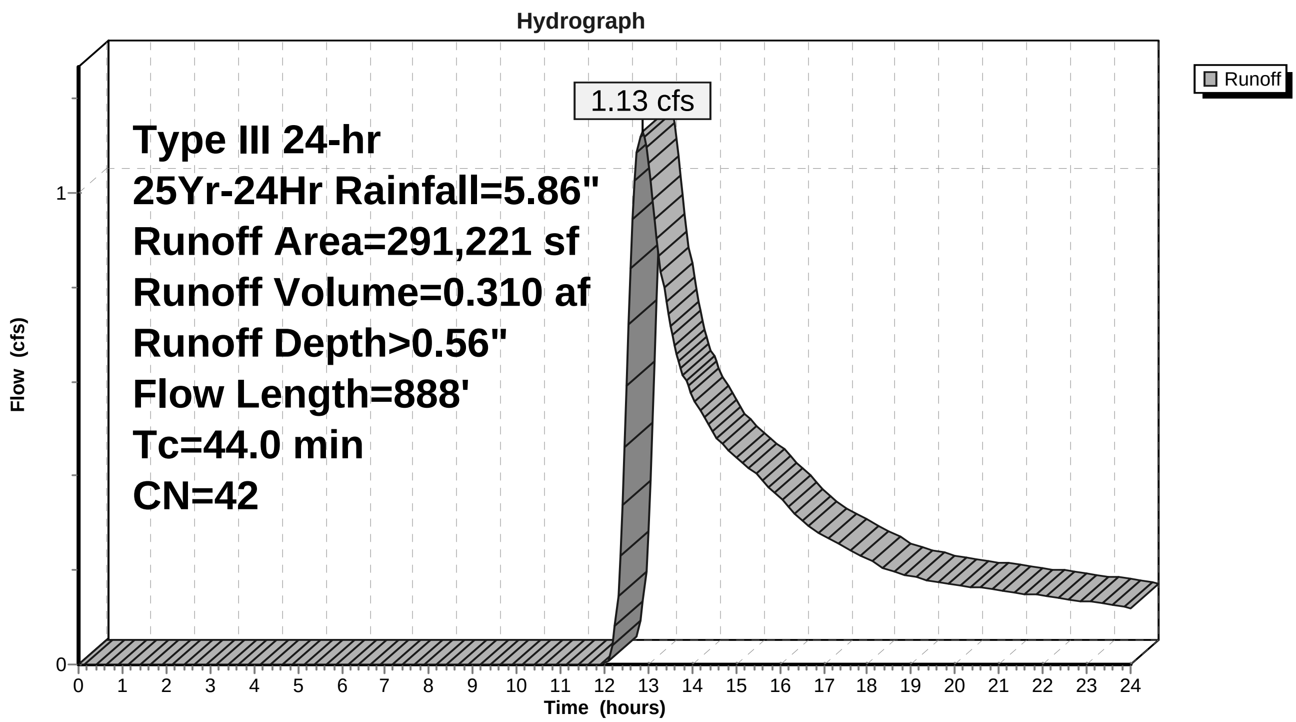
Runoff = 1.13 cfs @ 12.85 hrs, Volume= 0.310 af, Depth> 0.56"

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=5.86"

Area (sf)	CN	Description
179,805	30	Woods, Good, HSG A
78,325	55	Woods, Good, HSG B
18,788	70	Woods, Good, HSG C
14,303	77	Woods, Good, HSG D
291,221	42	Weighted Average
291,221		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	100	0.0825	0.13		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
1.8	119	0.0482	1.10		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
1.6	149	0.1008	1.59		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
28.1	520	0.0038	0.31		**Shallow Concentrated Flow, Segment #4** Woodland Kv= 5.0 fps
44.0	888	Total			

Subcatchment 6S: Subcatchment #6



Summary for Subcatchment 7S: Subcatchment #7

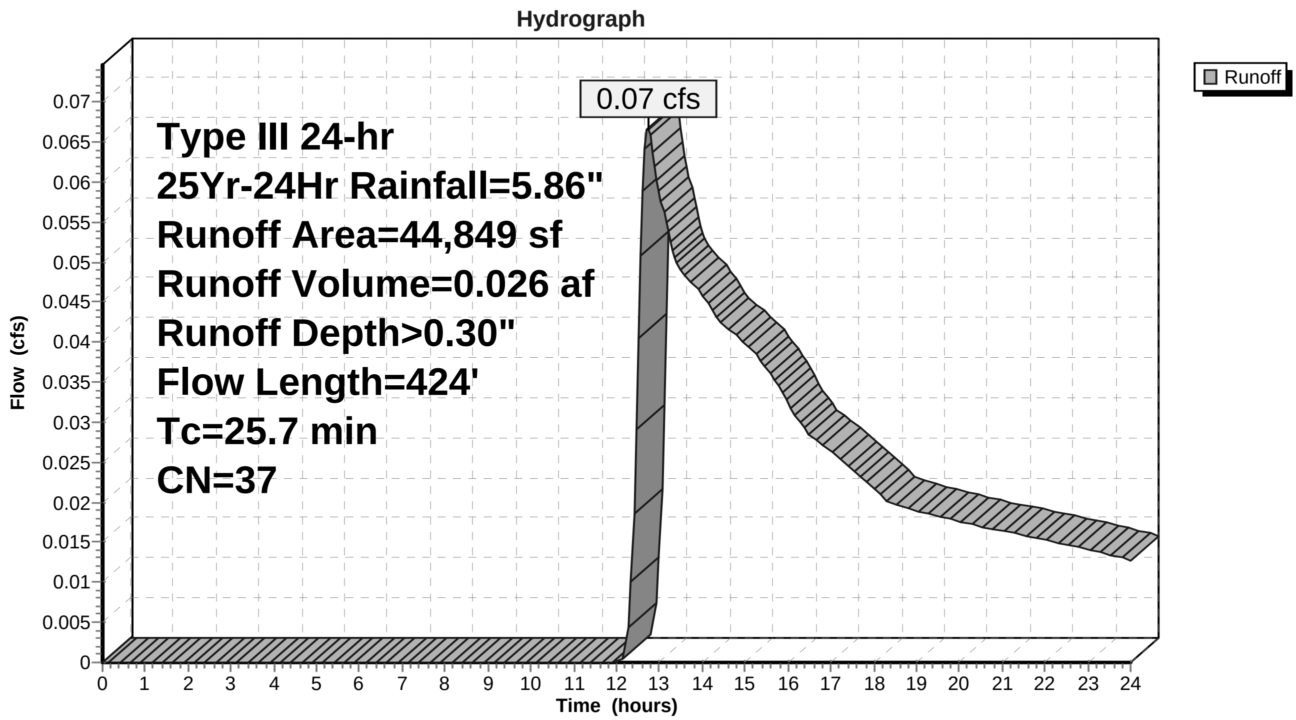
Runoff = 0.07 cfs @ 12.73 hrs, Volume= 0.026 af, Depth> 0.30"

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=5.86"

Area (sf)	CN	Description
30,264	30	Woods, Good, HSG A
6,501	55	Woods, Good, HSG B
1,500	70	Woods, Good, HSG C
3,889	30	Meadow, non-grazed, HSG A
1,549	58	Meadow, non-grazed, HSG B
1,146	71	Meadow, non-grazed, HSG C
44,849	37	Weighted Average
44,849		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	100	0.0350	0.09		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
7.3	256	0.0137	0.59		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
0.8	68	0.0737	1.36		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
25.7	424	Total			

Subcatchment 7S: Subcatchment #7



Summary for Subcatchment 8S: Subcatchment #8

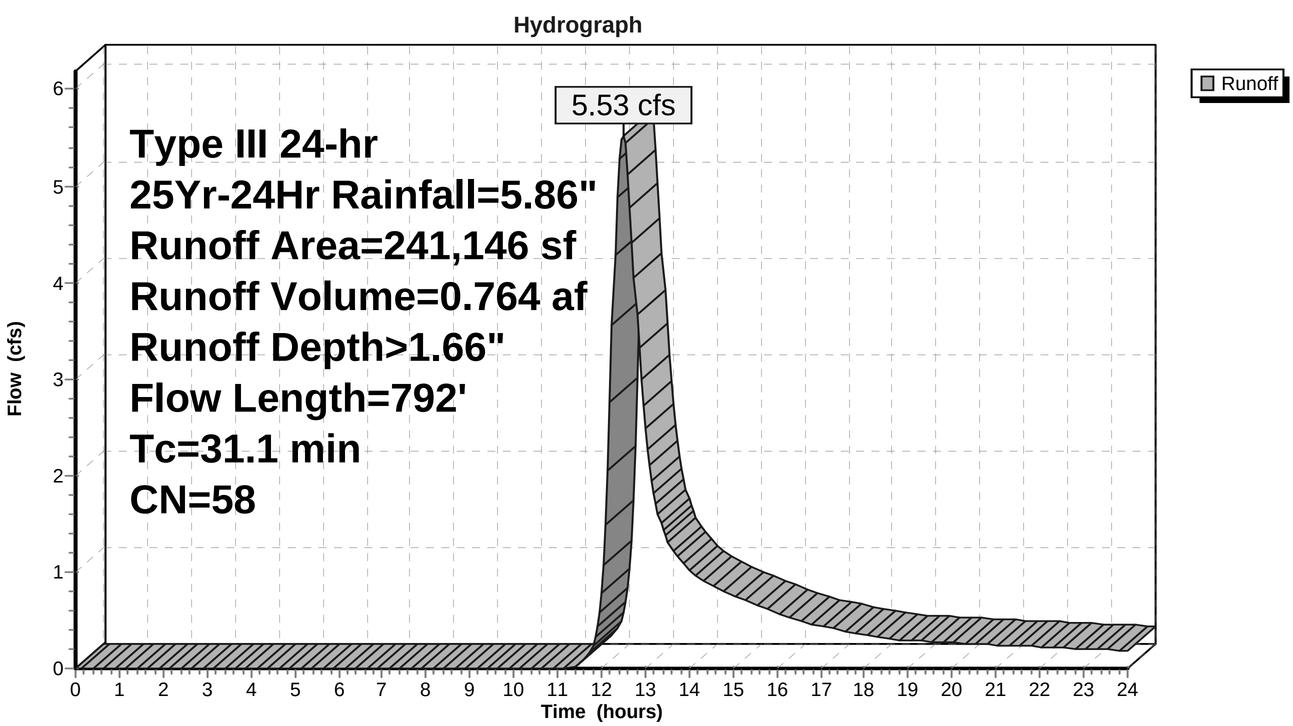
Runoff = 5.53 cfs @ 12.48 hrs, Volume= 0.764 af, Depth> 1.66"

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=5.86"

Area (sf)	CN	Description
10,293	30	Woods, Good, HSG A
170,503	55	Woods, Good, HSG B
60,350	70	Woods, Good, HSG C
241,146	58	Weighted Average
241,146		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	100	0.0500	0.11		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
14.0	562	0.0178	0.67		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
1.9	130	0.0538	1.16		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
31.1	792	Total			

Subcatchment 8S: Subcatchment #8



Summary for Subcatchment 9S: Subcatchment #9

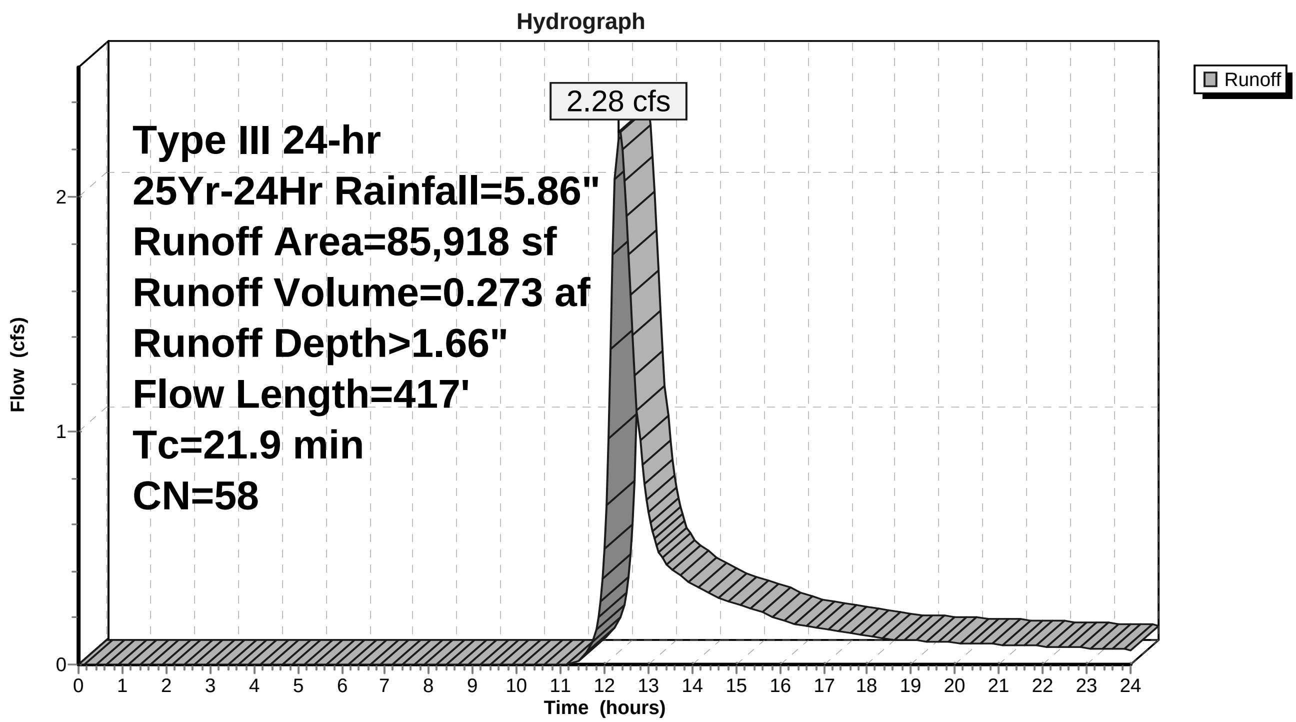
Runoff = 2.28 cfs @ 12.34 hrs, Volume= 0.273 af, Depth> 1.66"

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=5.86"

Area (sf)	CN	Description
678	98	Paved parking, HSG B
290	98	Paved parking, HSG C
62,963	55	Woods, Good, HSG B
7,784	58	Meadow, non-grazed, HSG B
214	71	Meadow, non-grazed, HSG C
13,989	70	Woods, Good, HSG C
85,918	58	Weighted Average
84,950		98.87% Pervious Area
968		1.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	100	0.0500	0.11		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
6.7	317	0.0252	0.79		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
21.9	417	Total			

Subcatchment 9S: Subcatchment #9



Summary for Subcatchment 10S: Subcatchment #10

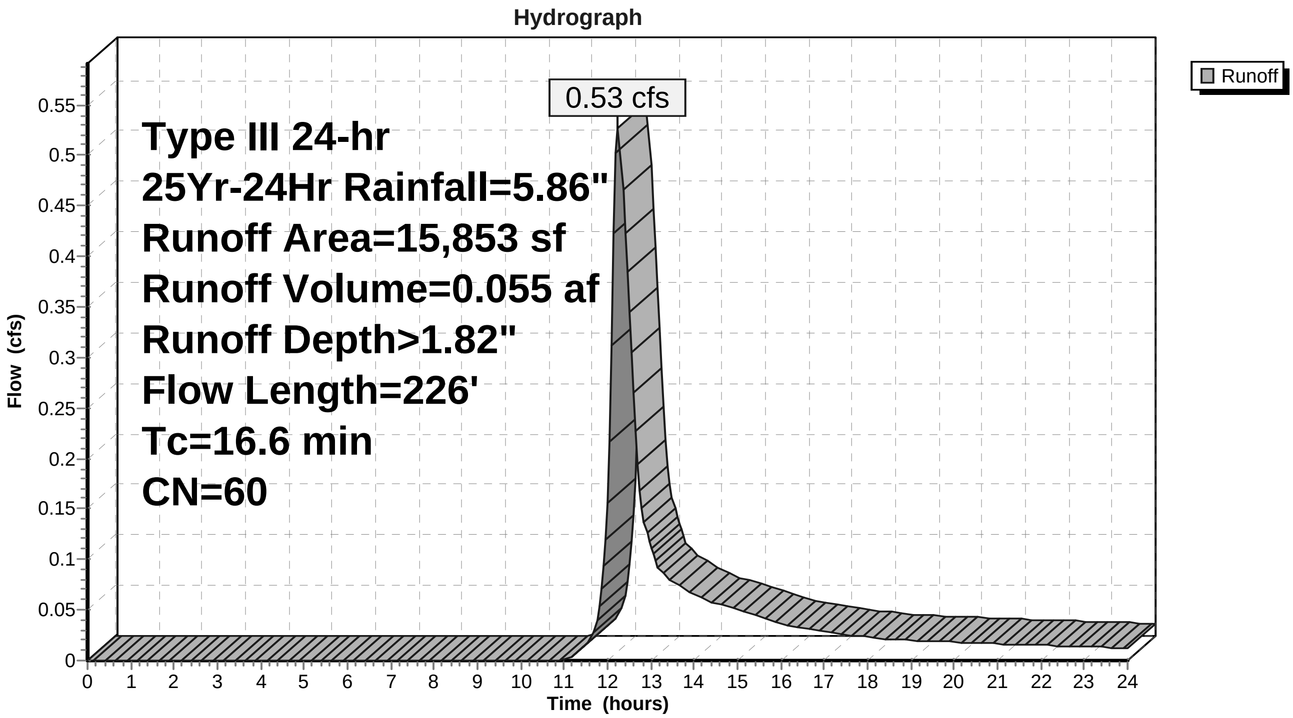
Runoff = 0.53 cfs @ 12.25 hrs, Volume= 0.055 af, Depth> 1.82"

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=5.86"

Area (sf)	CN	Description
1,134	98	Paved parking, HSG B
486	98	Paved parking, HSG C
12,737	55	Woods, Good, HSG B
275	70	Woods, Good, HSG C
855	61	>75% Grass cover, Good, HSG B
366	74	>75% Grass cover, Good, HSG C
15,853	60	Weighted Average
14,233		89.78% Pervious Area
1,620		10.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	80	0.0563	0.11		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
2.4	20	0.1990	0.14		**Sheet Flow, Segment #2** Woods: Light underbrush n= 0.400 P2= 3.06"
2.1	126	0.0398	1.00		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
16.6	226	Total			

Subcatchment 10S: Subcatchment #10



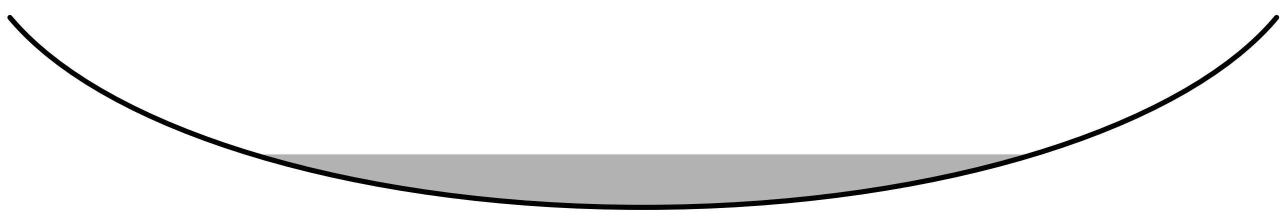
Summary for Reach 1R: Reach #1

Inflow Area = 7.369 ac, 1.12% Impervious, Inflow Depth > 1.27" for 25Yr-24Hr event
Inflow = 3.96 cfs @ 12.79 hrs, Volume= 0.781 af
Outflow = 1.56 cfs @ 13.83 hrs, Volume= 0.723 af, Atten= 61%, Lag= 62.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.43 fps, Min. Travel Time= 84.6 min
Avg. Velocity = 0.33 fps, Avg. Travel Time= 109.9 min

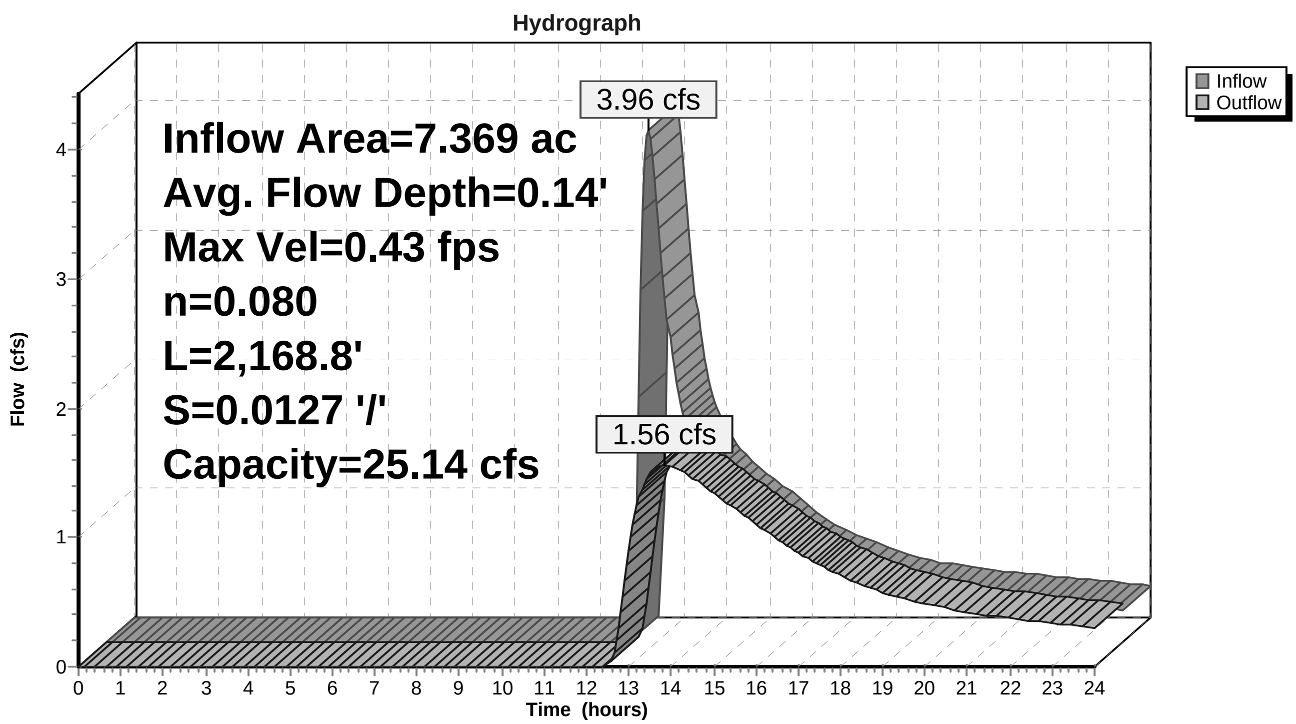
Peak Storage= 7,908 cf @ 13.83 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 0.50' Flow Area= 25.0 sf, Capacity= 25.14 cfs

75.00' x 0.50' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 2,168.8' Slope= 0.0127 '/'
Inlet Invert= 183.50', Outlet Invert= 156.00'



‡

Reach 1R: Reach #1



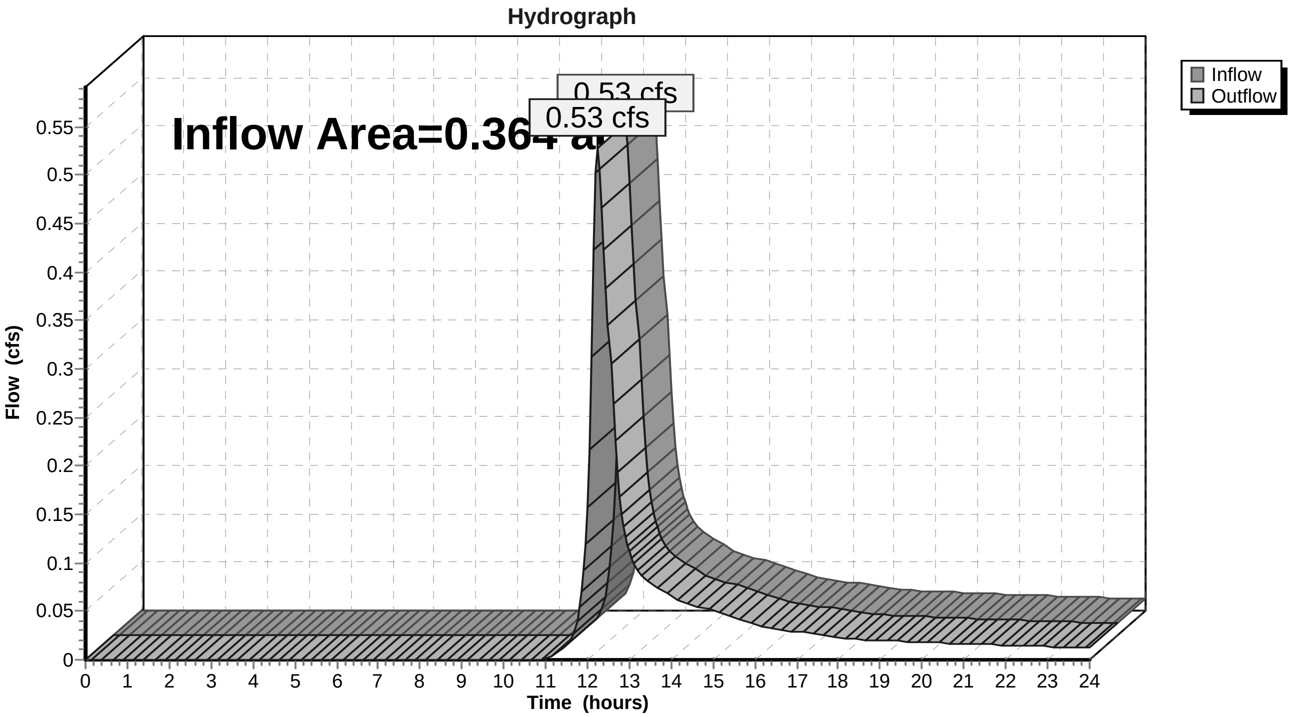
Summary for Reach 100R: Final Reach #100

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

Inflow Area = 0.364 ac, 10.22% Impervious, Inflow Depth > 1.82" for 25Yr-24Hr event
Inflow = 0.53 cfs @ 12.25 hrs, Volume= 0.055 af
Outflow = 0.53 cfs @ 12.25 hrs, Volume= 0.055 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 100R: Final Reach #100



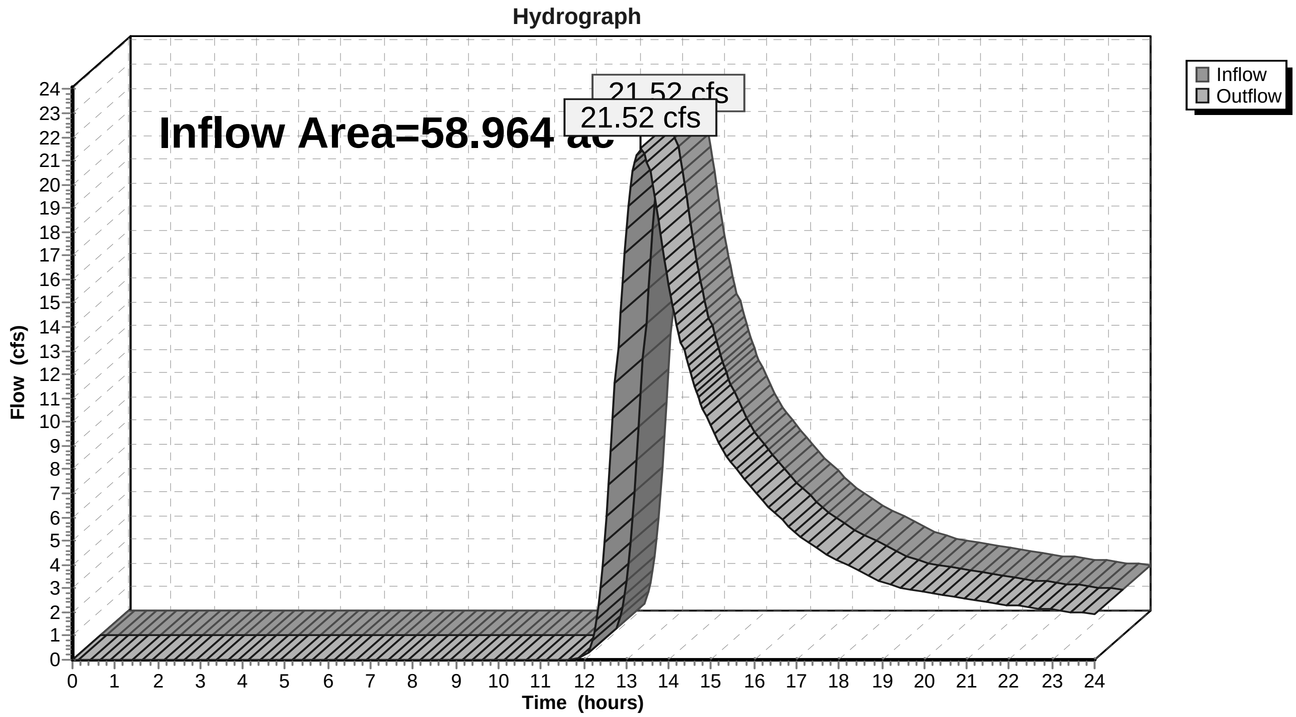
Summary for Reach 200R: Final Reach #200

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

Inflow Area =	58.964 ac,	0.85% Impervious, Inflow Depth > 1.24"	for 25Yr-24Hr event
Inflow =	21.52 cfs @	13.35 hrs, Volume=	6.099 af
Outflow =	21.52 cfs @	13.35 hrs, Volume=	6.099 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 200R: Final Reach #200



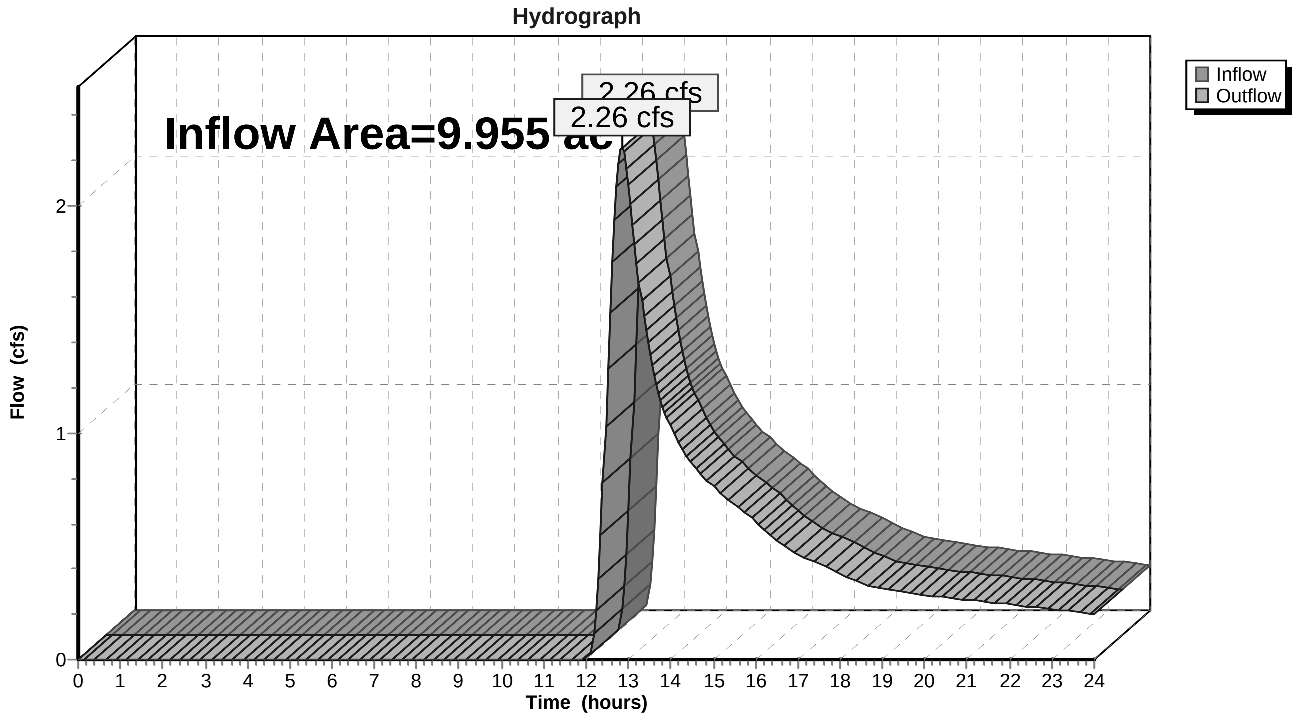
Summary for Reach 300R: Final Reach #300

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

Inflow Area = 9.955 ac, 0.00% Impervious, Inflow Depth > 0.67" for 25Yr-24Hr event
Inflow = 2.26 cfs @ 12.84 hrs, Volume= 0.557 af
Outflow = 2.26 cfs @ 12.84 hrs, Volume= 0.557 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 300R: Final Reach #300



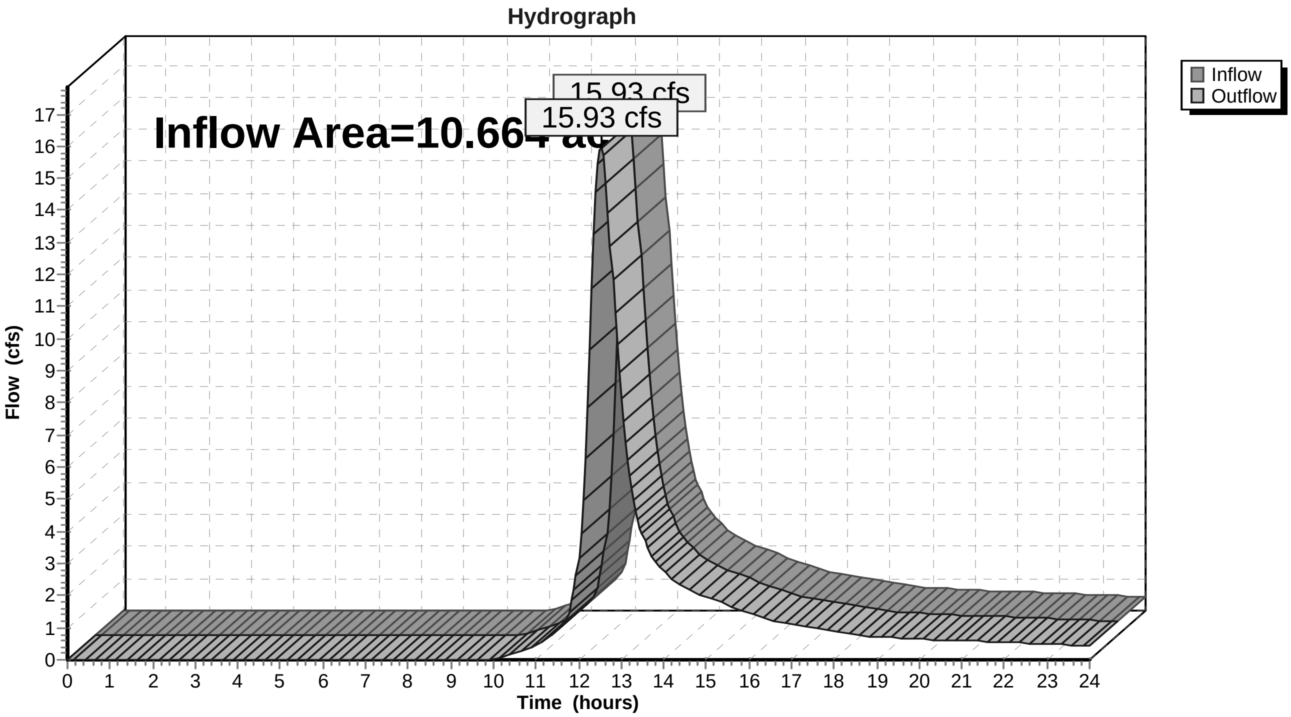
Summary for Reach 400R: Final Reach #400

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

Inflow Area = 10.664 ac, 0.00% Impervious, Inflow Depth > 2.49" for 25Yr-24Hr event
Inflow = 15.93 cfs @ 12.53 hrs, Volume= 2.215 af
Outflow = 15.93 cfs @ 12.53 hrs, Volume= 2.215 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 400R: Final Reach #400



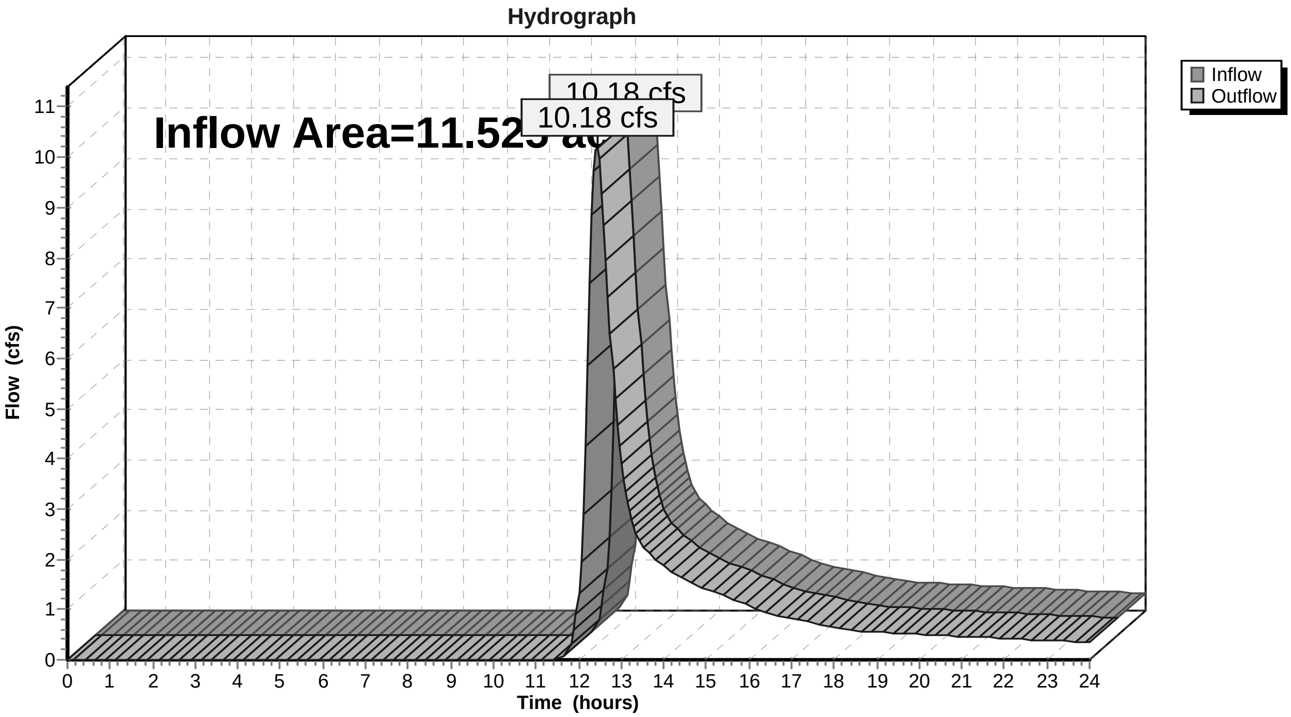
Summary for Reach 500R: Final Reach #500

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

Inflow Area = 11.525 ac, 0.00% Impervious, Inflow Depth > 1.43" for 25Yr-24Hr event
Inflow = 10.18 cfs @ 12.43 hrs, Volume= 1.370 af
Outflow = 10.18 cfs @ 12.43 hrs, Volume= 1.370 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 500R: Final Reach #500



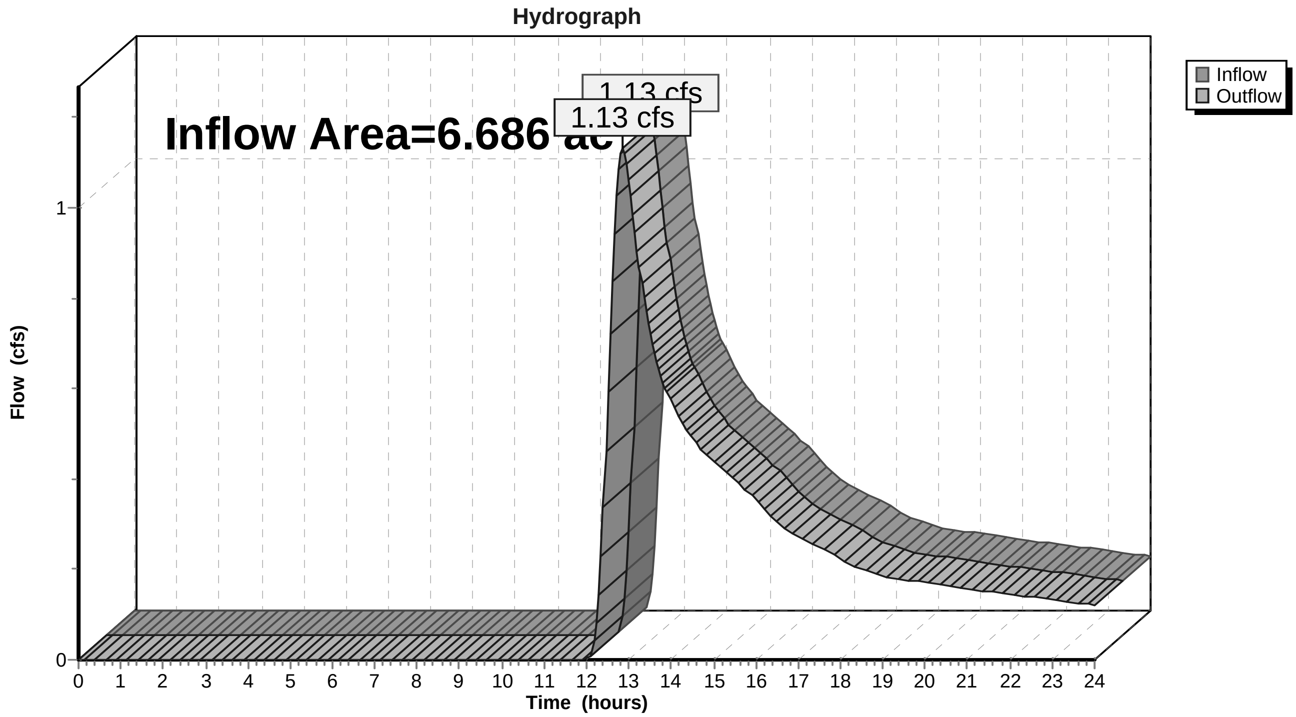
Summary for Reach 600R: Final Reach #600

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

Inflow Area =	6.686 ac,	0.00% Impervious,	Inflow Depth > 0.56"	for 25Yr-24Hr event	
Inflow =	1.13 cfs @	12.85 hrs,	Volume=	0.310 af	
Outflow =	1.13 cfs @	12.85 hrs,	Volume=	0.310 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 600R: Final Reach #600



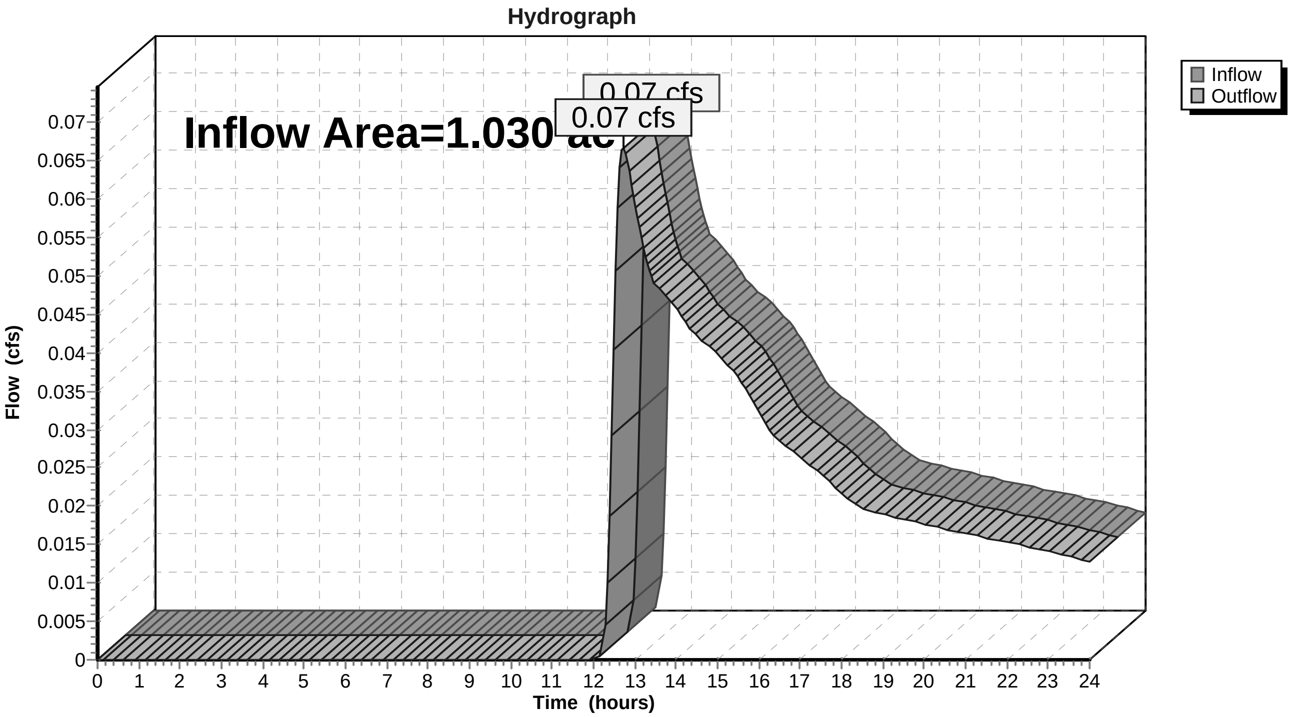
Summary for Reach 700R: Final Reach #700

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

Inflow Area = 1.030 ac, 0.00% Impervious, Inflow Depth > 0.30" for 25Yr-24Hr event
Inflow = 0.07 cfs @ 12.73 hrs, Volume= 0.026 af
Outflow = 0.07 cfs @ 12.73 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 700R: Final Reach #700



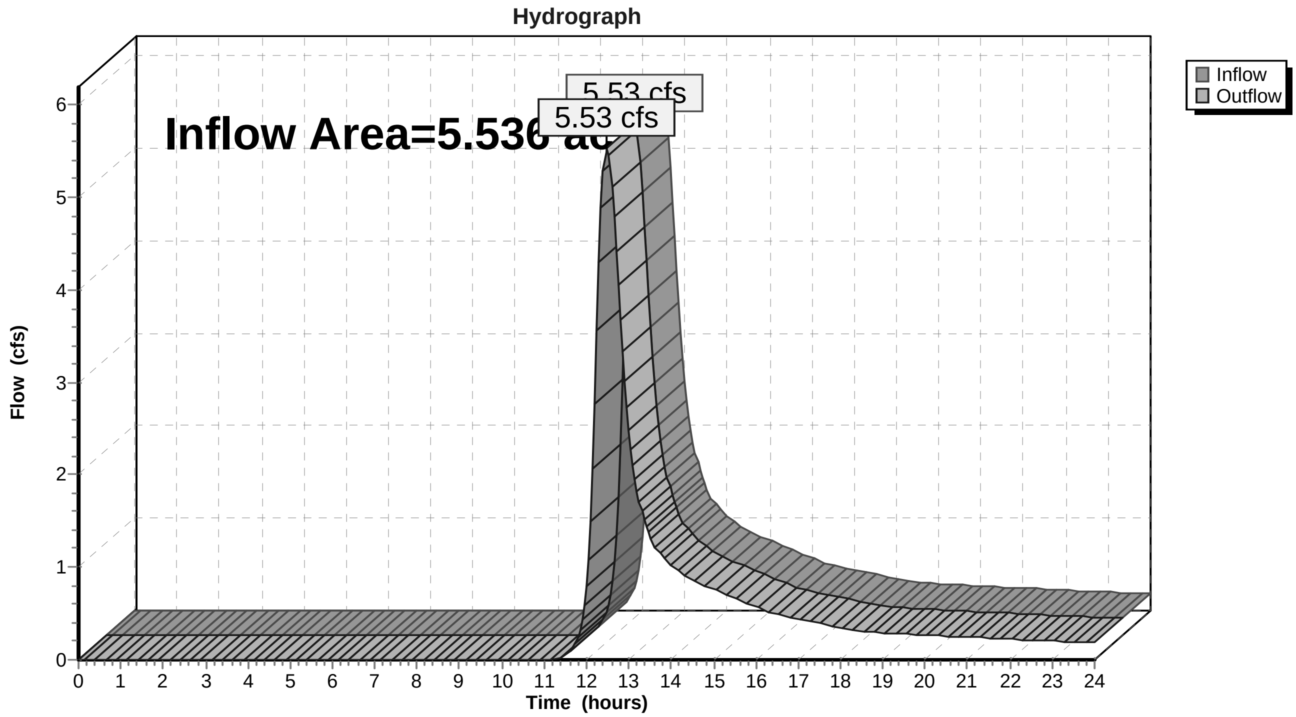
Summary for Reach 800R: Final Reach #800

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

Inflow Area =	5.536 ac,	0.00% Impervious,	Inflow Depth > 1.66"	for 25Yr-24Hr event
Inflow =	5.53 cfs @	12.48 hrs, Volume=	0.764 af	
Outflow =	5.53 cfs @	12.48 hrs, Volume=	0.764 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 800R: Final Reach #800



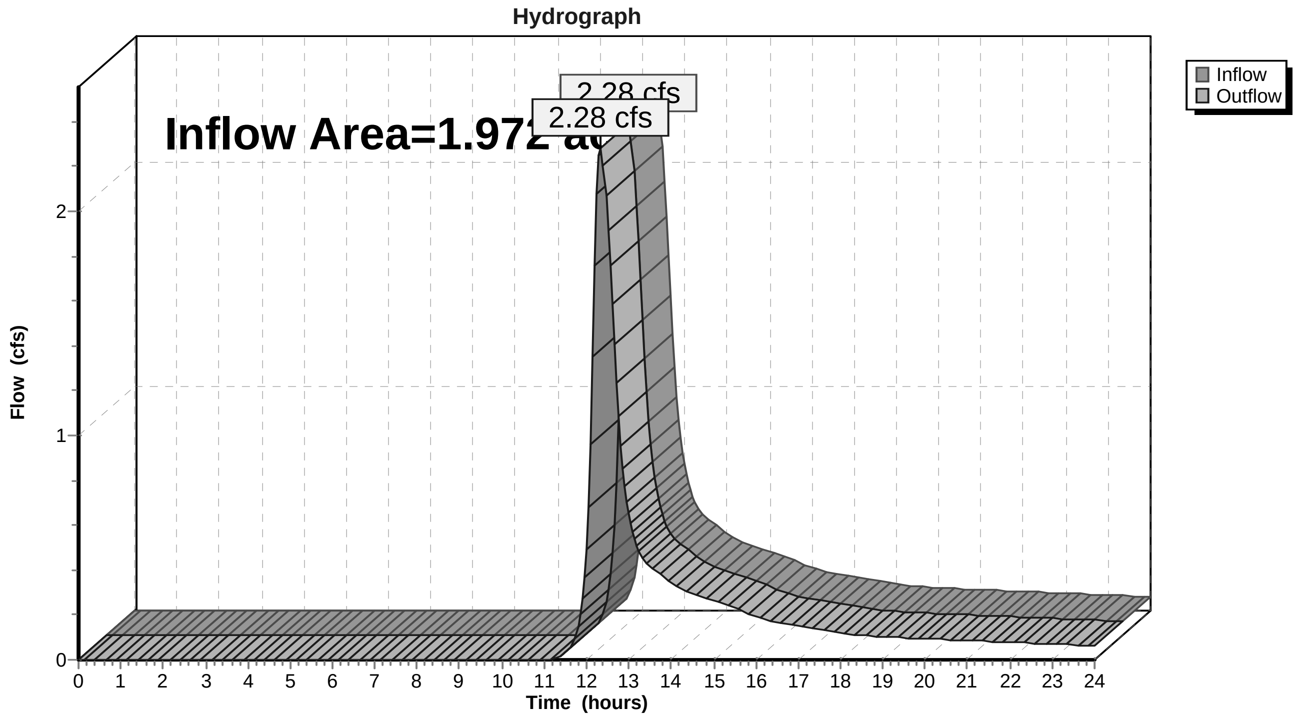
Summary for Reach 900R: Final Reach #900

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

Inflow Area =	1.972 ac,	1.13% Impervious,	Inflow Depth > 1.66"	for 25Yr-24Hr event
Inflow =	2.28 cfs @	12.34 hrs, Volume=	0.273 af	
Outflow =	2.28 cfs @	12.34 hrs, Volume=	0.273 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 900R: Final Reach #900



Summary for Pond 1P: Pond #1

Inflow Area = 7.369 ac, 1.12% Impervious, Inflow Depth > 1.74" for 25Yr-24Hr event
Inflow = 8.59 cfs @ 12.38 hrs, Volume= 1.068 af
Outflow = 3.98 cfs @ 12.79 hrs, Volume= 0.796 af, Atten= 54%, Lag= 24.7 min
Discarded = 0.02 cfs @ 12.83 hrs, Volume= 0.015 af
Primary = 3.96 cfs @ 12.79 hrs, Volume= 0.781 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 183.73' @ 12.83 hrs Surf.Area= 23,487 sf Storage= 15,315 cf

Plug-Flow detention time= 161.7 min calculated for 0.796 af (75% of inflow)
Center-of-Mass det. time= 68.6 min (949.4 - 880.7)

Volume	Invert	Avail.Storage	Storage Description
#1	182.50'	22,461 cf	**Open Water Storage (Irregular)** Listed below (Recalc)

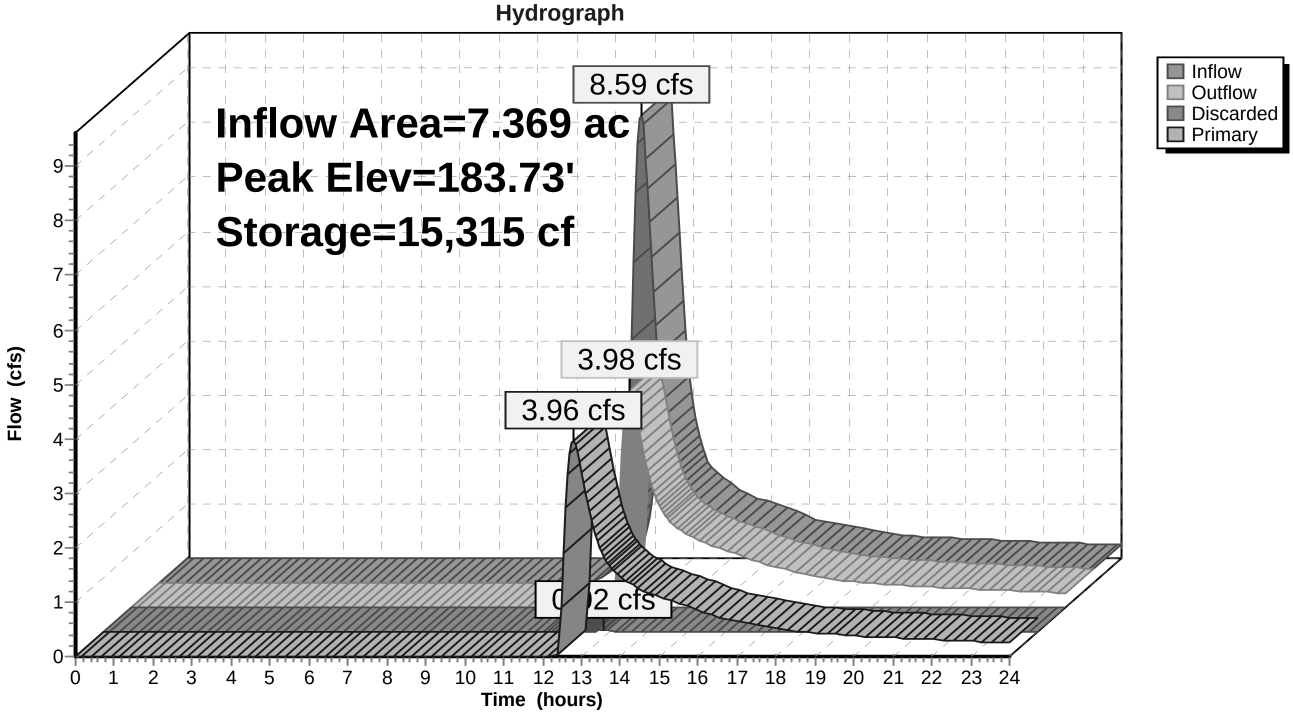
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
182.50	596	133.6	0	0	596
183.00	12,210	625.2	2,584	2,584	30,281
184.00	28,701	903.8	19,877	22,461	64,188

Device	Routing	Invert	Outlet Devices
#1	Primary	183.50'	**15.0' long x 30.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Discarded	182.50'	**0.030 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 12.83 hrs HW=183.73' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=3.96 cfs @ 12.79 hrs HW=183.72' TW=183.57' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 3.96 cfs @ 1.17 fps)

Pond 1P: Pond #1



SITE SPECIFIC SOILS LEGEND

SYMBOL	SLOPES	SOIL TAXONOMIC NAME	HYDROLOGIC SOIL GROUP
12	B,C,D,E	HINCKLEY	A
26	B,D	WINDSOR	A
29	B,C,D,E	WOODBRIDGE	C
40	B,C	CHATFIELD HOLLIS COMPLEX	C/D
43	B,C,D,E	CANTON (VERY STONY)	B
67	B,C,D,E	PAXTON (VERY STONY)	C
68	B,C	SUTTON	B
115	A	SCARBORO	D
118	B,C,D,E	SUDBURY	B
313	B,C,D,E	DEERFIELD	B
400	A,B,C,D	UDORTHENTS (SANDY OR GRAVELLY)	A
496	A	NATCHAUG VARIANT	D
500	B	UDORTHENTS (LOAMY)	C
547	B	WALPOLE (VERY STONY)	C
900	A	ENDOQUENTS (SANDY OR GRAVELLY)	C

SLOPE: A = 0–3% B = 3–8% C = 8–15% D = 15–25% E = 25–50% F = 50%+

DENOMINATOR: /VP = VERY POORLY DRAINED /P = POORLY DRAINED
/SWP = SOMEWHAT POORLY DRAINED /MW = MODERATELY WELL DRAINED

WETLAND NOTE:

WETLANDS WERE DELINEATED BY JOHN P. HAYES, CWS, IN THE SUMMER OF 2022 USING THE FOLLOWING CRITERIA:

1. USACE. 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. 2012. VICKSBURG, MS.

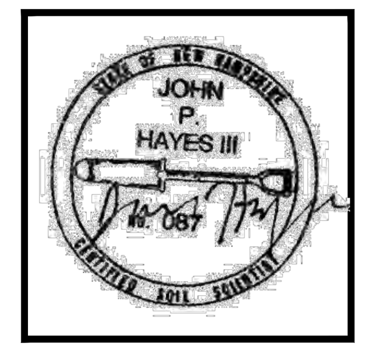
2. USACE. CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. ENVIRONMENTAL LABORATORY. 1987. VICKSBURG, MS.

3. UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE. 2018. FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 8.2. L.M. VASILAS, G.W. HURT, AND J.F. BERKOWITZ (EDS.). USDA, NRCS, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.

4. NEW ENGLAND HYDRIC SOIL TECHNICAL COMMITTEE. FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 4. NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION. 2019. LOWELL, MA.

5. U.S. ARMY CORPS OF ENGINEERS 2019. NATIONAL WETLAND PLANT LIST, VERSION 3.3. HTTP://WETLAND-PLANTS.USACE.ARMY.MIL/

JOHN P. HAYES, CWS



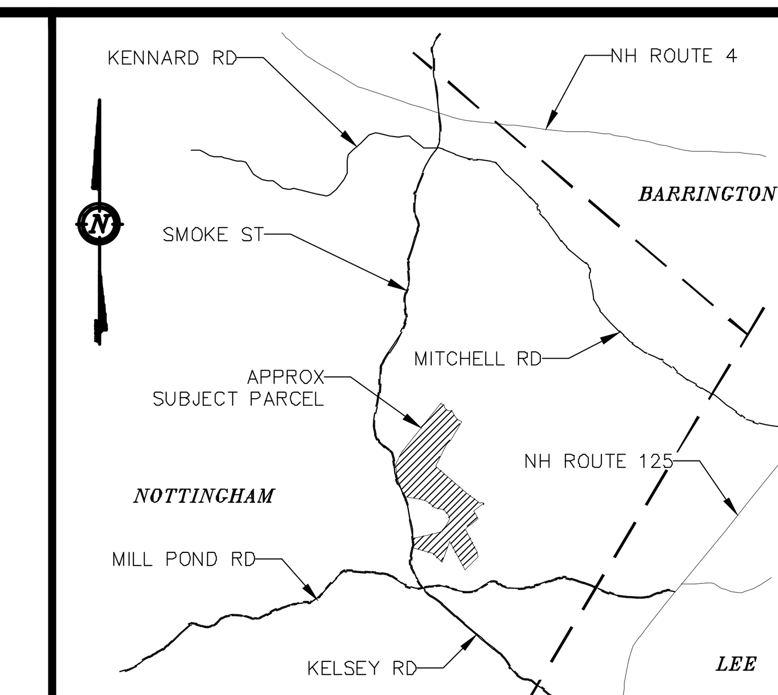
JOHN P. HAYES, CSS

LEGEND:

299	EXISTING CONTOUR MINOR
300	EXISTING CONTOUR MAJOR
	STONE WALL
	WETLAND LINE
	LIMIT OF SITE SPECIFIC SOILS SURVEY
	SOIL LINE
448A	SOIL SERIES
	NRCS SOIL LINE
HfB	NRCS SOIL LABEL
	LIMIT OF WATERSHED
	TIME OF CONCENTRATION PATH
	FLOW REACH
	MATCH LINE
R.C.R.D.	ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP.	TYPICAL
FND	FOUND
	DRAIN MANHOLE W/STRUCTURE
	CATCH BASIN W/ STRUCTURE
	STORMWATER BMP OUTLET STRUCTURE
D	DRAIN CULVERT W/ FLARED END SECTION (F.E.S.)
U.D	UNDERDRAIN

SYMBOLS LEGEND:

#	SUBCATCHMENT AREA SYMBOL
#	FLOW REACH SYMBOL
#	POND DEVICE SYMBOL
Tc. / #	TIME OF CONCENTRATION SEGMENT



LOCATION PLAN
NOTTINGHAM, NH
NOT TO SCALE

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

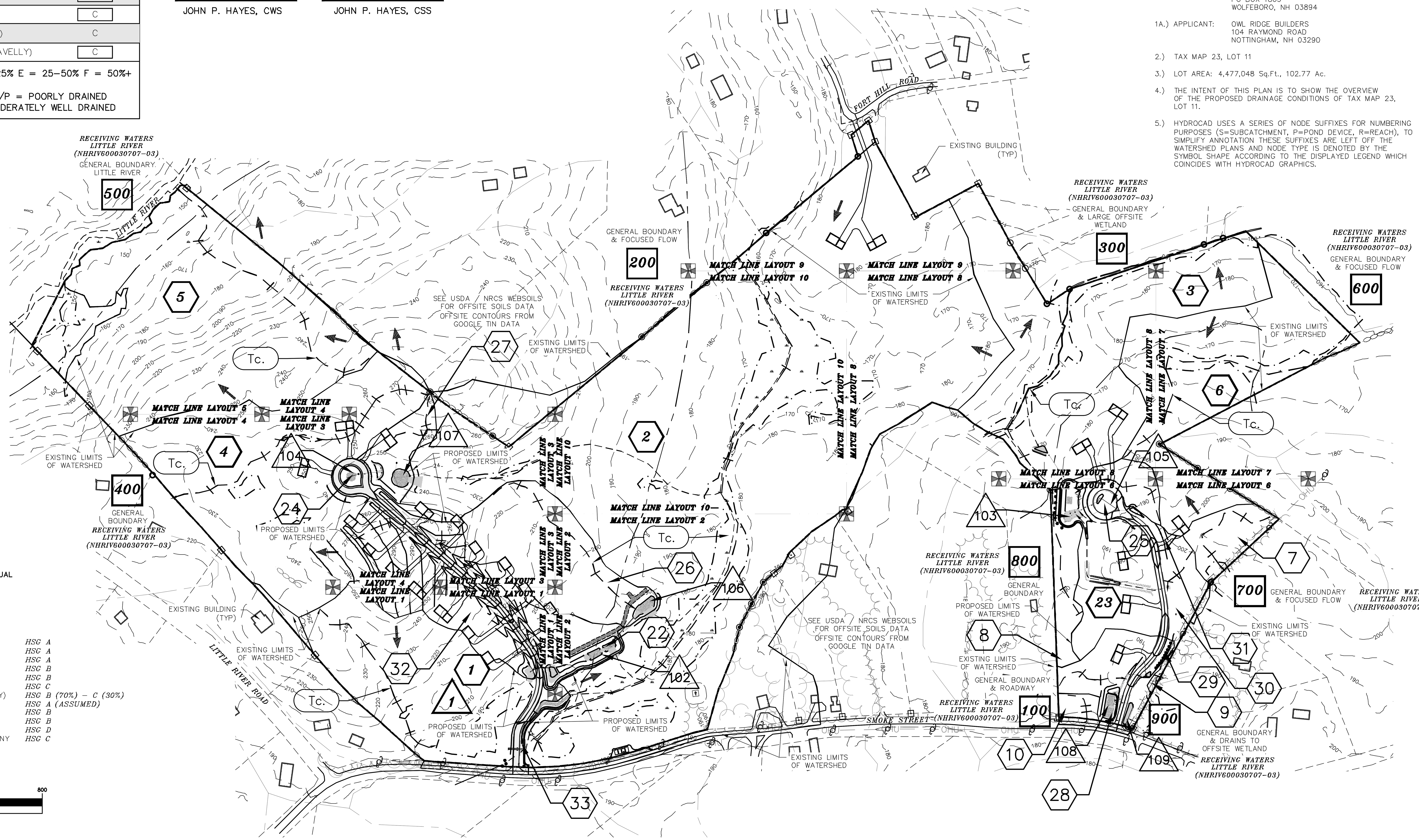
1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) THE INTENT OF THIS PLAN IS TO SHOW THE OVERVIEW OF THE PROPOSED DRAINAGE CONDITIONS OF TAX MAP 23, LOT 11.

5.) 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.



EPA CGP NOTE:

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

NRCS SOILS DATA:

12A ~ HINCKLEY LOAMY SAND (0–3% SLOPES)	*HSG A*
12B ~ HINCKLEY LOAMY SAND (3–8% SLOPES)	*HSG A*
12C ~ HINCKLEY LOAMY SAND (8–15% SLOPES)	*HSG A*
43C ~ CANTON FINE SANDY LOAM (8–15% SLOPES)	*HSG B*
43D ~ CANTON FINE SANDY LOAM (15–25% SLOPES)	*HSG B*
67D ~ PAXTON FINE SANDY LOAM (15–25% SLOPES)	*HSG C*
140C ~ CHATFIELD-HOLLIS-CANTON COMPLEX (8–15% SLOPES, ROCKY)	*HSG B (70%) – C (30%)*
298 ~ PITS, SAND AND GRAVEL	*HSG A (ASSUMED)*
299 ~ UDORTHENTS, SMOOTHED	*HSG B*
313B ~ DEERFIELD LOAMY FINE SAND (3–8% SLOPES)	*HSG B*
395 ~ SWANSEA MUCKY PEAT (0–2% SLOPES)	*HSG D*
547B ~ WALPOLE VERY FINE SANDY LOAM (3–8% SLOPES) VERY STONY	*HSG C*

SEE USDA / NRCS WEBSOILS FOR OFFSITE SOILS DATA

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

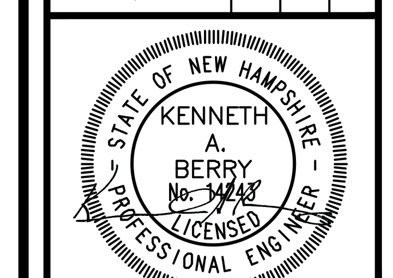
SWPPP EPA SITE MAP (PROPOSED)

W-2 PROPOSED CONDITION WATERSHED OVERVIEW PLAN

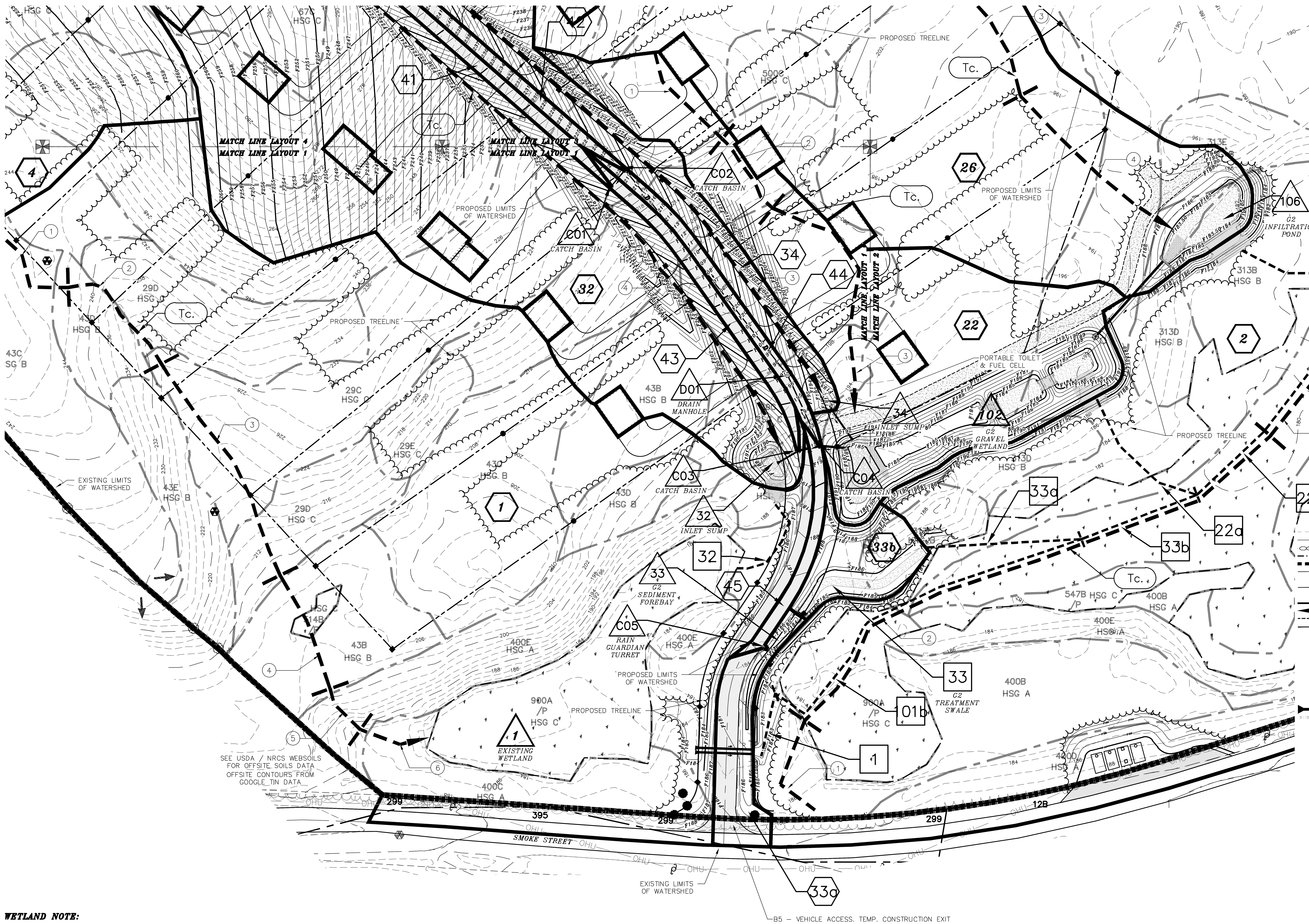
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

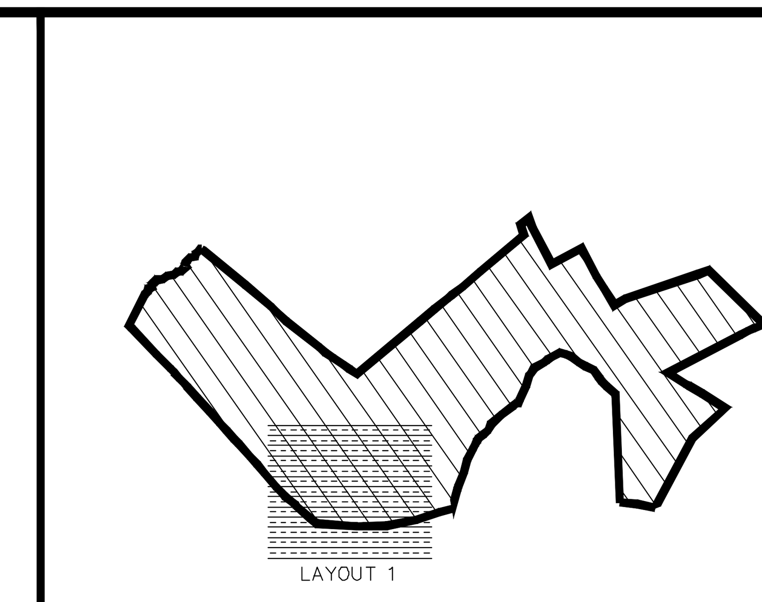
BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 200 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065



NOT FOR CONSTRUCTION





LAYOUT LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) THE INTENT OF THIS PLAN IS TO SHOW A PORTION OF THE PROPOSED DRAINAGE CONDITIONS OF TAX MAP 23, LOT 11.

5.) 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
LIMIT OF SITE SPECIFIC SOILS SURVEY
SOIL LINE
SOIL SERIES
NRCS SOIL LINE
NRCS SOIL LABEL
LIMIT OF WATERSHED
TIME OF CONCENTRATION PATH
FLOW REACH
MATCH LINE
R.C.R.D. ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND
DRAIN MANHOLE W/STRUCTURE
CATCH BASIN W/ STRUCTURE
STORMWATER BMP OUTLET STRUCTURE
DRAIN CULVERT W/ FLARED END SECTION (F.E.S.)
UNDERDRAIN

SYMBOLS LEGEND:

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

GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

WETLAND NOTE:

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STATE OF NEW HAMPSHIRE
JOHN P. HAYES, III
CERTIFIED WETLAND SCIENTIST

JOHN P. HAYES, CWS

JOHN P. HAYES III
No. 087

JOHN P. HAYES, CSS

EPA CGP NOTE:

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

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SWPPP EPA SITE MAP (PROPOSED)

W-2 PROPOSED CONDITIONS WATERSHED PLAN - LAYOUT 1

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14248
LICENSED
PROFESSIONAL ENGINEER

WETLAND NOTE:

WETLANDS WERE DELINEATED BY JOHN P. HAYES, CWS, IN THE SUMMER OF 2022 USING THE FOLLOWING CRITERIA:

1. USACE. 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. 2012. VICKSBURG, MS.

2. USACE. CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. ENVIRONMENTAL LABORATORY. 1987. VICKSBURG, MS.

3. UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE. 2018. FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 8.2. L.M. VASILAS, G.W. HURT, AND J.F. BERKOWITZ (EDS.). USDA, NRCS, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.

4. NEW ENGLAND HYDRIC SOIL TECHNICAL COMMITTEE. FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 4. NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION. 2019. LOWELL, MA.

5. U.S. ARMY CORPS OF ENGINEERS 2019. NATIONAL WETLAND PLANT LIST, VERSION 3.3.
HTTP://WETLAND-PLANTS.USACE.ARMY.MIL/

STATE OF NEW HAMPSHIRE · JOHN P. HAYES, III · CERTIFIED WETLAND SCIENTIST

JOHN P. HAYES, CWS

STATE OF NEW HAMPSHIRE · JOHN P. HAYES III · CERTIFIED SOIL SCIENTIST

JOHN P. HAYES, CSS

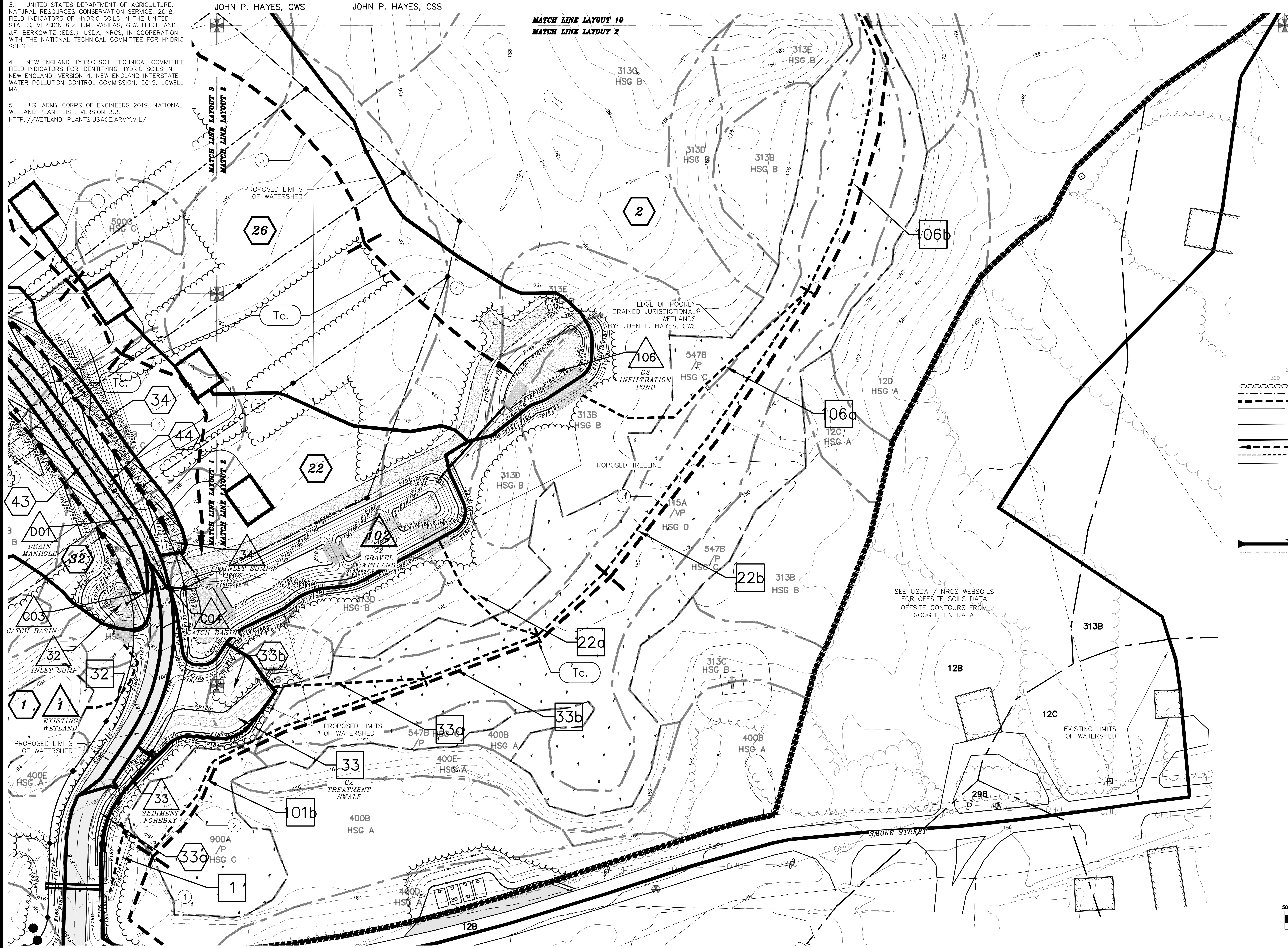
EPA CGP NOTE:

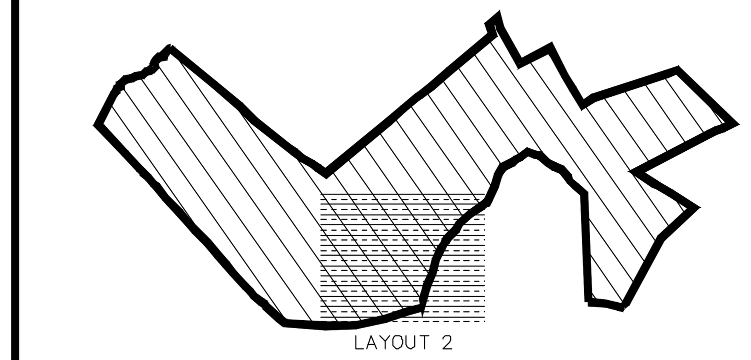
EPA CGP 7.2.4 SITE MAP LEGEND

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





LAYOUT LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) THE INTENT OF THIS PLAN IS TO SHOW A PORTION OF THE PROPOSED DRAINAGE CONDITIONS OF TAX MAP 23, LOT 11.

5.) 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:

299	EXISTING CONTOUR MINOR
300	EXISTING CONTOUR MAJOR
	STONE WALL
	WETLAND LINE
	LIMIT OF SITE SPECIFIC SOILS SURVEY
	SOIL LINE
448A	SOIL SERIES
	NRCS SOIL LINE
HfB	NRCS SOIL LABEL
	LIMIT OF WATERSHED
	TIME OF CONCENTRATION PATH
	FLOW REACH
	MATCH LINE
R.C.R.D.	ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP.	TYPICAL
FND	FOUND
	DRAIN MANHOLE W/STRUCTURE
	CATCH BASIN W/ STRUCTURE
	STORMWATER BMP OUTLET STRUCTURE
D	DRAIN CULVERT W/ FLARED END SECTION (F.E.S.)
U.D	UNDERDRAIN

SYMBOLS LEGEND:

#	SUBCATCHMENT AREA SYMBOL
#	FLOW REACH SYMBOL
#	POND DEVICE SYMBOL
Tc. / #	TIME OF CONCENTRATION SEGMENT

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

W-2 PROPOSED CONDITIONS WATERSHED PLAN – LAYOUT 2
SWPPP EPA SITE MAP (PROPOSED)

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 – 065

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

NOT FOR CONSTRUCTION

EPA CGP NOTE:

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

STATE OF NEW HAMPSHIRE — JOHN P. HAYES, III — CERTIFIED WETLAND SCIENTIST

JOHN P. HAYES, CWS

STATE OF NEW HAMPSHIRE — JOHN P. HAYES III — No. 087 — CERTIFIED SOIL SCIENTIST

JOHN P. HAYES, CSS

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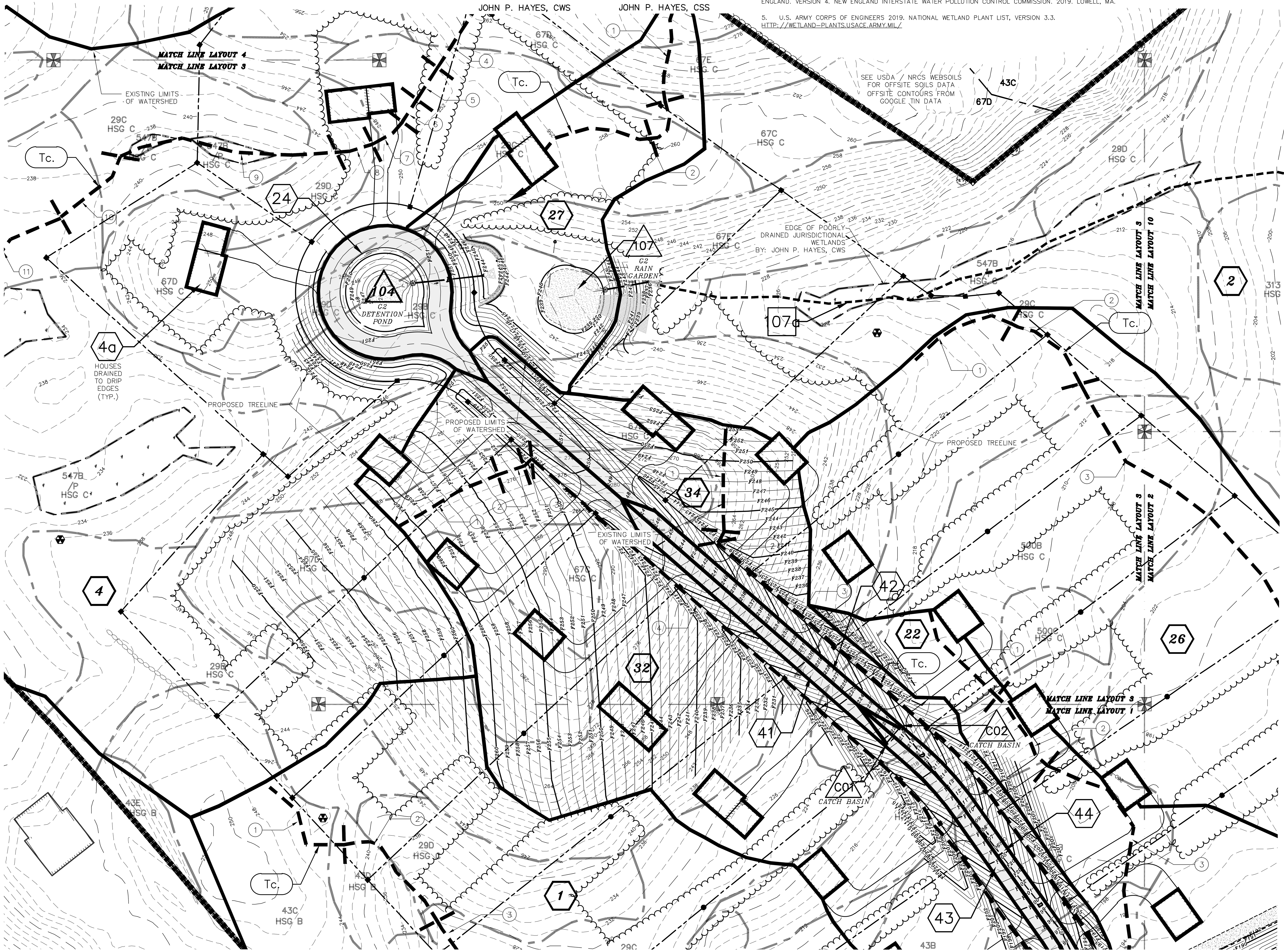

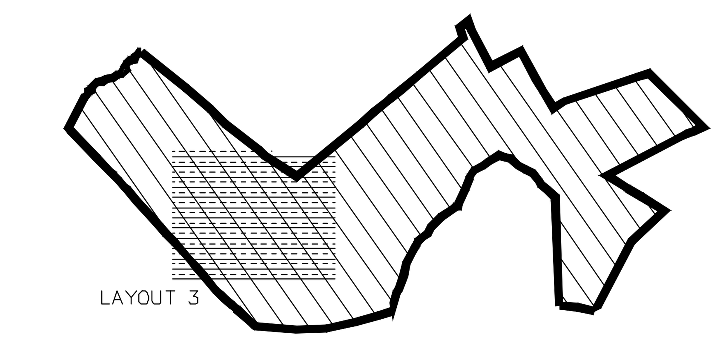

LAYOUT LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

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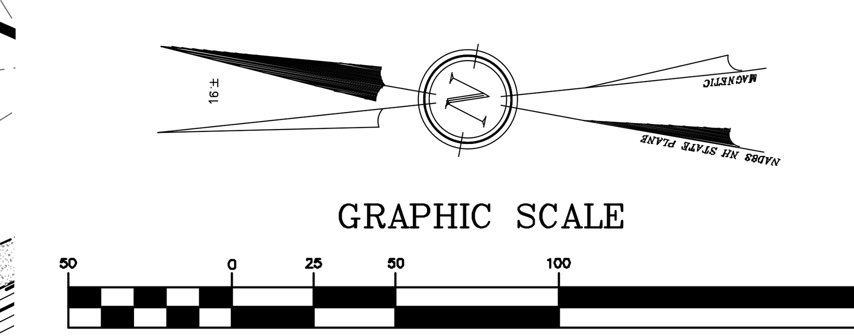
LEGEND:

299	EXISTING CONTOUR MINOR
300	EXISTING CONTOUR MAJOR
	STONE WALL
	WETLAND LINE
	LIMIT OF SITE SPECIFIC SOILS SURVEY
	SOIL LINE
448A	SOIL SERIES
	NRCS SOIL LINE
HfB	NRCS SOIL LABEL
	LIMIT OF WATERSHED
	TIME OF CONCENTRATION PATH
	FLOW REACH
	MATCH LINE
R.C.R.D.	ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP.	TYPICAL
FND	FOUND
	DRAIN MANHOLE W/STRUCTURE
	CATCH BASIN W/ STRUCTURE
	STORMWATER BMP OUTLET STRUCTURE
U.D	DRAIN CULVERT W/ FLARED END SECTION (F.E.S.) UNDERDRAIN

SYMBOLS LEGEND:

# #	SUBCATCHMENT AREA SYMBOL
# #	FLOW REACH SYMBOL
# #	POND DEVICE SYMBOL
Tc. #	TIME OF CONCENTRATION SEGMENT



(IN FEET)
1 inch = 50 ft.

SWPPP EPA SITE MAP (PROPOSED)

W-2 PROPOSED CONDITIONS WATERSHED PLAN – LAYOUT 3

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 – 065

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

NOT FOR CONSTRUCTION

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JOHN P. HAYES, CWS

JOHN P. HAYES, CSS

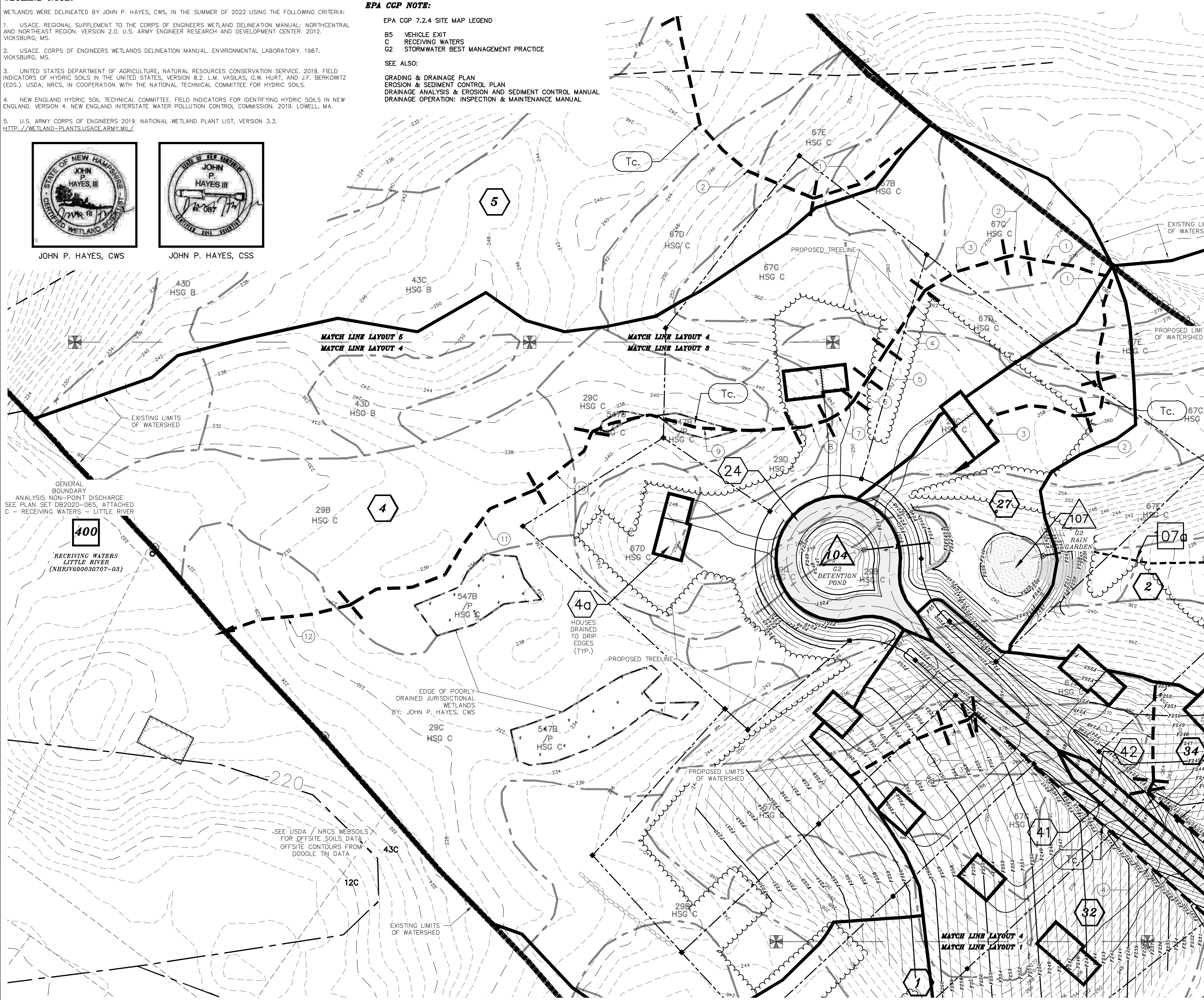
EPA CGP NOTE:

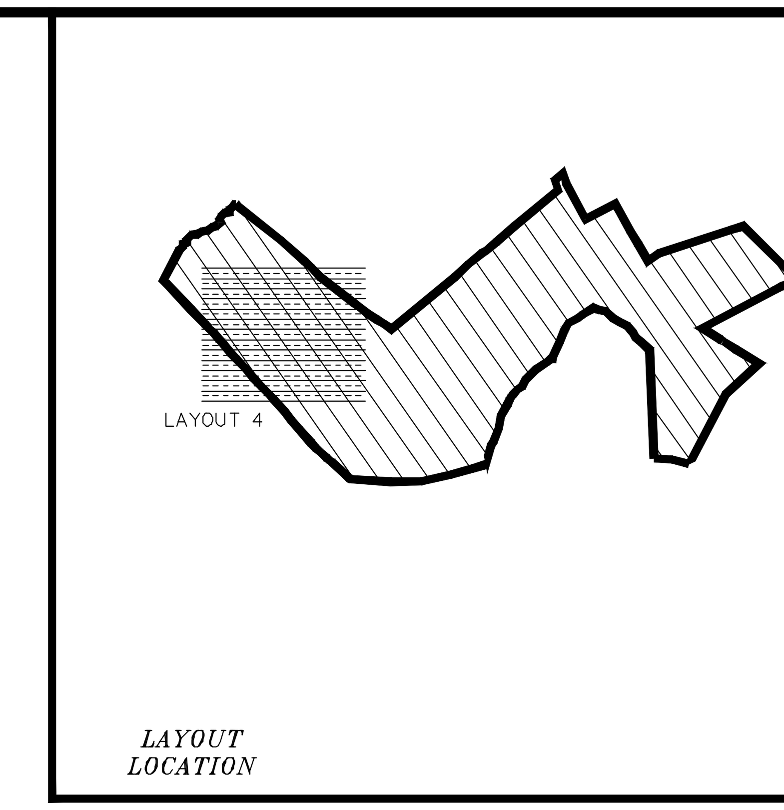
EPA CGP 7.2.4 SITE MAP LEGEND

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





LAYOUT LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) THE INTENT OF THIS PLAN IS TO SHOW A PORTION OF THE PROPOSED DRAINAGE CONDITIONS OF TAX MAP 23, LOT 11.

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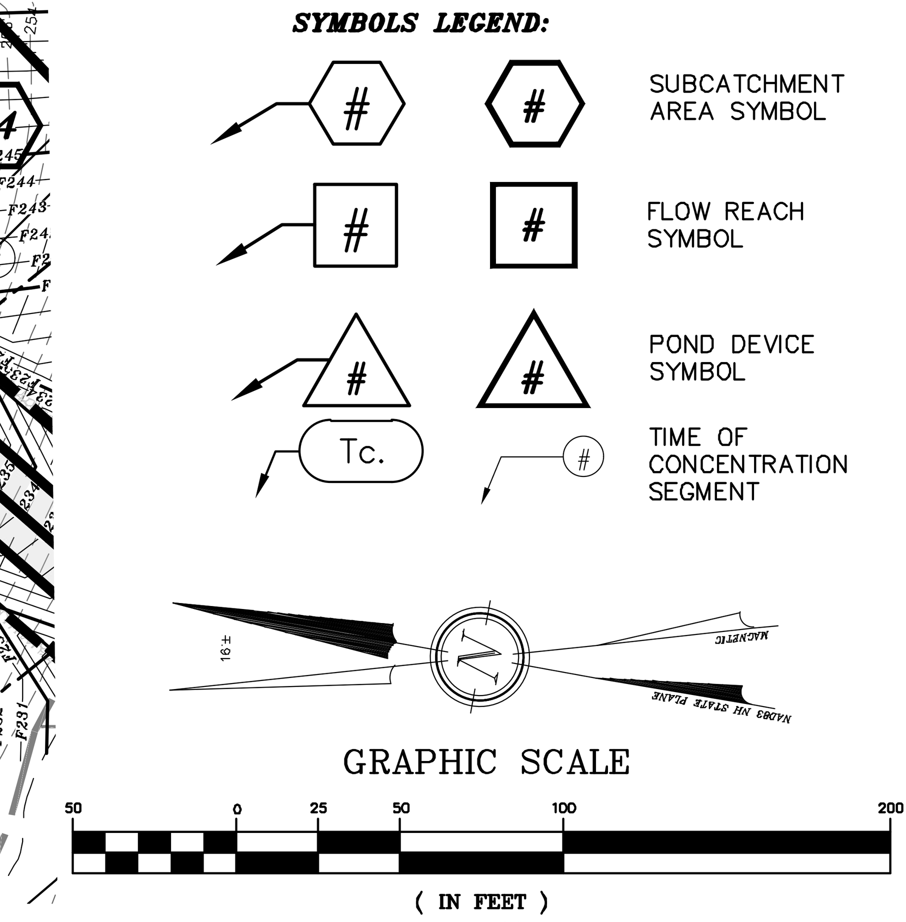
LEGEND:

EXISTING CONTOUR MINOR
EXISTING CONTOUR MAJOR
STONE WALL
WETLAND LINE
LIMIT OF SITE SPECIFIC SOILS SURVEY
SOIL LINE
SOIL SERIES
NRCS SOIL LINE
NRCS SOIL LABEL
LIMIT OF WATERSHED
TIME OF CONCENTRATION PATH
FLOW REACH
MATCH LINE
R.C.R.D. ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND
DRAIN MANHOLE W/STRUCTURE
CATCH BASIN W/ STRUCTURE
STORMWATER BMP OUTLET STRUCTURE
DRAIN CULVERT W/ FLARED END SECTION (F.E.S.)
UNDERDRAIN

SYMBOLS LEGEND:

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



(IN FEET)
1 inch = 50 ft.

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SWPPP EPA SITE MAP (PROPOSED)

W-2 PROPOSED CONDITIONS WATERSHED PLAN - LAYOUT 4

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

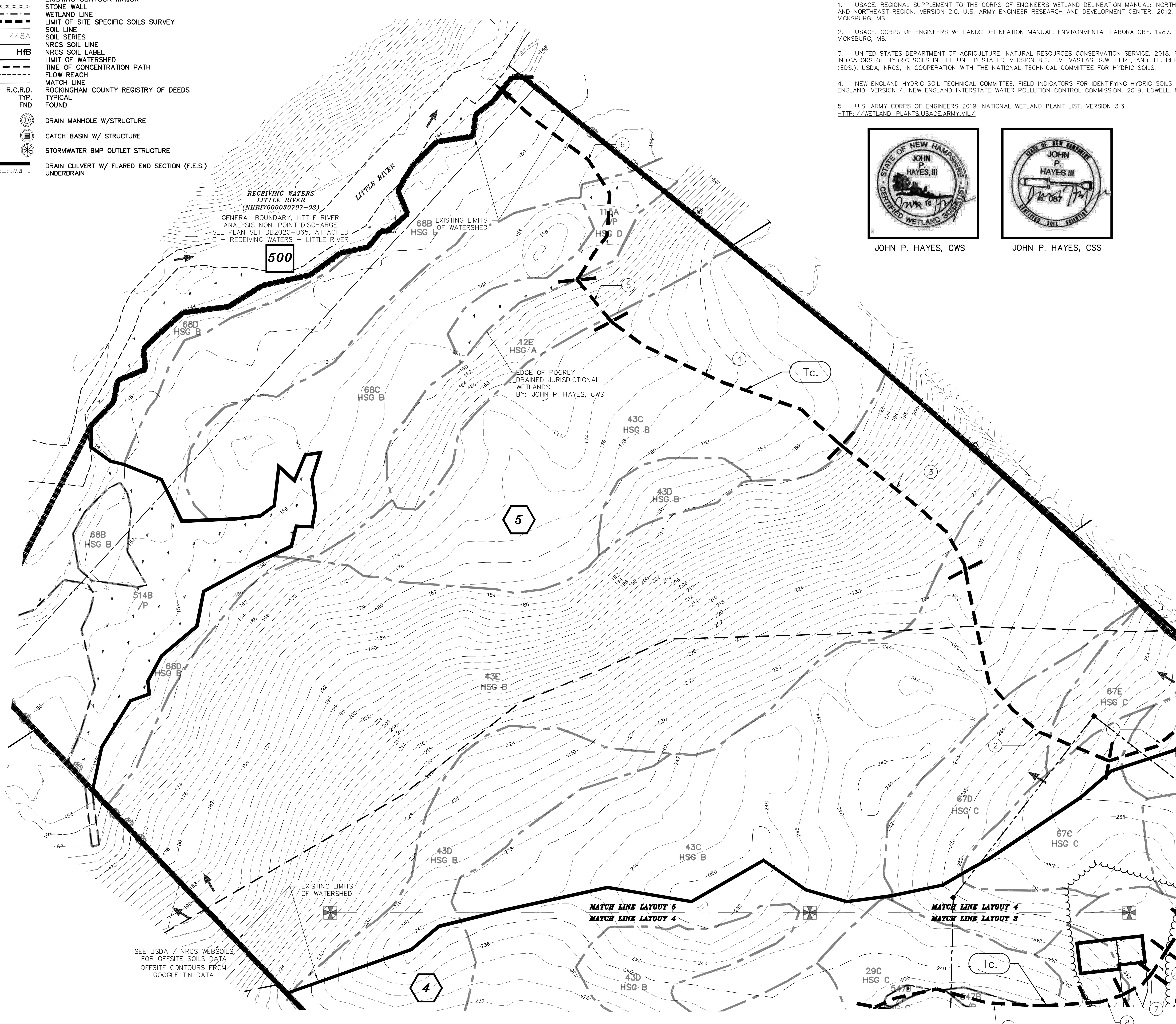
BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065

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

LEGEND:

- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR
- STONE WALL
- WETLAND LINE
- LIMIT OF SITE SPECIFIC SOILS SURVEY
- SOIL LINE
- 448A SOIL SERIES
- NRCS SOIL LINE
- HfB NRCS SOIL LABEL
- LIMIT OF WATERSHED
- TIME OF CONCENTRATION PATH
- FLOW REACH
- MATCH LINE
- R.C.R.D. ROCKINGHAM COUNTY REGISTRY OF DEEDS
- TYP. TYPICAL
- FND FOUND
- DRAIN MANHOLE W/STRUCTURE
- CATCH BASIN W/ STRUCTURE
- STORMWATER BMP OUTLET STRUCTURE
- DRAIN CULVERT W/ FLARED END SECTION (F.E.S.)
- UNDERDRAIN



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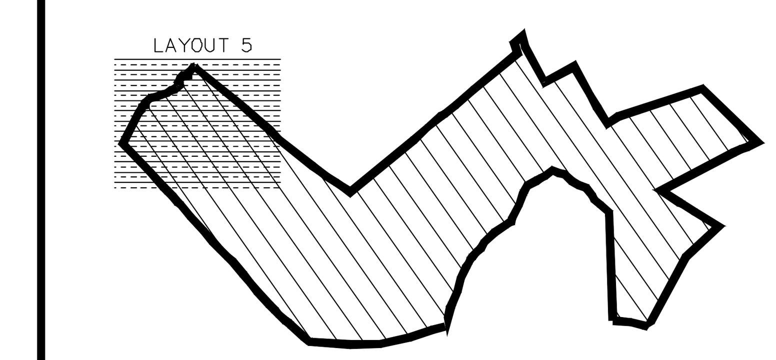
STATE OF NEW HAMPSHIRE JOHN P. HAYES, III No. 18 CERTIFIED WETLAND SCIENTIST

JOHN P. HAYES, CWS

STATE OF NEW HAMPSHIRE JOHN P. HAYES III No. 067 CERTIFIED SOIL SCIENTIST

JOHN P. HAYES, CSS



LAYOUT LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD, PO BOX 1805, WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS, 104 RAYMOND ROAD, NOTTINGHAM, NH 03290

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EPA CGP NOTE:

EPA CGP 7.2.4 SITE MAP LEGEND

- B5 VEHICLE EXIT
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- G2 STORMWATER BEST MANAGEMENT PRACTICE

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SYMBOLS LEGEND:

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

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

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SWPPP EPA SITE MAP (PROPOSED)
W-2 PROPOSED CONDITIONS WATERSHED PLAN - LAYOUT 5
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 50 FT.
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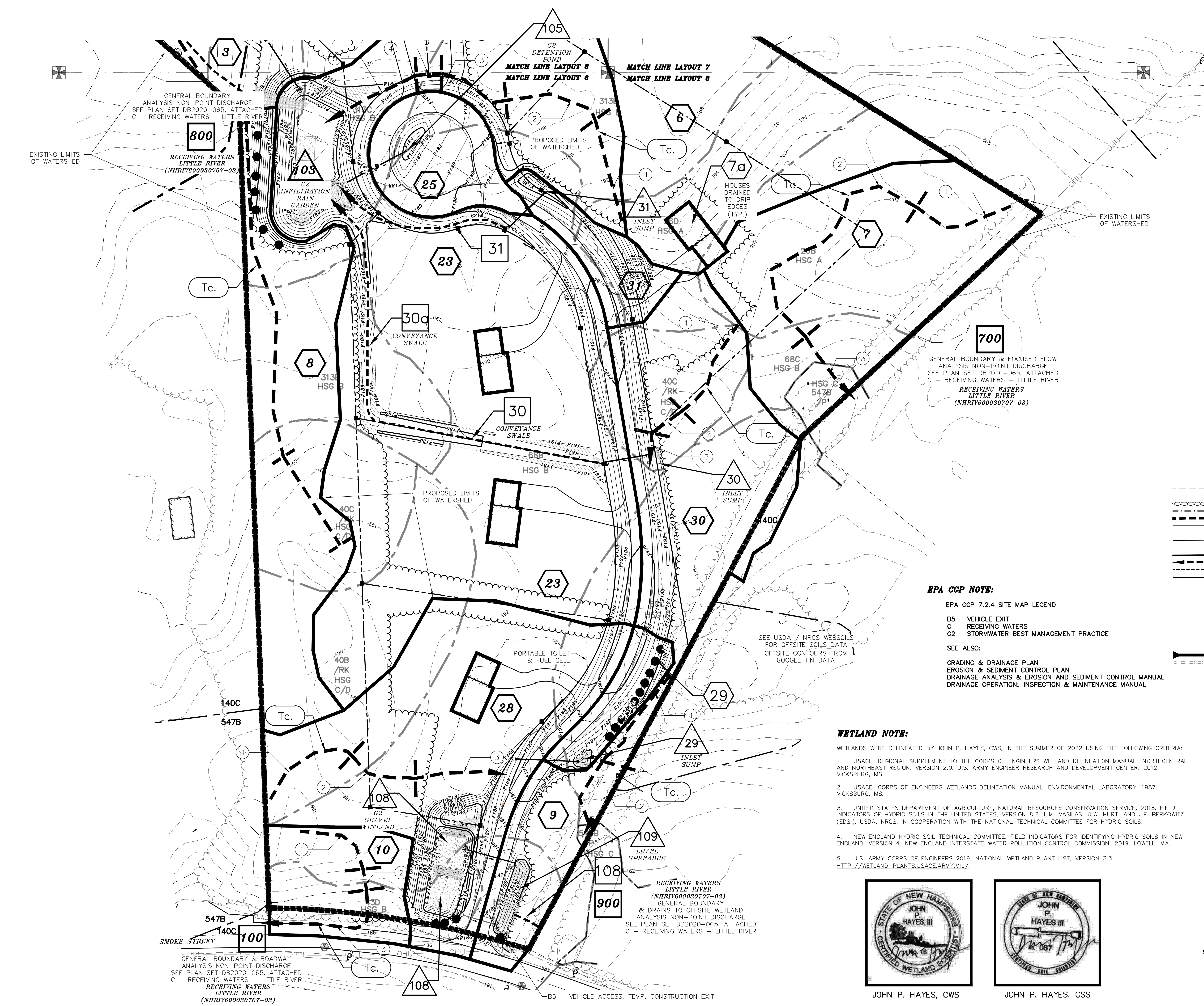
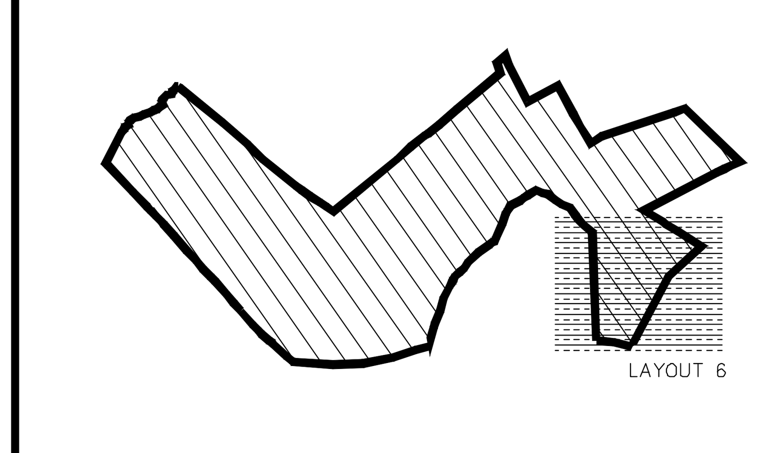
STATE OF NEW HAMPSHIRE KENNETH A. BERRY No. 14948 LICENSED PROFESSIONAL ENGINEER

SHEET 17 OF 22

NOT FOR CONSTRUCTION





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EXISTING CONTOUR MINOR
EXISTING CONTOUR MAJOR
STONE WALL
WETLAND LINE
LIMIT OF SITE SPECIFIC SOILS SURVEY
SOIL LINE
448A SOIL SERIES
NRCS SOIL LINE
HfB NRCS SOIL LABEL
LIMIT OF WATERSHED
TIME OF CONCENTRATION PATH
FLOW REACH
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TYP. TYPICAL
FND FOUND
DRAIN MANHOLE W/STRUCTURE
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STORMWATER BMP OUTLET STRUCTURE
DRAIN CULVERT W/ FLARED END SECTION (F.E.S.)
U.D UNDERDRAIN

EPA CGP NOTE:

EPA CGP 7.2.4 SITE MAP LEGEND

B5 VEHICLE EXIT
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G2 STORMWATER BEST MANAGEMENT PRACTICE

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

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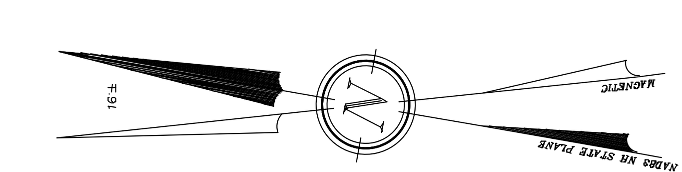
CERTIFIED WETLAND SCIENTIST

JOHN P. HAYES III

JOHN P. HAYES, CWS

JOHN P. HAYES, CSS



GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SWPPP EPA SITE MAP (PROPOSED)

W-2 PROPOSED CONDITIONS WATERSHED PLAN – LAYOUT 6

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 – 065

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14248
LICENSED
PROFESSIONAL ENGINEER

NOT FOR CONSTRUCTION

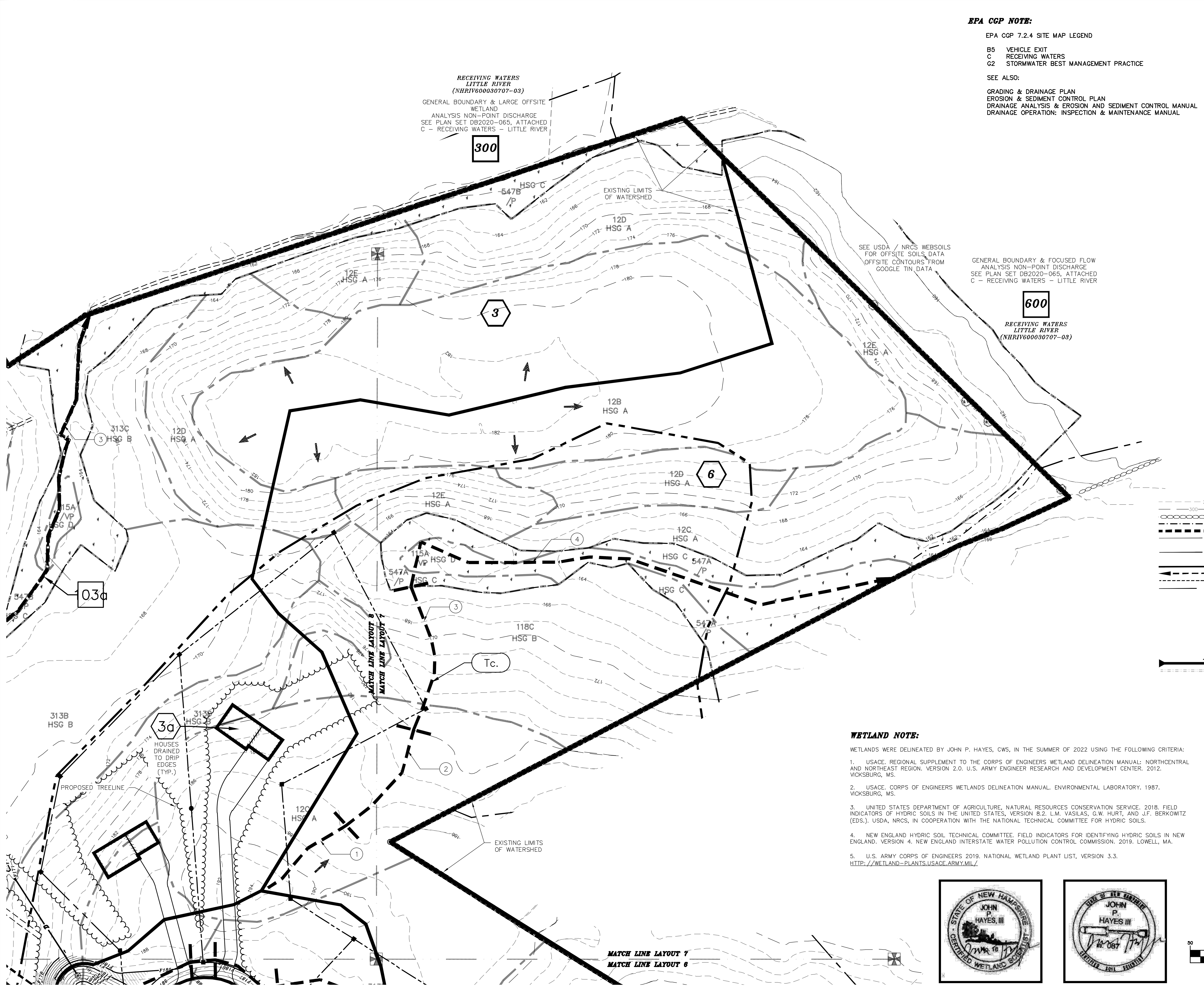
EPA CGP NOTE:

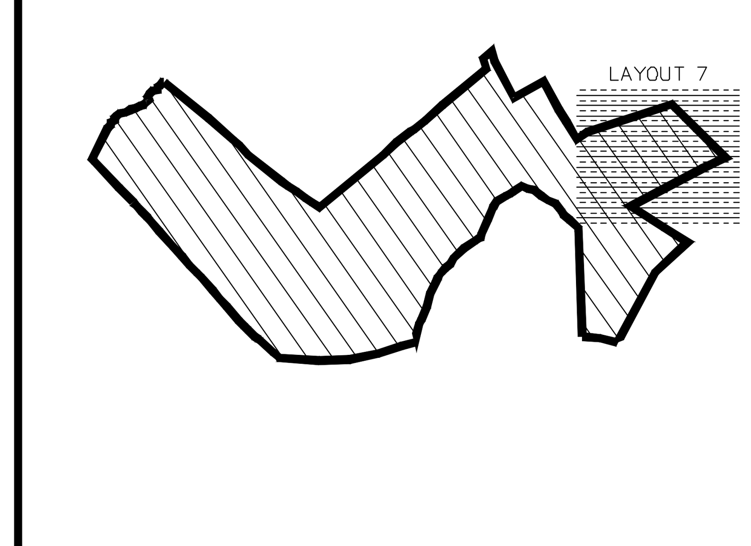
EPA CGP 7.2.4 SITE MAP LEGEND

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





LAYOUT LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) THE INTENT OF THIS PLAN IS TO SHOW A PORTION OF THE PROPOSED DRAINAGE CONDITIONS OF TAX MAP 23, LOT 11.

5.) 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
LIMIT OF SITE SPECIFIC SOILS SURVEY
SOIL LINE
448A SOIL SERIES
NRCS SOIL LINE
HfB NRCS SOIL LABEL
LIMIT OF WATERSHED
TIME OF CONCENTRATION PATH
FLOW REACH
MATCH LINE
R.C.R.D. ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND
DRAIN MANHOLE W/STRUCTURE
CATCH BASIN W/ STRUCTURE
STORMWATER BMP OUTLET STRUCTURE
DRAIN CULVERT W/ FLARED END SECTION (F.E.S.)
UNDERDRAIN

SYMBOLS LEGEND:

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

WETLAND NOTE:

WETLANDS WERE DELINEATED BY JOHN P. HAYES, CWS, IN THE SUMMER OF 2022 USING THE FOLLOWING CRITERIA:

1. USACE. 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. 2012. VICKSBURG, MS.

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4. NEW ENGLAND HYDRIC SOIL TECHNICAL COMMITTEE. FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 4. NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION. 2019. LOWELL, MA.

5. U.S. ARMY CORPS OF ENGINEERS 2019. NATIONAL WETLAND PLANT LIST, VERSION 3.3. HTTP://WETLAND-PLANTS.USACE.ARMY.MIL/

STATE OF NEW HAMPSHIRE — JOHN P. HAYES, III — CERTIFIED WETLAND SCIENTIST

JOHN P. HAYES, CWS

STATE OF NEW HAMPSHIRE — JOHN P. HAYES III — CERTIFIED SOIL SCIENTIST

JOHN P. HAYES, CSS

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SWPPP EPA SITE MAP (PROPOSED)

W-2 PROPOSED CONDITIONS WATERSHED PLAN – LAYOUT 7

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 – 065

STATE OF NEW HAMPSHIRE — KENNETH A. BERRY — LICENSED PROFESSIONAL ENGINEER

NOT FOR CONSTRUCTION

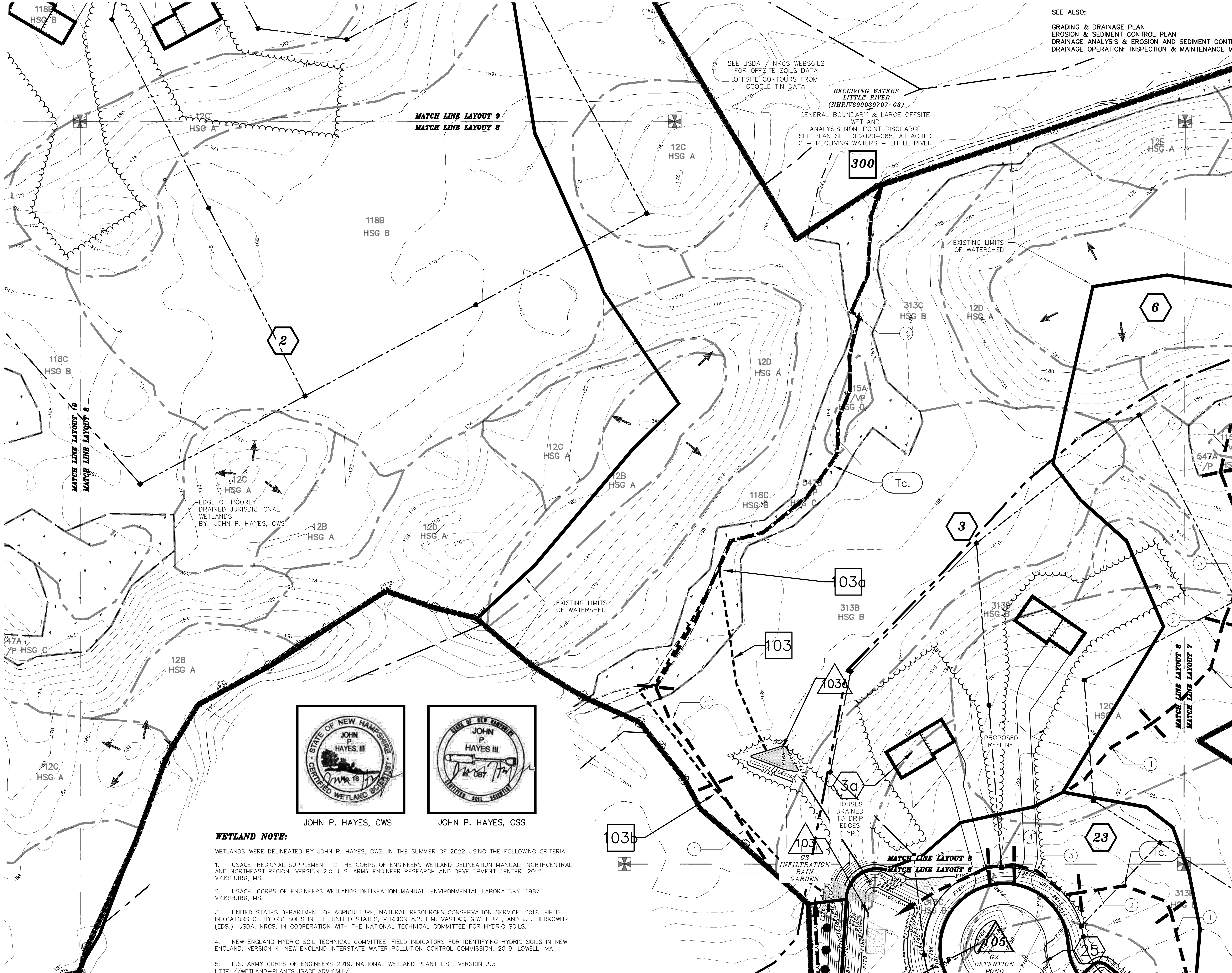
EPA CGP NOTE:

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



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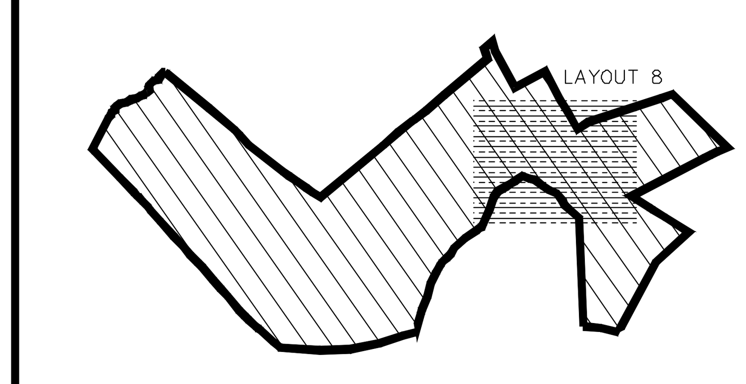

LAYOUT LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

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LEGEND:

299	EXISTING CONTOUR MINOR
300	EXISTING CONTOUR MAJOR
	STONE WALL
	WETLAND LINE
	LIMIT OF SITE SPECIFIC SOILS SURVEY
	SOIL LINE
448A	SOIL SERIES
	NRCS SOIL LINE
HfB	NRCS SOIL LABEL
	LIMIT OF WATERSHED
	TIME OF CONCENTRATION PATH
	FLOW REACH
	MATCH LINE
R.C.R.D.	ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP.	TYPICAL
FND	FOUND
D	DRAIN MANHOLE W/STRUCTURE
	CATCH BASIN W/ STRUCTURE
	STORMWATER BMP OUTLET STRUCTURE
D	DRAIN CULVERT W/ FLARED END SECTION (F.E.S.)
U.D	UNDERDRAIN

SYMBOLS LEGEND:

#	#	SUBCATCHMENT AREA SYMBOL
#	#	FLOW REACH SYMBOL
#	#	POND DEVICE SYMBOL
Tc.	#	TIME OF CONCENTRATION SEGMENT

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REVISION	DATE	DESCRIPTION
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SWPPP EPA SITE MAP (PROPOSED)

W-2 PROPOSED CONDITIONS WATERSHED PLAN – LAYOUT 8

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 – 065

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

NOT FOR CONSTRUCTION

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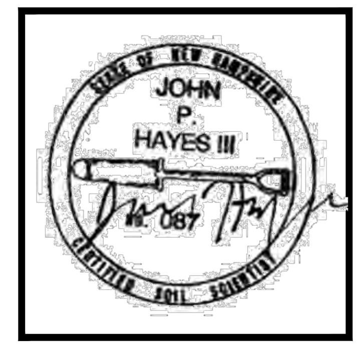
JOHN P. HAYES, CWS



JOHN P. HAYES, CSS

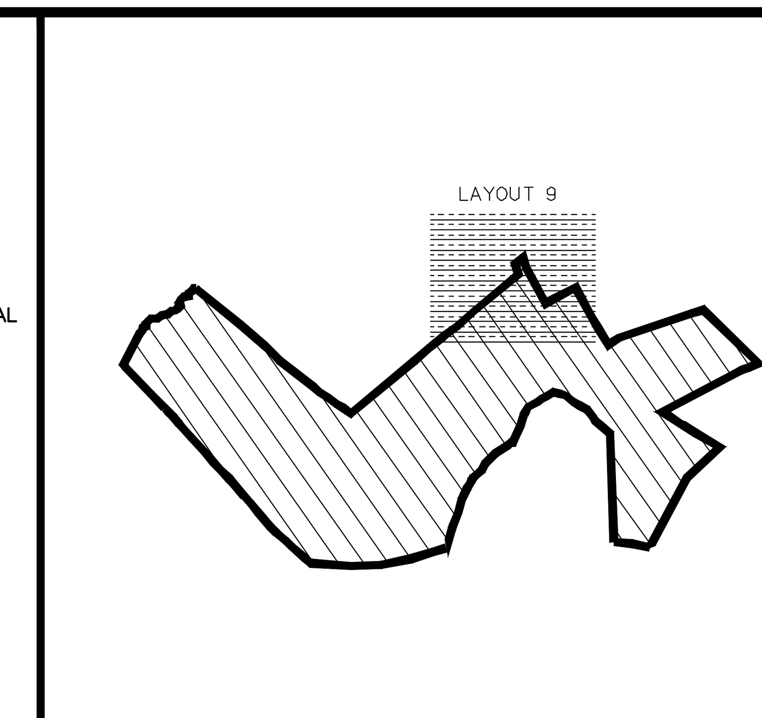
EPA CGP NOTE:

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



LAYOUT LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

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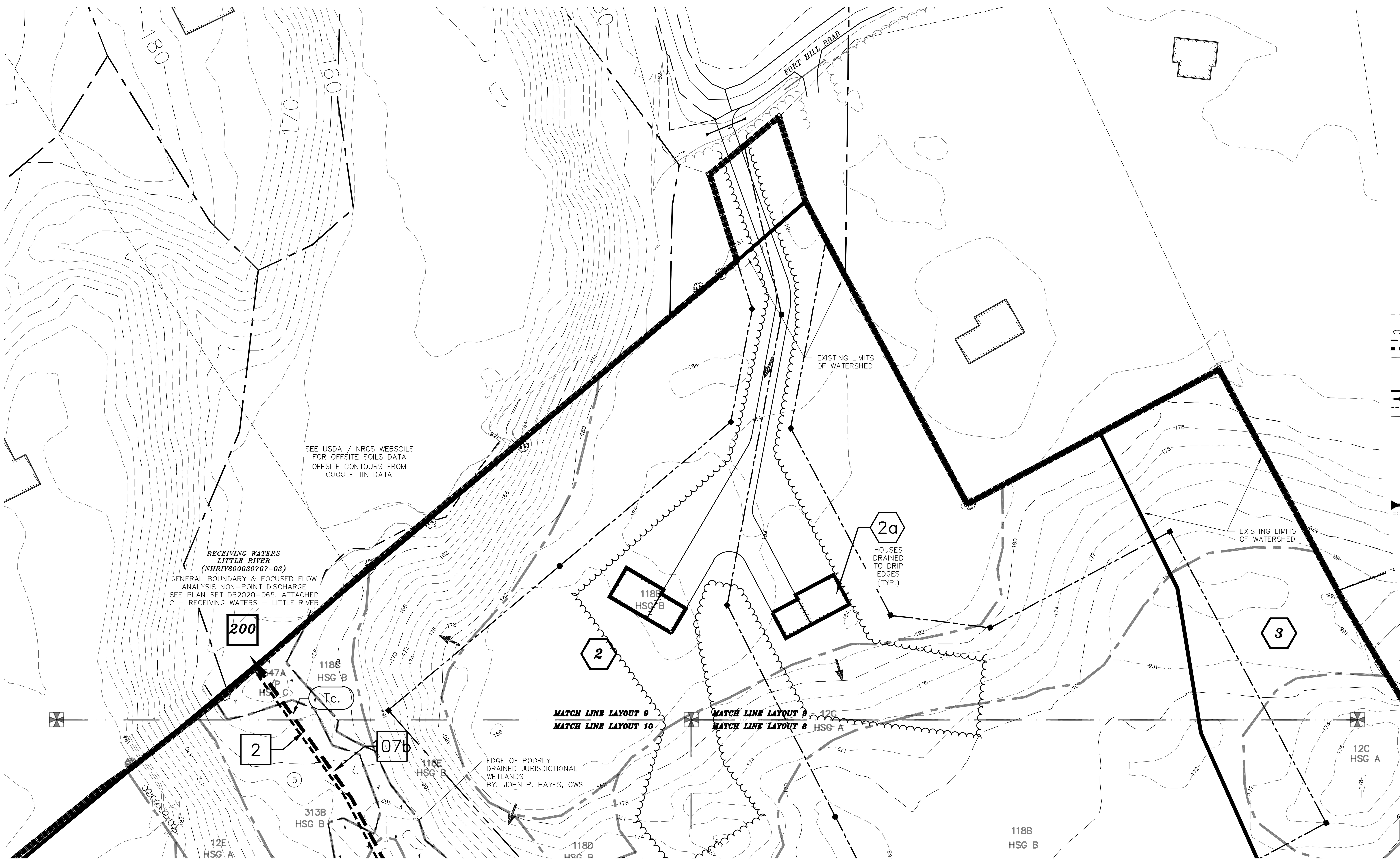
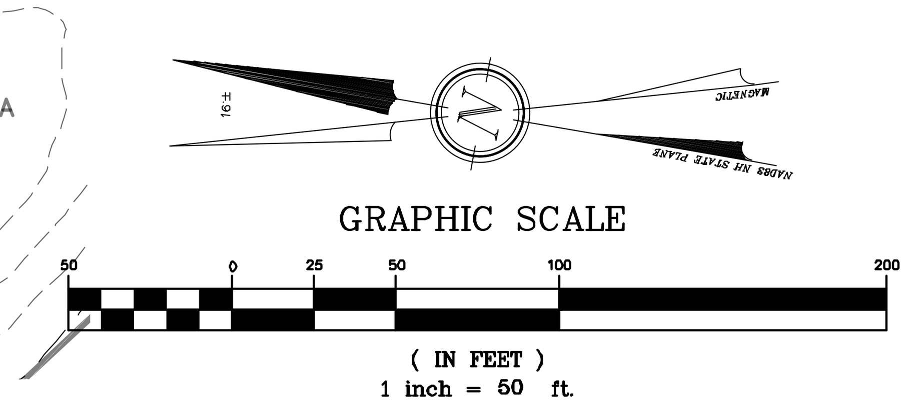


LEGEND:

EXISTING CONTOUR MINOR
EXISTING CONTOUR MAJOR
STONE WALL
WETLAND LINE
LIMIT OF SITE SPECIFIC SOILS SURVEY
SOIL LINE
448A SOIL SERIES
NRCS SOIL LINE
HfB NRCS SOIL LABEL
LIMIT OF WATERSHED
TIME OF CONCENTRATION PATH
FLOW REACH
MATCH LINE
R.C.R.D. ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND
DRAIN MANHOLE W/STRUCTURE
CATCH BASIN W/ STRUCTURE
STORMWATER BMP OUTLET STRUCTURE
DRAIN CULVERT W/ FLARED END SECTION (F.E.S.)
UD UNDERDRAIN

SYMBOLS LEGEND:

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



REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SWPPP EPA SITE MAP (PROPOSED)

W-2 PROPOSED CONDITIONS WATERSHED PLAN - LAYOUT 9

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
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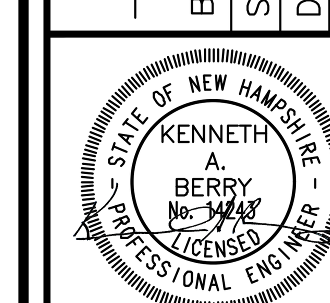

SHEET 21 OF 22

NOT FOR CONSTRUCTION

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JOHN P. HAYES, CWS

JOHN P. HAYES, CSS

EPA CGP NOTE:

EPA CGP 7.2.4 SITE MAP LEGEND

- B5 VEHICLE EXIT
- C RECEIVING WATERS
- G2 STORMWATER BEST MANAGEMENT PRACTICE

SEE ALSO:

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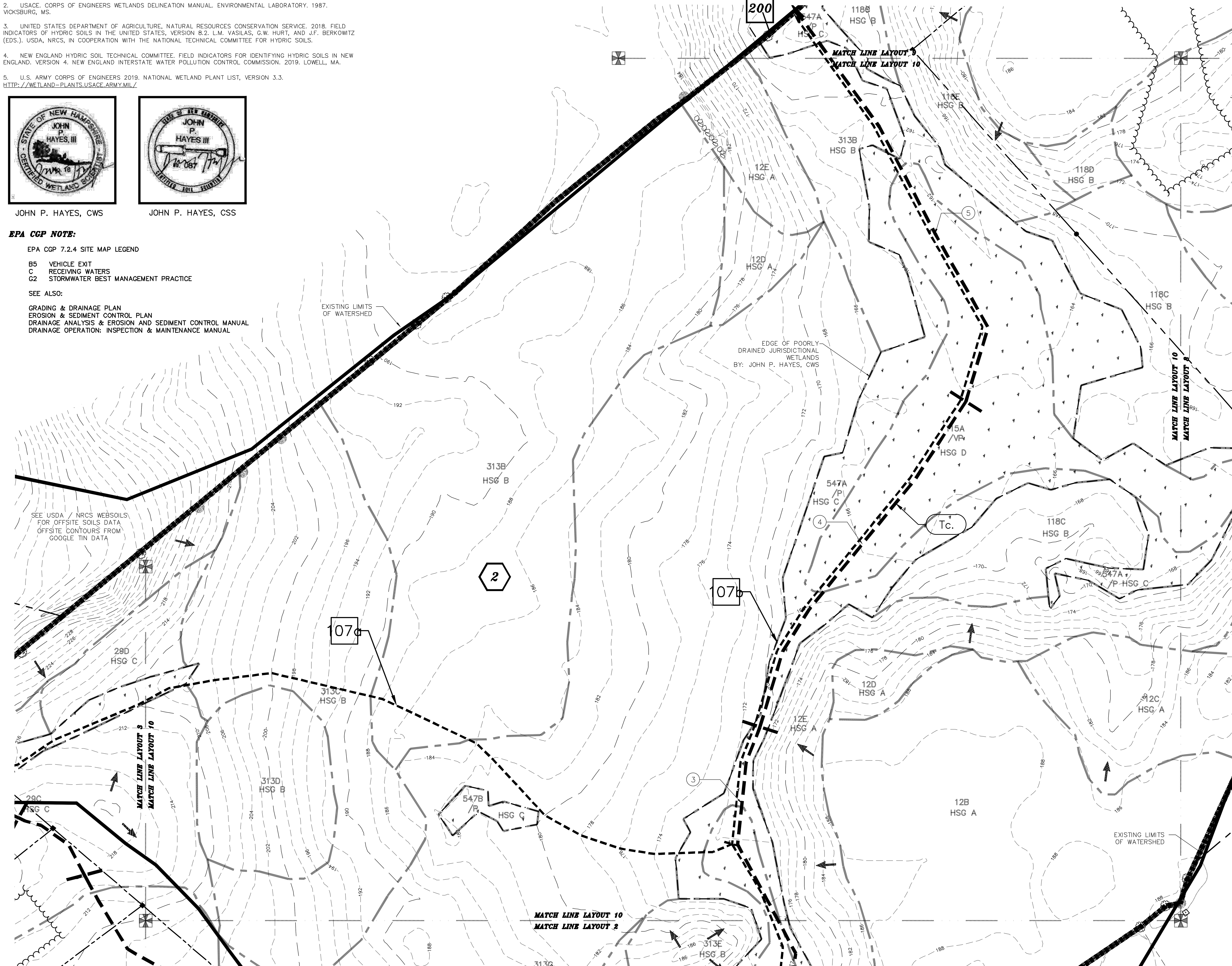

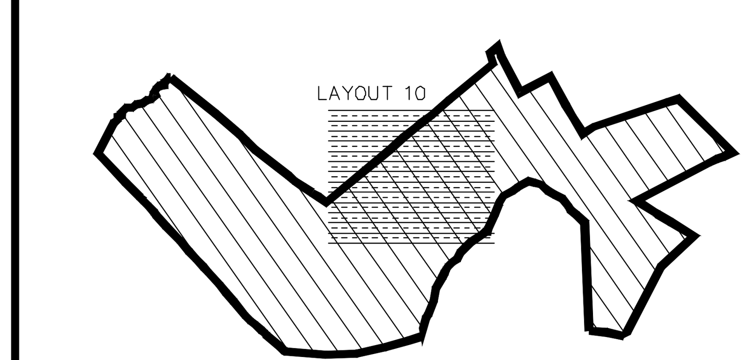

LAYOUT LOCATION

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

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LEGEND:

299	EXISTING CONTOUR MINOR
300	EXISTING CONTOUR MAJOR
	STONE WALL
	WETLAND LINE
	LIMIT OF SITE SPECIFIC SOILS SURVEY
	SOIL LINE
448A	SOIL SERIES
	NRCS SOIL LINE
HfB	NRCS SOIL LABEL
	LIMIT OF WATERSHED
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	MATCH LINE
R.C.R.D.	ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP.	TYPICAL
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SYMBOLS LEGEND:

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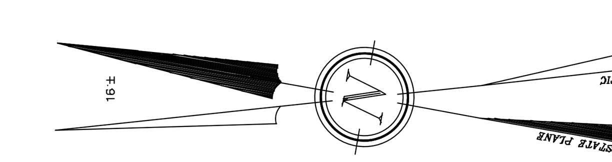

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REVISION	DATE	DESCRIPTION
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SWPPP EPA SITE MAP (PROPOSED)

W-2 PROPOSED CONDITIONS WATERSHED PLAN - LAYOUT 10

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
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SCALE : 1 IN. EQUALS 50 FT.
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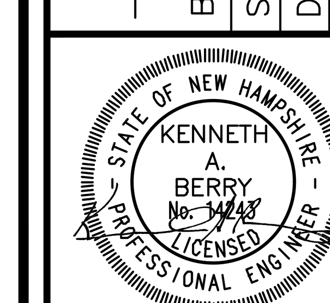
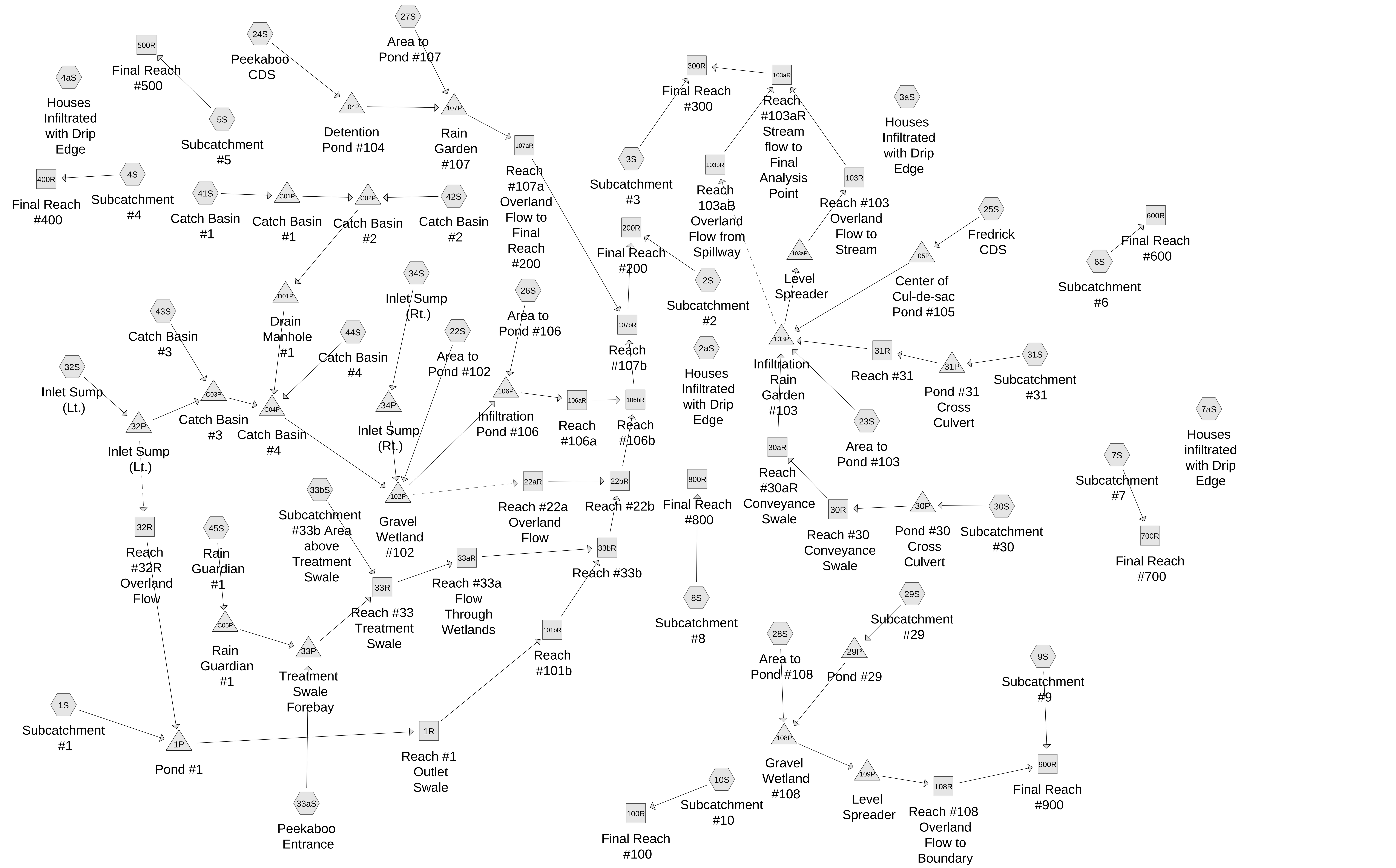
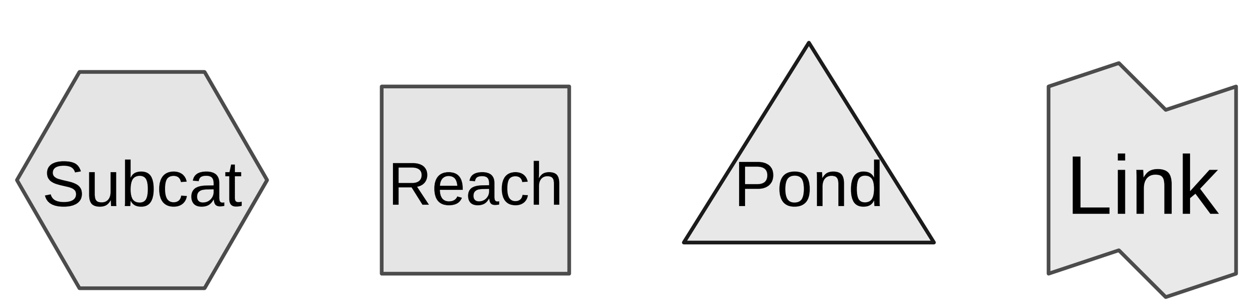






Routing Diagram for 20-065 Proposed Analysis

Prepared by Berry Surveying & Engineering, Printed 12/7/2023

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points x 3
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=280,391 sf 2.68% Impervious Runoff Depth>0.32"
Flow Length=663' Tc=24.8 min CN=59 Runoff=0.85 cfs 0.172 af

Subcatchment 2aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>2.83"
Tc=0.0 min CN=98 Runoff=0.25 cfs 0.017 af

Subcatchment 2S: Subcatchment #2 Runoff Area=1,847,283 sf 1.43% Impervious Runoff Depth>0.13"
Flow Length=2,208' Tc=87.6 min UI Adjusted CN=52 Runoff=0.83 cfs 0.469 af

Subcatchment 3aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>2.83"
Tc=0.0 min CN=98 Runoff=0.25 cfs 0.017 af

Subcatchment 3S: Subcatchment #3 Runoff Area=429,754 sf 0.89% Impervious Runoff Depth>0.02"
Flow Length=753' Tc=46.0 min UI Adjusted CN=44 Runoff=0.02 cfs 0.015 af

Subcatchment 4aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>2.83"
Tc=0.0 min CN=98 Runoff=0.25 cfs 0.017 af

Subcatchment 4S: Subcatchment #4 Runoff Area=422,569 sf 0.94% Impervious Runoff Depth>0.65"
Flow Length=1,007' Tc=35.8 min UI Adjusted CN=68 Runoff=3.28 cfs 0.526 af

Subcatchment 5S: Subcatchment #5 Runoff Area=502,048 sf 0.00% Impervious Runoff Depth>0.21"
Flow Length=1,017' Tc=26.5 min CN=55 Runoff=0.68 cfs 0.200 af

Subcatchment 6S: Subcatchment #6 Runoff Area=289,461 sf 0.18% Impervious Runoff Depth>0.01"
Flow Length=888' Tc=44.0 min CN=42 Runoff=0.01 cfs 0.003 af

Subcatchment 7aS: Houses infiltrated with Runoff Area=1,584 sf 100.00% Impervious Runoff Depth>2.83"
Tc=0.0 min CN=98 Runoff=0.12 cfs 0.009 af

Subcatchment 7S: Subcatchment #7 Runoff Area=44,800 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=424' Tc=25.7 min CN=37 Runoff=0.00 cfs 0.000 af

Subcatchment 8S: Subcatchment #8 Runoff Area=37,283 sf 0.00% Impervious Runoff Depth>0.46"
Flow Length=423' Tc=19.2 min CN=63 Runoff=0.22 cfs 0.032 af

Subcatchment 9S: Subcatchment #9 Runoff Area=15,375 sf 16.48% Impervious Runoff Depth>0.46"
Flow Length=172' Tc=13.4 min UI Adjusted CN=63 Runoff=0.10 cfs 0.013 af

Subcatchment 10S: Subcatchment #10 Runoff Area=14,130 sf 10.22% Impervious Runoff Depth>0.35"
Flow Length=226' Tc=16.6 min CN=60 Runoff=0.06 cfs 0.010 af

Subcatchment 22S: Area to Pond #102 Runoff Area=65,100 sf 12.44% Impervious Runoff Depth>0.35"
Flow Length=397' Tc=12.9 min CN=60 Runoff=0.27 cfs 0.044 af

Subcatchment 23S: Area to Pond #103 Runoff Area=149,518 sf 8.75% Impervious Runoff Depth>0.53"
Flow Length=381' Tc=17.5 min CN=65 Runoff=1.14 cfs 0.152 af

Subcatchment 24S: Peekaboo CDS Runoff Area=12,590 sf 58.28% Impervious Runoff Depth>1.95"
Tc=6.0 min CN=89 Runoff=0.65 cfs 0.047 af

Subcatchment 25S: Fredrick CDS Runoff Area=12,484 sf 57.92% Impervious Runoff Depth>1.56"
Tc=6.0 min CN=84 Runoff=0.52 cfs 0.037 af

Subcatchment 26S: Area to Pond #106 Runoff Area=164,053 sf 3.12% Impervious Runoff Depth>0.26"
Flow Length=679' Tc=20.6 min CN=57 Runoff=0.37 cfs 0.082 af

Subcatchment 27S: Area to Pond #107 Runoff Area=43,831 sf 7.06% Impervious Runoff Depth>0.94"
Flow Length=309' Tc=11.6 min UI Adjusted CN=74 Runoff=0.85 cfs 0.079 af

Subcatchment 28S: Area to Pond #108 Runoff Area=58,076 sf 12.93% Impervious Runoff Depth>0.65"
Flow Length=247' Tc=24.0 min CN=68 Runoff=0.54 cfs 0.073 af

Subcatchment 29S: Subcatchment #29 Runoff Area=6,005 sf 26.21% Impervious Runoff Depth>0.84"
Tc=6.0 min CN=72 Runoff=0.12 cfs 0.010 af

Subcatchment 30S: Subcatchment #30 Runoff Area=40,007 sf 7.55% Impervious Runoff Depth>0.49"
Flow Length=159' Tc=13.1 min CN=64 Runoff=0.30 cfs 0.038 af

Subcatchment 31S: Subcatchment #31 Runoff Area=8,090 sf 30.07% Impervious Runoff Depth>0.49"
Tc=6.0 min CN=64 Runoff=0.08 cfs 0.008 af

Subcatchment 32S: Inlet Sump (Lt.) Runoff Area=122,911 sf 18.55% Impervious Runoff Depth>1.05"
Flow Length=809' Tc=11.6 min CN=76 Runoff=2.75 cfs 0.248 af

Subcatchment 33aS: Peekaboo Entrance Runoff Area=7,232 sf 54.76% Impervious Runoff Depth>1.00"
Tc=6.0 min CN=75 Runoff=0.18 cfs 0.014 af

Subcatchment 33bS: Subcatchment #33b Runoff Area=7,285 sf 0.00% Impervious Runoff Depth>0.08"
Tc=6.0 min CN=49 Runoff=0.00 cfs 0.001 af

Subcatchment 34S: Inlet Sump (Rt.) Runoff Area=40,148 sf 21.43% Impervious Runoff Depth>1.23"
Flow Length=594' Tc=8.6 min CN=79 Runoff=1.17 cfs 0.095 af

Subcatchment 41S: Catch Basin #1 Runoff Area=3,378 sf 100.00% Impervious Runoff Depth>2.83"
Tc=6.0 min CN=98 Runoff=0.22 cfs 0.018 af

Subcatchment 42S: Catch Basin #2 Runoff Area=3,365 sf 100.00% Impervious Runoff Depth>2.83"
Tc=6.0 min CN=98 Runoff=0.22 cfs 0.018 af

Subcatchment 43S: Catch Basin #3 Runoff Area=3,418 sf 100.00% Impervious Runoff Depth>2.83"
Tc=6.0 min CN=98 Runoff=0.23 cfs 0.018 af

Subcatchment 44S: Catch Basin #4 Runoff Area=3,568 sf 100.00% Impervious Runoff Depth>2.83"
Tc=6.0 min CN=98 Runoff=0.24 cfs 0.019 af

Subcatchment 45S: Rain Guardian #1 Runoff Area=2,431 sf 100.00% Impervious Runoff Depth>2.83"
Tc=6.0 min CN=98 Runoff=0.16 cfs 0.013 af

Reach 1R: Reach #1 Outlet Swale Avg. Flow Depth=0.20' Max Vel=0.49 fps Inflow=0.16 cfs 0.087 af
n=0.045 L=60.0' S=0.0033 '/' Capacity=22.47 cfs Outflow=0.16 cfs 0.087 af

Reach 22aR: Reach #22a Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=125.0' S=0.0732 '/' Capacity=16.09 cfs Outflow=0.00 cfs 0.000 af

Reach 22bR: Reach #22b Avg. Flow Depth=0.15' Max Vel=0.31 fps Inflow=0.17 cfs 0.098 af
n=0.080 L=392.0' S=0.0060 '/' Capacity=45.67 cfs Outflow=0.17 cfs 0.096 af

Reach 30aR: Reach #30aR Conveyance Avg. Flow Depth=0.06' Max Vel=0.67 fps Inflow=0.20 cfs 0.036 af
n=0.045 L=201.0' S=0.0199 '/' Capacity=29.56 cfs Outflow=0.19 cfs 0.036 af

Reach 30R: Reach #30 Conveyance Avg. Flow Depth=0.05' Max Vel=0.46 fps Inflow=0.21 cfs 0.037 af
n=0.045 L=205.0' S=0.0098 '/' Capacity=30.09 cfs Outflow=0.20 cfs 0.036 af

Reach 31R: Reach #31 Avg. Flow Depth=0.05' Max Vel=0.62 fps Inflow=0.07 cfs 0.008 af
n=0.045 L=158.0' S=0.0222 '/' Capacity=19.07 cfs Outflow=0.06 cfs 0.008 af

Reach 32R: Reach #32R Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=90.0' S=0.0222 '/' Capacity=8.86 cfs Outflow=0.00 cfs 0.000 af

Reach 33aR: Reach #33a Flow Through Avg. Flow Depth=0.06' Max Vel=0.34 fps Inflow=0.06 cfs 0.015 af
n=0.080 L=130.0' S=0.0231 '/' Capacity=21.37 cfs Outflow=0.05 cfs 0.015 af

Reach 33bR: Reach #33b Avg. Flow Depth=0.15' Max Vel=0.31 fps Inflow=0.17 cfs 0.099 af
n=0.080 L=108.0' S=0.0060 '/' Capacity=45.76 cfs Outflow=0.17 cfs 0.098 af

Reach 33R: Reach #33 Treatment Swale Avg. Flow Depth=0.05' Max Vel=0.13 fps Inflow=0.10 cfs 0.015 af
n=0.140 L=135.0' S=0.0074 '/' Capacity=10.03 cfs Outflow=0.06 cfs 0.015 af

Reach 100R: Final Reach #100 Inflow=0.06 cfs 0.010 af
Outflow=0.06 cfs 0.010 af

Reach 101bR: Reach #101b Avg. Flow Depth=0.17' Max Vel=0.24 fps Inflow=0.16 cfs 0.087 af
n=0.080 L=332.0' S=0.0030 '/' Capacity=32.37 cfs Outflow=0.16 cfs 0.084 af

Reach 103aR: Reach #103aR Stream Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.022 L=427.0' S=0.0076 '/' Capacity=22.54 cfs Outflow=0.00 cfs 0.000 af

Reach 103bR: Reach 103aB Overland Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=393.0' S=0.0254 '/' Capacity=4.73 cfs Outflow=0.00 cfs 0.000 af

Reach 103R: Reach #103 Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=166.0' S=0.0301 '/' Capacity=18.07 cfs Outflow=0.00 cfs 0.000 af

Reach 106aR: Reach #106a Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=251.0' S=0.0159 '/' Capacity=11.27 cfs Outflow=0.00 cfs 0.000 af

Reach 106bR: Reach #106b Avg. Flow Depth=0.14' Max Vel=0.45 fps Inflow=0.17 cfs 0.096 af
n=0.080 L=365.0' S=0.0137 '/' Capacity=51.13 cfs Outflow=0.17 cfs 0.094 af

Reach 107aR: Reach #107a Overland Avg. Flow Depth=0.08' Max Vel=0.65 fps Inflow=0.15 cfs 0.103 af
n=0.080 L=1,054.0' S=0.0598 '/' Capacity=34.39 cfs Outflow=0.15 cfs 0.100 af

Reach 107bR: Reach #107b Avg. Flow Depth=0.16' Max Vel=0.58 fps Inflow=0.28 cfs 0.193 af
n=0.080 L=902.8' S=0.0188 '/' Capacity=59.95 cfs Outflow=0.28 cfs 0.187 af

Reach 108R: Reach #108 Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=26.0' S=0.0192 '/' Capacity=20.64 cfs Outflow=0.00 cfs 0.000 af

Reach 200R: Final Reach #200 Inflow=1.01 cfs 0.656 af
Outflow=1.01 cfs 0.656 af

Reach 300R: Final Reach #300 Inflow=0.02 cfs 0.015 af
Outflow=0.02 cfs 0.015 af

Reach 400R: Final Reach #400 Inflow=3.28 cfs 0.526 af
Outflow=3.28 cfs 0.526 af

Reach 500R: Final Reach #500 Inflow=0.68 cfs 0.200 af
Outflow=0.68 cfs 0.200 af

Reach 600R: Final Reach #600 Inflow=0.01 cfs 0.003 af
Outflow=0.01 cfs 0.003 af

Reach 700R: Final Reach #700 Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach 800R: Final Reach #800 Inflow=0.22 cfs 0.032 af
Outflow=0.22 cfs 0.032 af

Reach 900R: Final Reach #900 Inflow=0.10 cfs 0.013 af
Outflow=0.10 cfs 0.013 af

Pond 1P: Pond #1 Peak Elev=183.08' Storage=3,769 cf Inflow=0.85 cfs 0.172 af
Discarded=0.01 cfs 0.009 af Primary=0.16 cfs 0.087 af Outflow=0.17 cfs 0.096 af

Pond 29P: Pond #29 Peak Elev=188.91' Storage=5 cf Inflow=0.12 cfs 0.010 af
15.0" Round Culvert n=0.012 L=55.0' S=0.0091 '/' Outflow=0.12 cfs 0.010 af

Pond 30P: Pond #30 Cross Culvert Peak Elev=191.48' Storage=213 cf Inflow=0.30 cfs 0.038 af
15.0" Round Culvert n=0.012 L=40.0' S=0.0063 '/' Outflow=0.21 cfs 0.037 af

Pond 31P: Pond #31 Cross Culvert Peak Elev=189.14' Storage=9 cf Inflow=0.08 cfs 0.008 af
15.0" Round Culvert n=0.012 L=43.0' S=0.0058 '/' Outflow=0.07 cfs 0.008 af

Pond 32P: Inlet Sump (Lt.) Peak Elev=187.77' Storage=248 cf Inflow=2.75 cfs 0.248 af
Primary=2.71 cfs 0.247 af Secondary=0.00 cfs 0.000 af Outflow=2.71 cfs 0.247 af

Pond 33P: Treatment Swale Forebay Peak Elev=185.54' Storage=585 cf Inflow=0.34 cfs 0.027 af
Outflow=0.10 cfs 0.014 af

Pond 34P: Inlet Sump (Rt.) Peak Elev=190.48' Storage=6 cf Inflow=1.17 cfs 0.095 af
18.0" Round Culvert n=0.012 L=29.7' S=0.1010 '/' Outflow=1.17 cfs 0.094 af

Pond 102P: Gravel Wetland #102 Peak Elev=186.81' Storage=12,754 cf Inflow=4.61 cfs 0.459 af
Primary=0.10 cfs 0.090 af Secondary=0.16 cfs 0.099 af Tertiary=0.00 cfs 0.000 af Outflow=0.24 cfs 0.189 af

Pond 103aP: Level Spreader Peak Elev=169.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 103P: Infiltration Rain Garden #103 Peak Elev=179.79' Storage=4,458 cf Inflow=1.44 cfs 0.233 af
Discarded=0.19 cfs 0.186 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.19 cfs 0.186 af

Pond 104P: Detention Pond #104 Peak Elev=246.47' Storage=539 cf Inflow=0.65 cfs 0.047 af
Outflow=0.18 cfs 0.047 af

Pond 105P: Center of Cul-de-sac Pond #105 Peak Elev=184.33' Storage=15 cf Inflow=0.52 cfs 0.037 af
15.0" Round Culvert n=0.012 L=60.0' S=0.0333 '/' Outflow=0.52 cfs 0.037 af

Pond 106P: Infiltration Pond #106 Peak Elev=185.84' Storage=5,661 cf Inflow=0.46 cfs 0.271 af
Discarded=0.13 cfs 0.141 af Primary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.141 af

Pond 107P: Rain Garden #107 Peak Elev=239.65' Storage=2,685 cf Inflow=1.02 cfs 0.126 af
Primary=0.05 cfs 0.008 af Secondary=0.10 cfs 0.095 af Tertiary=0.00 cfs 0.000 af Outflow=0.15 cfs 0.103 af

Pond 108P: Gravel Wetland #108 Peak Elev=184.57' Storage=2,889 cf Inflow=0.59 cfs 0.082 af
Primary=0.02 cfs 0.004 af Secondary=0.06 cfs 0.012 af Outflow=0.07 cfs 0.016 af

Pond 109P: Level Spreader Peak Elev=184.57' Storage=703 cf Inflow=0.07 cfs 0.016 af
Outflow=0.00 cfs 0.000 af

Pond C01P: Catch Basin #1 Peak Elev=214.56' Storage=0.000 af Inflow=0.22 cfs 0.018 af
12.0" Round Culvert n=0.012 L=16.0' S=0.0094 '/' Outflow=0.23 cfs 0.018 af

Pond C02P: Catch Basin #2 Peak Elev=214.38' Storage=0.000 af Inflow=0.45 cfs 0.036 af
12.0" Round Culvert n=0.012 L=231.0' S=0.0965 '/' Outflow=0.45 cfs 0.036 af

Pond C03P: Catch Basin #3 Peak Elev=186.81' Storage=0.000 af Inflow=2.85 cfs 0.265 af
24.0" Round Culvert n=0.012 L=16.0' S=0.0094 '/' Outflow=2.85 cfs 0.265 af

Pond C04P: Catch Basin #4 Peak Elev=186.81' Storage=0.000 af Inflow=3.31 cfs 0.321 af
24.0" Round Culvert n=0.012 L=20.0' S=0.0125 '/' Outflow=3.31 cfs 0.320 af

Pond C05P: Rain Guardian #1 Peak Elev=185.54' Storage=0.000 af Inflow=0.16 cfs 0.013 af
Outflow=0.16 cfs 0.013 af

Pond D01P: Drain Manhole #1 Peak Elev=192.00' Storage=0.000 af Inflow=0.45 cfs 0.036 af
12.0" Round Culvert n=0.012 L=66.2' S=0.0819 '/' Outflow=0.45 cfs 0.036 af

Total Runoff Area = 106.696 ac Runoff Volume = 2.514 af Average Runoff Depth = 0.28"
96.40% Pervious = 102.853 ac 3.60% Impervious = 3.843 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points x 3
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=280,391 sf 2.68% Impervious Runoff Depth>1.02"
Flow Length=663' Tc=24.8 min CN=59 Runoff=4.05 cfs 0.549 af

Subcatchment 2aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>4.39"
Tc=0.0 min CN=98 Runoff=0.38 cfs 0.027 af

Subcatchment 2S: Subcatchment #2 Runoff Area=1,847,283 sf 1.43% Impervious Runoff Depth>0.62"
Flow Length=2,208' Tc=87.6 min UI Adjusted CN=52 Runoff=6.85 cfs 2.196 af

Subcatchment 3aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>4.39"
Tc=0.0 min CN=98 Runoff=0.38 cfs 0.027 af

Subcatchment 3S: Subcatchment #3 Runoff Area=429,754 sf 0.89% Impervious Runoff Depth>0.29"
Flow Length=753' Tc=46.0 min UI Adjusted CN=44 Runoff=0.60 cfs 0.235 af

Subcatchment 4aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>4.39"
Tc=0.0 min CN=98 Runoff=0.38 cfs 0.027 af

Subcatchment 4S: Subcatchment #4 Runoff Area=422,569 sf 0.94% Impervious Runoff Depth>1.61"
Flow Length=1,007' Tc=35.8 min UI Adjusted CN=68 Runoff=9.18 cfs 1.298 af

Subcatchment 5S: Subcatchment #5 Runoff Area=502,048 sf 0.00% Impervious Runoff Depth>0.79"
Flow Length=1,017' Tc=26.5 min CN=55 Runoff=4.93 cfs 0.763 af

Subcatchment 6S: Subcatchment #6 Runoff Area=289,461 sf 0.18% Impervious Runoff Depth>0.22"
Flow Length=888' Tc=44.0 min CN=42 Runoff=0.24 cfs 0.120 af

Subcatchment 7aS: Houses infiltrated with Runoff Area=1,584 sf 100.00% Impervious Runoff Depth>4.39"
Tc=0.0 min CN=98 Runoff=0.19 cfs 0.013 af

Subcatchment 7S: Subcatchment #7 Runoff Area=44,800 sf 0.00% Impervious Runoff Depth>0.08"
Flow Length=424' Tc=25.7 min CN=37 Runoff=0.01 cfs 0.007 af

Subcatchment 8S: Subcatchment #8 Runoff Area=37,283 sf 0.00% Impervious Runoff Depth>1.27"
Flow Length=423' Tc=19.2 min CN=63 Runoff=0.79 cfs 0.091 af

Subcatchment 9S: Subcatchment #9 Runoff Area=15,375 sf 16.48% Impervious Runoff Depth>1.28"
Flow Length=172' Tc=13.4 min UI Adjusted CN=63 Runoff=0.38 cfs 0.038 af

Subcatchment 10S: Subcatchment #10 Runoff Area=14,130 sf 10.22% Impervious Runoff Depth>1.09"
Flow Length=226' Tc=16.6 min CN=60 Runoff=0.26 cfs 0.029 af

Subcatchment 22S: Area to Pond #102 Runoff Area=65,100 sf 12.44% Impervious Runoff Depth>1.09"
Flow Length=397' Tc=12.9 min CN=60 Runoff=1.30 cfs 0.135 af

Subcatchment 23S: Area to Pond #103 Runoff Area=149,518 sf 8.75% Impervious Runoff Depth>1.41"
Flow Length=381' Tc=17.5 min CN=65 Runoff=3.75 cfs 0.402 af

Subcatchment 24S: Peekaboo CDS Runoff Area=12,590 sf 58.28% Impervious Runoff Depth>3.42"
Tc=6.0 min CN=89 Runoff=1.11 cfs 0.082 af

Subcatchment 25S: Fredrick CDS Runoff Area=12,484 sf 57.92% Impervious Runoff Depth>2.93"
Tc=6.0 min CN=84 Runoff=0.96 cfs 0.070 af

Subcatchment 26S: Area to Pond #106 Runoff Area=164,053 sf 3.12% Impervious Runoff Depth>0.91"
Flow Length=679' Tc=20.6 min CN=57 Runoff=2.15 cfs 0.285 af

Subcatchment 27S: Area to Pond #107 Runoff Area=43,831 sf 7.06% Impervious Runoff Depth>2.07"
Flow Length=309' Tc=11.6 min UI Adjusted CN=74 Runoff=2.00 cfs 0.173 af

Subcatchment 28S: Area to Pond #108 Runoff Area=58,076 sf 12.93% Impervious Runoff Depth>1.61"
Flow Length=247' Tc=24.0 min CN=68 Runoff=1.51 cfs 0.179 af

Subcatchment 29S: Subcatchment #29 Runoff Area=6,005 sf 26.21% Impervious Runoff Depth>1.91"
Tc=6.0 min CN=72 Runoff=0.30 cfs 0.022 af

Subcatchment 30S: Subcatchment #30 Runoff Area=40,007 sf 7.55% Impervious Runoff Depth>1.34"
Flow Length=159' Tc=13.1 min CN=64 Runoff=1.05 cfs 0.103 af

Subcatchment 31S: Subcatchment #31 Runoff Area=8,090 sf 30.07% Impervious Runoff Depth>1.34"
Tc=6.0 min CN=64 Runoff=0.27 cfs 0.021 af

Subcatchment 32S: Inlet Sump (Lt.) Runoff Area=122,911 sf 18.55% Impervious Runoff Depth>2.23"
Flow Length=809' Tc=11.6 min CN=76 Runoff=6.08 cfs 0.524 af

Subcatchment 33aS: Peekaboo Entrance Runoff Area=7,232 sf 54.76% Impervious Runoff Depth>2.15"
Tc=6.0 min CN=75 Runoff=0.41 cfs 0.030 af

Subcatchment 33bS: Subcatchment #33b Runoff Area=7,285 sf 0.00% Impervious Runoff Depth>0.50"
Tc=6.0 min CN=49 Runoff=0.05 cfs 0.007 af

Subcatchment 34S: Inlet Sump (Rt.) Runoff Area=40,148 sf 21.43% Impervious Runoff Depth>2.48"
Flow Length=594' Tc=8.6 min CN=79 Runoff=2.42 cfs 0.191 af

Subcatchment 41S: Catch Basin #1 Runoff Area=3,378 sf 100.00% Impervious Runoff Depth>4.39"
Tc=6.0 min CN=98 Runoff=0.34 cfs 0.028 af

Subcatchment 42S: Catch Basin #2 Runoff Area=3,365 sf 100.00% Impervious Runoff Depth>4.39"
Tc=6.0 min CN=98 Runoff=0.34 cfs 0.028 af

Subcatchment 43S: Catch Basin #3 Runoff Area=3,418 sf 100.00% Impervious Runoff Depth>4.39"
Tc=6.0 min CN=98 Runoff=0.35 cfs 0.029 af

Subcatchment 44S: Catch Basin #4 Runoff Area=3,568 sf 100.00% Impervious Runoff Depth>4.39"
Tc=6.0 min CN=98 Runoff=0.36 cfs 0.030 af

Subcatchment 45S: Rain Guardian #1 Runoff Area=2,431 sf 100.00% Impervious Runoff Depth>4.39"
Tc=6.0 min CN=98 Runoff=0.25 cfs 0.020 af

Reach 1R: Reach #1 Outlet Swale Avg. Flow Depth=0.53' Max Vel=0.93 fps Inflow=1.36 cfs 0.453 af
n=0.045 L=60.0' S=0.0033 '/' Capacity=22.47 cfs Outflow=1.36 cfs 0.452 af

Reach 22aR: Reach #22a Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=125.0' S=0.0732 '/' Capacity=16.09 cfs Outflow=0.00 cfs 0.000 af

Reach 22bR: Reach #22b Avg. Flow Depth=0.39' Max Vel=0.59 fps Inflow=1.40 cfs 0.490 af
n=0.080 L=392.0' S=0.0060 '/' Capacity=45.67 cfs Outflow=1.37 cfs 0.485 af

Reach 30aR: Reach #30aR Conveyance Avg. Flow Depth=0.13' Max Vel=1.12 fps Inflow=0.77 cfs 0.101 af
n=0.045 L=201.0' S=0.0199 '/' Capacity=29.56 cfs Outflow=0.77 cfs 0.100 af

Reach 30R: Reach #30 Conveyance Avg. Flow Depth=0.12' Max Vel=0.77 fps Inflow=0.79 cfs 0.101 af
n=0.045 L=205.0' S=0.0098 '/' Capacity=30.09 cfs Outflow=0.77 cfs 0.101 af

Reach 31R: Reach #31 Avg. Flow Depth=0.11' Max Vel=0.99 fps Inflow=0.26 cfs 0.021 af
n=0.045 L=158.0' S=0.0222 '/' Capacity=19.07 cfs Outflow=0.25 cfs 0.021 af

Reach 32R: Reach #32R Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=90.0' S=0.0222 '/' Capacity=8.86 cfs Outflow=0.00 cfs 0.000 af

Reach 33aR: Reach #33a Flow Through Avg. Flow Depth=0.16' Max Vel=0.64 fps Inflow=0.44 cfs 0.044 af
n=0.080 L=130.0' S=0.0231 '/' Capacity=21.37 cfs Outflow=0.43 cfs 0.044 af

Reach 33bR: Reach #33b Avg. Flow Depth=0.40' Max Vel=0.59 fps Inflow=1.40 cfs 0.491 af
n=0.080 L=108.0' S=0.0060 '/' Capacity=45.76 cfs Outflow=1.40 cfs 0.490 af

Reach 33R: Reach #33 Treatment Swale Avg. Flow Depth=0.18' Max Vel=0.27 fps Inflow=0.63 cfs 0.044 af
n=0.140 L=135.0' S=0.0074 '/' Capacity=10.03 cfs Outflow=0.44 cfs 0.044 af

Reach 100R: Final Reach #100 Inflow=0.26 cfs 0.029 af
Outflow=0.26 cfs 0.029 af

Reach 101bR: Reach #101b Avg. Flow Depth=0.45' Max Vel=0.46 fps Inflow=1.36 cfs 0.452 af
n=0.080 L=332.0' S=0.0030 '/' Capacity=32.37 cfs Outflow=1.32 cfs 0.447 af

Reach 103aR: Reach #103aR Stream Avg. Flow Depth=0.03' Max Vel=0.56 fps Inflow=0.05 cfs 0.015 af
n=0.022 L=427.0' S=0.0076 '/' Capacity=22.54 cfs Outflow=0.05 cfs 0.015 af

Reach 103bR: Reach 103aB Overland Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=393.0' S=0.0254 '/' Capacity=4.73 cfs Outflow=0.00 cfs 0.000 af

Reach 103R: Reach #103 Overland Flow Avg. Flow Depth=0.03' Max Vel=0.26 fps Inflow=0.05 cfs 0.016 af
n=0.080 L=166.0' S=0.0301 '/' Capacity=18.07 cfs Outflow=0.05 cfs 0.015 af

Reach 106aR: Reach #106a Avg. Flow Depth=0.14' Max Vel=0.49 fps Inflow=0.78 cfs 0.449 af
n=0.080 L=251.0' S=0.0159 '/' Capacity=11.27 cfs Outflow=0.76 cfs 0.444 af

Reach 106bR: Reach #106b Avg. Flow Depth=0.42' Max Vel=0.92 fps Inflow=1.79 cfs 0.928 af
n=0.080 L=365.0' S=0.0137 '/' Capacity=51.13 cfs Outflow=1.77 cfs 0.921 af

Reach 107aR: Reach #107a Overland Avg. Flow Depth=0.13' Max Vel=0.90 fps Inflow=0.43 cfs 0.217 af
n=0.080 L=1,054.0' S=0.0598 '/' Capacity=34.39 cfs Outflow=0.43 cfs 0.213 af

Reach 107bR: Reach #107b Avg. Flow Depth=0.42' Max Vel=1.09 fps Inflow=2.19 cfs 1.135 af
n=0.080 L=902.8' S=0.0188 '/' Capacity=59.95 cfs Outflow=2.14 cfs 1.117 af

Reach 108R: Reach #108 Overland Flow Avg. Flow Depth=0.06' Max Vel=0.30 fps Inflow=0.20 cfs 0.075 af
n=0.080 L=26.0' S=0.0192 '/' Capacity=20.64 cfs Outflow=0.20 cfs 0.075 af

Reach 200R: Final Reach #200 Inflow=8.43 cfs 3.313 af
Outflow=8.43 cfs 3.313 af

Reach 300R: Final Reach #300 Inflow=0.60 cfs 0.250 af
Outflow=0.60 cfs 0.250 af

Reach 400R: Final Reach #400 Inflow=9.18 cfs 1.298 af
Outflow=9.18 cfs 1.298 af

Reach 500R: Final Reach #500 Inflow=4.93 cfs 0.763 af
Outflow=4.93 cfs 0.763 af

Reach 600R: Final Reach #600 Inflow=0.24 cfs 0.120 af
Outflow=0.24 cfs 0.120 af

Reach 700R: Final Reach #700 Inflow=0.01 cfs 0.007 af
Outflow=0.01 cfs 0.007 af

Reach 800R: Final Reach #800 Inflow=0.79 cfs 0.091 af
Outflow=0.79 cfs 0.091 af

Reach 900R: Final Reach #900 Inflow=0.38 cfs 0.113 af
Outflow=0.38 cfs 0.113 af

Pond 1P: Pond #1 Peak Elev=183.33' Storage=7,474 cf Inflow=4.05 cfs 0.549 af
Discarded=0.01 cfs 0.010 af Primary=1.36 cfs 0.453 af Outflow=1.37 cfs 0.463 af

Pond 29P: Pond #29 Peak Elev=189.00' Storage=10 cf Inflow=0.30 cfs 0.022 af
15.0" Round Culvert n=0.012 L=55.0' S=0.0091 '/' Outflow=0.30 cfs 0.022 af

Pond 30P: Pond #30 Cross Culvert Peak Elev=191.71' Storage=564 cf Inflow=1.05 cfs 0.103 af
15.0" Round Culvert n=0.012 L=40.0' S=0.0063 '/' Outflow=0.79 cfs 0.101 af

Pond 31P: Pond #31 Cross Culvert Peak Elev=189.26' Storage=20 cf Inflow=0.27 cfs 0.021 af
15.0" Round Culvert n=0.012 L=43.0' S=0.0058 '/' Outflow=0.26 cfs 0.021 af

Pond 32P: Inlet Sump (Lt.) Peak Elev=188.24' Storage=474 cf Inflow=6.08 cfs 0.524 af
Primary=5.95 cfs 0.520 af Secondary=0.00 cfs 0.000 af Outflow=5.95 cfs 0.520 af

Pond 33P: Treatment Swale Forebay Peak Elev=185.62' Storage=664 cf Inflow=0.65 cfs 0.050 af
Outflow=0.58 cfs 0.037 af

Pond 34P: Inlet Sump (Rt.) Peak Elev=190.72' Storage=12 cf Inflow=2.42 cfs 0.191 af
18.0" Round Culvert n=0.012 L=29.7' S=0.1010 '/' Outflow=2.40 cfs 0.191 af

Pond 102P: Gravel Wetland #102 Peak Elev=188.15' Storage=25,125 cf Inflow=10.36 cfs 0.960 af
Primary=0.10 cfs 0.089 af Secondary=0.49 cfs 0.435 af Tertiary=0.00 cfs 0.000 af Outflow=0.56 cfs 0.524 af

Pond 103aP: Level Spreader Peak Elev=170.03' Storage=389 cf Inflow=0.06 cfs 0.024 af
Outflow=0.05 cfs 0.016 af

Pond 103P: Infiltration Rain Garden #103 Peak Elev=181.93' Storage=17,176 cf Inflow=4.87 cfs 0.593 af
Discarded=0.19 cfs 0.195 af Primary=0.06 cfs 0.024 af Secondary=0.00 cfs 0.000 af Outflow=0.24 cfs 0.219 af

Pond 104P: Detention Pond #104 Peak Elev=246.96' Storage=1,100 cf Inflow=1.11 cfs 0.082 af
Outflow=0.25 cfs 0.082 af

Pond 105P: Center of Cul-de-sac Pond #105 Peak Elev=184.46' Storage=25 cf Inflow=0.96 cfs 0.070 af
15.0" Round Culvert n=0.012 L=60.0' S=0.0333 '/' Outflow=0.96 cfs 0.070 af

Pond 106P: Infiltration Pond #106 Peak Elev=186.80' Storage=9,194 cf Inflow=2.56 cfs 0.809 af
Discarded=0.13 cfs 0.150 af Primary=0.78 cfs 0.449 af Outflow=0.90 cfs 0.600 af

Pond 107P: Rain Garden #107 Peak Elev=240.25' Storage=4,380 cf Inflow=2.22 cfs 0.256 af
Primary=0.32 cfs 0.106 af Secondary=0.11 cfs 0.111 af Tertiary=0.00 cfs 0.000 af Outflow=0.43 cfs 0.217 af

Pond 108P: Gravel Wetland #108 Peak Elev=185.01' Storage=4,805 cf Inflow=1.64 cfs 0.201 af
Primary=0.02 cfs 0.004 af Secondary=0.38 cfs 0.092 af Outflow=0.40 cfs 0.092 af

Pond 109P: Level Spreader Peak Elev=185.01' Storage=1,109 cf Inflow=0.40 cfs 0.095 af
Outflow=0.20 cfs 0.070 af

Pond C01P: Catch Basin #1 Peak Elev=214.64' Storage=0.000 af Inflow=0.34 cfs 0.028 af
12.0" Round Culvert n=0.012 L=16.0' S=0.0094 '/' Outflow=0.34 cfs 0.028 af

Pond C02P: Catch Basin #2 Peak Elev=214.47' Storage=0.000 af Inflow=0.68 cfs 0.057 af
12.0" Round Culvert n=0.012 L=231.0' S=0.0965 '/' Outflow=0.69 cfs 0.057 af

Pond C03P: Catch Basin #3 Peak Elev=188.15' Storage=0.001 af Inflow=6.16 cfs 0.549 af
24.0" Round Culvert n=0.012 L=16.0' S=0.0094 '/' Outflow=6.15 cfs 0.549 af

Pond C04P: Catch Basin #4 Peak Elev=188.15' Storage=0.001 af Inflow=6.86 cfs 0.635 af
24.0" Round Culvert n=0.012 L=20.0' S=0.0125 '/' Outflow=6.85 cfs 0.634 af

Pond C05P: Rain Guardian #1 Peak Elev=185.62' Storage=0.000 af Inflow=0.25 cfs 0.020 af
Outflow=0.24 cfs 0.020 af

Pond D01P: Drain Manhole #1 Peak Elev=192.09' Storage=0.000 af Inflow=0.69 cfs 0.057 af
12.0" Round Culvert n=0.012 L=66.2' S=0.0819 '/' Outflow=0.69 cfs 0.057 af

Total Runoff Area = 106.696 ac Runoff Volume = 7.779 af Average Runoff Depth = 0.87"
96.40% Pervious = 102.853 ac 3.60% Impervious = 3.843 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points x 3
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=280,391 sf 2.68% Impervious Runoff Depth>1.74"
Flow Length=663' Tc=24.8 min CN=59 Runoff=7.50 cfs 0.932 af

Subcatchment 2aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>5.62"
Tc=0.0 min CN=98 Runoff=0.48 cfs 0.034 af

Subcatchment 2S: Subcatchment #2 Runoff Area=1,847,283 sf 1.43% Impervious Runoff Depth>1.18"
Flow Length=2,208' Tc=87.6 min UI Adjusted CN=52 Runoff=15.29 cfs 4.166 af

Subcatchment 3aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>5.62"
Tc=0.0 min CN=98 Runoff=0.48 cfs 0.034 af

Subcatchment 3S: Subcatchment #3 Runoff Area=429,754 sf 0.89% Impervious Runoff Depth>0.67"
Flow Length=753' Tc=46.0 min UI Adjusted CN=44 Runoff=2.24 cfs 0.552 af

Subcatchment 4aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>5.62"
Tc=0.0 min CN=98 Runoff=0.48 cfs 0.034 af

Subcatchment 4S: Subcatchment #4 Runoff Area=422,569 sf 0.94% Impervious Runoff Depth>2.49"
Flow Length=1,007' Tc=35.8 min UI Adjusted CN=68 Runoff=14.62 cfs 2.015 af

Subcatchment 5S: Subcatchment #5 Runoff Area=502,048 sf 0.00% Impervious Runoff Depth>1.43"
Flow Length=1,017' Tc=26.5 min CN=55 Runoff=10.18 cfs 1.370 af

Subcatchment 6S: Subcatchment #6 Runoff Area=289,461 sf 0.18% Impervious Runoff Depth>0.56"
Flow Length=888' Tc=44.0 min CN=42 Runoff=1.13 cfs 0.308 af

Subcatchment 7aS: Houses infiltrated with Runoff Area=1,584 sf 100.00% Impervious Runoff Depth>5.62"
Tc=0.0 min CN=98 Runoff=0.24 cfs 0.017 af

Subcatchment 7S: Subcatchment #7 Runoff Area=44,800 sf 0.00% Impervious Runoff Depth>0.30"
Flow Length=424' Tc=25.7 min CN=37 Runoff=0.07 cfs 0.026 af

Subcatchment 8S: Subcatchment #8 Runoff Area=37,283 sf 0.00% Impervious Runoff Depth>2.07"
Flow Length=423' Tc=19.2 min CN=63 Runoff=1.36 cfs 0.148 af

Subcatchment 9S: Subcatchment #9 Runoff Area=15,375 sf 16.48% Impervious Runoff Depth>2.07"
Flow Length=172' Tc=13.4 min UI Adjusted CN=63 Runoff=0.65 cfs 0.061 af

Subcatchment 10S: Subcatchment #10 Runoff Area=14,130 sf 10.22% Impervious Runoff Depth>1.82"
Flow Length=226' Tc=16.6 min CN=60 Runoff=0.47 cfs 0.049 af

Subcatchment 22S: Area to Pond #102 Runoff Area=65,100 sf 12.44% Impervious Runoff Depth>1.82"
Flow Length=397' Tc=12.9 min CN=60 Runoff=2.38 cfs 0.227 af

Subcatchment 23S: Area to Pond #103 Runoff Area=149,518 sf 8.75% Impervious Runoff Depth>2.24"
Flow Length=381' Tc=17.5 min CN=65 Runoff=6.23 cfs 0.641 af

Subcatchment 24S: Peekaboo CDS Runoff Area=12,590 sf 58.28% Impervious Runoff Depth>4.60"
Tc=6.0 min CN=89 Runoff=1.46 cfs 0.111 af

Subcatchment 25S: Fredrick CDS Runoff Area=12,484 sf 57.92% Impervious Runoff Depth>4.06"
Tc=6.0 min CN=84 Runoff=1.32 cfs 0.097 af

Subcatchment 26S: Area to Pond #106 Runoff Area=164,053 sf 3.12% Impervious Runoff Depth>1.58"
Flow Length=679' Tc=20.6 min CN=57 Runoff=4.21 cfs 0.497 af

Subcatchment 27S: Area to Pond #107 Runoff Area=43,831 sf 7.06% Impervious Runoff Depth>3.06"
Flow Length=309' Tc=11.6 min UI Adjusted CN=74 Runoff=2.99 cfs 0.257 af

Subcatchment 28S: Area to Pond #108 Runoff Area=58,076 sf 12.93% Impervious Runoff Depth>2.50"
Flow Length=247' Tc=24.0 min CN=68 Runoff=2.41 cfs 0.278 af

Subcatchment 29S: Subcatchment #29 Runoff Area=6,005 sf 26.21% Impervious Runoff Depth>2.88"
Tc=6.0 min CN=72 Runoff=0.46 cfs 0.033 af

Subcatchment 30S: Subcatchment #30 Runoff Area=40,007 sf 7.55% Impervious Runoff Depth>2.16"
Flow Length=159' Tc=13.1 min CN=64 Runoff=1.77 cfs 0.165 af

Subcatchment 31S: Subcatchment #31 Runoff Area=8,090 sf 30.07% Impervious Runoff Depth>2.16"
Tc=6.0 min CN=64 Runoff=0.45 cfs 0.033 af

Subcatchment 32S: Inlet Sump (Lt.) Runoff Area=122,911 sf 18.55% Impervious Runoff Depth>3.25"
Flow Length=809' Tc=11.6 min CN=76 Runoff=8.91 cfs 0.765 af

Subcatchment 33aS: Peekaboo Entrance Runoff Area=7,232 sf 54.76% Impervious Runoff Depth>3.16"
Tc=6.0 min CN=75 Runoff=0.60 cfs 0.044 af

Subcatchment 33bS: Subcatchment #33b Runoff Area=7,285 sf 0.00% Impervious Runoff Depth>1.00"
Tc=6.0 min CN=49 Runoff=0.14 cfs 0.014 af

Subcatchment 34S: Inlet Sump (Rt.) Runoff Area=40,148 sf 21.43% Impervious Runoff Depth>3.55"
Flow Length=594' Tc=8.6 min CN=79 Runoff=3.46 cfs 0.273 af

Subcatchment 41S: Catch Basin #1 Runoff Area=3,378 sf 100.00% Impervious Runoff Depth>5.62"
Tc=6.0 min CN=98 Runoff=0.43 cfs 0.036 af

Subcatchment 42S: Catch Basin #2 Runoff Area=3,365 sf 100.00% Impervious Runoff Depth>5.62"
Tc=6.0 min CN=98 Runoff=0.43 cfs 0.036 af

Subcatchment 43S: Catch Basin #3 Runoff Area=3,418 sf 100.00% Impervious Runoff Depth>5.62"
Tc=6.0 min CN=98 Runoff=0.44 cfs 0.037 af

Subcatchment 44S: Catch Basin #4 Runoff Area=3,568 sf 100.00% Impervious Runoff Depth>5.62"
Tc=6.0 min CN=98 Runoff=0.46 cfs 0.038 af

Subcatchment 45S: Rain Guardian #1 Runoff Area=2,431 sf 100.00% Impervious Runoff Depth>5.62"
Tc=6.0 min CN=98 Runoff=0.31 cfs 0.026 af

Reach 1R: Reach #1 Outlet Swale Avg. Flow Depth=0.80' Max Vel=1.20 fps Inflow=3.25 cfs 1.036 af
n=0.045 L=60.0' S=0.0033 '/' Capacity=22.47 cfs Outflow=3.25 cfs 1.035 af

Reach 22aR: Reach #22a Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=125.0' S=0.0732 '/' Capacity=16.09 cfs Outflow=0.00 cfs 0.000 af

Reach 22bR: Reach #22b Avg. Flow Depth=0.59' Max Vel=0.77 fps Inflow=3.33 cfs 1.097 af
n=0.080 L=392.0' S=0.0060 '/' Capacity=45.67 cfs Outflow=3.28 cfs 1.090 af

Reach 30aR: Reach #30aR Conveyance Avg. Flow Depth=0.17' Max Vel=1.36 fps Inflow=1.32 cfs 0.163 af
n=0.045 L=201.0' S=0.0199 '/' Capacity=29.56 cfs Outflow=1.31 cfs 0.162 af

Reach 30R: Reach #30 Conveyance Avg. Flow Depth=0.16' Max Vel=0.94 fps Inflow=1.33 cfs 0.163 af
n=0.045 L=205.0' S=0.0098 '/' Capacity=30.09 cfs Outflow=1.32 cfs 0.163 af

Reach 31R: Reach #31 Avg. Flow Depth=0.14' Max Vel=1.18 fps Inflow=0.44 cfs 0.033 af
n=0.045 L=158.0' S=0.0222 '/' Capacity=19.07 cfs Outflow=0.42 cfs 0.033 af

Reach 32R: Reach #32R Overland Flow Avg. Flow Depth=0.18' Max Vel=0.66 fps Inflow=0.92 cfs 0.207 af
n=0.080 L=90.0' S=0.0222 '/' Capacity=8.86 cfs Outflow=0.91 cfs 0.207 af

Reach 33aR: Reach #33a Flow Through Avg. Flow Depth=0.22' Max Vel=0.78 fps Inflow=0.82 cfs 0.070 af
n=0.080 L=130.0' S=0.0231 '/' Capacity=21.37 cfs Outflow=0.79 cfs 0.070 af

Reach 33bR: Reach #33b Avg. Flow Depth=0.59' Max Vel=0.77 fps Inflow=3.33 cfs 1.099 af
n=0.080 L=108.0' S=0.0060 '/' Capacity=45.76 cfs Outflow=3.33 cfs 1.097 af

Reach 33R: Reach #33 Treatment Swale Avg. Flow Depth=0.26' Max Vel=0.33 fps Inflow=0.99 cfs 0.071 af
n=0.140 L=135.0' S=0.0074 '/' Capacity=10.03 cfs Outflow=0.82 cfs 0.070 af

Reach 100R: Final Reach #100 Inflow=0.47 cfs 0.049 af
Outflow=0.47 cfs 0.049 af

Reach 101bR: Reach #101b Avg. Flow Depth=0.68' Max Vel=0.60 fps Inflow=3.25 cfs 1.035 af
n=0.080 L=332.0' S=0.0030 '/' Capacity=32.37 cfs Outflow=3.18 cfs 1.029 af

Reach 103aR: Reach #103aR Stream Avg. Flow Depth=0.08' Max Vel=1.04 fps Inflow=0.26 cfs 0.207 af
n=0.022 L=427.0' S=0.0076 '/' Capacity=22.54 cfs Outflow=0.26 cfs 0.205 af

Reach 103bR: Reach 103aB Overland Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=393.0' S=0.0254 '/' Capacity=4.73 cfs Outflow=0.00 cfs 0.000 af

Reach 103R: Reach #103 Overland Flow Avg. Flow Depth=0.07' Max Vel=0.42 fps Inflow=0.26 cfs 0.209 af
n=0.080 L=166.0' S=0.0301 '/' Capacity=18.07 cfs Outflow=0.26 cfs 0.207 af

Reach 106aR: Reach #106a Avg. Flow Depth=0.22' Max Vel=0.64 fps Inflow=2.24 cfs 0.801 af
n=0.080 L=251.0' S=0.0159 '/' Capacity=11.27 cfs Outflow=1.83 cfs 0.793 af

Reach 106bR: Reach #106b Avg. Flow Depth=0.67' Max Vel=1.26 fps Inflow=4.98 cfs 1.883 af
n=0.080 L=365.0' S=0.0137 '/' Capacity=51.13 cfs Outflow=4.94 cfs 1.874 af

Reach 107aR: Reach #107a Overland Avg. Flow Depth=0.15' Max Vel=0.98 fps Inflow=0.58 cfs 0.319 af
n=0.080 L=1,054.0' S=0.0598 '/' Capacity=34.39 cfs Outflow=0.57 cfs 0.315 af

Reach 107bR: Reach #107b Avg. Flow Depth=0.65' Max Vel=1.44 fps Inflow=5.50 cfs 2.189 af
n=0.080 L=902.8' S=0.0188 '/' Capacity=59.95 cfs Outflow=5.31 cfs 2.166 af

Reach 108R: Reach #108 Overland Flow Avg. Flow Depth=0.12' Max Vel=0.48 fps Inflow=0.95 cfs 0.182 af
n=0.080 L=26.0' S=0.0192 '/' Capacity=20.64 cfs Outflow=0.98 cfs 0.182 af

Reach 200R: Final Reach #200 Inflow=20.59 cfs 6.332 af
Outflow=20.59 cfs 6.332 af

Reach 300R: Final Reach #300 Inflow=2.24 cfs 0.757 af
Outflow=2.24 cfs 0.757 af

Reach 400R: Final Reach #400 Inflow=14.62 cfs 2.015 af
Outflow=14.62 cfs 2.015 af

Reach 500R: Final Reach #500 Inflow=10.18 cfs 1.370 af
Outflow=10.18 cfs 1.370 af

Reach 600R: Final Reach #600 Inflow=1.13 cfs 0.308 af
Outflow=1.13 cfs 0.308 af

Reach 700R: Final Reach #700 Inflow=0.07 cfs 0.026 af
Outflow=0.07 cfs 0.026 af

Reach 800R: Final Reach #800 Inflow=1.36 cfs 0.148 af
Outflow=1.36 cfs 0.148 af

Reach 900R: Final Reach #900 Inflow=1.11 cfs 0.243 af
Outflow=1.11 cfs 0.243 af

Pond 1P: Pond #1 Peak Elev=183.60' Storage=12,109 cf Inflow=7.53 cfs 1.140 af
Discarded=0.01 cfs 0.011 af Primary=3.25 cfs 1.036 af Outflow=3.27 cfs 1.046 af

Pond 29P: Pond #29 Peak Elev=189.06' Storage=14 cf Inflow=0.46 cfs 0.033 af
15.0" Round Culvert n=0.012 L=55.0' S=0.0091 '/' Outflow=0.46 cfs 0.033 af

Pond 30P: Pond #30 Cross Culvert Peak Elev=191.87' Storage=901 cf Inflow=1.77 cfs 0.165 af
15.0" Round Culvert n=0.012 L=40.0' S=0.0063 '/' Outflow=1.33 cfs 0.163 af

Pond 31P: Pond #31 Cross Culvert Peak Elev=189.34' Storage=30 cf Inflow=0.45 cfs 0.033 af
15.0" Round Culvert n=0.012 L=43.0' S=0.0058 '/' Outflow=0.44 cfs 0.033 af

Pond 32P: Inlet Sump (Lt.) Peak Elev=188.88' Storage=882 cf Inflow=8.91 cfs 0.765 af
Primary=8.15 cfs 0.614 af Secondary=0.92 cfs 0.207 af Outflow=8.24 cfs 0.754 af

Pond 33P: Treatment Swale Forebay Peak Elev=185.65' Storage=700 cf Inflow=0.91 cfs 0.070 af
Outflow=0.85 cfs 0.057 af

Pond 34P: Inlet Sump (Rt.) Peak Elev=190.88' Storage=18 cf Inflow=3.46 cfs 0.273 af
18.0" Round Culvert n=0.012 L=29.7' S=0.1010 '/' Outflow=3.45 cfs 0.273 af

Pond 102P: Gravel Wetland #102 Peak Elev=188.92' Storage=33,726 cf Inflow=14.94 cfs 1.259 af
Primary=0.10 cfs 0.110 af Secondary=0.61 cfs 0.561 af Tertiary=0.00 cfs 0.000 af Outflow=0.70 cfs 0.671 af

Pond 103aP: Level Spreader Peak Elev=170.07' Storage=409 cf Inflow=0.26 cfs 0.218 af
Outflow=0.26 cfs 0.209 af

Pond 103P: Infiltration Rain Garden #103 Peak Elev=183.08' Storage=25,931 cf Inflow=8.16 cfs 0.934 af
Discarded=0.19 cfs 0.206 af Primary=0.26 cfs 0.218 af Secondary=0.00 cfs 0.000 af Outflow=0.44 cfs 0.424 af

Pond 104P: Detention Pond #104 Peak Elev=247.31' Storage=1,589 cf Inflow=1.46 cfs 0.111 af
Outflow=0.28 cfs 0.111 af

Pond 105P: Center of Cul-de-sac Pond #105 Peak Elev=184.55' Storage=34 cf Inflow=1.32 cfs 0.097 af
15.0" Round Culvert n=0.012 L=60.0' S=0.0333 '/' Outflow=1.32 cfs 0.097 af

Pond 106P: Infiltration Pond #106 Peak Elev=186.85' Storage=9,398 cf Inflow=4.79 cfs 1.168 af
Discarded=0.13 cfs 0.157 af Primary=2.24 cfs 0.801 af Outflow=2.36 cfs 0.958 af

Pond 107P: Rain Garden #107 Peak Elev=240.83' Storage=6,394 cf Inflow=3.24 cfs 0.367 af
Primary=0.45 cfs 0.198 af Secondary=0.12 cfs 0.121 af Tertiary=0.00 cfs 0.000 af Outflow=0.58 cfs 0.319 af

Pond 108P: Gravel Wetland #108 Peak Elev=185.10' Storage=5,154 cf Inflow=2.60 cfs 0.311 af
Primary=0.02 cfs 0.005 af Secondary=1.47 cfs 0.202 af Outflow=1.64 cfs 0.201 af

Pond 109P: Level Spreader Peak Elev=185.03' Storage=1,130 cf Inflow=1.48 cfs 0.207 af
Outflow=0.95 cfs 0.181 af

Pond C01P: Catch Basin #1 Peak Elev=214.70' Storage=0.000 af Inflow=0.43 cfs 0.036 af
12.0" Round Culvert n=0.012 L=16.0' S=0.0094 '/' Outflow=0.44 cfs 0.036 af

Pond C02P: Catch Basin #2 Peak Elev=214.53' Storage=0.000 af Inflow=0.87 cfs 0.072 af
12.0" Round Culvert n=0.012 L=231.0' S=0.0965 '/' Outflow=0.87 cfs 0.072 af

Pond C03P: Catch Basin #3 Peak Elev=188.93' Storage=0.001 af Inflow=8.43 cfs 0.650 af
24.0" Round Culvert n=0.012 L=16.0' S=0.0094 '/' Outflow=8.42 cfs 0.649 af

Pond C04P: Catch Basin #4 Peak Elev=188.92' Storage=0.001 af Inflow=9.39 cfs 0.760 af
24.0" Round Culvert n=0.012 L=20.0' S=0.0125 '/' Outflow=9.37 cfs 0.759 af

Pond C05P: Rain Guardian #1 Peak Elev=185.65' Storage=0.000 af Inflow=0.31 cfs 0.026 af
Outflow=0.31 cfs 0.026 af

Pond D01P: Drain Manhole #1 Peak Elev=192.15' Storage=0.000 af Inflow=0.87 cfs 0.072 af
12.0" Round Culvert n=0.012 L=66.2' S=0.0819 '/' Outflow=0.87 cfs 0.072 af

Total Runoff Area = 106.696 ac Runoff Volume = 13.356 af Average Runoff Depth = 1.50"
96.40% Pervious = 102.853 ac 3.60% Impervious = 3.843 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points x 3
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=280,391 sf 2.68% Impervious Runoff Depth>2.50"
Flow Length=663' Tc=24.8 min CN=59 Runoff=11.19 cfs 1.340 af

Subcatchment 2aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>6.77"
Tc=0.0 min CN=98 Runoff=0.57 cfs 0.041 af

Subcatchment 2S: Subcatchment #2 Runoff Area=1,847,283 sf 1.43% Impervious Runoff Depth>1.80"
Flow Length=2,208' Tc=87.6 min UI Adjusted CN=52 Runoff=25.15 cfs 6.365 af

Subcatchment 3aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>6.77"
Tc=0.0 min CN=98 Runoff=0.57 cfs 0.041 af

Subcatchment 3S: Subcatchment #3 Runoff Area=429,754 sf 0.89% Impervious Runoff Depth>1.14"
Flow Length=753' Tc=46.0 min UI Adjusted CN=44 Runoff=4.60 cfs 0.937 af

Subcatchment 4aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>6.77"
Tc=0.0 min CN=98 Runoff=0.57 cfs 0.041 af

Subcatchment 4S: Subcatchment #4 Runoff Area=422,569 sf 0.94% Impervious Runoff Depth>3.39"
Flow Length=1,007' Tc=35.8 min UI Adjusted CN=68 Runoff=20.09 cfs 2.742 af

Subcatchment 5S: Subcatchment #5 Runoff Area=502,048 sf 0.00% Impervious Runoff Depth>2.12"
Flow Length=1,017' Tc=26.5 min CN=55 Runoff=15.98 cfs 2.032 af

Subcatchment 6S: Subcatchment #6 Runoff Area=289,461 sf 0.18% Impervious Runoff Depth>0.98"
Flow Length=888' Tc=44.0 min CN=42 Runoff=2.54 cfs 0.544 af

Subcatchment 7aS: Houses infiltrated with Runoff Area=1,584 sf 100.00% Impervious Runoff Depth>6.77"
Tc=0.0 min CN=98 Runoff=0.29 cfs 0.021 af

Subcatchment 7S: Subcatchment #7 Runoff Area=44,800 sf 0.00% Impervious Runoff Depth>0.62"
Flow Length=424' Tc=25.7 min CN=37 Runoff=0.23 cfs 0.053 af

Subcatchment 8S: Subcatchment #8 Runoff Area=37,283 sf 0.00% Impervious Runoff Depth>2.90"
Flow Length=423' Tc=19.2 min CN=63 Runoff=1.95 cfs 0.207 af

Subcatchment 9S: Subcatchment #9 Runoff Area=15,375 sf 16.48% Impervious Runoff Depth>2.90"
Flow Length=172' Tc=13.4 min UI Adjusted CN=63 Runoff=0.92 cfs 0.085 af

Subcatchment 10S: Subcatchment #10 Runoff Area=14,130 sf 10.22% Impervious Runoff Depth>2.60"
Flow Length=226' Tc=16.6 min CN=60 Runoff=0.69 cfs 0.070 af

Subcatchment 22S: Area to Pond #102 Runoff Area=65,100 sf 12.44% Impervious Runoff Depth>2.60"
Flow Length=397' Tc=12.9 min CN=60 Runoff=3.50 cfs 0.324 af

Subcatchment 23S: Area to Pond #103 Runoff Area=149,518 sf 8.75% Impervious Runoff Depth>3.10"
Flow Length=381' Tc=17.5 min CN=65 Runoff=8.77 cfs 0.886 af

Subcatchment 24S: Peekaboo CDS Runoff Area=12,590 sf 58.28% Impervious Runoff Depth>5.71"
Tc=6.0 min CN=89 Runoff=1.80 cfs 0.138 af

Subcatchment 25S: Fredrick CDS Runoff Area=12,484 sf 57.92% Impervious Runoff Depth>5.15"
Tc=6.0 min CN=84 Runoff=1.65 cfs 0.123 af

Subcatchment 26S: Area to Pond #106 Runoff Area=164,053 sf 3.12% Impervious Runoff Depth>2.31"
Flow Length=679' Tc=20.6 min CN=57 Runoff=6.43 cfs 0.724 af

Subcatchment 27S: Area to Pond #107 Runoff Area=43,831 sf 7.06% Impervious Runoff Depth>4.04"
Flow Length=309' Tc=11.6 min UI Adjusted CN=74 Runoff=3.95 cfs 0.339 af

Subcatchment 28S: Area to Pond #108 Runoff Area=58,076 sf 12.93% Impervious Runoff Depth>3.40"
Flow Length=247' Tc=24.0 min CN=68 Runoff=3.31 cfs 0.378 af

Subcatchment 29S: Subcatchment #29 Runoff Area=6,005 sf 26.21% Impervious Runoff Depth>3.83"
Tc=6.0 min CN=72 Runoff=0.61 cfs 0.044 af

Subcatchment 30S: Subcatchment #30 Runoff Area=40,007 sf 7.55% Impervious Runoff Depth>3.00"
Flow Length=159' Tc=13.1 min CN=64 Runoff=2.52 cfs 0.230 af

Subcatchment 31S: Subcatchment #31 Runoff Area=8,090 sf 30.07% Impervious Runoff Depth>3.01"
Tc=6.0 min CN=64 Runoff=0.64 cfs 0.047 af

Subcatchment 32S: Inlet Sump (Lt.) Runoff Area=122,911 sf 18.55% Impervious Runoff Depth>4.26"
Flow Length=809' Tc=11.6 min CN=76 Runoff=11.65 cfs 1.001 af

Subcatchment 33aS: Peekaboo Entrance Runoff Area=7,232 sf 54.76% Impervious Runoff Depth>4.15"
Tc=6.0 min CN=75 Runoff=0.79 cfs 0.057 af

Subcatchment 33bS: Subcatchment #33b Runoff Area=7,285 sf 0.00% Impervious Runoff Depth>1.58"
Tc=6.0 min CN=49 Runoff=0.26 cfs 0.022 af

Subcatchment 34S: Inlet Sump (Rt.) Runoff Area=40,148 sf 21.43% Impervious Runoff Depth>4.59"
Flow Length=594' Tc=8.6 min CN=79 Runoff=4.45 cfs 0.352 af

Subcatchment 41S: Catch Basin #1 Runoff Area=3,378 sf 100.00% Impervious Runoff Depth>6.77"
Tc=6.0 min CN=98 Runoff=0.52 cfs 0.044 af

Subcatchment 42S: Catch Basin #2 Runoff Area=3,365 sf 100.00% Impervious Runoff Depth>6.77"
Tc=6.0 min CN=98 Runoff=0.52 cfs 0.044 af

Subcatchment 43S: Catch Basin #3 Runoff Area=3,418 sf 100.00% Impervious Runoff Depth>6.77"
Tc=6.0 min CN=98 Runoff=0.53 cfs 0.044 af

Subcatchment 44S: Catch Basin #4 Runoff Area=3,568 sf 100.00% Impervious Runoff Depth>6.77"
Tc=6.0 min CN=98 Runoff=0.55 cfs 0.046 af

Subcatchment 45S: Rain Guardian #1 Runoff Area=2,431 sf 100.00% Impervious Runoff Depth>6.77"
Tc=6.0 min CN=98 Runoff=0.37 cfs 0.031 af

Reach 1R: Reach #1 Outlet Swale Avg. Flow Depth=1.16' Max Vel=1.52 fps Inflow=7.18 cfs 1.712 af
n=0.045 L=60.0' S=0.0033 '/' Capacity=22.47 cfs Outflow=7.18 cfs 1.711 af

Reach 22aR: Reach #22a Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=125.0' S=0.0732 '/' Capacity=16.09 cfs Outflow=0.00 cfs 0.000 af

Reach 22bR: Reach #22b Avg. Flow Depth=0.85' Max Vel=0.98 fps Inflow=7.28 cfs 1.798 af
n=0.080 L=392.0' S=0.0060 '/' Capacity=45.67 cfs Outflow=7.18 cfs 1.790 af

Reach 30aR: Reach #30aR Conveyance Avg. Flow Depth=0.21' Max Vel=1.54 fps Inflow=1.86 cfs 0.227 af
n=0.045 L=201.0' S=0.0199 '/' Capacity=29.56 cfs Outflow=1.85 cfs 0.226 af

Reach 30R: Reach #30 Conveyance Avg. Flow Depth=0.20' Max Vel=1.07 fps Inflow=1.87 cfs 0.228 af
n=0.045 L=205.0' S=0.0098 '/' Capacity=30.09 cfs Outflow=1.86 cfs 0.227 af

Reach 31R: Reach #31 Avg. Flow Depth=0.17' Max Vel=1.32 fps Inflow=0.63 cfs 0.046 af
n=0.045 L=158.0' S=0.0222 '/' Capacity=19.07 cfs Outflow=0.60 cfs 0.046 af

Reach 32R: Reach #32R Overland Flow Avg. Flow Depth=0.35' Max Vel=1.04 fps Inflow=4.20 cfs 0.483 af
n=0.080 L=90.0' S=0.0222 '/' Capacity=8.86 cfs Outflow=4.13 cfs 0.483 af

Reach 33aR: Reach #33a Flow Through Avg. Flow Depth=0.26' Max Vel=0.86 fps Inflow=1.15 cfs 0.097 af
n=0.080 L=130.0' S=0.0231 '/' Capacity=21.37 cfs Outflow=1.12 cfs 0.097 af

Reach 33bR: Reach #33b Avg. Flow Depth=0.85' Max Vel=0.98 fps Inflow=7.28 cfs 1.800 af
n=0.080 L=108.0' S=0.0060 '/' Capacity=45.76 cfs Outflow=7.28 cfs 1.798 af

Reach 33R: Reach #33 Treatment Swale Avg. Flow Depth=0.31' Max Vel=0.37 fps Inflow=1.35 cfs 0.098 af
n=0.140 L=135.0' S=0.0074 '/' Capacity=10.03 cfs Outflow=1.15 cfs 0.097 af

Reach 100R: Final Reach #100 Inflow=0.69 cfs 0.070 af
Outflow=0.69 cfs 0.070 af

Reach 101bR: Reach #101b Avg. Flow Depth=0.99' Max Vel=0.76 fps Inflow=7.18 cfs 1.711 af
n=0.080 L=332.0' S=0.0030 '/' Capacity=32.37 cfs Outflow=7.06 cfs 1.703 af

Reach 103aR: Reach #103aR Stream Avg. Flow Depth=0.10' Max Vel=1.18 fps Inflow=0.37 cfs 0.317 af
n=0.022 L=427.0' S=0.0076 '/' Capacity=22.54 cfs Outflow=0.37 cfs 0.314 af

Reach 103bR: Reach 103aB Overland Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=393.0' S=0.0254 '/' Capacity=4.73 cfs Outflow=0.00 cfs 0.000 af

Reach 103R: Reach #103 Overland Flow Avg. Flow Depth=0.08' Max Vel=0.47 fps Inflow=0.37 cfs 0.320 af
n=0.080 L=166.0' S=0.0301 '/' Capacity=18.07 cfs Outflow=0.37 cfs 0.317 af

Reach 106aR: Reach #106a Avg. Flow Depth=0.34' Max Vel=0.86 fps Inflow=5.87 cfs 1.070 af
n=0.080 L=251.0' S=0.0159 '/' Capacity=11.27 cfs Outflow=4.79 cfs 1.062 af

Reach 106bR: Reach #106b Avg. Flow Depth=0.94' Max Vel=1.57 fps Inflow=10.08 cfs 2.852 af
n=0.080 L=365.0' S=0.0137 '/' Capacity=51.13 cfs Outflow=10.05 cfs 2.841 af

Reach 107aR: Reach #107a Overland Avg. Flow Depth=0.16' Max Vel=1.03 fps Inflow=0.67 cfs 0.423 af
n=0.080 L=1,054.0' S=0.0598 '/' Capacity=34.39 cfs Outflow=0.67 cfs 0.419 af

Reach 107bR: Reach #107b Avg. Flow Depth=0.88' Max Vel=1.77 fps Inflow=10.68 cfs 3.259 af
n=0.080 L=902.8' S=0.0188 '/' Capacity=59.95 cfs Outflow=10.39 cfs 3.234 af

Reach 108R: Reach #108 Overland Flow Avg. Flow Depth=0.17' Max Vel=0.61 fps Inflow=2.25 cfs 0.296 af
n=0.080 L=26.0' S=0.0192 '/' Capacity=20.64 cfs Outflow=2.09 cfs 0.296 af

Reach 200R: Final Reach #200 Inflow=35.04 cfs 9.599 af
Outflow=35.04 cfs 9.599 af

Reach 300R: Final Reach #300 Inflow=4.60 cfs 1.252 af
Outflow=4.60 cfs 1.252 af

Reach 400R: Final Reach #400 Inflow=20.09 cfs 2.742 af
Outflow=20.09 cfs 2.742 af

Reach 500R: Final Reach #500 Inflow=15.98 cfs 2.032 af
Outflow=15.98 cfs 2.032 af

Reach 600R: Final Reach #600 Inflow=2.54 cfs 0.544 af
Outflow=2.54 cfs 0.544 af

Reach 700R: Final Reach #700 Inflow=0.23 cfs 0.053 af
Outflow=0.23 cfs 0.053 af

Reach 800R: Final Reach #800 Inflow=1.95 cfs 0.207 af
Outflow=1.95 cfs 0.207 af

Reach 900R: Final Reach #900 Inflow=2.39 cfs 0.381 af
Outflow=2.39 cfs 0.381 af

Pond 1P: Pond #1 Peak Elev=184.02' Storage=20,797 cf Inflow=13.67 cfs 1.823 af
Discarded=0.02 cfs 0.011 af Primary=7.18 cfs 1.712 af Outflow=7.20 cfs 1.723 af

Pond 29P: Pond #29 Peak Elev=189.12' Storage=18 cf Inflow=0.61 cfs 0.044 af
15.0" Round Culvert n=0.012 L=55.0' S=0.0091 '/' Outflow=0.61 cfs 0.044 af

Pond 30P: Pond #30 Cross Culvert Peak Elev=192.01' Storage=1,260 cf Inflow=2.52 cfs 0.230 af
15.0" Round Culvert n=0.012 L=40.0' S=0.0063 '/' Outflow=1.87 cfs 0.228 af

Pond 31P: Pond #31 Cross Culvert Peak Elev=189.41' Storage=39 cf Inflow=0.64 cfs 0.047 af
15.0" Round Culvert n=0.012 L=43.0' S=0.0058 '/' Outflow=0.63 cfs 0.046 af

Pond 32P: Inlet Sump (Lt.) Peak Elev=189.08' Storage=1,036 cf Inflow=11.65 cfs 1.001 af
Primary=7.86 cfs 0.505 af Secondary=4.20 cfs 0.483 af Outflow=11.95 cfs 0.988 af

Pond 33P: Treatment Swale Forebay Peak Elev=185.68' Storage=729 cf Inflow=1.17 cfs 0.089 af
Outflow=1.09 cfs 0.076 af

Pond 34P: Inlet Sump (Rt.) Peak Elev=191.03' Storage=24 cf Inflow=4.45 cfs 0.352 af
18.0" Round Culvert n=0.012 L=29.7' S=0.1010 '/' Outflow=4.44 cfs 0.352 af

Pond 102P: Gravel Wetland #102 Peak Elev=189.27' Storage=38,118 cf Inflow=17.19 cfs 1.358 af
Primary=0.10 cfs 0.120 af Secondary=0.66 cfs 0.600 af Tertiary=0.00 cfs 0.000 af Outflow=0.75 cfs 0.720 af

Pond 103aP: Level Spreader Peak Elev=170.08' Storage=415 cf Inflow=0.37 cfs 0.330 af
Outflow=0.37 cfs 0.320 af

Pond 103P: Infiltration Rain Garden #103 Peak Elev=184.26' Storage=36,708 cf Inflow=11.45 cfs 1.282 af
Discarded=0.19 cfs 0.216 af Primary=0.37 cfs 0.330 af Secondary=0.00 cfs 0.000 af Outflow=0.55 cfs 0.545 af

Pond 104P: Detention Pond #104 Peak Elev=247.61' Storage=2,074 cf Inflow=1.80 cfs 0.138 af
Outflow=0.31 cfs 0.137 af

Pond 105P: Center of Cul-de-sac Pond #105 Peak Elev=184.63' Storage=43 cf Inflow=1.65 cfs 0.123 af
15.0" Round Culvert n=0.012 L=60.0' S=0.0333 '/' Outflow=1.65 cfs 0.123 af

Pond 106P: Infiltration Pond #106 Peak Elev=186.93' Storage=9,770 cf Inflow=7.11 cfs 1.444 af
Discarded=0.13 cfs 0.164 af Primary=5.87 cfs 1.070 af Outflow=6.00 cfs 1.234 af

Pond 107P: Rain Garden #107 Peak Elev=241.35' Storage=8,548 cf Inflow=4.23 cfs 0.476 af
Primary=0.55 cfs 0.292 af Secondary=0.13 cfs 0.131 af Tertiary=0.00 cfs 0.000 af Outflow=0.67 cfs 0.423 af

Pond 108P: Gravel Wetland #108 Peak Elev=185.31' Storage=6,117 cf Inflow=3.56 cfs 0.422 af
Primary=0.02 cfs 0.006 af Secondary=2.39 cfs 0.316 af Outflow=2.11 cfs 0.312 af

Pond 109P: Level Spreader Peak Elev=185.06' Storage=1,157 cf Inflow=2.40 cfs 0.322 af
Outflow=2.25 cfs 0.296 af

Pond C01P: Catch Basin #1 Peak Elev=214.75' Storage=0.000 af Inflow=0.52 cfs 0.044 af
12.0" Round Culvert n=0.012 L=16.0' S=0.0094 '/' Outflow=0.52 cfs 0.044 af

Pond C02P: Catch Basin #2 Peak Elev=214.58' Storage=0.000 af Inflow=1.04 cfs 0.087 af
12.0" Round Culvert n=0.012 L=231.0' S=0.0965 '/' Outflow=1.04 cfs 0.087 af

Pond C03P: Catch Basin #3 Peak Elev=189.27' Storage=0.001 af Inflow=8.28 cfs 0.549 af
24.0" Round Culvert n=0.012 L=16.0' S=0.0094 '/' Outflow=8.26 cfs 0.548 af

Pond C04P: Catch Basin #4 Peak Elev=189.27' Storage=0.001 af Inflow=9.65 cfs 0.682 af
24.0" Round Culvert n=0.012 L=20.0' S=0.0125 '/' Outflow=9.63 cfs 0.681 af

Pond C05P: Rain Guardian #1 Peak Elev=185.68' Storage=0.000 af Inflow=0.37 cfs 0.031 af
Outflow=0.38 cfs 0.031 af

Pond D01P: Drain Manhole #1 Peak Elev=192.20' Storage=0.000 af Inflow=1.04 cfs 0.087 af
12.0" Round Culvert n=0.012 L=66.2' S=0.0819 '/' Outflow=1.04 cfs 0.087 af

Total Runoff Area = 106.696 ac Runoff Volume = 19.393 af Average Runoff Depth = 2.18"
96.40% Pervious = 102.853 ac 3.60% Impervious = 3.843 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points x 3
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=280,391 sf 2.68% Impervious Runoff Depth>3.49"
Flow Length=663' Tc=24.8 min CN=59 Runoff=15.98 cfs 1.874 af

Subcatchment 2aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>8.15"
Tc=0.0 min CN=98 Runoff=0.69 cfs 0.049 af

Subcatchment 2S: Subcatchment #2 Runoff Area=1,847,283 sf 1.43% Impervious Runoff Depth>2.65"
Flow Length=2,208' Tc=87.6 min UI Adjusted CN=52 Runoff=38.80 cfs 9.350 af

Subcatchment 3aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>8.15"
Tc=0.0 min CN=98 Runoff=0.69 cfs 0.049 af

Subcatchment 3S: Subcatchment #3 Runoff Area=429,754 sf 0.89% Impervious Runoff Depth>1.81"
Flow Length=753' Tc=46.0 min UI Adjusted CN=44 Runoff=8.23 cfs 1.490 af

Subcatchment 4aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>8.15"
Tc=0.0 min CN=98 Runoff=0.69 cfs 0.049 af

Subcatchment 4S: Subcatchment #4 Runoff Area=422,569 sf 0.94% Impervious Runoff Depth>4.53"
Flow Length=1,007' Tc=35.8 min UI Adjusted CN=68 Runoff=26.95 cfs 3.663 af

Subcatchment 5S: Subcatchment #5 Runoff Area=502,048 sf 0.00% Impervious Runoff Depth>3.03"
Flow Length=1,017' Tc=26.5 min CN=55 Runoff=23.71 cfs 2.914 af

Subcatchment 6S: Subcatchment #6 Runoff Area=289,461 sf 0.18% Impervious Runoff Depth>1.61"
Flow Length=888' Tc=44.0 min CN=42 Runoff=4.80 cfs 0.889 af

Subcatchment 7aS: Houses infiltrated with Runoff Area=1,584 sf 100.00% Impervious Runoff Depth>8.15"
Tc=0.0 min CN=98 Runoff=0.34 cfs 0.025 af

Subcatchment 7S: Subcatchment #7 Runoff Area=44,800 sf 0.00% Impervious Runoff Depth>1.12"
Flow Length=424' Tc=25.7 min CN=37 Runoff=0.55 cfs 0.096 af

Subcatchment 8S: Subcatchment #8 Runoff Area=37,283 sf 0.00% Impervious Runoff Depth>3.96"
Flow Length=423' Tc=19.2 min CN=63 Runoff=2.71 cfs 0.283 af

Subcatchment 9S: Subcatchment #9 Runoff Area=15,375 sf 16.48% Impervious Runoff Depth>3.97"
Flow Length=172' Tc=13.4 min UI Adjusted CN=63 Runoff=1.28 cfs 0.117 af

Subcatchment 10S: Subcatchment #10 Runoff Area=14,130 sf 10.22% Impervious Runoff Depth>3.62"
Flow Length=226' Tc=16.6 min CN=60 Runoff=0.98 cfs 0.098 af

Subcatchment 22S: Area to Pond #102 Runoff Area=65,100 sf 12.44% Impervious Runoff Depth>3.62"
Flow Length=397' Tc=12.9 min CN=60 Runoff=4.96 cfs 0.451 af

Subcatchment 23S: Area to Pond #103 Runoff Area=149,518 sf 8.75% Impervious Runoff Depth>4.20"
Flow Length=381' Tc=17.5 min CN=65 Runoff=11.98 cfs 1.201 af

Subcatchment 24S: Peekaboo CDS Runoff Area=12,590 sf 58.28% Impervious Runoff Depth>7.06"
Tc=6.0 min CN=89 Runoff=2.20 cfs 0.170 af

Subcatchment 25S: Fredrick CDS Runoff Area=12,484 sf 57.92% Impervious Runoff Depth>6.47"
Tc=6.0 min CN=84 Runoff=2.05 cfs 0.154 af

Subcatchment 26S: Area to Pond #106 Runoff Area=164,053 sf 3.12% Impervious Runoff Depth>3.27"
Flow Length=679' Tc=20.6 min CN=57 Runoff=9.36 cfs 1.025 af

Subcatchment 27S: Area to Pond #107 Runoff Area=43,831 sf 7.06% Impervious Runoff Depth>5.27"
Flow Length=309' Tc=11.6 min UI Adjusted CN=74 Runoff=5.13 cfs 0.442 af

Subcatchment 28S: Area to Pond #108 Runoff Area=58,076 sf 12.93% Impervious Runoff Depth>4.54"
Flow Length=247' Tc=24.0 min CN=68 Runoff=4.44 cfs 0.505 af

Subcatchment 29S: Subcatchment #29 Runoff Area=6,005 sf 26.21% Impervious Runoff Depth>5.03"
Tc=6.0 min CN=72 Runoff=0.80 cfs 0.058 af

Subcatchment 30S: Subcatchment #30 Runoff Area=40,007 sf 7.55% Impervious Runoff Depth>4.08"
Flow Length=159' Tc=13.1 min CN=64 Runoff=3.46 cfs 0.313 af

Subcatchment 31S: Subcatchment #31 Runoff Area=8,090 sf 30.07% Impervious Runoff Depth>4.09"
Tc=6.0 min CN=64 Runoff=0.87 cfs 0.063 af

Subcatchment 32S: Inlet Sump (Lt.) Runoff Area=122,911 sf 18.55% Impervious Runoff Depth>5.50"
Flow Length=809' Tc=11.6 min CN=76 Runoff=14.98 cfs 1.294 af

Subcatchment 33aS: Peekaboo Entrance Runoff Area=7,232 sf 54.76% Impervious Runoff Depth>5.39"
Tc=6.0 min CN=75 Runoff=1.02 cfs 0.075 af

Subcatchment 33bS: Subcatchment #33b Runoff Area=7,285 sf 0.00% Impervious Runoff Depth>2.38"
Tc=6.0 min CN=49 Runoff=0.42 cfs 0.033 af

Subcatchment 34S: Inlet Sump (Rt.) Runoff Area=40,148 sf 21.43% Impervious Runoff Depth>5.86"
Flow Length=594' Tc=8.6 min CN=79 Runoff=5.64 cfs 0.450 af

Subcatchment 41S: Catch Basin #1 Runoff Area=3,378 sf 100.00% Impervious Runoff Depth>8.15"
Tc=6.0 min CN=98 Runoff=0.62 cfs 0.053 af

Subcatchment 42S: Catch Basin #2 Runoff Area=3,365 sf 100.00% Impervious Runoff Depth>8.15"
Tc=6.0 min CN=98 Runoff=0.62 cfs 0.052 af

Subcatchment 43S: Catch Basin #3 Runoff Area=3,418 sf 100.00% Impervious Runoff Depth>8.15"
Tc=6.0 min CN=98 Runoff=0.63 cfs 0.053 af

Subcatchment 44S: Catch Basin #4 Runoff Area=3,568 sf 100.00% Impervious Runoff Depth>8.15"
Tc=6.0 min CN=98 Runoff=0.66 cfs 0.056 af

Subcatchment 45S: Rain Guardian #1 Runoff Area=2,431 sf 100.00% Impervious Runoff Depth>8.15"
Tc=6.0 min CN=98 Runoff=0.45 cfs 0.038 af

Reach 1R: Reach #1 Outlet Swale Avg. Flow Depth=1.50' Max Vel=1.77 fps Inflow=12.31 cfs 2.589 af
n=0.045 L=60.0' S=0.0033 '/' Capacity=22.47 cfs Outflow=12.31 cfs 2.588 af

Reach 22aR: Reach #22a Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=125.0' S=0.0732 '/' Capacity=16.09 cfs Outflow=0.00 cfs 0.000 af

Reach 22bR: Reach #22b Avg. Flow Depth=1.09' Max Vel=1.15 fps Inflow=12.46 cfs 2.703 af
n=0.080 L=392.0' S=0.0060 '/' Capacity=45.67 cfs Outflow=12.31 cfs 2.691 af

Reach 30aR: Reach #30aR Conveyance Avg. Flow Depth=0.25' Max Vel=1.71 fps Inflow=2.52 cfs 0.309 af
n=0.045 L=201.0' S=0.0199 '/' Capacity=29.56 cfs Outflow=2.51 cfs 0.309 af

Reach 30R: Reach #30 Conveyance Avg. Flow Depth=0.24' Max Vel=1.19 fps Inflow=2.54 cfs 0.310 af
n=0.045 L=205.0' S=0.0098 '/' Capacity=30.09 cfs Outflow=2.52 cfs 0.309 af

Reach 31R: Reach #31 Avg. Flow Depth=0.21' Max Vel=1.45 fps Inflow=0.86 cfs 0.063 af
n=0.045 L=158.0' S=0.0222 '/' Capacity=19.07 cfs Outflow=0.83 cfs 0.063 af

Reach 32R: Reach #32R Overland Flow Avg. Flow Depth=0.49' Max Vel=1.31 fps Inflow=8.50 cfs 0.846 af
n=0.080 L=90.0' S=0.0222 '/' Capacity=8.86 cfs Outflow=8.37 cfs 0.846 af

Reach 33aR: Reach #33a Flow Through Avg. Flow Depth=0.30' Max Vel=0.95 fps Inflow=1.56 cfs 0.132 af
n=0.080 L=130.0' S=0.0231 '/' Capacity=21.37 cfs Outflow=1.53 cfs 0.131 af

Reach 33bR: Reach #33b Avg. Flow Depth=1.09' Max Vel=1.16 fps Inflow=12.47 cfs 2.707 af
n=0.080 L=108.0' S=0.0060 '/' Capacity=45.76 cfs Outflow=12.46 cfs 2.703 af

Reach 33R: Reach #33 Treatment Swale Avg. Flow Depth=0.37' Max Vel=0.41 fps Inflow=1.80 cfs 0.133 af
n=0.140 L=135.0' S=0.0074 '/' Capacity=10.03 cfs Outflow=1.56 cfs 0.132 af

Reach 100R: Final Reach #100 Inflow=0.98 cfs 0.098 af
Outflow=0.98 cfs 0.098 af

Reach 101bR: Reach #101b Avg. Flow Depth=1.27' Max Vel=0.90 fps Inflow=12.31 cfs 2.588 af
n=0.080 L=332.0' S=0.0030 '/' Capacity=32.37 cfs Outflow=12.12 cfs 2.575 af

Reach 103aR: Reach #103aR Stream Avg. Flow Depth=0.30' Max Vel=2.34 fps Inflow=2.56 cfs 0.681 af
n=0.022 L=427.0' S=0.0076 '/' Capacity=22.54 cfs Outflow=2.54 cfs 0.678 af

Reach 103bR: Reach 103aB Overland Avg. Flow Depth=0.09' Max Vel=0.46 fps Inflow=0.19 cfs 0.006 af
n=0.080 L=393.0' S=0.0254 '/' Capacity=4.73 cfs Outflow=0.12 cfs 0.006 af

Reach 103R: Reach #103 Overland Flow Avg. Flow Depth=0.20' Max Vel=0.84 fps Inflow=2.51 cfs 0.678 af
n=0.080 L=166.0' S=0.0301 '/' Capacity=18.07 cfs Outflow=2.46 cfs 0.675 af

Reach 106aR: Reach #106a Avg. Flow Depth=0.45' Max Vel=1.04 fps Inflow=10.17 cfs 1.458 af
n=0.080 L=251.0' S=0.0159 '/' Capacity=11.27 cfs Outflow=8.79 cfs 1.449 af

Reach 106bR: Reach #106b Avg. Flow Depth=1.20' Max Vel=1.84 fps Inflow=17.31 cfs 4.140 af
n=0.080 L=365.0' S=0.0137 '/' Capacity=51.13 cfs Outflow=17.24 cfs 4.126 af

Reach 107aR: Reach #107a Overland Avg. Flow Depth=0.17' Max Vel=1.07 fps Inflow=0.77 cfs 0.553 af
n=0.080 L=1,054.0' S=0.0598 '/' Capacity=34.39 cfs Outflow=0.77 cfs 0.548 af

Reach 107bR: Reach #107b Avg. Flow Depth=1.13' Max Vel=2.07 fps Inflow=17.95 cfs 4.675 af
n=0.080 L=902.8' S=0.0188 '/' Capacity=59.95 cfs Outflow=17.54 cfs 4.642 af

Reach 108R: Reach #108 Overland Flow Avg. Flow Depth=0.20' Max Vel=0.67 fps Inflow=2.77 cfs 0.428 af
n=0.080 L=26.0' S=0.0192 '/' Capacity=20.64 cfs Outflow=2.76 cfs 0.427 af

Reach 200R: Final Reach #200 Inflow=54.13 cfs 13.992 af
Outflow=54.13 cfs 13.992 af

Reach 300R: Final Reach #300 Inflow=8.26 cfs 2.168 af
Outflow=8.26 cfs 2.168 af

Reach 400R: Final Reach #400 Inflow=26.95 cfs 3.663 af
Outflow=26.95 cfs 3.663 af

Reach 500R: Final Reach #500 Inflow=23.71 cfs 2.914 af
Outflow=23.71 cfs 2.914 af

Reach 600R: Final Reach #600 Inflow=4.80 cfs 0.889 af
Outflow=4.80 cfs 0.889 af

Reach 700R: Final Reach #700 Inflow=0.55 cfs 0.096 af
Outflow=0.55 cfs 0.096 af

Reach 800R: Final Reach #800 Inflow=2.71 cfs 0.283 af
Outflow=2.71 cfs 0.283 af

Reach 900R: Final Reach #900 Inflow=3.21 cfs 0.544 af
Outflow=3.21 cfs 0.544 af

Pond 1P: Pond #1 Peak Elev=184.48' Storage=31,050 cf Inflow=23.07 cfs 2.720 af
Discarded=0.02 cfs 0.012 af Primary=12.31 cfs 2.589 af Outflow=12.32 cfs 2.601 af

Pond 29P: Pond #29 Peak Elev=189.17' Storage=23 cf Inflow=0.80 cfs 0.058 af
15.0" Round Culvert n=0.012 L=55.0' S=0.0091 '/' Outflow=0.80 cfs 0.058 af

Pond 30P: Pond #30 Cross Culvert Peak Elev=192.16' Storage=1,738 cf Inflow=3.46 cfs 0.313 af
15.0" Round Culvert n=0.012 L=40.0' S=0.0063 '/' Outflow=2.54 cfs 0.310 af

Pond 31P: Pond #31 Cross Culvert Peak Elev=189.49' Storage=51 cf Inflow=0.87 cfs 0.063 af
15.0" Round Culvert n=0.012 L=43.0' S=0.0058 '/' Outflow=0.86 cfs 0.063 af

Pond 32P: Inlet Sump (Lt.) Peak Elev=189.29' Storage=1,214 cf Inflow=14.98 cfs 1.294 af
Primary=6.71 cfs 0.430 af Secondary=8.50 cfs 0.846 af Outflow=14.71 cfs 1.276 af

Pond 33P: Treatment Swale Forebay Peak Elev=185.71' Storage=764 cf Inflow=1.48 cfs 0.112 af
Outflow=1.38 cfs 0.099 af

Pond 34P: Inlet Sump (Rt.) Peak Elev=191.20' Storage=32 cf Inflow=5.64 cfs 0.450 af
18.0" Round Culvert n=0.012 L=29.7' S=0.1010 '/' Outflow=5.63 cfs 0.450 af

Pond 102P: Gravel Wetland #102 Peak Elev=189.85' Storage=45,832 cf Inflow=18.99 cfs 1.543 af
Primary=0.10 cfs 0.135 af Secondary=0.73 cfs 0.680 af Tertiary=0.00 cfs 0.000 af Outflow=0.83 cfs 0.815 af

Pond 103aP: Level Spreader Peak Elev=170.21' Storage=482 cf Inflow=2.51 cfs 0.687 af
Outflow=2.51 cfs 0.678 af

Pond 103P: Infiltration Rain Garden #103 Peak Elev=184.54' Storage=39,497 cf Inflow=15.59 cfs 1.727 af
Discarded=0.19 cfs 0.226 af Primary=2.51 cfs 0.687 af Secondary=0.19 cfs 0.006 af Outflow=2.88 cfs 0.920 af

Pond 104P: Detention Pond #104 Peak Elev=247.94' Storage=2,682 cf Inflow=2.20 cfs 0.170 af
Outflow=0.34 cfs 0.170 af

Pond 105P: Center of Cul-de-sac Pond #105 Peak Elev=184.71' Storage=53 cf Inflow=2.05 cfs 0.154 af
15.0" Round Culvert n=0.012 L=60.0' S=0.0333 '/' Outflow=2.05 cfs 0.154 af

Pond 106P: Infiltration Pond #106 Peak Elev=187.01' Storage=10,117 cf Inflow=10.08 cfs 1.840 af
Discarded=0.13 cfs 0.172 af Primary=10.17 cfs 1.458 af Outflow=10.30 cfs 1.629 af

Pond 107P: Rain Garden #107 Peak Elev=241.92' Storage=11,342 cf Inflow=5.44 cfs 0.612 af
Primary=0.63 cfs 0.410 af Secondary=0.14 cfs 0.144 af Tertiary=0.00 cfs 0.000 af Outflow=0.77 cfs 0.553 af

Pond 108P: Gravel Wetland #108 Peak Elev=185.59' Storage=7,504 cf Inflow=4.77 cfs 0.563 af
Primary=0.02 cfs 0.007 af Secondary=2.74 cfs 0.445 af Outflow=2.76 cfs 0.453 af

Pond 109P: Level Spreader Peak Elev=185.07' Storage=1,165 cf Inflow=2.76 cfs 0.453 af
Outflow=2.77 cfs 0.428 af

Pond C01P: Catch Basin #1 Peak Elev=214.80' Storage=0.000 af Inflow=0.62 cfs 0.053 af
12.0" Round Culvert n=0.012 L=16.0' S=0.0094 '/' Outflow=0.62 cfs 0.053 af

Pond C02P: Catch Basin #2 Peak Elev=214.64' Storage=0.000 af Inflow=1.25 cfs 0.105 af
12.0" Round Culvert n=0.012 L=231.0' S=0.0965 '/' Outflow=1.25 cfs 0.105 af

Pond C03P: Catch Basin #3 Peak Elev=189.84' Storage=0.001 af Inflow=7.33 cfs 0.484 af
24.0" Round Culvert n=0.012 L=16.0' S=0.0094 '/' Outflow=7.31 cfs 0.483 af

Pond C04P: Catch Basin #4 Peak Elev=189.85' Storage=0.001 af Inflow=9.21 cfs 0.643 af
24.0" Round Culvert n=0.012 L=20.0' S=0.0125 '/' Outflow=9.18 cfs 0.642 af

Pond C05P: Rain Guardian #1 Peak Elev=185.71' Storage=0.000 af Inflow=0.45 cfs 0.038 af
Outflow=0.45 cfs 0.038 af

Pond D01P: Drain Manhole #1 Peak Elev=192.26' Storage=0.000 af Inflow=1.25 cfs 0.105 af
12.0" Round Culvert n=0.012 L=66.2' S=0.0819 '/' Outflow=1.25 cfs 0.105 af

Total Runoff Area = 106.696 ac Runoff Volume = 27.431 af Average Runoff Depth = 3.09"
96.40% Pervious = 102.853 ac 3.60% Impervious = 3.843 ac

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.468	39	>75% Grass cover, Good, HSG A (1S, 2S, 3S, 6S, 7S, 22S, 23S, 26S, 30S, 31S, 32S, 33aS, 33bS, 34S)
5.338	61	>75% Grass cover, Good, HSG B (1S, 2S, 3S, 4S, 6S, 8S, 9S, 10S, 22S, 23S, 25S, 26S, 28S, 29S, 30S, 31S, 32S, 33aS, 33bS)
5.356	74	>75% Grass cover, Good, HSG C (1S, 2S, 4S, 10S, 22S, 23S, 24S, 26S, 27S, 28S, 30S, 32S, 34S)
0.040	80	>75% Grass cover, Good, HSG D (1S)
0.031	96	Gravel surface, HSG A (1S, 31S, 32S, 33aS, 33bS)
0.081	96	Gravel surface, HSG B (1S, 9S, 23S, 25S, 28S, 29S, 30S, 31S, 33aS)
0.053	96	Gravel surface, HSG C (4S, 9S, 23S, 24S, 27S, 28S, 30S, 32S, 34S)
0.230	30	Meadow, non-grazed, HSG A (7S, 26S)
0.436	58	Meadow, non-grazed, HSG B (1S, 7S, 9S, 26S)
2.625	71	Meadow, non-grazed, HSG C (1S, 4S, 7S, 9S, 26S, 32S)
0.228	98	Paved parking, HSG A (1S, 6S, 22S, 23S, 30S, 31S, 32S, 33aS, 43S, 44S, 45S)
0.734	98	Paved parking, HSG B (1S, 10S, 23S, 25S, 28S, 29S, 30S, 31S, 32S, 33aS)
1.158	98	Paved parking, HSG C (10S, 22S, 23S, 24S, 27S, 28S, 30S, 32S, 34S, 41S, 42S, 43S, 44S)
0.072	98	Paved parking, HSG D (1S)
0.054	98	Roofs, HSG A (3aS, 22S)
0.090	98	Roofs, HSG B (3aS, 28S, 32S)
0.224	98	Roofs, HSG C (22S, 32S, 34S)
0.367	98	Unconnected pavement, HSG A (2S, 3S)
0.296	98	Unconnected pavement, HSG B (2S, 3S, 9S)
0.151	98	Unconnected pavement, HSG C (4S, 9S, 26S)
0.089	98	Unconnected roofs, HSG A (2S, 7aS, 26S)
0.179	98	Unconnected roofs, HSG B (1S, 2aS, 2S, 23S)
0.200	98	Unconnected roofs, HSG C (1S, 2S, 4aS, 26S, 27S)
22.346	30	Woods, Good, HSG A (1S, 2S, 3S, 5S, 6S, 7S, 22S, 23S, 26S, 33bS)
40.330	55	Woods, Good, HSG B (1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 22S, 23S, 26S, 28S, 29S, 30S, 32S, 33bS)
19.388	70	Woods, Good, HSG C (1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 22S, 23S, 26S, 27S, 28S, 30S, 32S, 34S)
3.130	77	Woods, Good, HSG D (2S, 3S, 5S, 6S)
106.696	**56**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
26.814	HSG A	1S, 2S, 3aS, 3S, 5S, 6S, 7aS, 7S, 22S, 23S, 26S, 30S, 31S, 32S, 33aS, 33bS, 34S, 43S, 44S, 45S
47.483	HSG B	1S, 2aS, 2S, 3aS, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 22S, 23S, 25S, 26S, 28S, 29S, 30S, 31S, 32S, 33aS, 33bS
29.156	HSG C	1S, 2S, 3S, 4aS, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 22S, 23S, 24S, 26S, 27S, 28S, 30S, 32S, 34S, 41S, 42S, 43S, 44S
3.243	HSG D	1S, 2S, 3S, 5S, 6S
0.000	Other	
106.696		**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
3.468	5.338	5.356	0.040	0.000	14.203	>75% Grass cover, Good	1S, 2S, 3S, 4S, 6S, 7S, 8S, 9S, 10S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 29S, 30S, 31S, 32S, 33aS, 33bS, 34S
0.031	0.081	0.053	0.000	0.000	0.165	Gravel surface	1S, 4S, 9S, 23S, 24S, 25S, 27S, 28S, 29S, 30S, 31S, 32S, 33aS, 33bS, 34S
0.230	0.436	2.625	0.000	0.000	3.291	Meadow, non-grazed	1S, 4S, 7S, 9S, 26S, 32S
0.228	0.734	1.158	0.072	0.000	2.193	Paved parking	1S, 6S, 10S, 22S, 23S, 24S, 25S, 27S, 28S, 29S, 30S, 31S,

Ground Covers (all nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.054	0.090	0.224	0.000	0.000	0.367	Roofs	3aS, 22S, 28S, 32S, 34S
0.367	0.296	0.151	0.000	0.000	0.814	Unconnected pavement	2S, 3S, 4S, 9S, 26S
0.089	0.179	0.200	0.000	0.000	0.468	Unconnected roofs	1S, 2aS, 2S, 4aS, 7aS, 23S, 26S, 27S
22.346	40.330	19.388	3.130	0.000	85.195	Woods, Good	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 22S, 23S, 26S, 27S, 28S, 29S, 30S, 32S, 33bS, 34S
26.814	**47.483**	**29.156**	**3.243**	**0.000**	**106.696**	**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	1P	182.50	182.00	50.0	0.0100	0.024	24.0	0.0	6.0
2	29P	188.75	188.25	55.0	0.0091	0.012	15.0	0.0	0.0
3	30P	191.25	191.00	40.0	0.0063	0.012	15.0	0.0	0.0
4	31P	189.00	188.75	43.0	0.0058	0.012	15.0	0.0	0.0
5	32P	187.00	186.00	17.0	0.0588	0.012	18.0	0.0	0.0
6	34P	190.00	187.00	29.7	0.1010	0.012	18.0	0.0	0.0
7	102P	183.67	183.50	101.2	0.0017	0.012	6.0	0.0	0.0
8	102P	185.50	185.00	90.0	0.0056	0.012	24.0	0.0	0.0
9	103P	175.00	171.50	109.0	0.0321	0.012	15.0	0.0	0.0
10	104P	245.75	244.00	60.0	0.0292	0.012	15.0	0.0	0.0
11	105P	184.00	182.00	60.0	0.0333	0.012	15.0	0.0	0.0
12	107P	236.50	236.25	28.0	0.0089	0.012	15.0	0.0	0.0
13	107P	236.50	236.50	1.0	0.0000	0.012	6.0	0.0	0.0
14	108P	183.17	183.00	35.0	0.0049	0.012	12.0	0.0	0.0
15	108P	183.25	183.00	47.0	0.0053	0.012	12.0	0.0	0.0
16	C01P	214.30	214.15	16.0	0.0094	0.012	12.0	0.0	0.0
17	C02P	214.05	191.77	231.0	0.0965	0.012	12.0	0.0	0.0
18	C03P	185.50	185.35	16.0	0.0094	0.012	24.0	0.0	0.0
19	C04P	185.25	185.00	20.0	0.0125	0.012	24.0	0.0	0.0
20	D01P	191.67	186.25	66.2	0.0819	0.012	12.0	0.0	0.0

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points x 3
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=280,391 sf 2.68% Impervious Runoff Depth>1.74"
Flow Length=663' Tc=24.8 min CN=59 Runoff=7.50 cfs 0.932 af

Subcatchment 2aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>5.62"
Tc=0.0 min CN=98 Runoff=0.48 cfs 0.034 af

Subcatchment 2S: Subcatchment #2 Runoff Area=1,847,283 sf 1.43% Impervious Runoff Depth>1.18"
Flow Length=2,208' Tc=87.6 min UI Adjusted CN=52 Runoff=15.29 cfs 4.166 af

Subcatchment 3aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>5.62"
Tc=0.0 min CN=98 Runoff=0.48 cfs 0.034 af

Subcatchment 3S: Subcatchment #3 Runoff Area=429,754 sf 0.89% Impervious Runoff Depth>0.67"
Flow Length=753' Tc=46.0 min UI Adjusted CN=44 Runoff=2.24 cfs 0.552 af

Subcatchment 4aS: Houses Infiltrated with Runoff Area=3,168 sf 100.00% Impervious Runoff Depth>5.62"
Tc=0.0 min CN=98 Runoff=0.48 cfs 0.034 af

Subcatchment 4S: Subcatchment #4 Runoff Area=422,569 sf 0.94% Impervious Runoff Depth>2.49"
Flow Length=1,007' Tc=35.8 min UI Adjusted CN=68 Runoff=14.62 cfs 2.015 af

Subcatchment 5S: Subcatchment #5 Runoff Area=502,048 sf 0.00% Impervious Runoff Depth>1.43"
Flow Length=1,017' Tc=26.5 min CN=55 Runoff=10.18 cfs 1.370 af

Subcatchment 6S: Subcatchment #6 Runoff Area=289,461 sf 0.18% Impervious Runoff Depth>0.56"
Flow Length=888' Tc=44.0 min CN=42 Runoff=1.13 cfs 0.308 af

Subcatchment 7aS: Houses infiltrated with Runoff Area=1,584 sf 100.00% Impervious Runoff Depth>5.62"
Tc=0.0 min CN=98 Runoff=0.24 cfs 0.017 af

Subcatchment 7S: Subcatchment #7 Runoff Area=44,800 sf 0.00% Impervious Runoff Depth>0.30"
Flow Length=424' Tc=25.7 min CN=37 Runoff=0.07 cfs 0.026 af

Subcatchment 8S: Subcatchment #8 Runoff Area=37,283 sf 0.00% Impervious Runoff Depth>2.07"
Flow Length=423' Tc=19.2 min CN=63 Runoff=1.36 cfs 0.148 af

Subcatchment 9S: Subcatchment #9 Runoff Area=15,375 sf 16.48% Impervious Runoff Depth>2.07"
Flow Length=172' Tc=13.4 min UI Adjusted CN=63 Runoff=0.65 cfs 0.061 af

Subcatchment 10S: Subcatchment #10 Runoff Area=14,130 sf 10.22% Impervious Runoff Depth>1.82"
Flow Length=226' Tc=16.6 min CN=60 Runoff=0.47 cfs 0.049 af

Subcatchment 22S: Area to Pond #102 Runoff Area=65,100 sf 12.44% Impervious Runoff Depth>1.82"
Flow Length=397' Tc=12.9 min CN=60 Runoff=2.38 cfs 0.227 af

Subcatchment 23S: Area to Pond #103 Runoff Area=149,518 sf 8.75% Impervious Runoff Depth>2.24"
Flow Length=381' Tc=17.5 min CN=65 Runoff=6.23 cfs 0.641 af

Subcatchment 24S: Peekaboo CDS Runoff Area=12,590 sf 58.28% Impervious Runoff Depth>4.60"
Tc=6.0 min CN=89 Runoff=1.46 cfs 0.111 af

Subcatchment 25S: Fredrick CDS Runoff Area=12,484 sf 57.92% Impervious Runoff Depth>4.06"
Tc=6.0 min CN=84 Runoff=1.32 cfs 0.097 af

Subcatchment 26S: Area to Pond #106 Runoff Area=164,053 sf 3.12% Impervious Runoff Depth>1.58"
Flow Length=679' Tc=20.6 min CN=57 Runoff=4.21 cfs 0.497 af

Subcatchment 27S: Area to Pond #107 Runoff Area=43,831 sf 7.06% Impervious Runoff Depth>3.06"
Flow Length=309' Tc=11.6 min UI Adjusted CN=74 Runoff=2.99 cfs 0.257 af

Subcatchment 28S: Area to Pond #108 Runoff Area=58,076 sf 12.93% Impervious Runoff Depth>2.50"
Flow Length=247' Tc=24.0 min CN=68 Runoff=2.41 cfs 0.278 af

Subcatchment 29S: Subcatchment #29 Runoff Area=6,005 sf 26.21% Impervious Runoff Depth>2.88"
Tc=6.0 min CN=72 Runoff=0.46 cfs 0.033 af

Subcatchment 30S: Subcatchment #30 Runoff Area=40,007 sf 7.55% Impervious Runoff Depth>2.16"
Flow Length=159' Tc=13.1 min CN=64 Runoff=1.77 cfs 0.165 af

Subcatchment 31S: Subcatchment #31 Runoff Area=8,090 sf 30.07% Impervious Runoff Depth>2.16"
Tc=6.0 min CN=64 Runoff=0.45 cfs 0.033 af

Subcatchment 32S: Inlet Sump (Lt.) Runoff Area=122,911 sf 18.55% Impervious Runoff Depth>3.25"
Flow Length=809' Tc=11.6 min CN=76 Runoff=8.91 cfs 0.765 af

Subcatchment 33aS: Peekaboo Entrance Runoff Area=7,232 sf 54.76% Impervious Runoff Depth>3.16"
Tc=6.0 min CN=75 Runoff=0.60 cfs 0.044 af

Subcatchment 33bS: Subcatchment #33b Runoff Area=7,285 sf 0.00% Impervious Runoff Depth>1.00"
Tc=6.0 min CN=49 Runoff=0.14 cfs 0.014 af

Subcatchment 34S: Inlet Sump (Rt.) Runoff Area=40,148 sf 21.43% Impervious Runoff Depth>3.55"
Flow Length=594' Tc=8.6 min CN=79 Runoff=3.46 cfs 0.273 af

Subcatchment 41S: Catch Basin #1 Runoff Area=3,378 sf 100.00% Impervious Runoff Depth>5.62"
Tc=6.0 min CN=98 Runoff=0.43 cfs 0.036 af

Subcatchment 42S: Catch Basin #2 Runoff Area=3,365 sf 100.00% Impervious Runoff Depth>5.62"
Tc=6.0 min CN=98 Runoff=0.43 cfs 0.036 af

Subcatchment 43S: Catch Basin #3 Runoff Area=3,418 sf 100.00% Impervious Runoff Depth>5.62"
Tc=6.0 min CN=98 Runoff=0.44 cfs 0.037 af

Subcatchment 44S: Catch Basin #4 Runoff Area=3,568 sf 100.00% Impervious Runoff Depth>5.62"
Tc=6.0 min CN=98 Runoff=0.46 cfs 0.038 af

Subcatchment 45S: Rain Guardian #1 Runoff Area=2,431 sf 100.00% Impervious Runoff Depth>5.62"
Tc=6.0 min CN=98 Runoff=0.31 cfs 0.026 af

Reach 1R: Reach #1 Outlet Swale Avg. Flow Depth=0.80' Max Vel=1.20 fps Inflow=3.25 cfs 1.036 af
n=0.045 L=60.0' S=0.0033 '/' Capacity=22.47 cfs Outflow=3.25 cfs 1.035 af

Reach 22aR: Reach #22a Overland Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=125.0' S=0.0732 '/' Capacity=16.09 cfs Outflow=0.00 cfs 0.000 af

Reach 22bR: Reach #22b Avg. Flow Depth=0.59' Max Vel=0.77 fps Inflow=3.33 cfs 1.097 af
n=0.080 L=392.0' S=0.0060 '/' Capacity=45.67 cfs Outflow=3.28 cfs 1.090 af

Reach 30aR: Reach #30aR Conveyance Avg. Flow Depth=0.17' Max Vel=1.36 fps Inflow=1.32 cfs 0.163 af
n=0.045 L=201.0' S=0.0199 '/' Capacity=29.56 cfs Outflow=1.31 cfs 0.162 af

Reach 30R: Reach #30 Conveyance Avg. Flow Depth=0.16' Max Vel=0.94 fps Inflow=1.33 cfs 0.163 af
n=0.045 L=205.0' S=0.0098 '/' Capacity=30.09 cfs Outflow=1.32 cfs 0.163 af

Reach 31R: Reach #31 Avg. Flow Depth=0.14' Max Vel=1.18 fps Inflow=0.44 cfs 0.033 af
n=0.045 L=158.0' S=0.0222 '/' Capacity=19.07 cfs Outflow=0.42 cfs 0.033 af

Reach 32R: Reach #32R Overland Flow Avg. Flow Depth=0.18' Max Vel=0.66 fps Inflow=0.92 cfs 0.207 af
n=0.080 L=90.0' S=0.0222 '/' Capacity=8.86 cfs Outflow=0.91 cfs 0.207 af

Reach 33aR: Reach #33a Flow Through Avg. Flow Depth=0.22' Max Vel=0.78 fps Inflow=0.82 cfs 0.070 af
n=0.080 L=130.0' S=0.0231 '/' Capacity=21.37 cfs Outflow=0.79 cfs 0.070 af

Reach 33bR: Reach #33b Avg. Flow Depth=0.59' Max Vel=0.77 fps Inflow=3.33 cfs 1.099 af
n=0.080 L=108.0' S=0.0060 '/' Capacity=45.76 cfs Outflow=3.33 cfs 1.097 af

Reach 33R: Reach #33 Treatment Swale Avg. Flow Depth=0.26' Max Vel=0.33 fps Inflow=0.99 cfs 0.071 af
n=0.140 L=135.0' S=0.0074 '/' Capacity=10.03 cfs Outflow=0.82 cfs 0.070 af

Reach 100R: Final Reach #100 Inflow=0.47 cfs 0.049 af
Outflow=0.47 cfs 0.049 af

Reach 101bR: Reach #101b Avg. Flow Depth=0.68' Max Vel=0.60 fps Inflow=3.25 cfs 1.035 af
n=0.080 L=332.0' S=0.0030 '/' Capacity=32.37 cfs Outflow=3.18 cfs 1.029 af

Reach 103aR: Reach #103aR Stream Avg. Flow Depth=0.08' Max Vel=1.04 fps Inflow=0.26 cfs 0.207 af
n=0.022 L=427.0' S=0.0076 '/' Capacity=22.54 cfs Outflow=0.26 cfs 0.205 af

Reach 103bR: Reach 103aB Overland Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=393.0' S=0.0254 '/' Capacity=4.73 cfs Outflow=0.00 cfs 0.000 af

Reach 103R: Reach #103 Overland Flow Avg. Flow Depth=0.07' Max Vel=0.42 fps Inflow=0.26 cfs 0.209 af
n=0.080 L=166.0' S=0.0301 '/' Capacity=18.07 cfs Outflow=0.26 cfs 0.207 af

Reach 106aR: Reach #106a Avg. Flow Depth=0.22' Max Vel=0.64 fps Inflow=2.24 cfs 0.801 af
n=0.080 L=251.0' S=0.0159 '/' Capacity=11.27 cfs Outflow=1.83 cfs 0.793 af

Reach 106bR: Reach #106b Avg. Flow Depth=0.67' Max Vel=1.26 fps Inflow=4.98 cfs 1.883 af
n=0.080 L=365.0' S=0.0137 '/' Capacity=51.13 cfs Outflow=4.94 cfs 1.874 af

Reach 107aR: Reach #107a Overland Avg. Flow Depth=0.15' Max Vel=0.98 fps Inflow=0.58 cfs 0.319 af
n=0.080 L=1,054.0' S=0.0598 '/' Capacity=34.39 cfs Outflow=0.57 cfs 0.315 af

Reach 107bR: Reach #107b Avg. Flow Depth=0.65' Max Vel=1.44 fps Inflow=5.50 cfs 2.189 af
n=0.080 L=902.8' S=0.0188 '/' Capacity=59.95 cfs Outflow=5.31 cfs 2.166 af

Reach 108R: Reach #108 Overland Flow Avg. Flow Depth=0.12' Max Vel=0.48 fps Inflow=0.95 cfs 0.182 af
n=0.080 L=26.0' S=0.0192 '/' Capacity=20.64 cfs Outflow=0.98 cfs 0.182 af

Reach 200R: Final Reach #200 Inflow=20.59 cfs 6.332 af
Outflow=20.59 cfs 6.332 af

Reach 300R: Final Reach #300 Inflow=2.24 cfs 0.757 af
Outflow=2.24 cfs 0.757 af

Reach 400R: Final Reach #400 Inflow=14.62 cfs 2.015 af
Outflow=14.62 cfs 2.015 af

Reach 500R: Final Reach #500 Inflow=10.18 cfs 1.370 af
Outflow=10.18 cfs 1.370 af

Reach 600R: Final Reach #600 Inflow=1.13 cfs 0.308 af
Outflow=1.13 cfs 0.308 af

Reach 700R: Final Reach #700 Inflow=0.07 cfs 0.026 af
Outflow=0.07 cfs 0.026 af

Reach 800R: Final Reach #800 Inflow=1.36 cfs 0.148 af
Outflow=1.36 cfs 0.148 af

Reach 900R: Final Reach #900 Inflow=1.11 cfs 0.243 af
Outflow=1.11 cfs 0.243 af

Pond 1P: Pond #1 Peak Elev=183.60' Storage=12,109 cf Inflow=7.53 cfs 1.140 af
Discarded=0.01 cfs 0.011 af Primary=3.25 cfs 1.036 af Outflow=3.27 cfs 1.046 af

Pond 29P: Pond #29 Peak Elev=189.06' Storage=14 cf Inflow=0.46 cfs 0.033 af
15.0" Round Culvert n=0.012 L=55.0' S=0.0091 '/' Outflow=0.46 cfs 0.033 af

Pond 30P: Pond #30 Cross Culvert Peak Elev=191.87' Storage=901 cf Inflow=1.77 cfs 0.165 af
15.0" Round Culvert n=0.012 L=40.0' S=0.0063 '/' Outflow=1.33 cfs 0.163 af

Pond 31P: Pond #31 Cross Culvert Peak Elev=189.34' Storage=30 cf Inflow=0.45 cfs 0.033 af
15.0" Round Culvert n=0.012 L=43.0' S=0.0058 '/' Outflow=0.44 cfs 0.033 af

Pond 32P: Inlet Sump (Lt.) Peak Elev=188.88' Storage=882 cf Inflow=8.91 cfs 0.765 af
Primary=8.15 cfs 0.614 af Secondary=0.92 cfs 0.207 af Outflow=8.24 cfs 0.754 af

Pond 33P: Treatment Swale Forebay Peak Elev=185.65' Storage=700 cf Inflow=0.91 cfs 0.070 af
Outflow=0.85 cfs 0.057 af

Pond 34P: Inlet Sump (Rt.) Peak Elev=190.88' Storage=18 cf Inflow=3.46 cfs 0.273 af
18.0" Round Culvert n=0.012 L=29.7' S=0.1010 '/' Outflow=3.45 cfs 0.273 af

Pond 102P: Gravel Wetland #102 Peak Elev=188.92' Storage=33,726 cf Inflow=14.94 cfs 1.259 af
Primary=0.10 cfs 0.110 af Secondary=0.61 cfs 0.561 af Tertiary=0.00 cfs 0.000 af Outflow=0.70 cfs 0.671 af

Pond 103aP: Level Spreader Peak Elev=170.07' Storage=409 cf Inflow=0.26 cfs 0.218 af
Outflow=0.26 cfs 0.209 af

Pond 103P: Infiltration Rain Garden #103 Peak Elev=183.08' Storage=25,931 cf Inflow=8.16 cfs 0.934 af
Discarded=0.19 cfs 0.206 af Primary=0.26 cfs 0.218 af Secondary=0.00 cfs 0.000 af Outflow=0.44 cfs 0.424 af

Pond 104P: Detention Pond #104 Peak Elev=247.31' Storage=1,589 cf Inflow=1.46 cfs 0.111 af
Outflow=0.28 cfs 0.111 af

Pond 105P: Center of Cul-de-sac Pond #105 Peak Elev=184.55' Storage=34 cf Inflow=1.32 cfs 0.097 af
15.0" Round Culvert n=0.012 L=60.0' S=0.0333 '/' Outflow=1.32 cfs 0.097 af

Pond 106P: Infiltration Pond #106 Peak Elev=186.85' Storage=9,398 cf Inflow=4.79 cfs 1.168 af
Discarded=0.13 cfs 0.157 af Primary=2.24 cfs 0.801 af Outflow=2.36 cfs 0.958 af

Pond 107P: Rain Garden #107 Peak Elev=240.83' Storage=6,394 cf Inflow=3.24 cfs 0.367 af
Primary=0.45 cfs 0.198 af Secondary=0.12 cfs 0.121 af Tertiary=0.00 cfs 0.000 af Outflow=0.58 cfs 0.319 af

Pond 108P: Gravel Wetland #108 Peak Elev=185.10' Storage=5,154 cf Inflow=2.60 cfs 0.311 af
Primary=0.02 cfs 0.005 af Secondary=1.47 cfs 0.202 af Outflow=1.64 cfs 0.201 af

Pond 109P: Level Spreader Peak Elev=185.03' Storage=1,130 cf Inflow=1.48 cfs 0.207 af
Outflow=0.95 cfs 0.181 af

Pond C01P: Catch Basin #1 Peak Elev=214.70' Storage=0.000 af Inflow=0.43 cfs 0.036 af
12.0" Round Culvert n=0.012 L=16.0' S=0.0094 '/' Outflow=0.44 cfs 0.036 af

Pond C02P: Catch Basin #2 Peak Elev=214.53' Storage=0.000 af Inflow=0.87 cfs 0.072 af
12.0" Round Culvert n=0.012 L=231.0' S=0.0965 '/' Outflow=0.87 cfs 0.072 af

Pond C03P: Catch Basin #3 Peak Elev=188.93' Storage=0.001 af Inflow=8.43 cfs 0.650 af
24.0" Round Culvert n=0.012 L=16.0' S=0.0094 '/' Outflow=8.42 cfs 0.649 af

Pond C04P: Catch Basin #4 Peak Elev=188.92' Storage=0.001 af Inflow=9.39 cfs 0.760 af
24.0" Round Culvert n=0.012 L=20.0' S=0.0125 '/' Outflow=9.37 cfs 0.759 af

Pond C05P: Rain Guardian #1 Peak Elev=185.65' Storage=0.000 af Inflow=0.31 cfs 0.026 af
Outflow=0.31 cfs 0.026 af

Pond D01P: Drain Manhole #1 Peak Elev=192.15' Storage=0.000 af Inflow=0.87 cfs 0.072 af
12.0" Round Culvert n=0.012 L=66.2' S=0.0819 '/' Outflow=0.87 cfs 0.072 af

Total Runoff Area = 106.696 ac Runoff Volume = 13.356 af Average Runoff Depth = 1.50"
96.40% Pervious = 102.853 ac 3.60% Impervious = 3.843 ac

Summary for Subcatchment 1S: Subcatchment #1

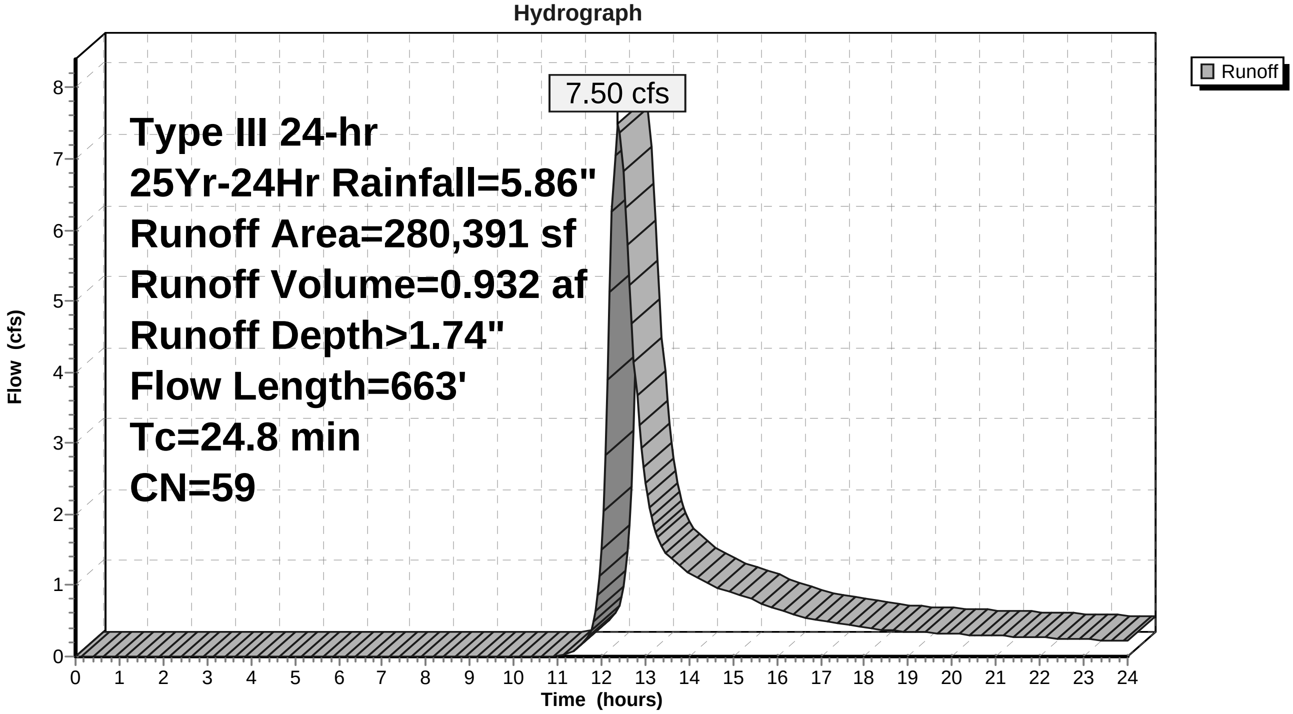
Runoff = 7.50 cfs @ 12.38 hrs, Volume= 0.932 af, Depth> 1.74"

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=5.86"

Area (sf)	CN	Description
6,027	39	>75% Grass cover, Good, HSG A
1,952	98	Paved parking, HSG A
43,197	30	Woods, Good, HSG A
651	96	Gravel surface, HSG A
504	98	Unconnected roofs, HSG B
7,538	61	>75% Grass cover, Good, HSG B
7,538	58	Meadow, non-grazed, HSG B
1,398	98	Paved parking, HSG B
90,470	55	Woods, Good, HSG B
47	96	Gravel surface, HSG B
504	98	Unconnected roofs, HSG C
16,275	74	>75% Grass cover, Good, HSG C
16,275	71	Meadow, non-grazed, HSG C
83,099	70	Woods, Good, HSG C
1,760	80	>75% Grass cover, Good, HSG D
3,156	98	Paved parking, HSG D
280,391	59	Weighted Average
272,877		97.32% Pervious Area
7,514		2.68% Impervious Area
1,008		13.41% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0300	0.09		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
1.1	129	0.1512	1.94		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
2.4	219	0.0913	1.51		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
1.6	112	0.0538	1.16		**Shallow Concentrated Flow, Segment #4** Woodland Kv= 5.0 fps
0.3	47	0.3389	2.91		**Shallow Concentrated Flow, Segment #5** Woodland Kv= 5.0 fps
0.7	56	0.0710	1.33		**Shallow Concentrated Flow, Segment #6** Woodland Kv= 5.0 fps
24.8	663	Total			

Subcatchment 1S: Subcatchment #1



Summary for Subcatchment 2aS: Houses Infiltrated with Drip Edge

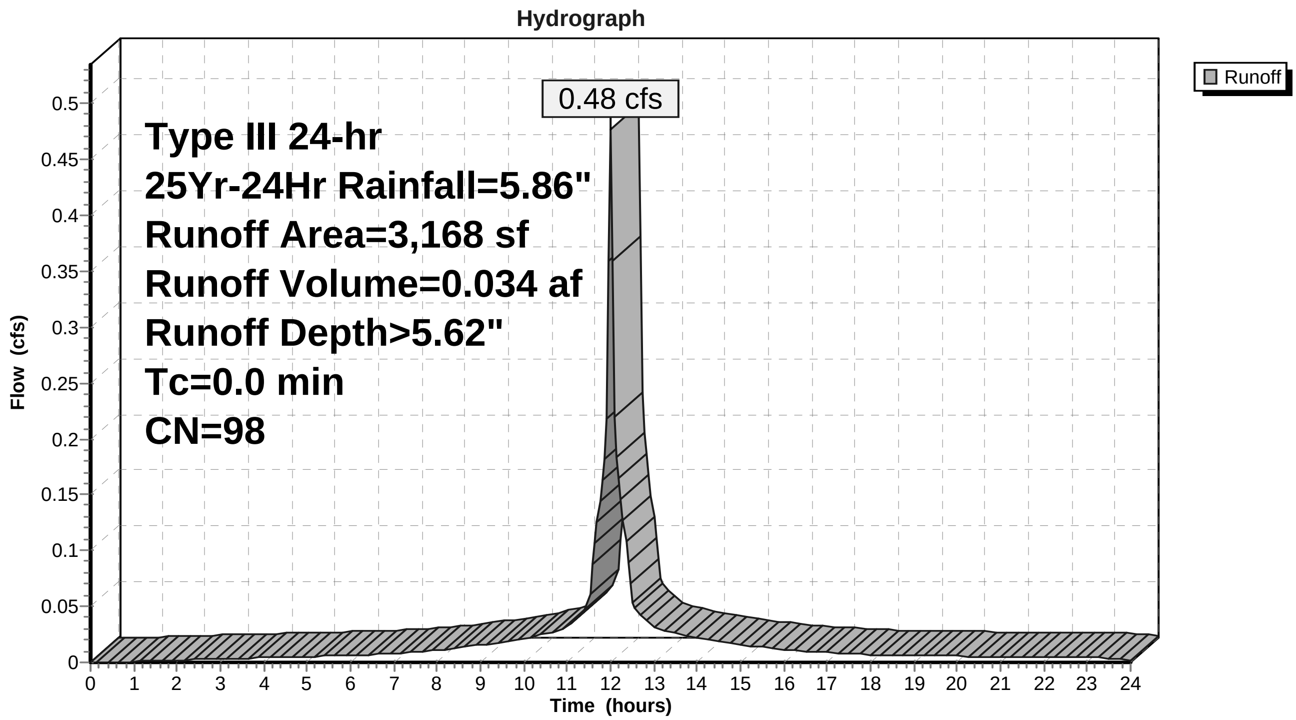
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.48 cfs @ 12.00 hrs, Volume= 0.034 af, Depth> 5.62"

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=5.86"

Area (sf)	CN	Description
3,168	98	Unconnected roofs, HSG B
3,168		100.00% Impervious Area
3,168		100.00% Unconnected

Subcatchment 2aS: Houses Infiltrated with Drip Edge



Summary for Subcatchment 2S: Subcatchment #2

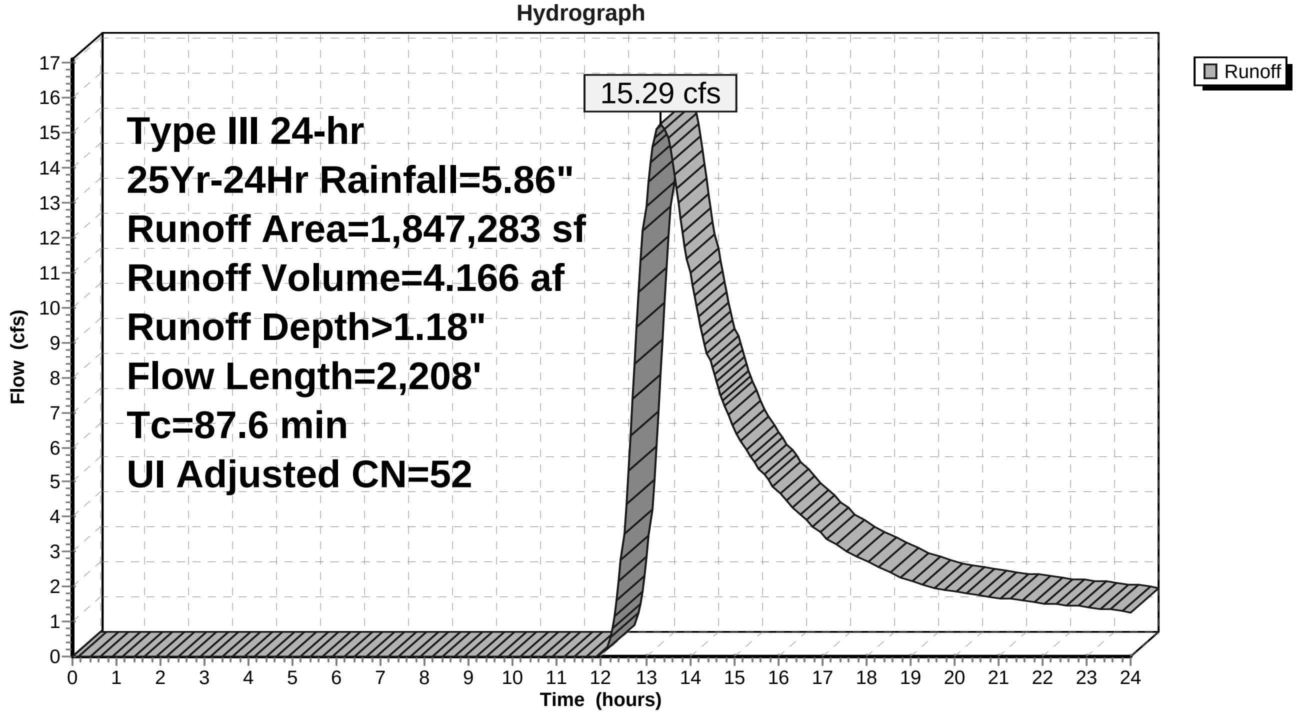
Runoff = 15.29 cfs @ 13.34 hrs, Volume= 4.166 af, Depth> 1.18"

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=5.86"

Area (sf)	CN	Adj	Description
1,982	98		Unconnected roofs, HSG A
80,837	39		>75% Grass cover, Good, HSG A
13,331	98		Unconnected pavement, HSG A
457,344	30		Woods, Good, HSG A
952	98		Unconnected roofs, HSG B
43,989	61		>75% Grass cover, Good, HSG B
9,406	98		Unconnected pavement, HSG B
843,366	55		Woods, Good, HSG B
767	98		Unconnected roofs, HSG C
19,296	74		>75% Grass cover, Good, HSG C
262,971	70		Woods, Good, HSG C
113,042	77		Woods, Good, HSG D
1,847,283	53	52	Weighted Average, UI Adjusted
1,820,845			98.57% Pervious Area
26,438			1.43% Impervious Area
26,438			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.0	100	0.0200	0.08		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
19.0	506	0.0079	0.44		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
27.4	813	0.0098	0.49		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
8.3	367	0.0218	0.74		**Shallow Concentrated Flow, Segment #4** Woodland Kv= 5.0 fps
10.9	422	0.0166	0.64		**Shallow Concentrated Flow, Segment #5** Woodland Kv= 5.0 fps
87.6	2,208	Total			

Subcatchment 2S: Subcatchment #2



Summary for Subcatchment 3aS: Houses Infiltrated with Drip Edge

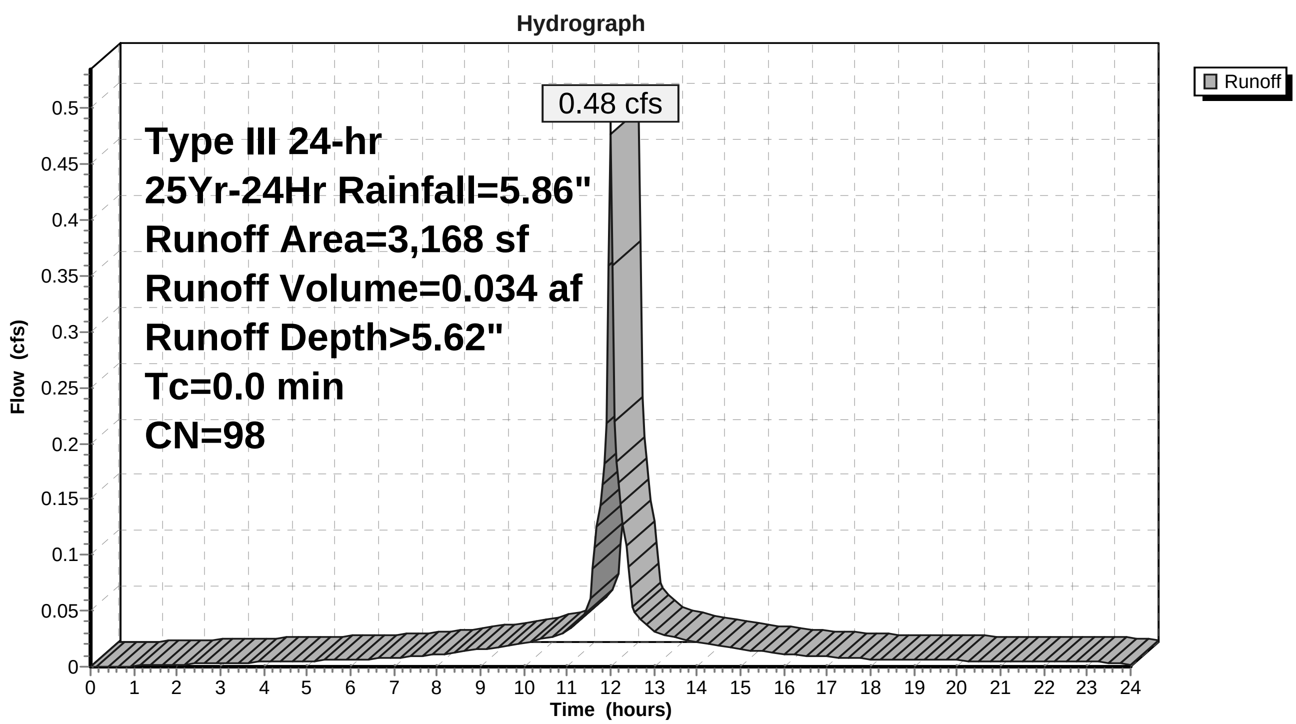
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.48 cfs @ 12.00 hrs, Volume= 0.034 af, Depth> 5.62"

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=5.86"

Area (sf)	CN	Description
1,345	98	Roofs, HSG A
1,823	98	Roofs, HSG B
3,168	98	Weighted Average
3,168		100.00% Impervious Area

Subcatchment 3aS: Houses Infiltrated with Drip Edge



Summary for Subcatchment 3S: Subcatchment #3

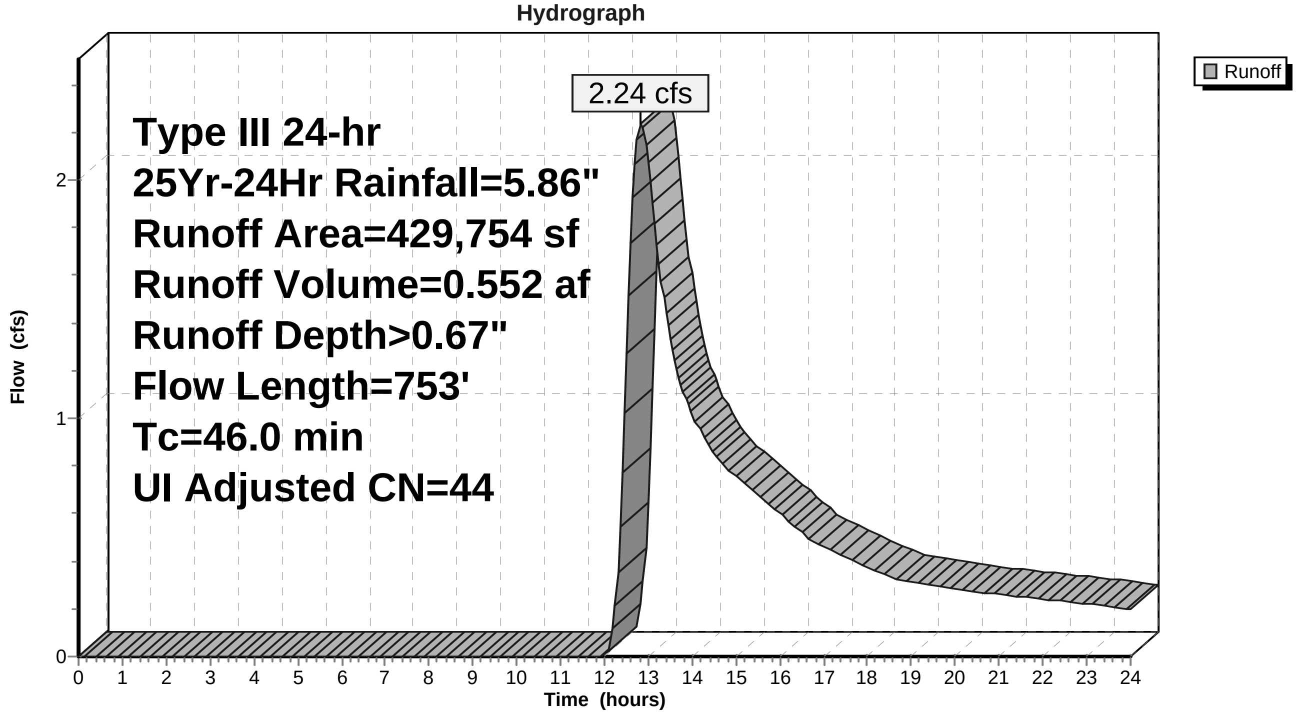
Runoff = 2.24 cfs @ 12.84 hrs, Volume= 0.552 af, Depth> 0.67"

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=5.86"

Area (sf)	CN	Adj	Description
0	98		Unconnected roofs, HSG A
10,468	39		>75% Grass cover, Good, HSG A
2,676	98		Unconnected pavement, HSG A
206,440	30		Woods, Good, HSG A
0	98		Unconnected roofs, HSG B
19,931	61		>75% Grass cover, Good, HSG B
1,155	98		Unconnected pavement, HSG B
152,096	55		Woods, Good, HSG B
35,137	70		Woods, Good, HSG C
1,851	77		Woods, Good, HSG D
429,754	45	44	Weighted Average, UI Adjusted
425,923			99.11% Pervious Area
3,831			0.89% Impervious Area
3,831			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.6	100	0.0150	0.07		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
2.3	106	0.0236	0.77		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
19.1	547	0.0091	0.48		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
46.0	753	Total			

Subcatchment 3S: Subcatchment #3



Summary for Subcatchment 4aS: Houses Infiltrated with Drip Edge

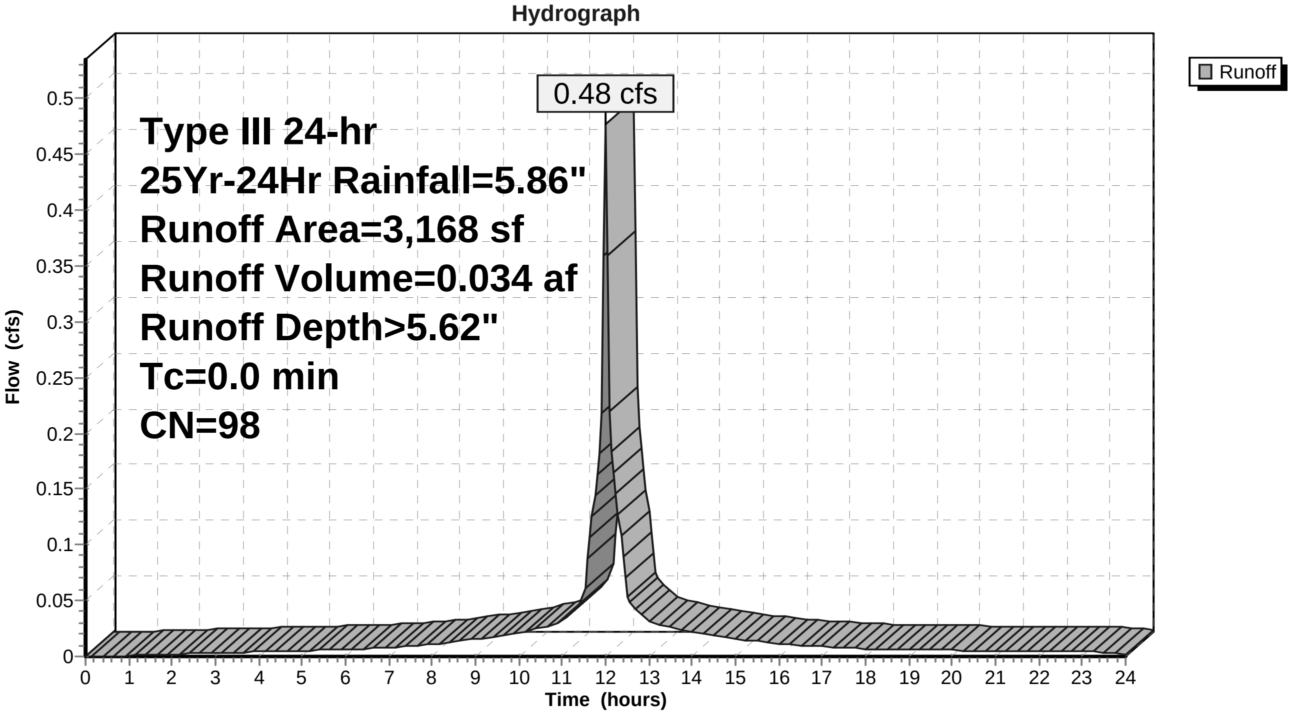
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.48 cfs @ 12.00 hrs, Volume= 0.034 af, Depth> 5.62"

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=5.86"

Area (sf)	CN	Description
3,168	98	Unconnected roofs, HSG C
3,168		100.00% Impervious Area
3,168		100.00% Unconnected

Subcatchment 4aS: Houses Infiltrated with Drip Edge



Summary for Subcatchment 4S: Subcatchment #4

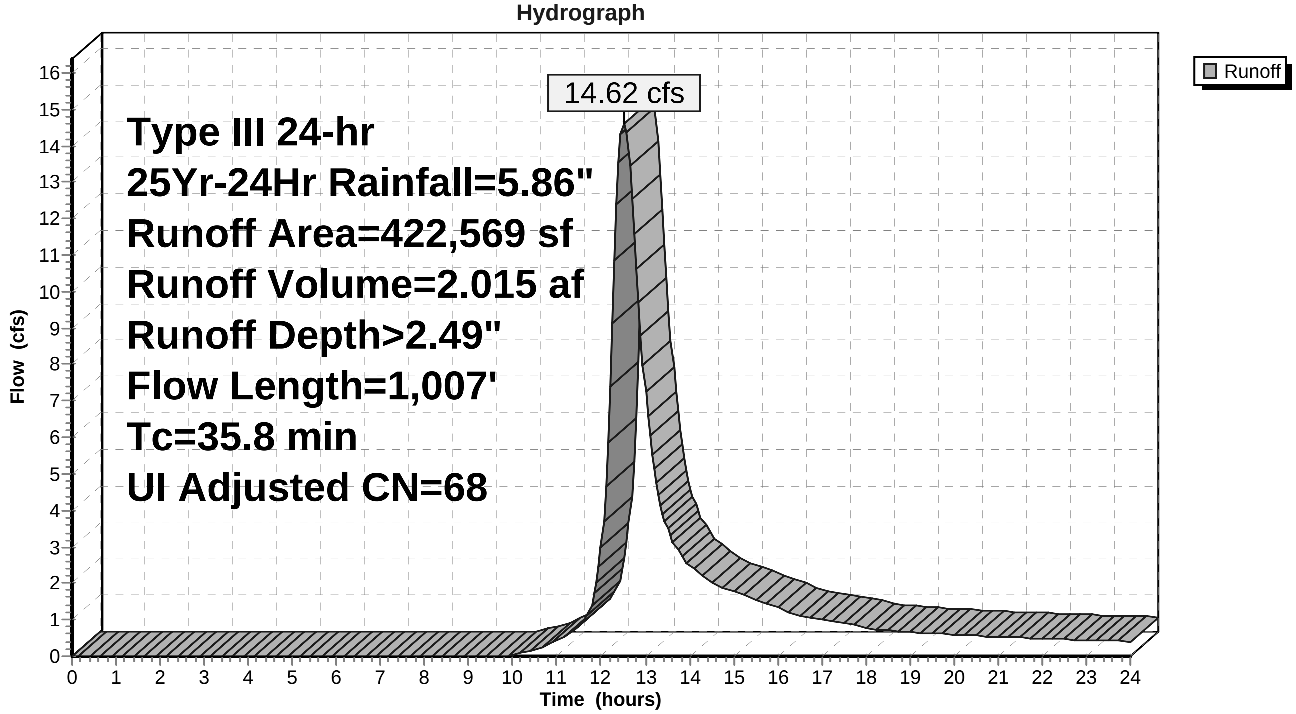
Runoff = 14.62 cfs @ 12.52 hrs, Volume= 2.015 af, Depth> 2.49"

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=5.86"

Area (sf)	CN	Adj	Description
31	61		>75% Grass cover, Good, HSG B
62,701	55		Woods, Good, HSG B
0	98		Unconnected roofs, HSG C
37,028	71		Meadow, non-grazed, HSG C
37,028	74		>75% Grass cover, Good, HSG C
3,989	98		Unconnected pavement, HSG C
281,338	70		Woods, Good, HSG C
454	96		Gravel surface, HSG C
422,569	69	68	Weighted Average, UI Adjusted
418,580			99.06% Pervious Area
3,989			0.94% Impervious Area
3,989			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	78	0.1150	0.15		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
5.0	23	0.0434	0.08		**Sheet Flow, Segment #2** Woods: Light underbrush n= 0.400 P2= 3.06"
1.0	85	0.0823	1.43		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
0.5	67	0.1791	2.12		**Shallow Concentrated Flow, Segment #4** Woodland Kv= 5.0 fps
0.7	34	0.0294	0.86		**Shallow Concentrated Flow, Segment #5** Woodland Kv= 5.0 fps
0.3	23	0.0434	1.46		**Shallow Concentrated Flow, Segment #6** Short Grass Pasture Kv= 7.0 fps
0.3	35	0.0100	2.03		**Shallow Concentrated Flow, Segment #7** Paved Kv= 20.3 fps
0.2	30	0.1363	2.58		**Shallow Concentrated Flow, Segment #8** Short Grass Pasture Kv= 7.0 fps
0.4	45	0.1176	1.71		**Shallow Concentrated Flow, Segment #9** Woodland Kv= 5.0 fps
7.5	159	0.0050	0.35		**Shallow Concentrated Flow, Segment #10** Woodland Kv= 5.0 fps
1.6	79	0.0256	0.80		**Shallow Concentrated Flow, Segment #11** Woodland Kv= 5.0 fps
7.9	224	0.0089	0.47		**Shallow Concentrated Flow, Segment #12** Woodland Kv= 5.0 fps
1.5	125	0.0725	1.35		**Shallow Concentrated Flow, Segment #13** Woodland Kv= 5.0 fps
35.8	1,007	Total			

Subcatchment 4S: Subcatchment #4



Summary for Subcatchment 5S: Subcatchment #5

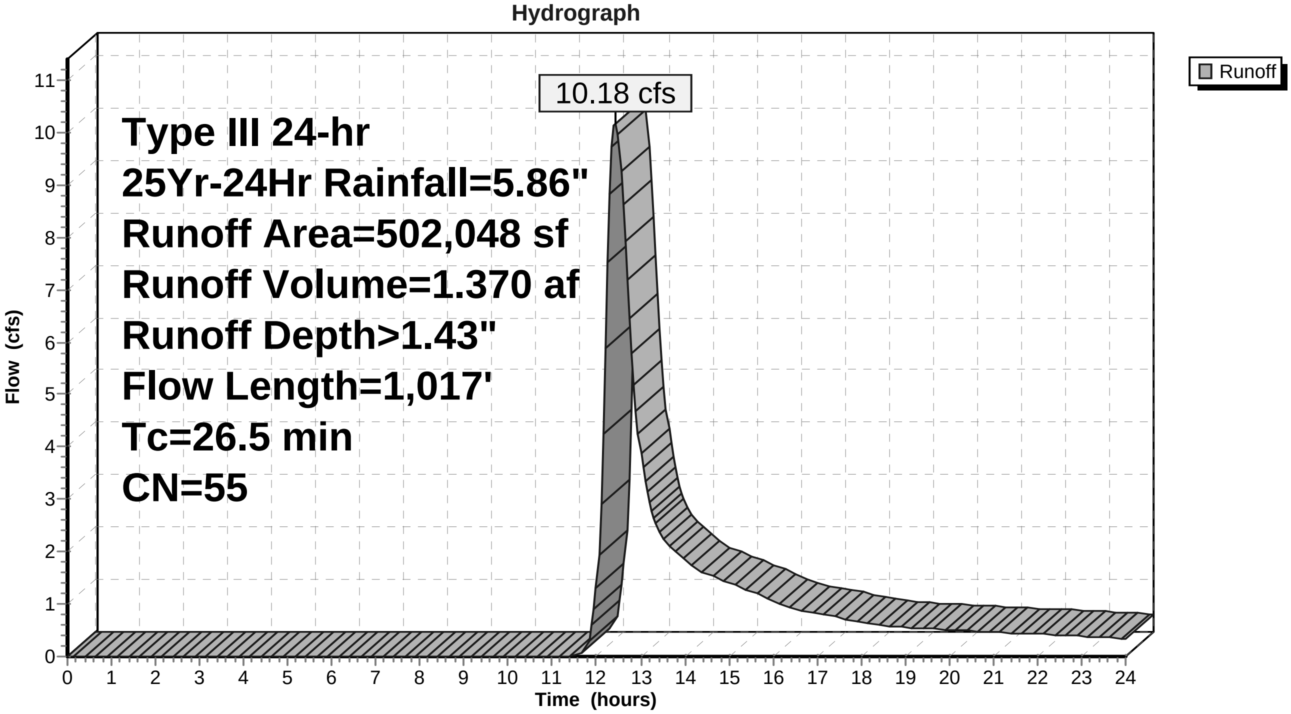
Runoff = 10.18 cfs @ 12.43 hrs, Volume= 1.370 af, Depth> 1.43"

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=5.86"

Area (sf)	CN	Description
19,851	30	Woods, Good, HSG A
439,083	55	Woods, Good, HSG B
35,954	70	Woods, Good, HSG C
7,160	77	Woods, Good, HSG D
502,048	55	Weighted Average
502,048		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.6	100	0.0400	0.10		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
2.4	239	0.1129	1.68		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
1.0	164	0.2808	2.65		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
3.0	242	0.0743	1.36		**Shallow Concentrated Flow, Segment #4** Woodland Kv= 5.0 fps
0.3	48	0.2496	2.50		**Shallow Concentrated Flow, Segment #5** Woodland Kv= 5.0 fps
3.2	224	0.0535	1.16		**Shallow Concentrated Flow, Segment #6** Woodland Kv= 5.0 fps
26.5	1,017	Total			

Subcatchment 5S: Subcatchment #5



Summary for Subcatchment 6S: Subcatchment #6

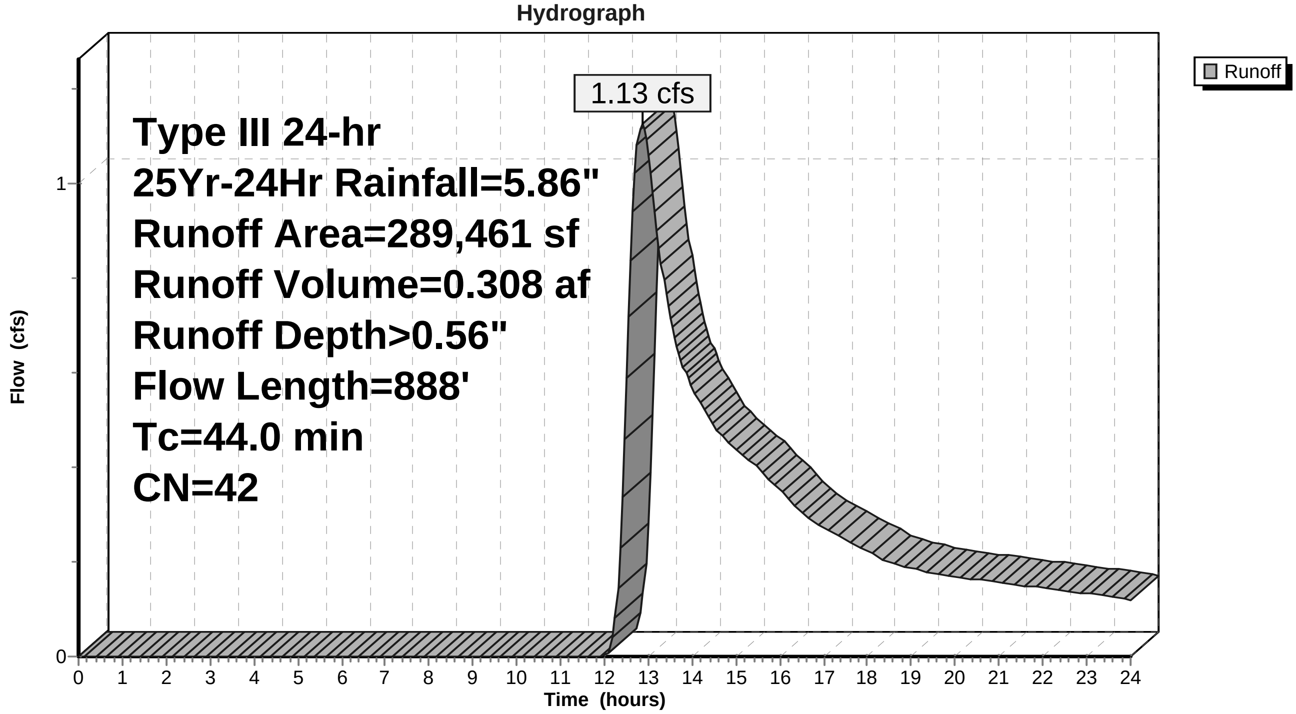
Runoff = 1.13 cfs @ 12.85 hrs, Volume= 0.308 af, Depth> 0.56"

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=5.86"

Area (sf)	CN	Description
4,069	39	>75% Grass cover, Good, HSG A
532	98	Paved parking, HSG A
173,565	30	Woods, Good, HSG A
76,991	55	Woods, Good, HSG B
1,213	61	>75% Grass cover, Good, HSG B
18,788	70	Woods, Good, HSG C
14,303	77	Woods, Good, HSG D
289,461	42	Weighted Average
288,929		99.82% Pervious Area
532		0.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	100	0.0825	0.13		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
1.8	119	0.0482	1.10		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
1.6	149	0.1008	1.59		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
28.1	520	0.0038	0.31		**Shallow Concentrated Flow, Segment #4** Woodland Kv= 5.0 fps
44.0	888	Total			

Subcatchment 6S: Subcatchment #6



Summary for Subcatchment 7aS: Houses infiltrated with Drip Edge

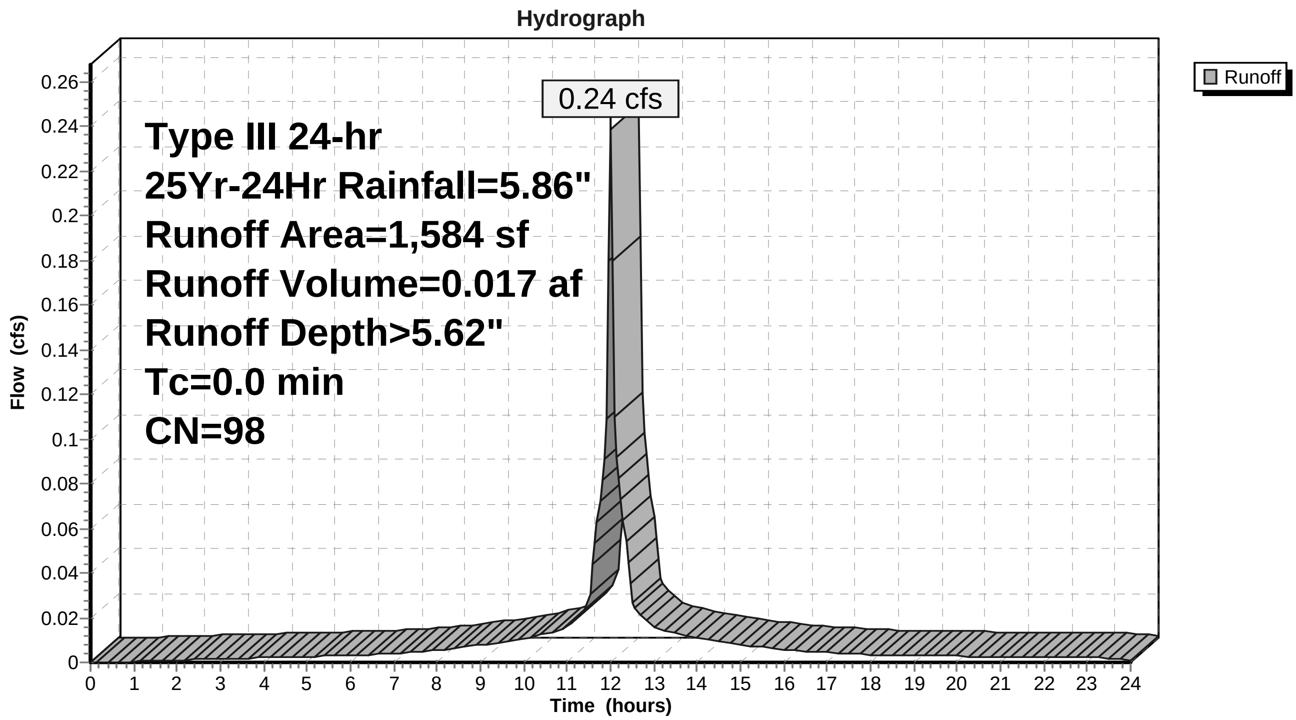
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.24 cfs @ 12.00 hrs, Volume= 0.017 af, Depth> 5.62"

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=5.86"

Area (sf)	CN	Description
1,584	98	Unconnected roofs, HSG A
1,584		100.00% Impervious Area
1,584		100.00% Unconnected

Subcatchment 7aS: Houses infiltrated with Drip Edge



Summary for Subcatchment 7S: Subcatchment #7

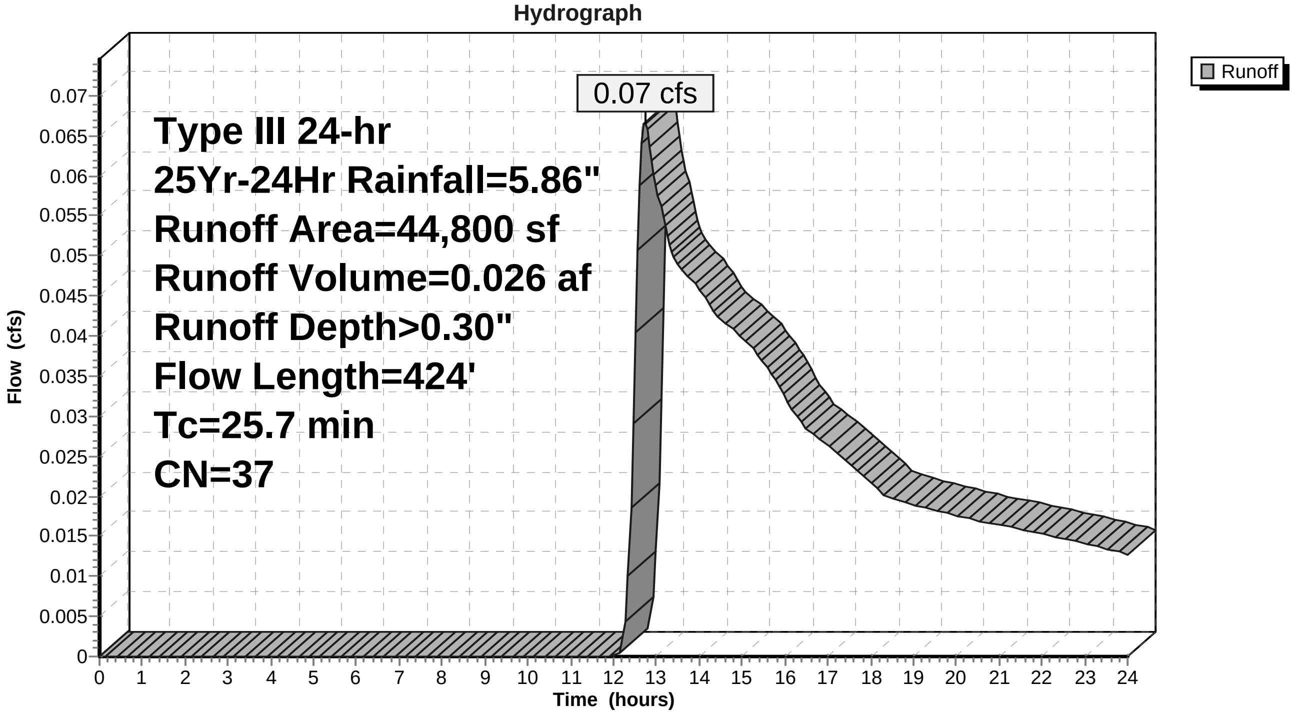
Runoff = 0.07 cfs @ 12.73 hrs, Volume= 0.026 af, Depth> 0.30"

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=5.86"

Area (sf)	CN	Description
0	98	Unconnected roofs, HSG A
1,732	39	>75% Grass cover, Good, HSG A
3,889	30	Meadow, non-grazed, HSG A
28,484	30	Woods, Good, HSG A
1,549	58	Meadow, non-grazed, HSG B
6,499	55	Woods, Good, HSG B
1,146	71	Meadow, non-grazed, HSG C
1,501	70	Woods, Good, HSG C
44,800	37	Weighted Average
44,800		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	100	0.0350	0.09		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
7.3	256	0.0137	0.59		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
0.8	68	0.0737	1.36		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
25.7	424	Total			

Subcatchment 7S: Subcatchment #7



Summary for Subcatchment 8S: Subcatchment #8

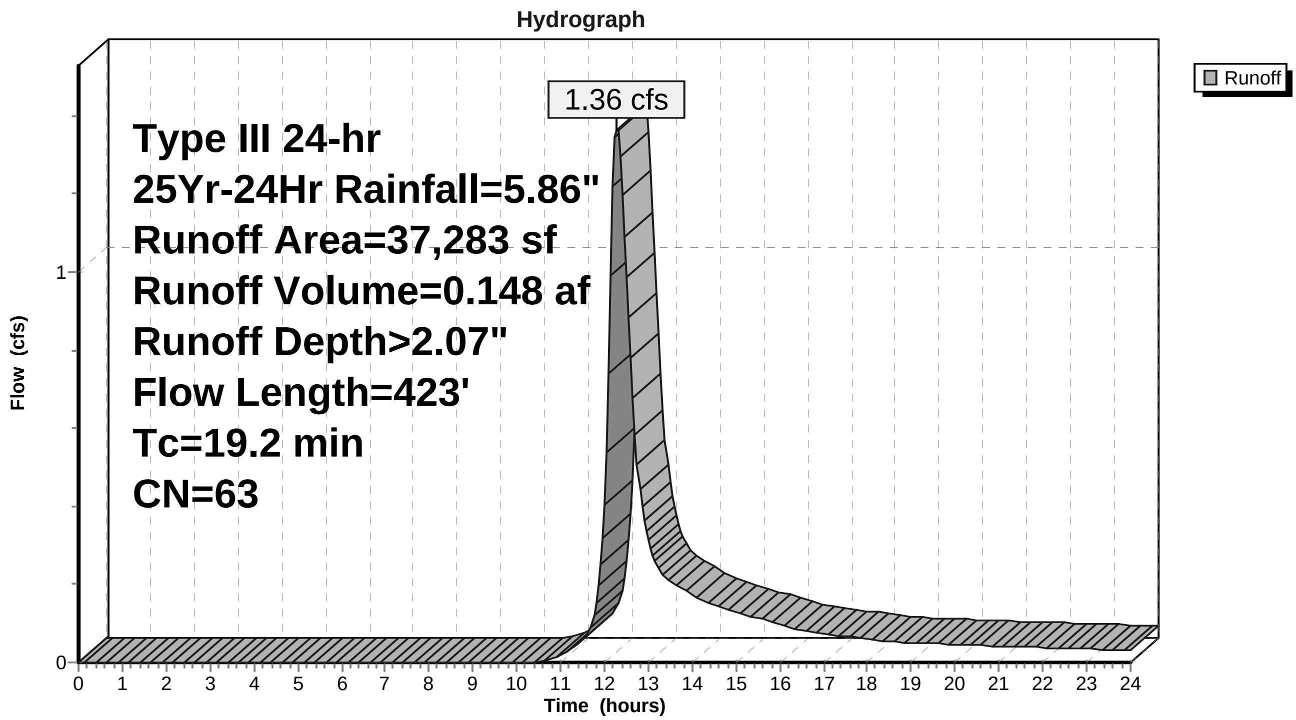
Runoff = 1.36 cfs @ 12.28 hrs, Volume= 0.148 af, Depth> 2.07"

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=5.86"

Area (sf)	CN	Description
1,354	61	>75% Grass cover, Good, HSG B
15,686	55	Woods, Good, HSG B
20,243	70	Woods, Good, HSG C
37,283	63	Weighted Average
37,283		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	100	0.0600	0.12		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
5.0	323	0.0464	1.08		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
19.2	423	Total			

Subcatchment 8S: Subcatchment #8



Summary for Subcatchment 9S: Subcatchment #9

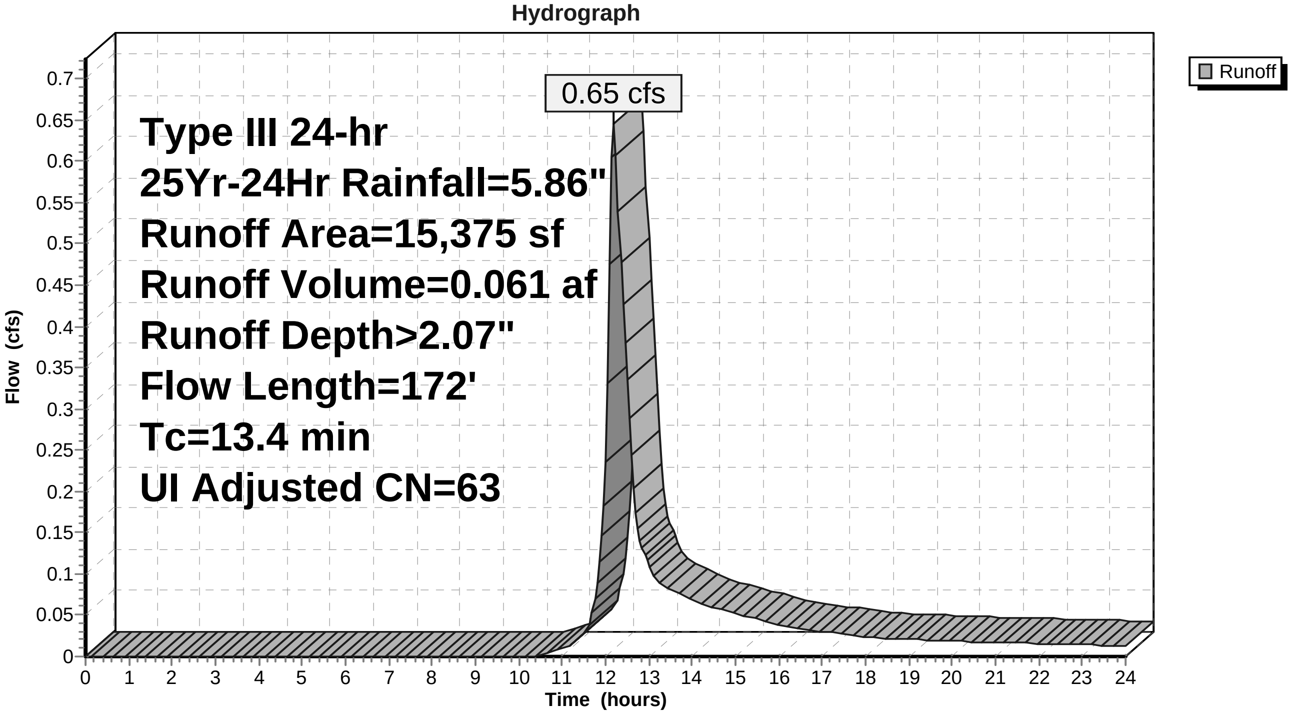
Runoff = 0.65 cfs @ 12.20 hrs, Volume= 0.061 af, Depth> 2.07"

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=5.86"

Area (sf)	CN	Adj	Description
3,146	61		>75% Grass cover, Good, HSG B
4,818	58		Meadow, non-grazed, HSG B
2,313	98		Unconnected pavement, HSG B
4,036	55		Woods, Good, HSG B
214	71		Meadow, non-grazed, HSG C
221	98		Unconnected pavement, HSG C
221	70		Woods, Good, HSG C
391	96		Gravel surface, HSG B
15	96		Gravel surface, HSG C
15,375	66	63	Weighted Average, UI Adjusted
12,841			83.52% Pervious Area
2,534			16.48% Impervious Area
2,534			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0800	0.13		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
0.8	72	0.0972	1.56		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
13.4	172	Total			

Subcatchment 9S: Subcatchment #9



Summary for Subcatchment 10S: Subcatchment #10

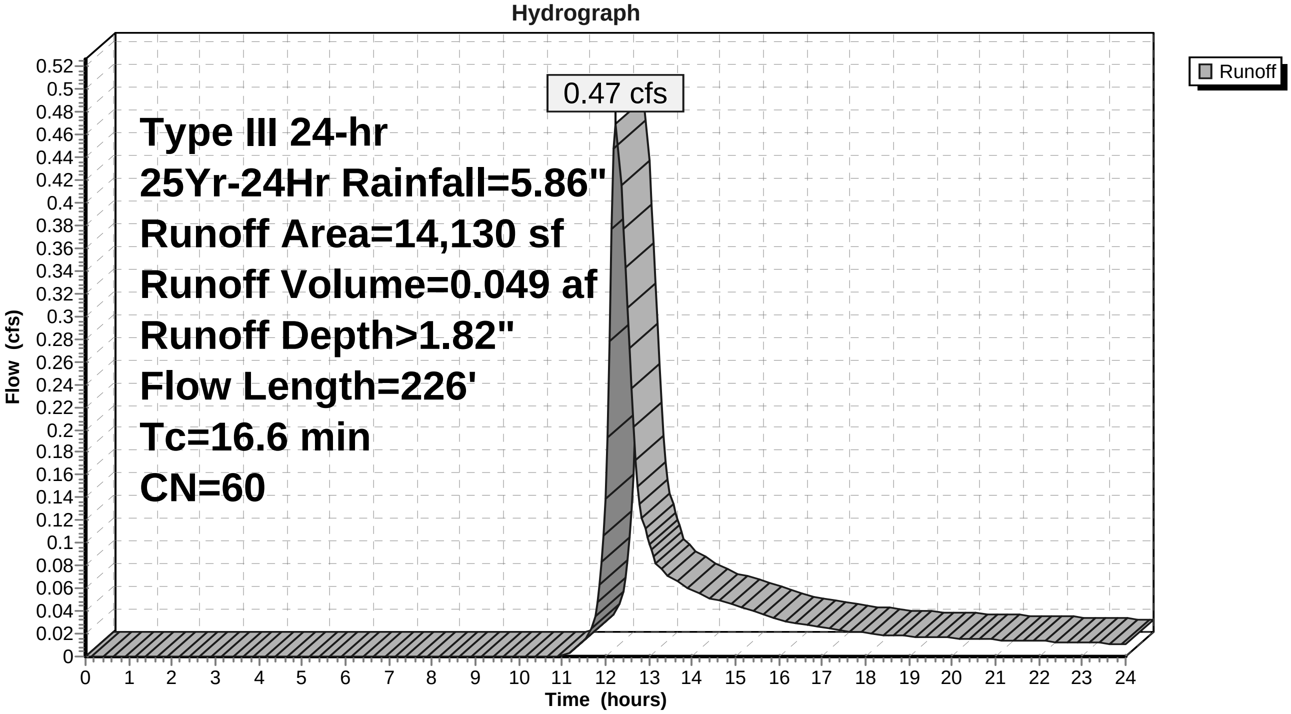
Runoff = 0.47 cfs @ 12.25 hrs, Volume= 0.049 af, Depth> 1.82"

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=5.86"

Area (sf)	CN	Description
694	61	>75% Grass cover, Good, HSG B
1,011	98	Paved parking, HSG B
11,420	55	Woods, Good, HSG B
433	98	Paved parking, HSG C
275	70	Woods, Good, HSG C
297	74	>75% Grass cover, Good, HSG C
14,130	60	Weighted Average
12,686		89.78% Pervious Area
1,444		10.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	80	0.0563	0.11		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
2.4	20	0.1990	0.14		**Sheet Flow, Segment #2** Woods: Light underbrush n= 0.400 P2= 3.06"
2.1	126	0.0398	1.00		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
16.6	226	Total			

Subcatchment 10S: Subcatchment #10



Summary for Subcatchment 22S: Area to Pond #102

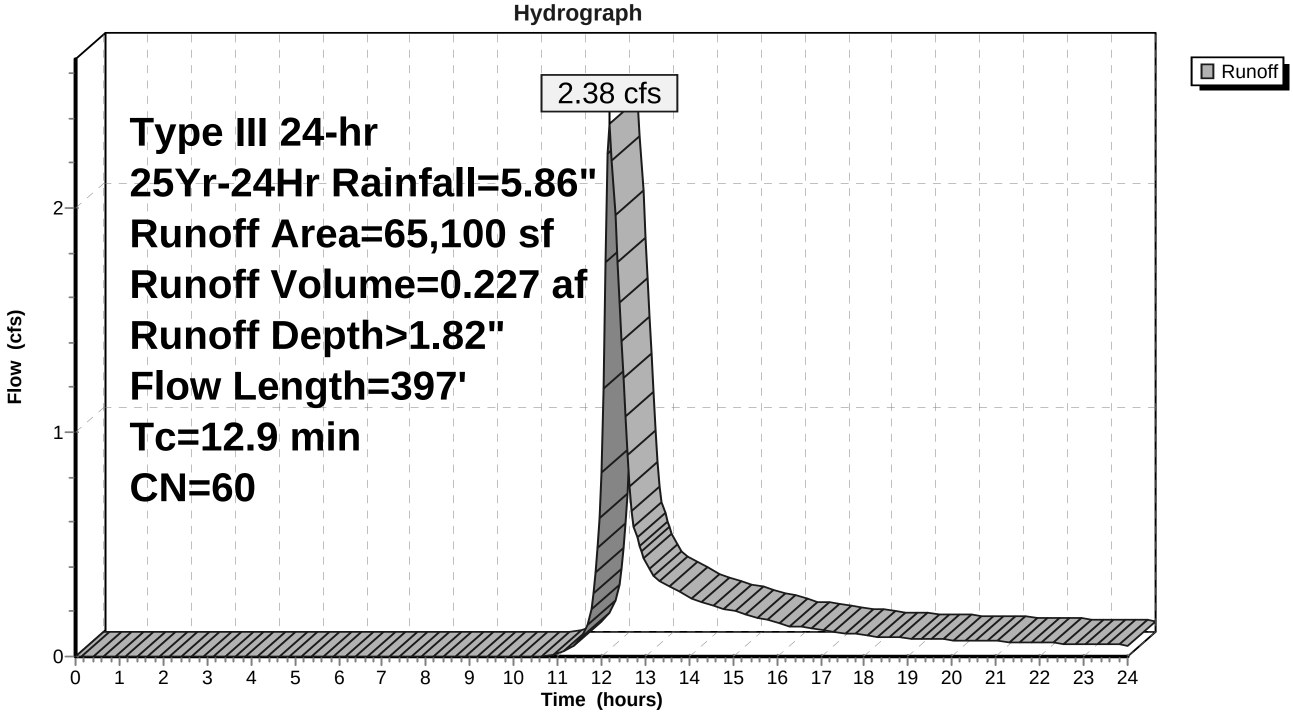
Runoff = 2.38 cfs @ 12.20 hrs, Volume= 0.227 af, Depth> 1.82"

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=5.86"

Area (sf)	CN	Description
1,008	98	Roofs, HSG A
26,108	39	>75% Grass cover, Good, HSG A
467	98	Paved parking, HSG A
1,757	30	Woods, Good, HSG A
7,771	61	>75% Grass cover, Good, HSG B
913	55	Woods, Good, HSG B
1,460	98	Roofs, HSG C
18,100	74	>75% Grass cover, Good, HSG C
5,162	98	Paved parking, HSG C
2,354	70	Woods, Good, HSG C
65,100	60	Weighted Average
57,003		87.56% Pervious Area
8,097		12.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	100	0.0200	0.17		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 3.06"
0.4	77	0.2078	3.19		**Shallow Concentrated Flow, Segment #2** Short Grass Pasture Kv= 7.0 fps
2.5	220	0.0455	1.49		**Shallow Concentrated Flow, Segment #2** Short Grass Pasture Kv= 7.0 fps
12.9	397	Total			

Subcatchment 22S: Area to Pond #102



Summary for Subcatchment 23S: Area to Pond #103

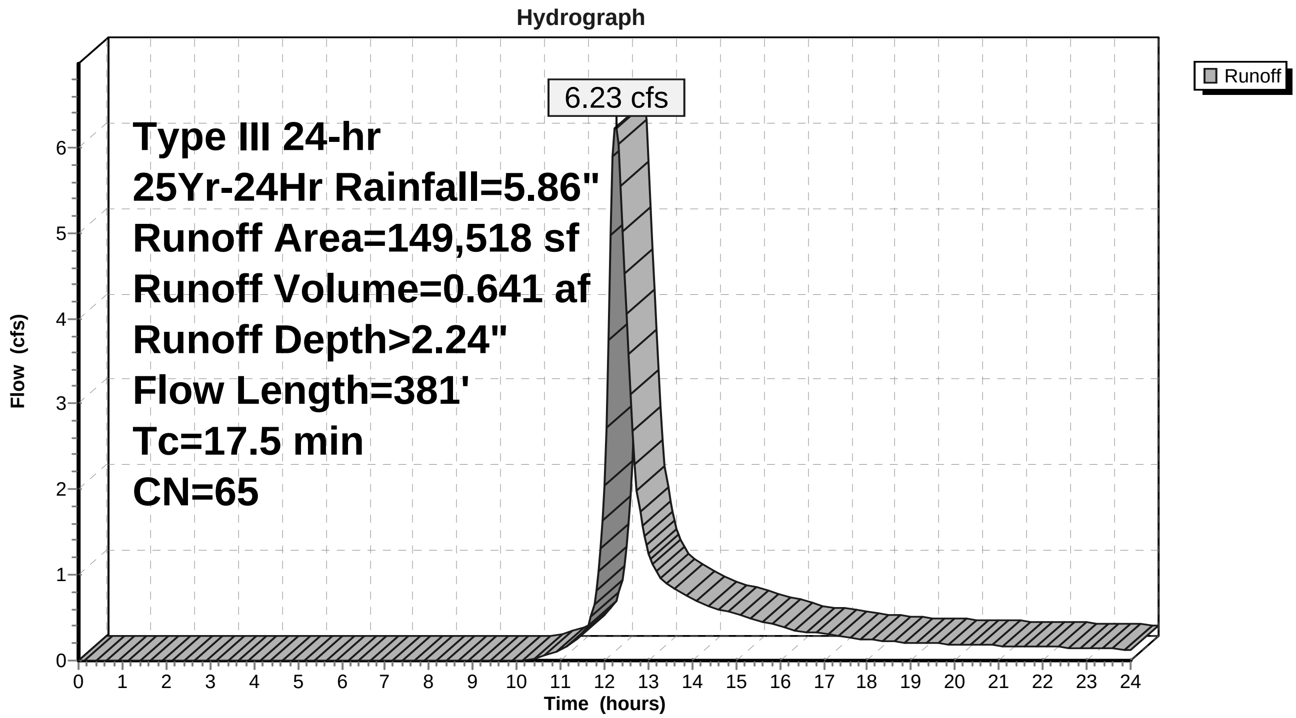
Runoff = 6.23 cfs @ 12.26 hrs, Volume= 0.641 af, Depth> 2.24"

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=5.86"

Area (sf)	CN	Description
722	39	>75% Grass cover, Good, HSG A
169	98	Paved parking, HSG A
1,821	30	Woods, Good, HSG A
3,168	98	Unconnected roofs, HSG B
85,729	61	>75% Grass cover, Good, HSG B
8,755	98	Paved parking, HSG B
21,758	55	Woods, Good, HSG B
1,000	96	Gravel surface, HSG B
9,640	74	>75% Grass cover, Good, HSG C
986	98	Paved parking, HSG C
15,605	70	Woods, Good, HSG C
165	96	Gravel surface, HSG C
149,518	65	Weighted Average
136,440		91.25% Pervious Area
13,078		8.75% Impervious Area
3,168		24.22% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0800	0.13		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
1.8	95	0.0316	0.89		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
2.0	71	0.0071	0.59		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
0.1	24	0.0208	2.93		**Shallow Concentrated Flow, Segment #4** Paved Kv= 20.3 fps
1.0	91	0.0442	1.47		**Shallow Concentrated Flow, Segment #5** Short Grass Pasture Kv= 7.0 fps
17.5	381	Total			

Subcatchment 23S: Area to Pond #103



Summary for Subcatchment 24S: Peekaboo CDS

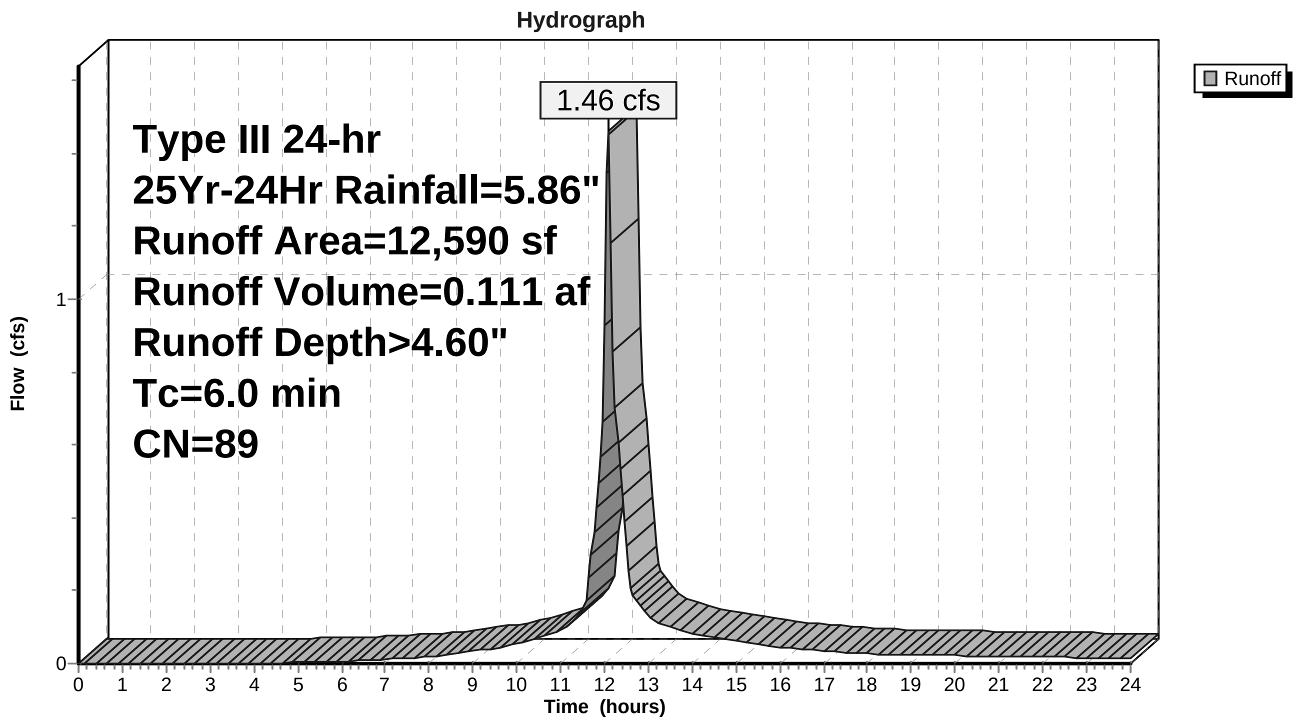
Runoff = 1.46 cfs @ 12.09 hrs, Volume= 0.111 af, Depth> 4.60"

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=5.86"

Area (sf)	CN	Description
4,731	74	>75% Grass cover, Good, HSG C
7,337	98	Paved parking, HSG C
522	96	Gravel surface, HSG C
12,590	89	Weighted Average
5,253		41.72% Pervious Area
7,337		58.28% Impervious Area

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

Subcatchment 24S: Peekaboo CDS



Summary for Subcatchment 25S: Fredrick CDS

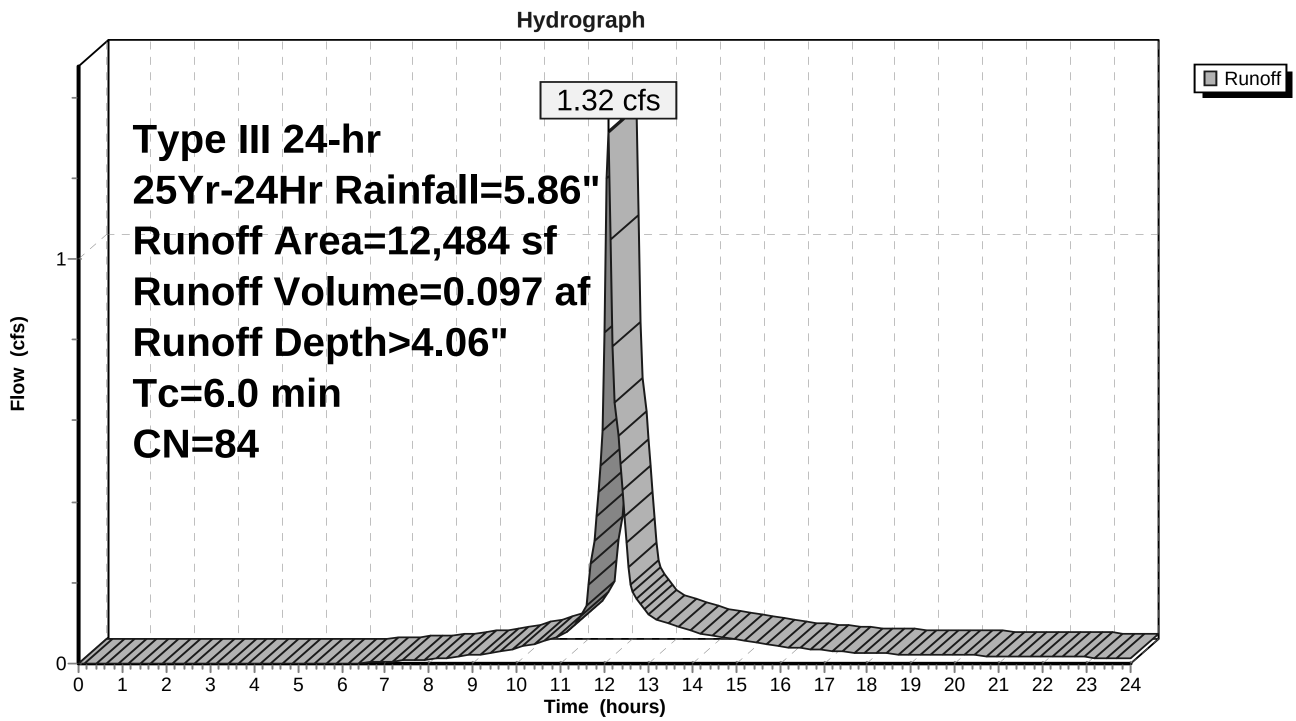
Runoff = 1.32 cfs @ 12.09 hrs, Volume= 0.097 af, Depth> 4.06"

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=5.86"

Area (sf)	CN	Description
4,731	61	>75% Grass cover, Good, HSG B
7,231	98	Paved parking, HSG B
522	96	Gravel surface, HSG B
12,484	84	Weighted Average
5,253		42.08% Pervious Area
7,231		57.92% Impervious Area

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

Subcatchment 25S: Fredrick CDS



Summary for Subcatchment 26S: Area to Pond #106

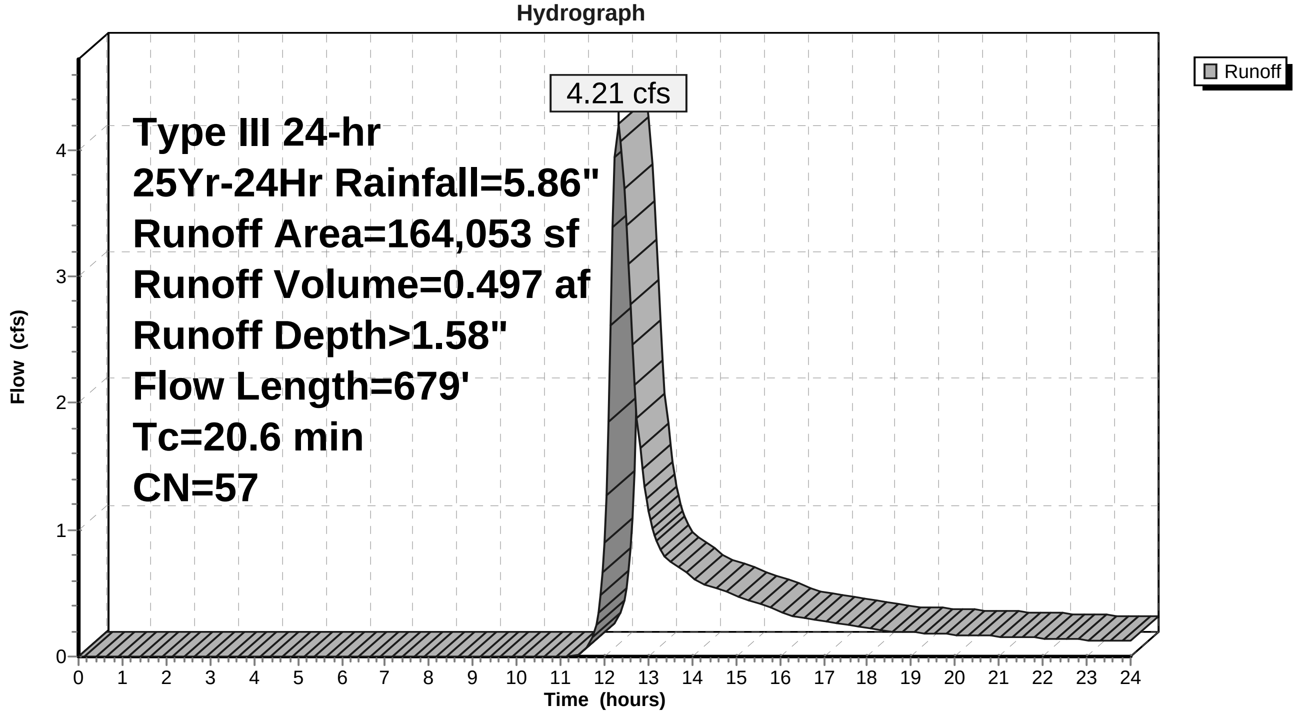
Runoff = 4.21 cfs @ 12.32 hrs, Volume= 0.497 af, Depth> 1.58"

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=5.86"

Area (sf)	CN	Description
311	98	Unconnected roofs, HSG A
40,918	30	Woods, Good, HSG A
7,768	55	Woods, Good, HSG B
2,429	98	Unconnected roofs, HSG C
2,376	98	Unconnected pavement, HSG C
53,519	70	Woods, Good, HSG C
6,114	39	>75% Grass cover, Good, HSG A
5,087	61	>75% Grass cover, Good, HSG B
17,165	74	>75% Grass cover, Good, HSG C
6,114	30	Meadow, non-grazed, HSG A
5,087	58	Meadow, non-grazed, HSG B
17,165	71	Meadow, non-grazed, HSG C
164,053	57	Weighted Average
158,937		96.88% Pervious Area
5,116		3.12% Impervious Area
5,116		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	100	0.0950	0.14		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
2.2	86	0.0174	0.66		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
4.2	319	0.0628	1.25		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
2.4	174	0.0574	1.20		**Shallow Concentrated Flow, Segment #4** Woodland Kv= 5.0 fps
20.6	679	Total			

Subcatchment 26S: Area to Pond #106



Summary for Subcatchment 27S: Area to Pond #107

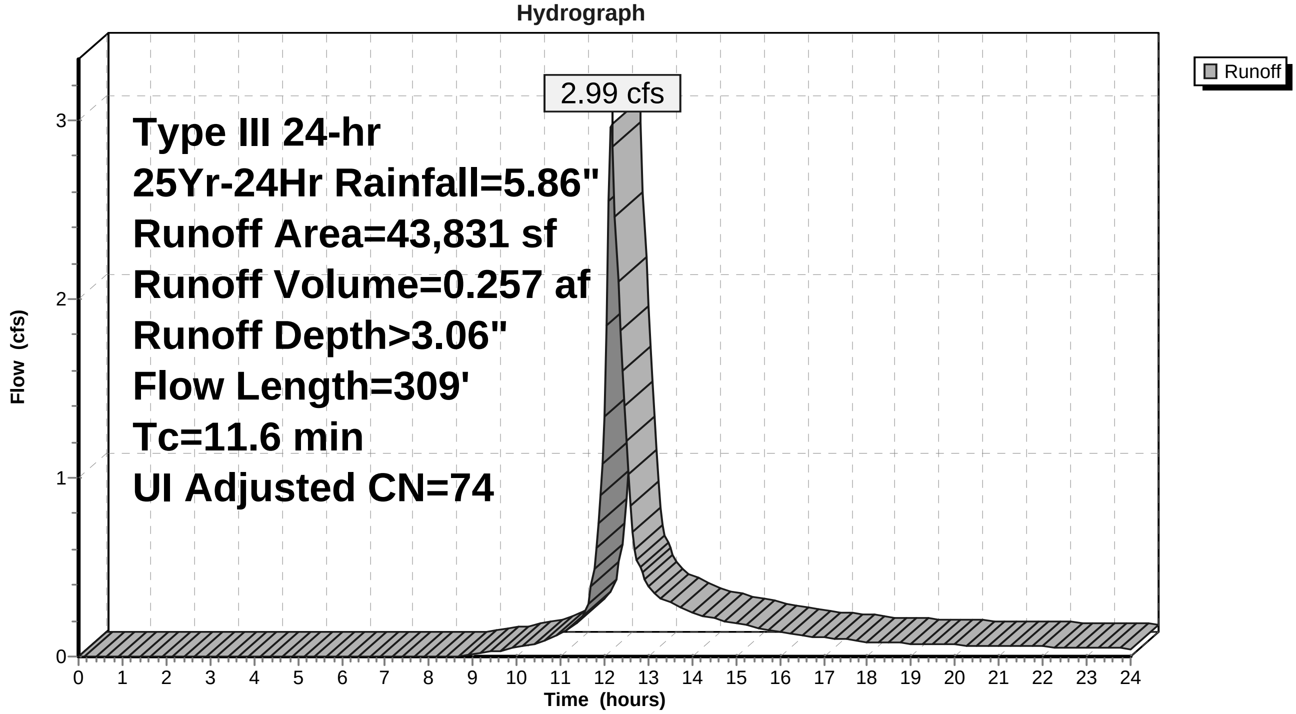
Runoff = 2.99 cfs @ 12.16 hrs, Volume= 0.257 af, Depth> 3.06"

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=5.86"

Area (sf)	CN	Adj	Description
1,854	98		Unconnected roofs, HSG C
28,368	74		>75% Grass cover, Good, HSG C
1,242	98		Paved parking, HSG C
12,152	70		Woods, Good, HSG C
215	96		Gravel surface, HSG C
43,831	75	74	Weighted Average, UI Adjusted
40,735			92.94% Pervious Area
3,096			7.06% Impervious Area
1,854			59.88% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	100	0.1800	0.18		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
0.6	43	0.0514	1.13		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
1.9	166	0.0452	1.49		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
11.6	309	Total			

Subcatchment 27S: Area to Pond #107



Summary for Subcatchment 28S: Area to Pond #108

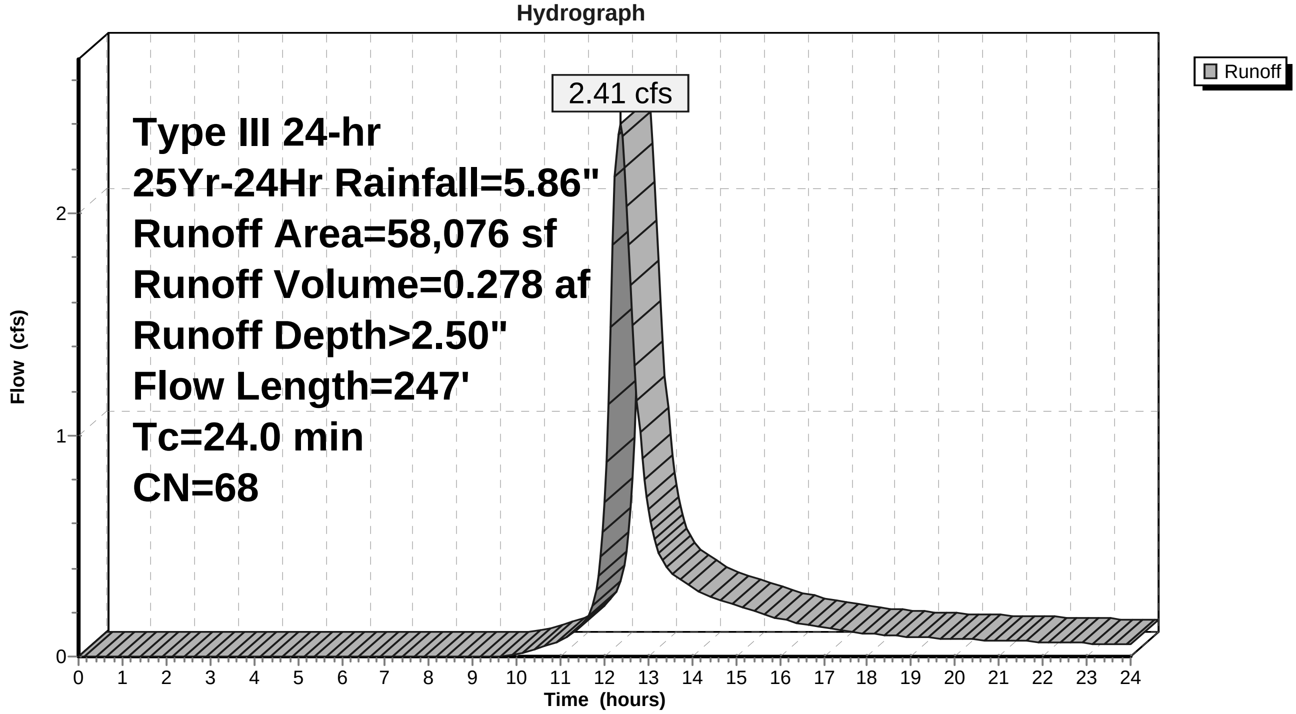
Runoff = 2.41 cfs @ 12.35 hrs, Volume= 0.278 af, Depth> 2.50"

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=5.86"

Area (sf)	CN	Description
1,584	98	Roofs, HSG B
26,908	61	>75% Grass cover, Good, HSG B
5,660	98	Paved parking, HSG B
8,948	55	Woods, Good, HSG B
641	96	Gravel surface, HSG B
4,142	74	>75% Grass cover, Good, HSG C
268	98	Paved parking, HSG C
9,909	70	Woods, Good, HSG C
16	96	Gravel surface, HSG C
58,076	68	Weighted Average
50,564		87.07% Pervious Area
7,512		12.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.0	100	0.0200	0.08		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
1.0	69	0.0508	1.13		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
1.0	78	0.0319	1.25		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
24.0	247	Total			

Subcatchment 28S: Area to Pond #108



Summary for Subcatchment 29S: Subcatchment #29

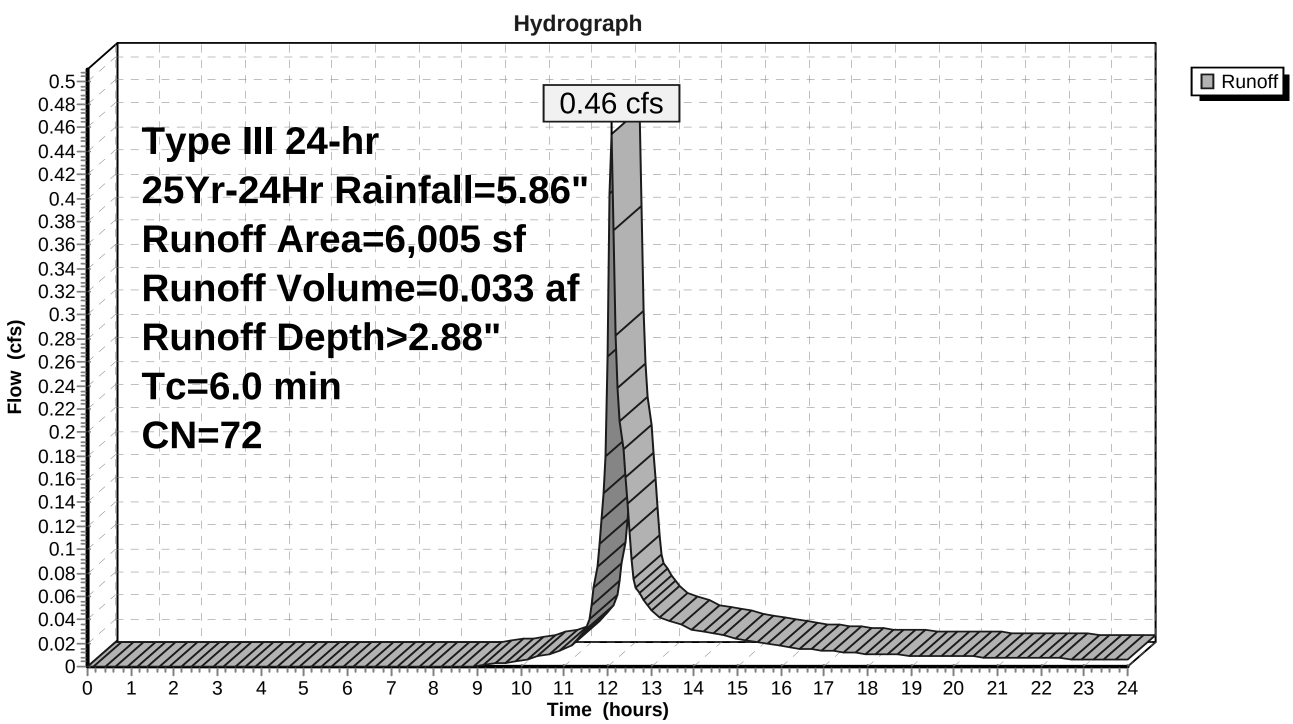
Runoff = 0.46 cfs @ 12.09 hrs, Volume= 0.033 af, Depth> 2.88"

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=5.86"

Area (sf)	CN	Description
3,178	61	>75% Grass cover, Good, HSG B
1,574	98	Paved parking, HSG B
317	96	Gravel surface, HSG B
936	55	Woods, Good, HSG B
6,005	72	Weighted Average
4,431		73.79% Pervious Area
1,574		26.21% Impervious Area

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

Subcatchment 29S: Subcatchment #29



Summary for Subcatchment 30S: Subcatchment #30

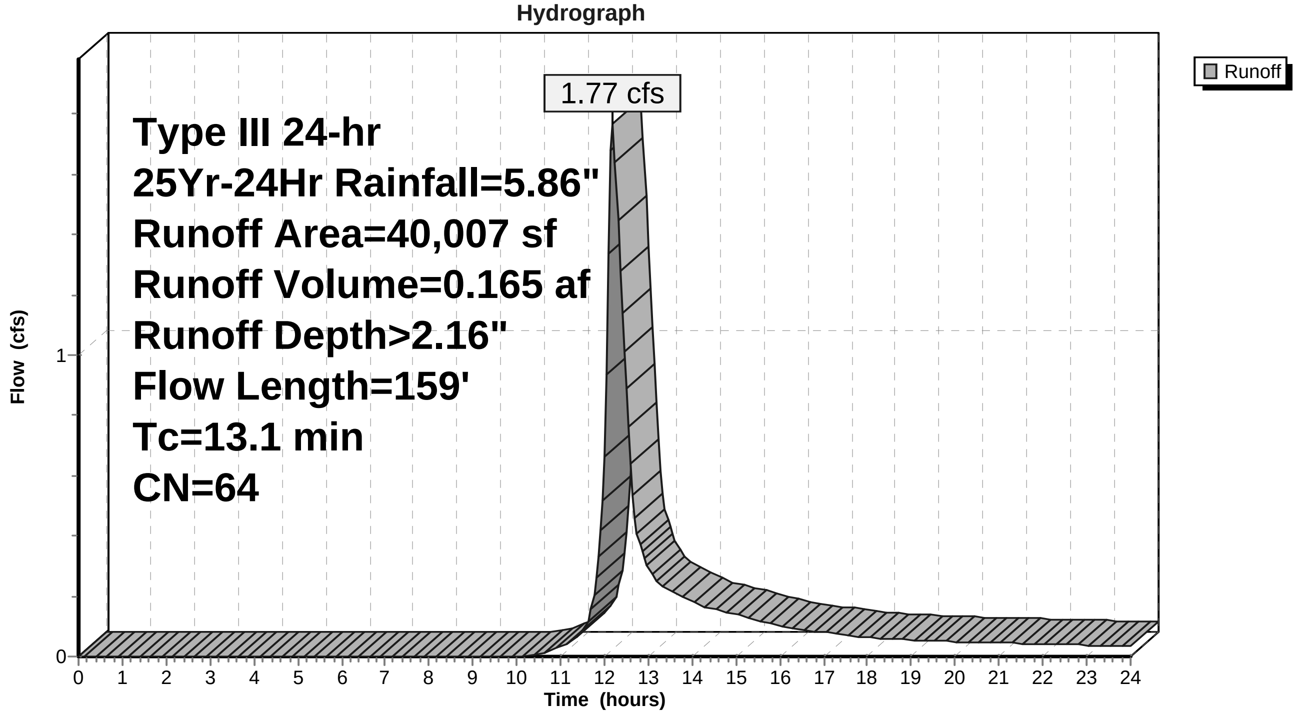
Runoff = 1.77 cfs @ 12.20 hrs, Volume= 0.165 af, Depth> 2.16"

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=5.86"

Area (sf)	CN	Description
3,175	39	>75% Grass cover, Good, HSG A
126	98	Paved parking, HSG A
10,042	61	>75% Grass cover, Good, HSG B
1,715	98	Paved parking, HSG B
11,216	55	Woods, Good, HSG B
322	96	Gravel surface, HSG B
4,652	74	>75% Grass cover, Good, HSG C
1,178	98	Paved parking, HSG C
7,329	70	Woods, Good, HSG C
252	96	Gravel surface, HSG C
40,007	64	Weighted Average
36,988		92.45% Pervious Area
3,019		7.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	100	0.0900	0.14		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
0.7	36	0.0277	0.83		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
0.4	23	0.0216	1.03		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
13.1	159	Total			

Subcatchment 30S: Subcatchment #30



Summary for Subcatchment 31S: Subcatchment #31

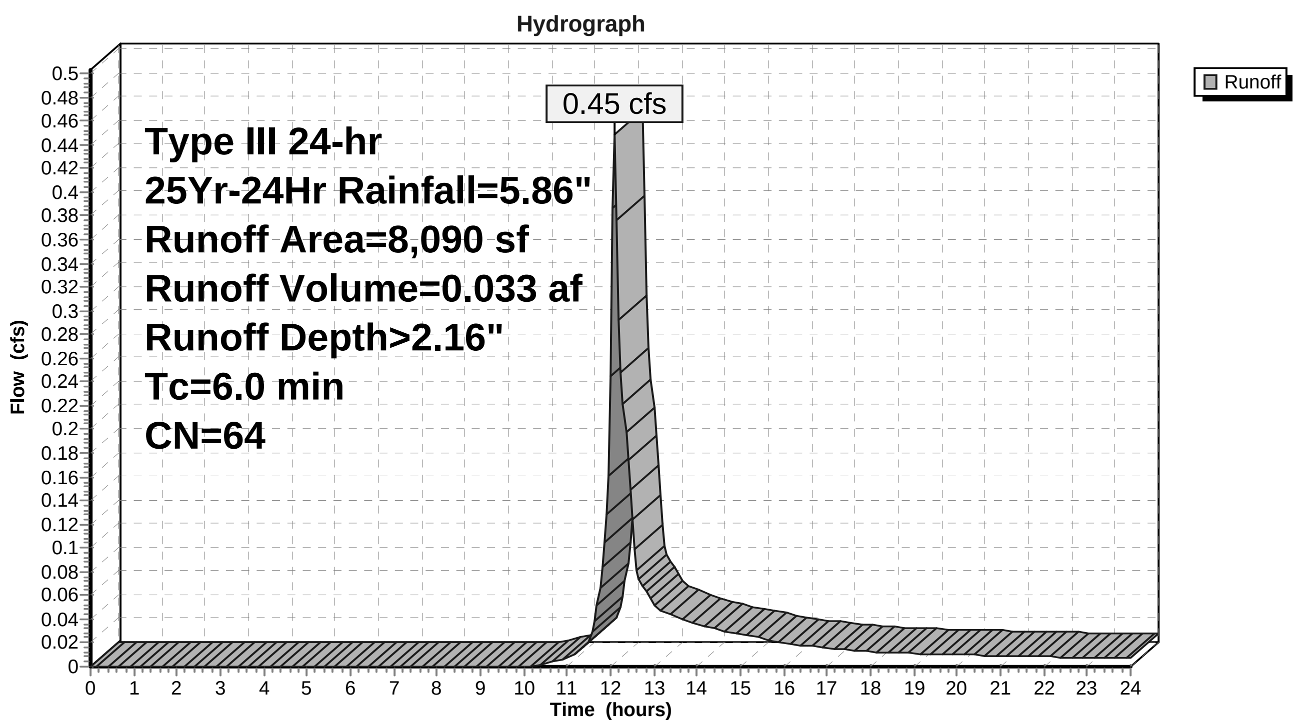
Runoff = 0.45 cfs @ 12.10 hrs, Volume= 0.033 af, Depth> 2.16"

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=5.86"

Area (sf)	CN	Description
3,590	39	>75% Grass cover, Good, HSG A
838	98	Paved parking, HSG A
83	96	Gravel surface, HSG A
1,763	61	>75% Grass cover, Good, HSG B
1,595	98	Paved parking, HSG B
221	96	Gravel surface, HSG B
8,090	64	Weighted Average
5,657		69.93% Pervious Area
2,433		30.07% Impervious Area

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

Subcatchment 31S: Subcatchment #31



Summary for Subcatchment 32S: Inlet Sump (Lt.)

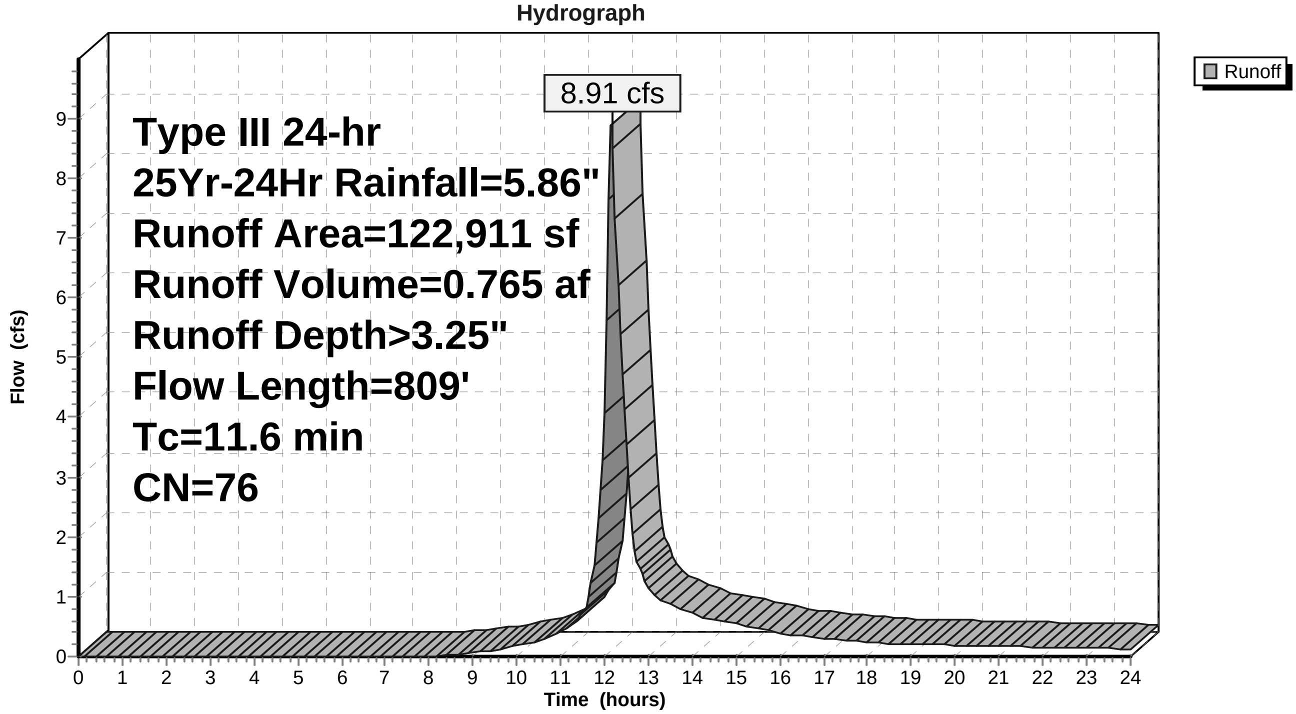
Runoff = 8.91 cfs @ 12.16 hrs, Volume= 0.765 af, Depth> 3.25"

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=5.86"

Area (sf)	CN	Description
1,449	39	>75% Grass cover, Good, HSG A
174	98	Paved parking, HSG A
16	96	Gravel surface, HSG A
7,170	61	>75% Grass cover, Good, HSG B
504	98	Roofs, HSG B
2,102	98	Paved parking, HSG B
1,984	55	Woods, Good, HSG B
6,192	98	Roofs, HSG C
42,536	71	Meadow, non-grazed, HSG C
42,536	74	>75% Grass cover, Good, HSG C
13,827	98	Paved parking, HSG C
4,116	70	Woods, Good, HSG C
305	96	Gravel surface, HSG C
122,911	76	Weighted Average
100,112		81.45% Pervious Area
22,799		18.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	100	0.0750	0.28		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 3.06"
0.2	25	0.0800	1.98		**Shallow Concentrated Flow, Segment #2** Short Grass Pasture Kv= 7.0 fps
0.0	9	0.3300	4.02		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
5.5	675	0.0844	2.03		**Shallow Concentrated Flow, Segment #4** Short Grass Pasture Kv= 7.0 fps
11.6	809	Total			

Subcatchment 32S: Inlet Sump (Lt.)



Summary for Subcatchment 33aS: Peekaboo Entrance

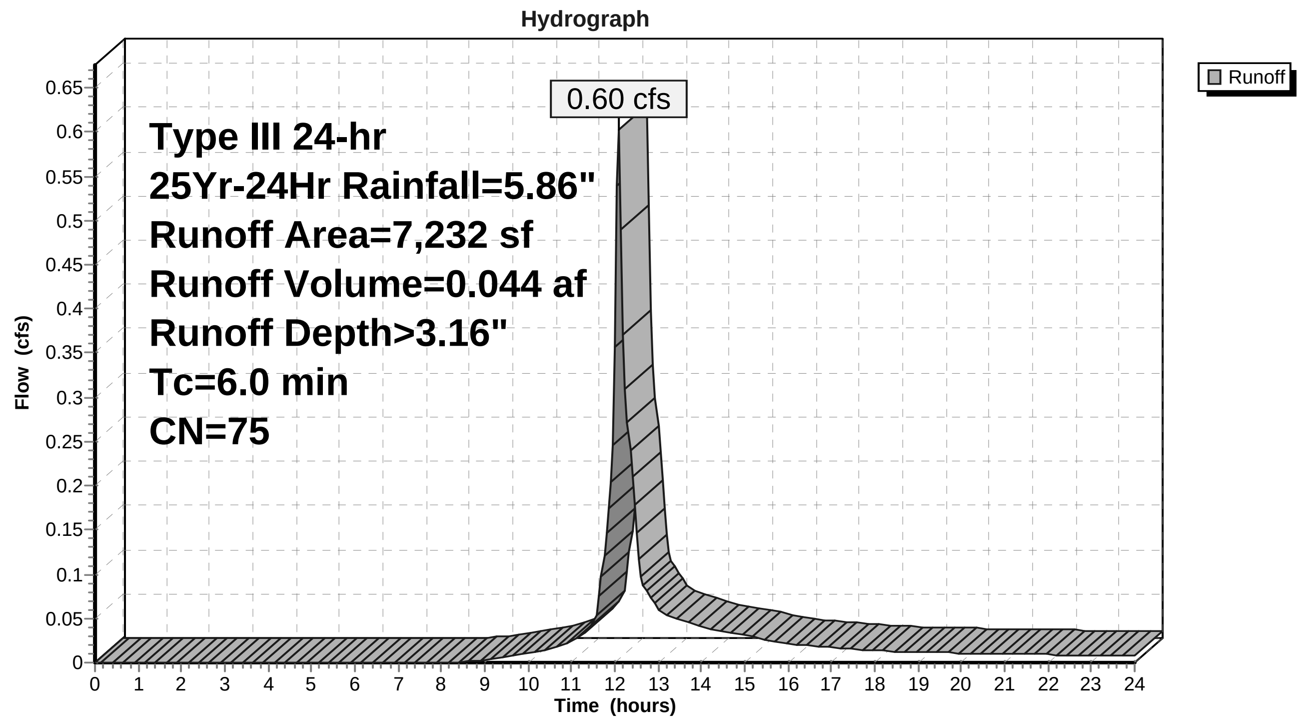
Runoff = 0.60 cfs @ 12.09 hrs, Volume= 0.044 af, Depth> 3.16"

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=5.86"

Area (sf)	CN	Description
2,648	39	>75% Grass cover, Good, HSG A
3,022	98	Paved parking, HSG A
316	96	Gravel surface, HSG A
251	61	>75% Grass cover, Good, HSG B
938	98	Paved parking, HSG B
57	96	Gravel surface, HSG B
7,232	75	Weighted Average
3,272		45.24% Pervious Area
3,960		54.76% Impervious Area

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

Subcatchment 33aS: Peekaboo Entrance



Summary for Subcatchment 33bS: Subcatchment #33b Area above Treatment Swale

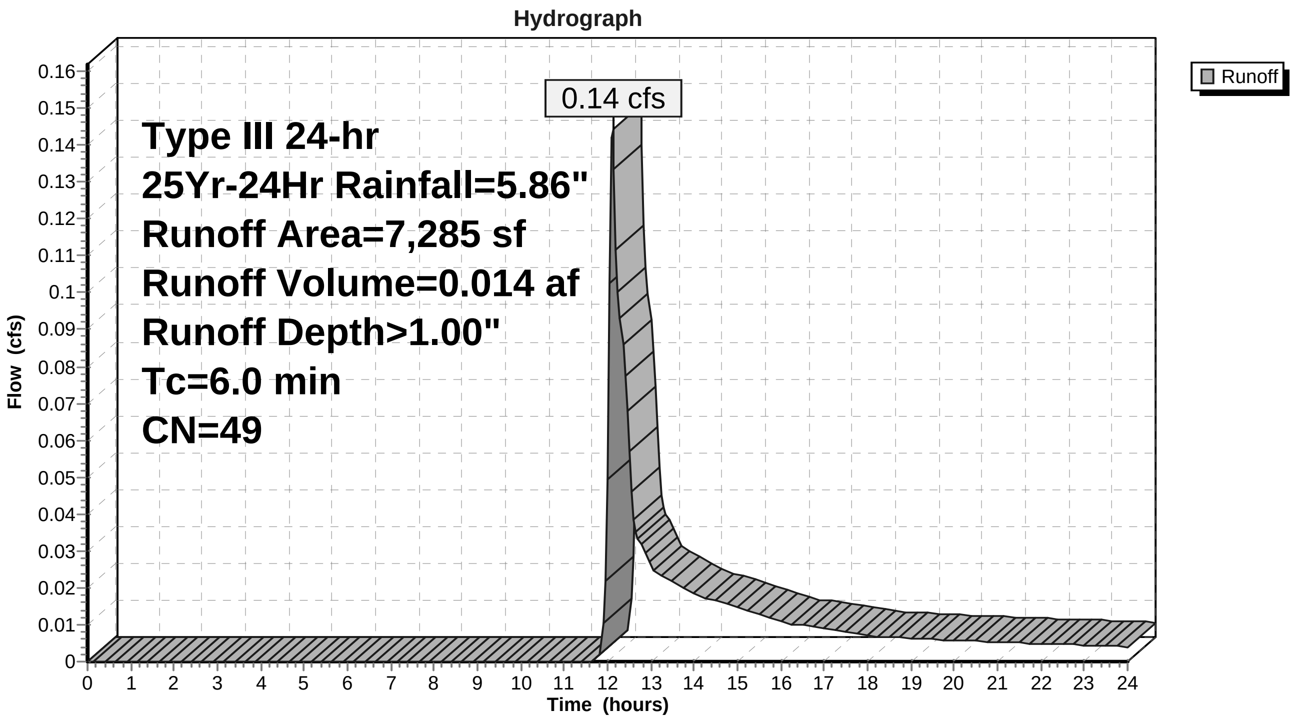
Runoff = 0.14 cfs @ 12.12 hrs, Volume= 0.014 af, Depth> 1.00"

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=5.86"

Area (sf)	CN	Description
4,078	39	>75% Grass cover, Good, HSG A
28	30	Woods, Good, HSG A
281	96	Gravel surface, HSG A
1,988	61	>75% Grass cover, Good, HSG B
910	55	Woods, Good, HSG B
7,285	49	Weighted Average
7,285		100.00% Pervious Area

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

Subcatchment 33bS: Subcatchment #33b Area above Treatment Swale



Summary for Subcatchment 34S: Inlet Sump (Rt.)

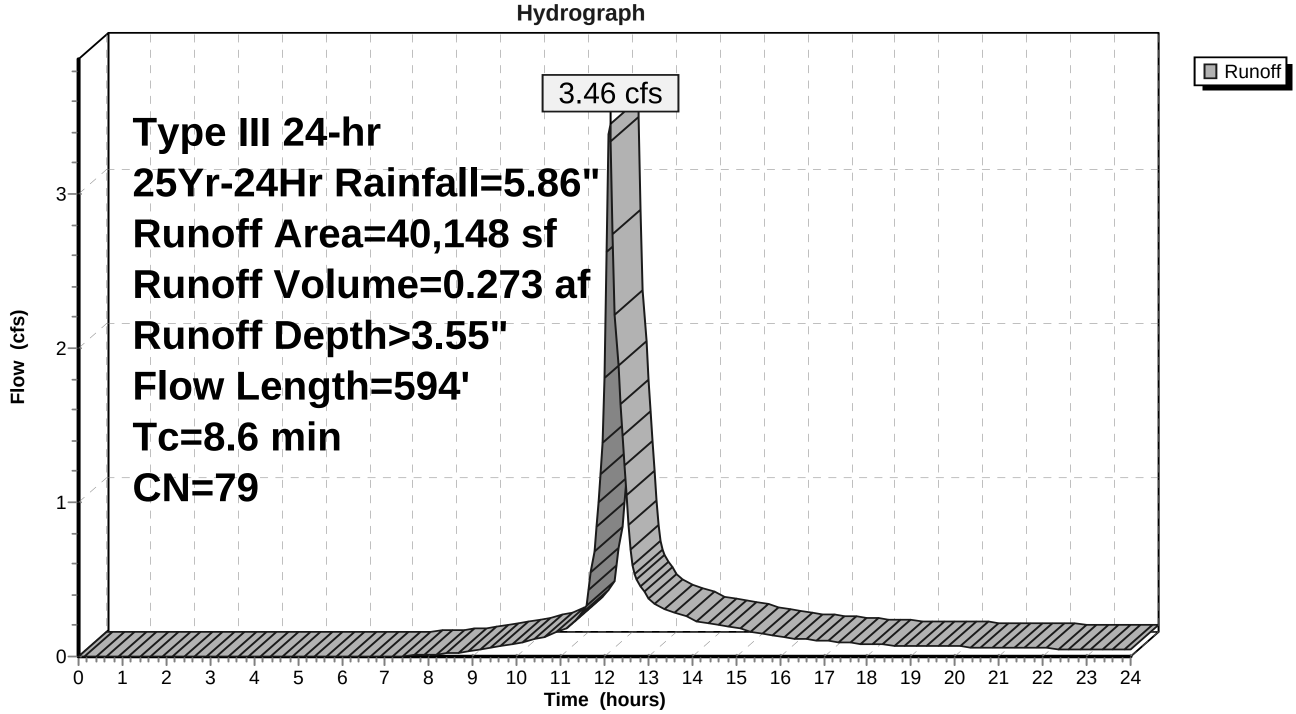
Runoff = 3.46 cfs @ 12.12 hrs, Volume= 0.273 af, Depth> 3.55"

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=5.86"

Area (sf)	CN	Description
63	39	>75% Grass cover, Good, HSG A
31,078	74	>75% Grass cover, Good, HSG C
6,517	98	Paved parking, HSG C
2,088	98	Roofs, HSG C
372	96	Gravel surface, HSG C
30	70	Woods, Good, HSG C
40,148	79	Weighted Average
31,543		78.57% Pervious Area
8,605		21.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	92	0.1087	0.32		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 3.06"
0.0	9	0.3300	4.02		**Shallow Concentrated Flow, Segment #2** Short Grass Pasture Kv= 7.0 fps
3.8	493	0.0953	2.16		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
8.6	594	Total			

Subcatchment 34S: Inlet Sump (Rt.)



Summary for Subcatchment 41S: Catch Basin #1

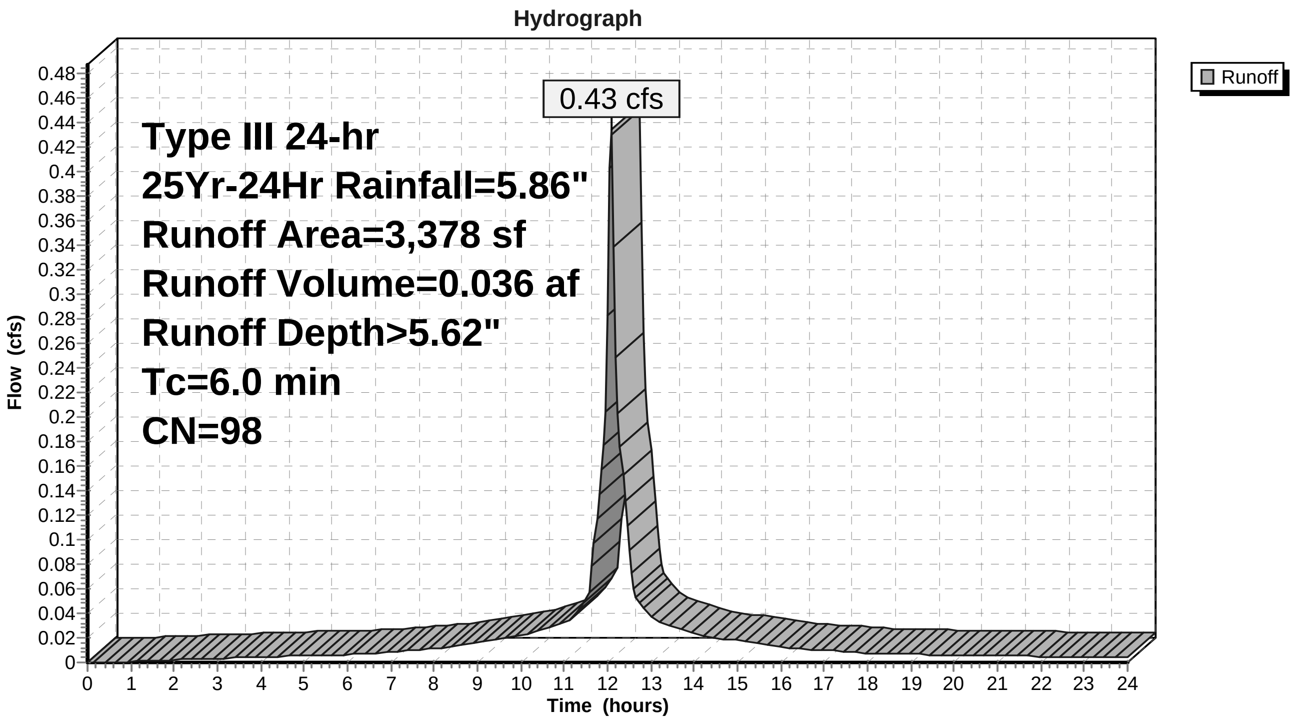
Runoff = 0.43 cfs @ 12.09 hrs, Volume= 0.036 af, Depth> 5.62"

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=5.86"

Area (sf)	CN	Description
3,378	98	Paved parking, HSG C
3,378		100.00% Impervious Area

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

Subcatchment 41S: Catch Basin #1



Summary for Subcatchment 42S: Catch Basin #2

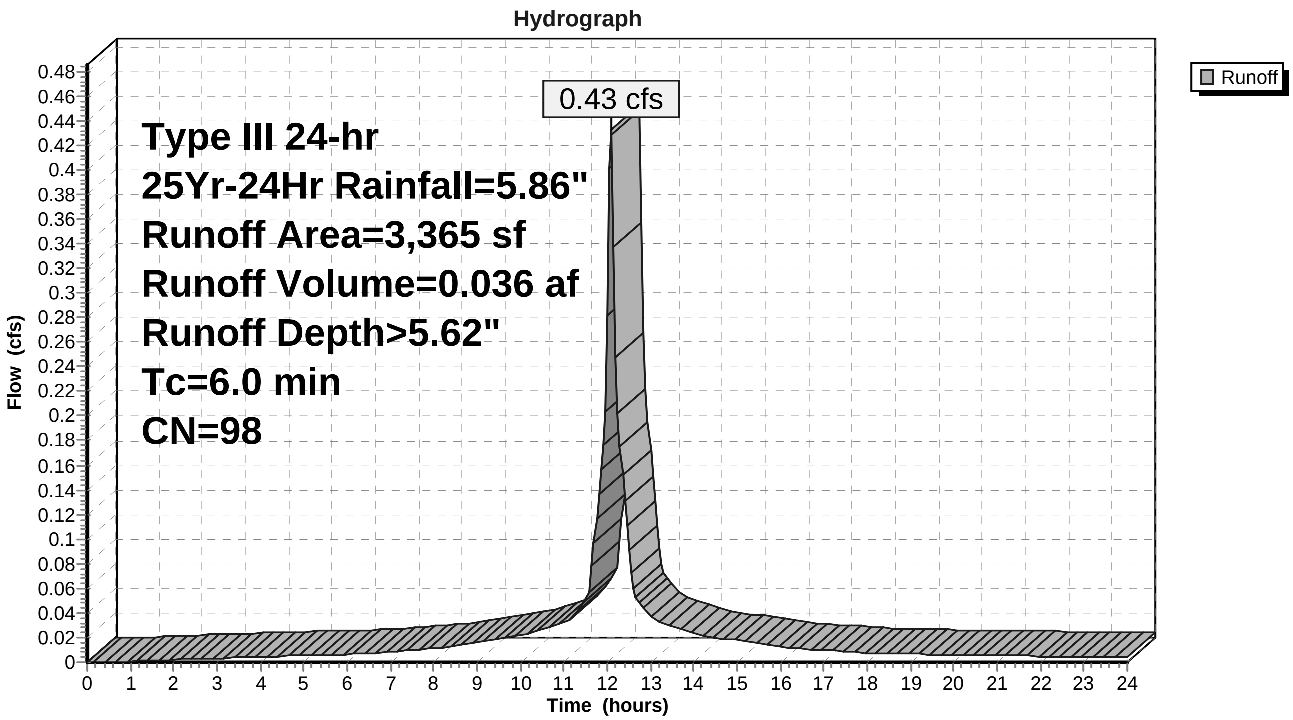
Runoff = 0.43 cfs @ 12.09 hrs, Volume= 0.036 af, Depth> 5.62"

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=5.86"

Area (sf)	CN	Description
3,365	98	Paved parking, HSG C
3,365		100.00% Impervious Area

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

Subcatchment 42S: Catch Basin #2



Summary for Subcatchment 43S: Catch Basin #3

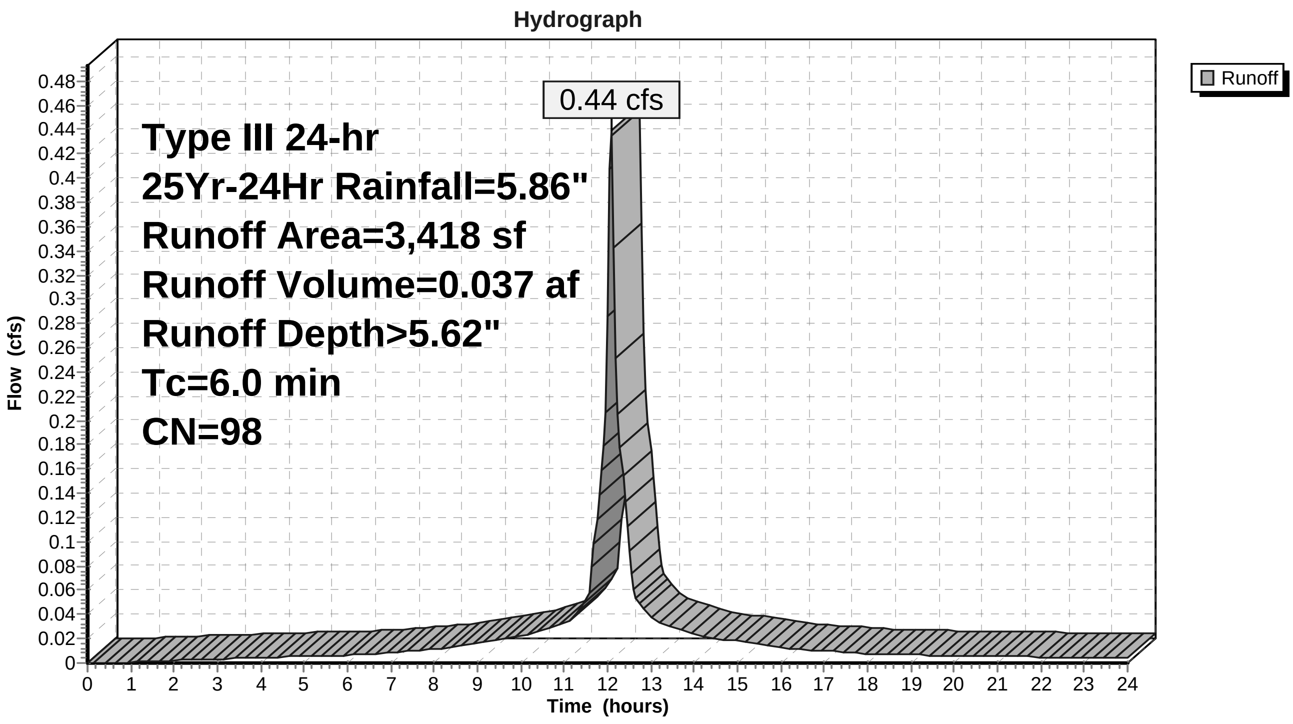
Runoff = 0.44 cfs @ 12.09 hrs, Volume= 0.037 af, Depth> 5.62"

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=5.86"

Area (sf)	CN	Description
80	98	Paved parking, HSG A
3,338	98	Paved parking, HSG C
3,418	98	Weighted Average
3,418		100.00% Impervious Area

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

Subcatchment 43S: Catch Basin #3



Summary for Subcatchment 44S: Catch Basin #4

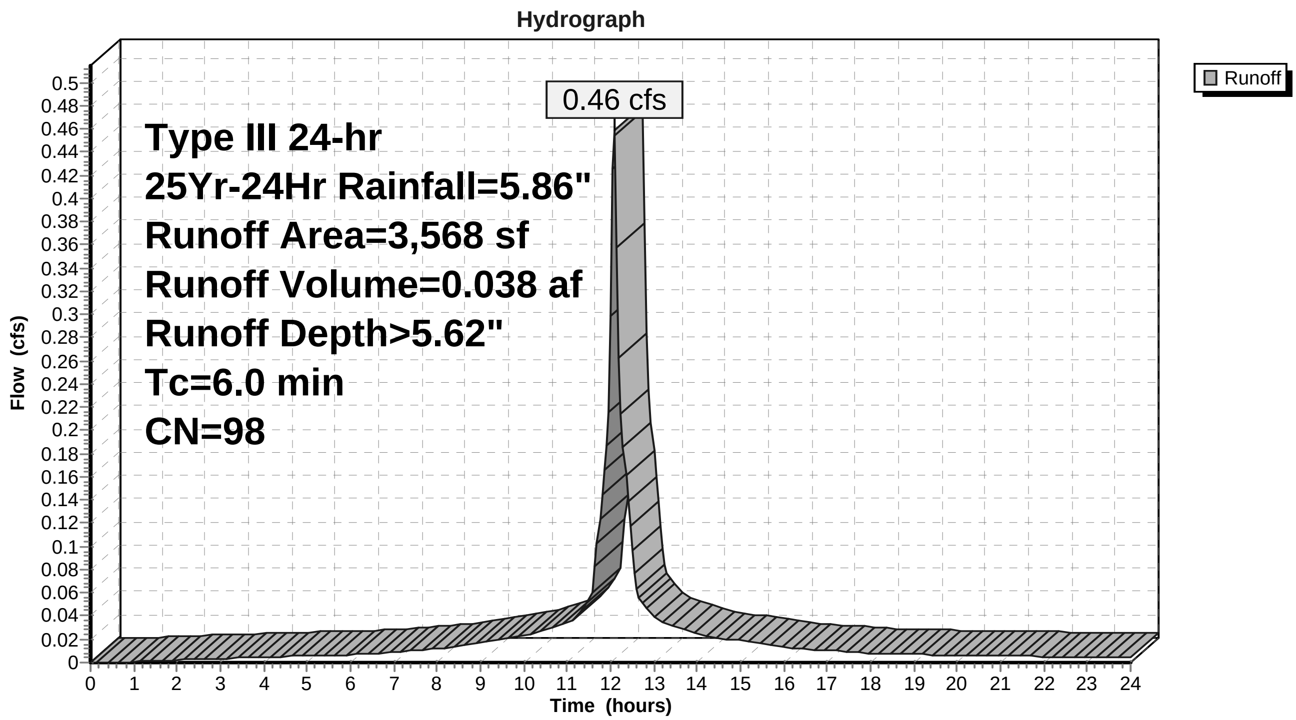
Runoff = 0.46 cfs @ 12.09 hrs, Volume= 0.038 af, Depth> 5.62"

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=5.86"

Area (sf)	CN	Description
160	98	Paved parking, HSG A
3,408	98	Paved parking, HSG C
3,568	98	Weighted Average
3,568		100.00% Impervious Area

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

Subcatchment 44S: Catch Basin #4



Summary for Subcatchment 45S: Rain Guardian #1

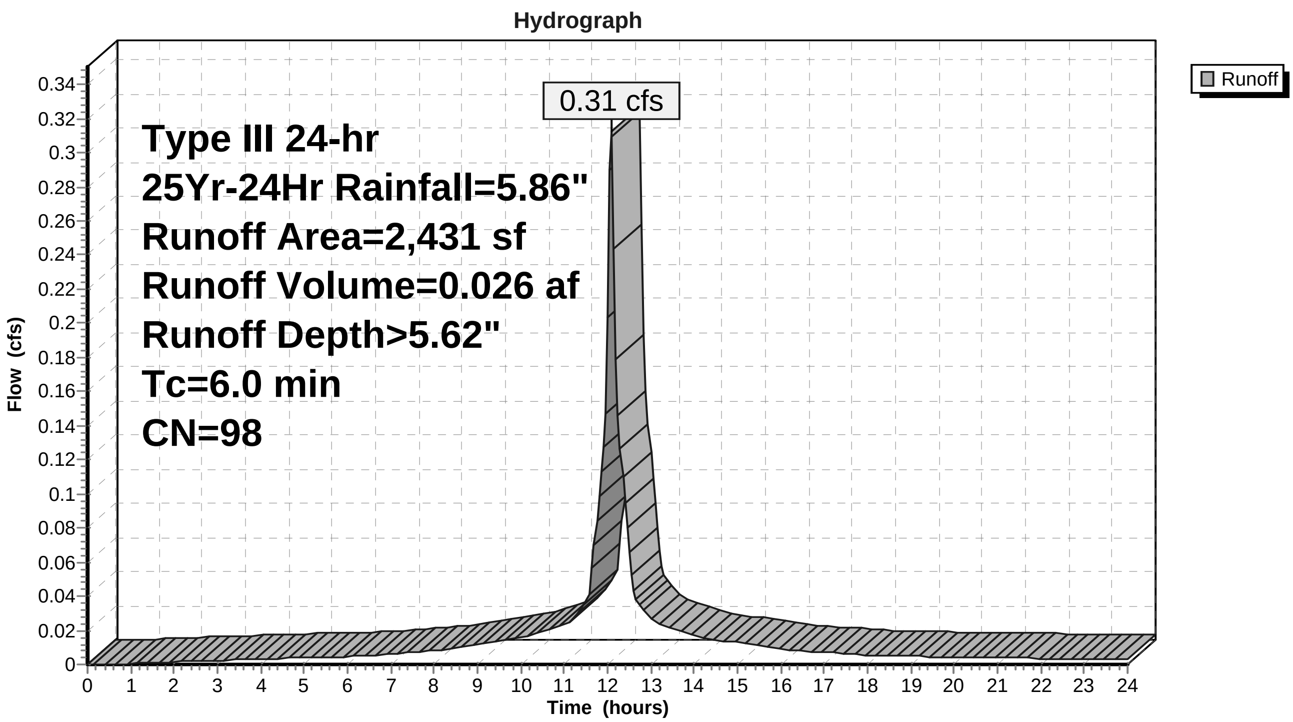
Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.026 af, Depth> 5.62"

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=5.86"

Area (sf)	CN	Description
2,431	98	Paved parking, HSG A
2,431		100.00% Impervious Area

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

Subcatchment 45S: Rain Guardian #1



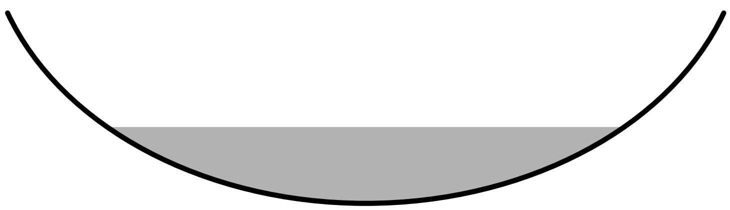
Summary for Reach 1R: Reach #1 Outlet Swale

Inflow Area = 6.437 ac, 2.68% Impervious, Inflow Depth > 1.93" for 25Yr-24Hr event
Inflow = 3.25 cfs @ 12.86 hrs, Volume= 1.036 af
Outflow = 3.25 cfs @ 12.87 hrs, Volume= 1.035 af, Atten= 0%, Lag= 0.5 min

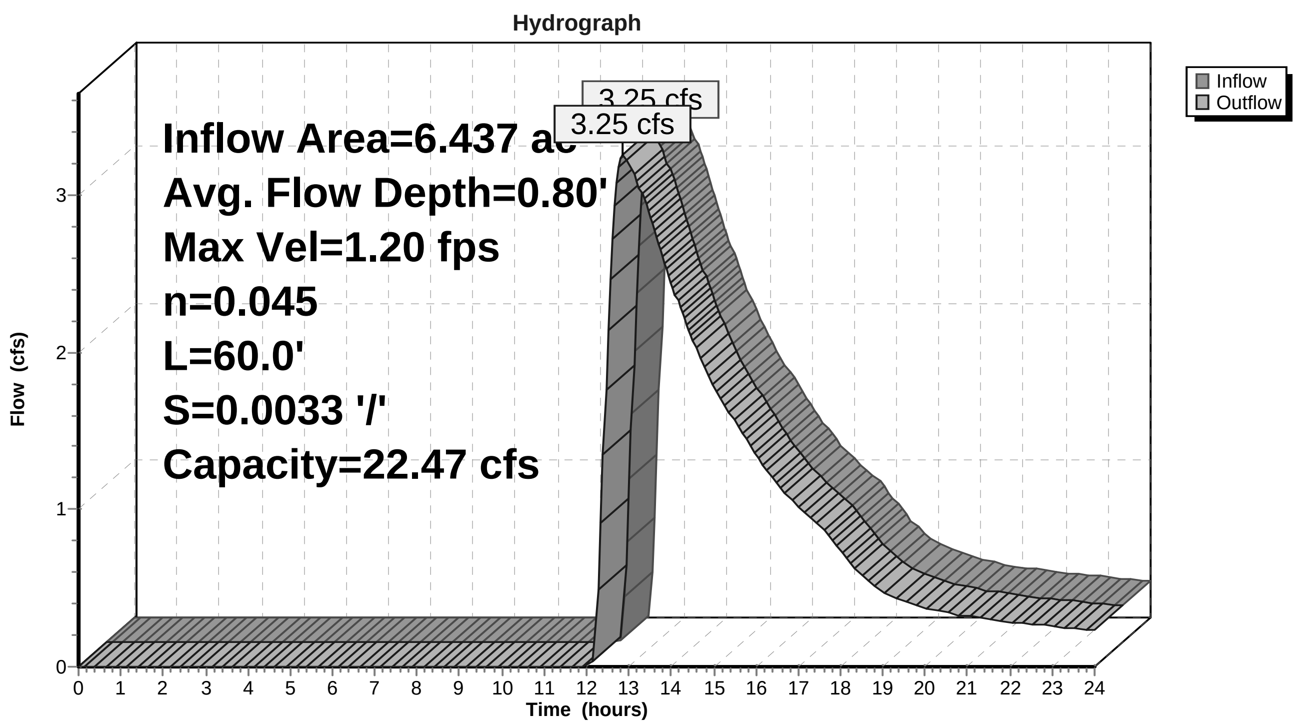
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 1.20 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.80 fps, Avg. Travel Time= 1.3 min

Peak Storage= 162 cf @ 12.87 hrs
Average Depth at Peak Storage= 0.80'
Bank-Full Depth= 2.00' Flow Area= 10.7 sf, Capacity= 22.47 cfs

8.00' x 2.00' deep Parabolic Channel, n= 0.045
Length= 60.0' Slope= 0.0033 '/'
Inlet Invert= 182.50', Outlet Invert= 182.30'



Reach 1R: Reach #1 Outlet Swale



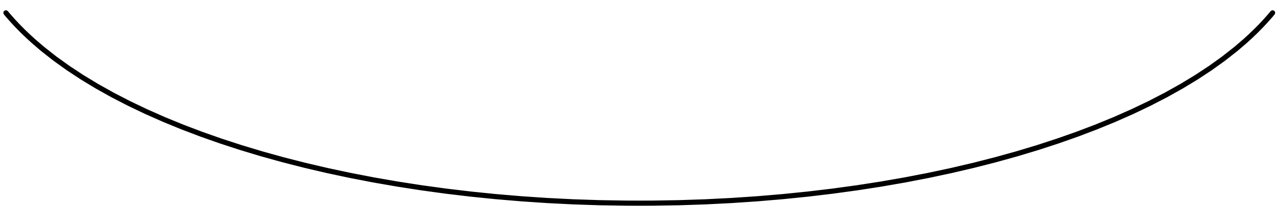
Summary for Reach 22aR: Reach #22a Overland Flow

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 / 3
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= 6.7 sf, Capacity= 16.09 cfs

20.00' x 0.50' deep Parabolic Channel, n= 0.080
Length= 125.0' Slope= 0.0732 '/'
Inlet Invert= 189.50', Outlet Invert= 180.35'



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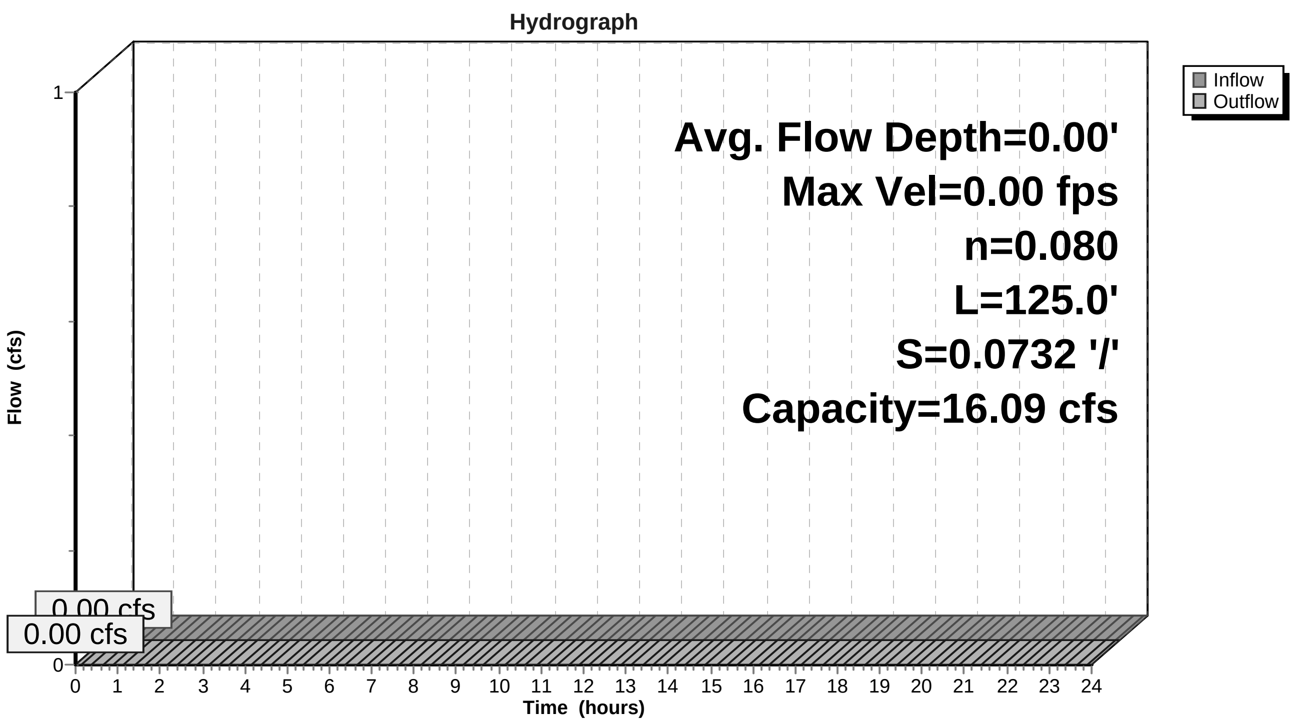
Reach 22aR: Reach #22a Overland Flow



Summary for Reach 22bR: Reach #22b

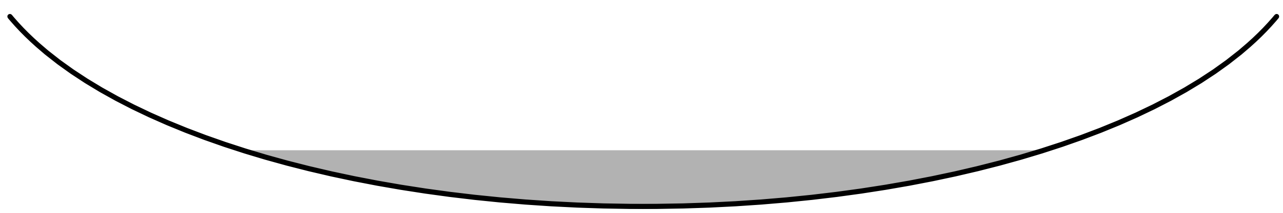
[62] Hint: Exceeded Reach 22aR OUTLET depth by 0.59' @ 13.20 hrs
[62] Hint: Exceeded Reach 33bR OUTLET depth by 0.01' @ 18.40 hrs

Inflow Area = 6.826 ac, 4.68% Impervious, Inflow Depth > 1.93" for 25Yr-24Hr event
Inflow = 3.33 cfs @ 13.05 hrs, Volume= 1.097 af
Outflow = 3.28 cfs @ 13.19 hrs, Volume= 1.090 af, Atten= 1%, Lag= 8.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.77 fps, Min. Travel Time= 8.5 min
Avg. Velocity = 0.50 fps, Avg. Travel Time= 13.0 min

Peak Storage= 1,675 cf @ 13.19 hrs
Average Depth at Peak Storage= 0.59'
Bank-Full Depth= 2.00' Flow Area= 26.7 sf, Capacity= 45.67 cfs

20.00' x 2.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 392.0' Slope= 0.0060 '/'
Inlet Invert= 180.35', Outlet Invert= 178.00'



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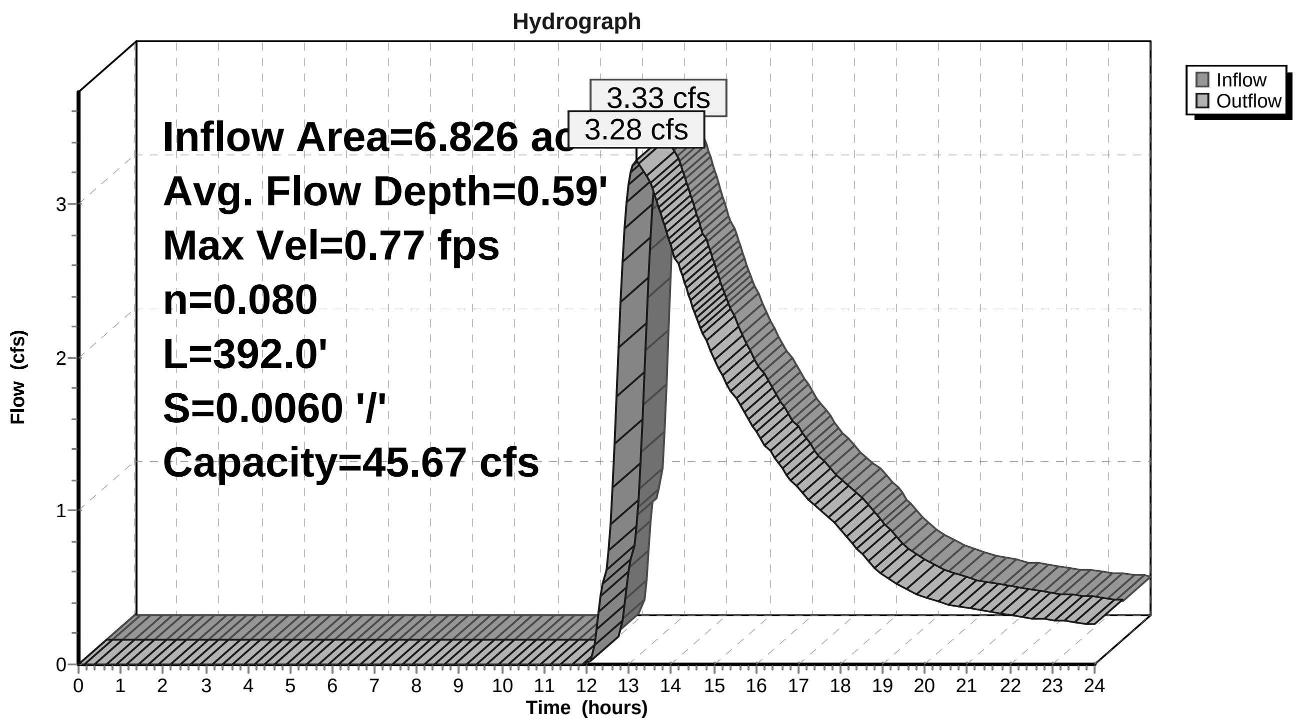
Reach 22bR: Reach #22b



Summary for Reach 30aR: Reach #30aR Conveyance Swale

[62] Hint: Exceeded Reach 30R OUTLET depth by 0.01' @ 12.70 hrs

Inflow Area = 0.918 ac, 7.55% Impervious, Inflow Depth > 2.13" for 25Yr-24Hr event
Inflow = 1.32 cfs @ 12.38 hrs, Volume= 0.163 af
Outflow = 1.31 cfs @ 12.41 hrs, Volume= 0.162 af, Atten= 0%, Lag= 1.8 min

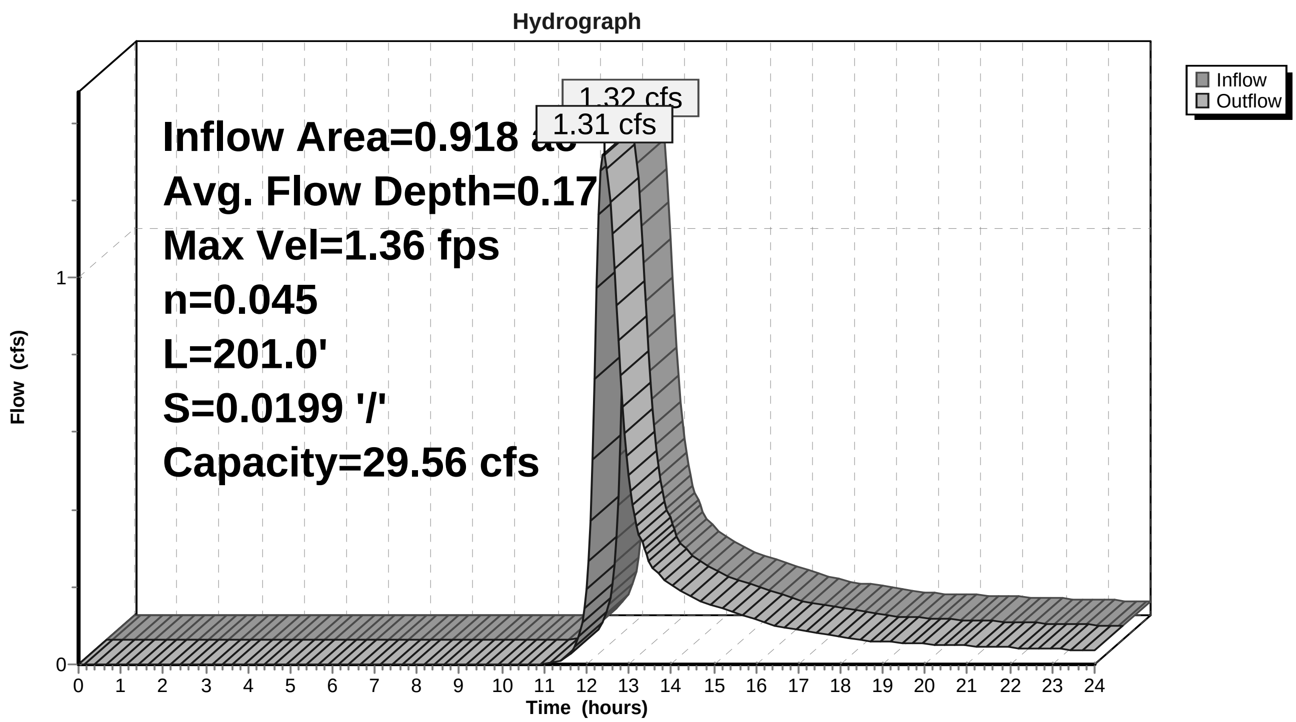
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 1.36 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 6.5 min

Peak Storage= 194 cf @ 12.41 hrs
Average Depth at Peak Storage= 0.17'
Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 29.56 cfs

5.00' x 1.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 201.0' Slope= 0.0199 '/'
Inlet Invert= 189.00', Outlet Invert= 185.00'

‡

Reach 30aR: Reach #30aR Conveyance Swale



Summary for Reach 30R: Reach #30 Conveyance Swale

Inflow Area = 0.918 ac, 7.55% Impervious, Inflow Depth > 2.14" for 25Yr-24Hr event
Inflow = 1.33 cfs @ 12.34 hrs, Volume= 0.163 af
Outflow = 1.32 cfs @ 12.38 hrs, Volume= 0.163 af, Atten= 1%, Lag= 2.7 min

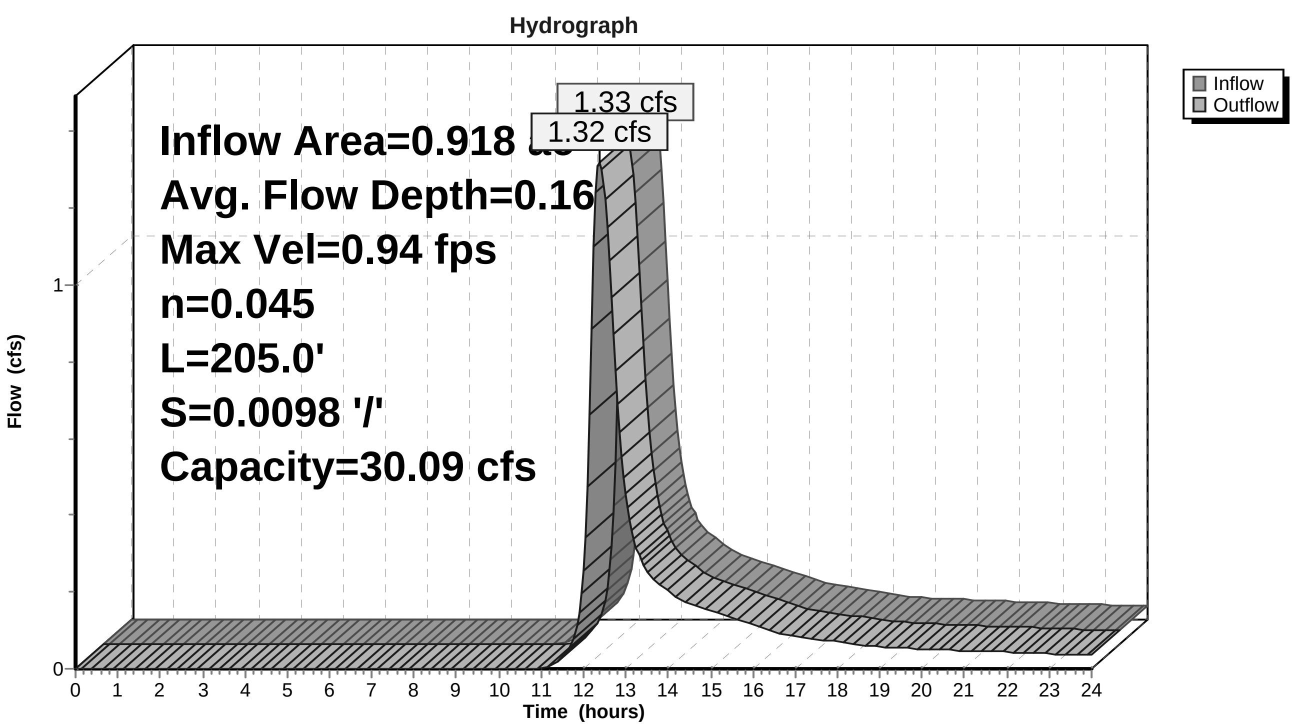
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.94 fps, Min. Travel Time= 3.6 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 9.8 min

Peak Storage= 287 cf @ 12.38 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 1.00' Flow Area= 11.0 sf, Capacity= 30.09 cfs

8.00' x 1.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 205.0' Slope= 0.0098 '/'
Inlet Invert= 191.00', Outlet Invert= 189.00'

‡

Reach 30R: Reach #30 Conveyance Swale



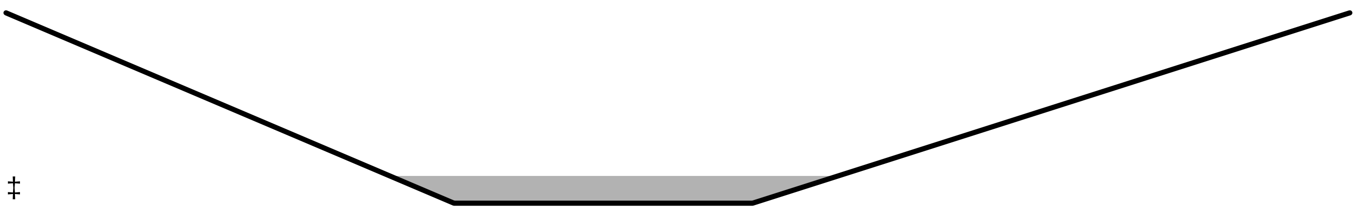
Summary for Reach 31R: Reach #31

Inflow Area = 0.186 ac, 30.07% Impervious, Inflow Depth > 2.16" for 25Yr-24Hr event
Inflow = 0.44 cfs @ 12.11 hrs, Volume= 0.033 af
Outflow = 0.42 cfs @ 12.14 hrs, Volume= 0.033 af, Atten= 5%, Lag= 1.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 1.18 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 0.40 fps, Avg. Travel Time= 6.6 min

Peak Storage= 57 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 1.00' Flow Area= 5.5 sf, Capacity= 19.07 cfs

2.00' x 1.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 4.0 '/' Top Width= 9.00'
Length= 158.0' Slope= 0.0222 '/'
Inlet Invert= 188.50', Outlet Invert= 185.00'



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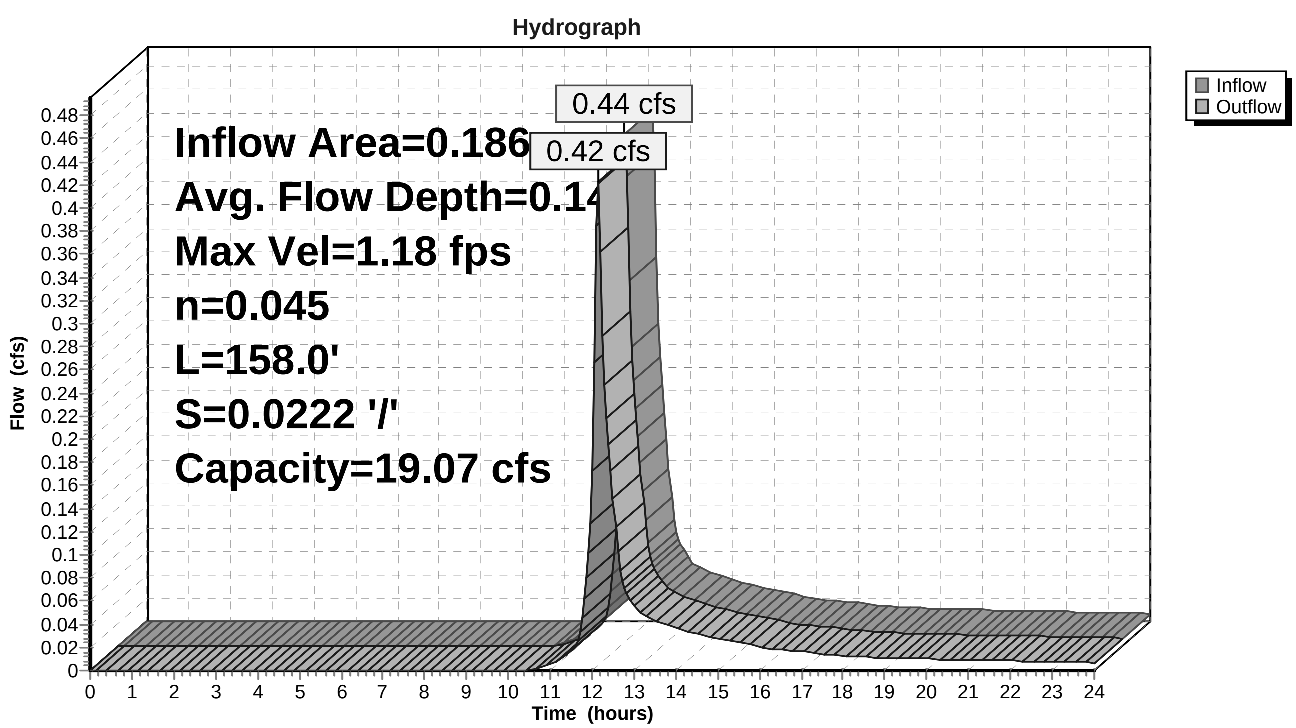
Reach 31R: Reach #31



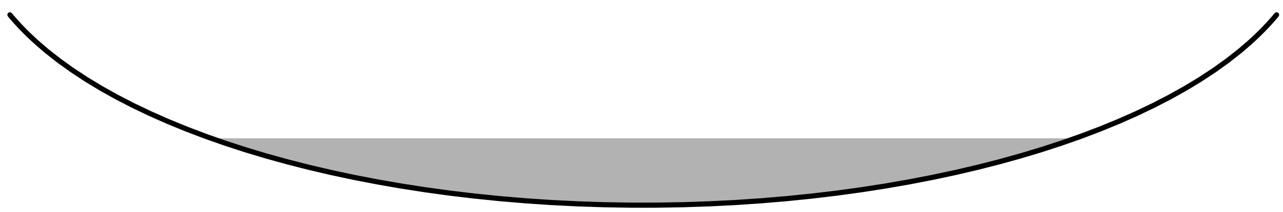
Summary for Reach 32R: Reach #32R Overland Flow

Inflow	=	0.92 cfs @	13.36 hrs, Volume=	0.207 af
Outflow	=	0.91 cfs @	13.39 hrs, Volume=	0.207 af, Atten= 1%, Lag= 1.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.66 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 0.37 fps, Avg. Travel Time= 4.1 min

Peak Storage= 124 cf @ 13.39 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 0.50' Flow Area= 6.7 sf, Capacity= 8.86 cfs

20.00' x 0.50' deep Parabolic Channel, n= 0.080
Length= 90.0' Slope= 0.0222 '/'
Inlet Invert= 187.00', Outlet Invert= 185.00'



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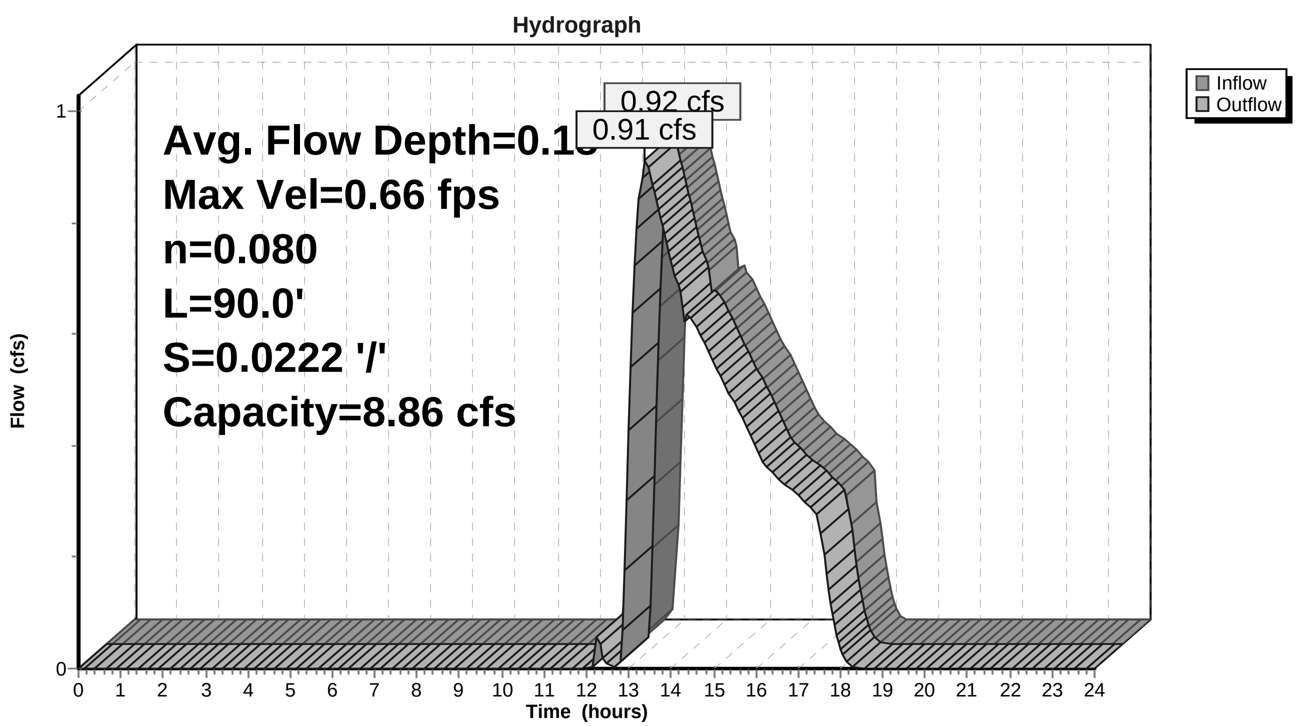
Reach 32R: Reach #32R Overland Flow



Summary for Reach 33aR: Reach #33a Flow Through Wetlands

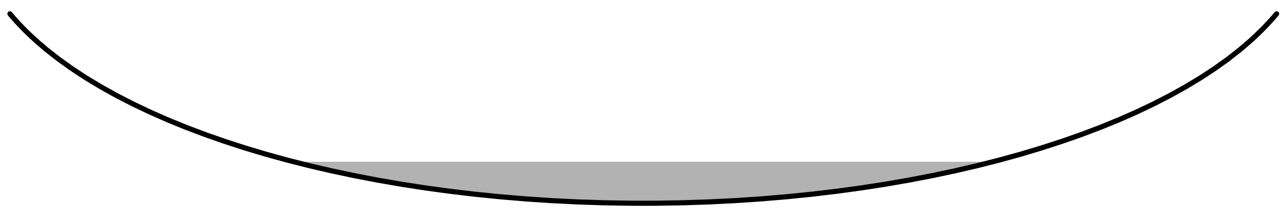
[62] Hint: Exceeded Reach 33R OUTLET depth by 0.01' @ 16.10 hrs

Inflow Area = 0.389 ac, 37.71% Impervious, Inflow Depth > 2.17" for 25Yr-24Hr event
Inflow = 0.82 cfs @ 12.20 hrs, Volume= 0.070 af
Outflow = 0.79 cfs @ 12.24 hrs, Volume= 0.070 af, Atten= 3%, Lag= 2.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.78 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 0.32 fps, Avg. Travel Time= 6.7 min

Peak Storage= 132 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 1.00' Flow Area= 10.0 sf, Capacity= 21.37 cfs

15.00' x 1.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 130.0' Slope= 0.0231 '/'
Inlet Invert= 184.00', Outlet Invert= 181.00'



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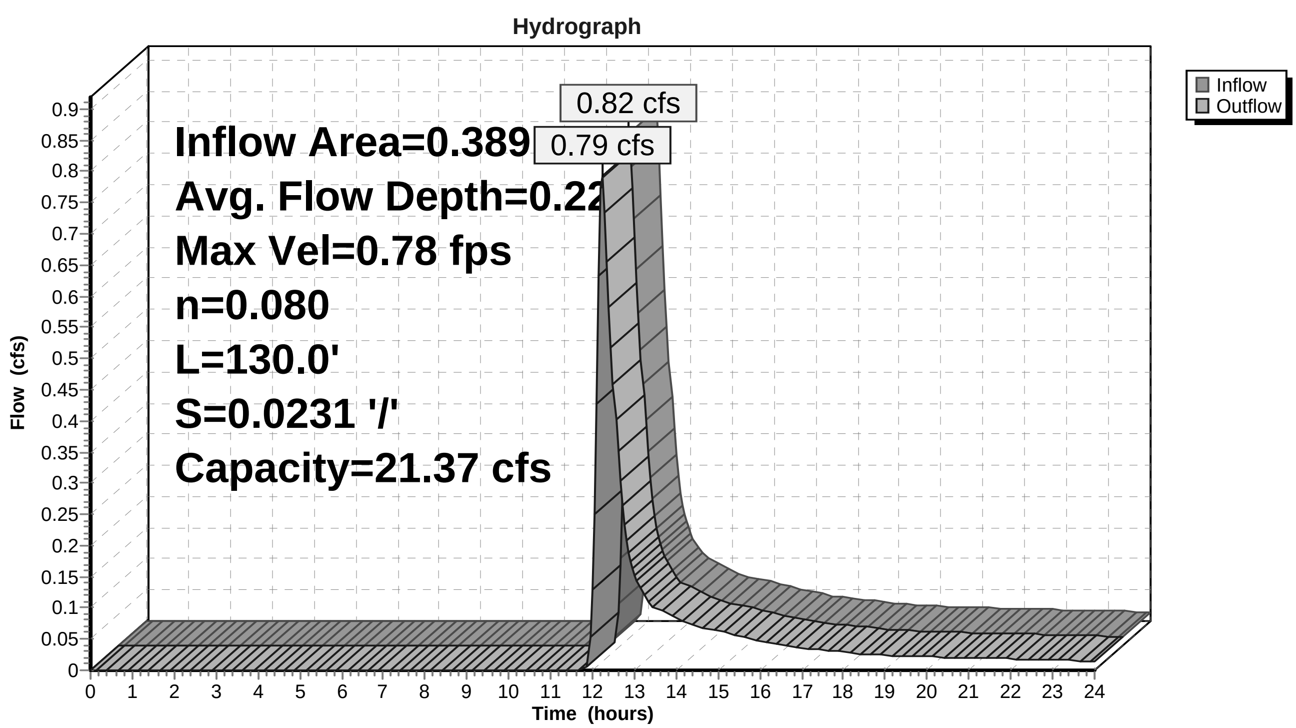
Reach 33aR: Reach #33a Flow Through Wetlands



Summary for Reach 33bR: Reach #33b

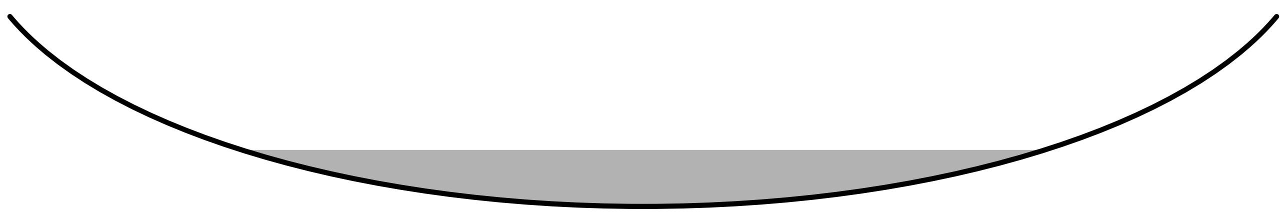
[62] Hint: Exceeded Reach 33aR OUTLET depth by 0.50' @ 13.15 hrs
[62] Hint: Exceeded Reach 101bR OUTLET depth by 0.27' @ 12.20 hrs

Inflow Area = 6.826 ac, 4.68% Impervious, Inflow Depth > 1.93" for 25Yr-24Hr event
Inflow = 3.33 cfs @ 13.02 hrs, Volume= 1.099 af
Outflow = 3.33 cfs @ 13.05 hrs, Volume= 1.097 af, Atten= 0%, Lag= 1.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.77 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 0.50 fps, Avg. Travel Time= 3.6 min

Peak Storage= 465 cf @ 13.05 hrs
Average Depth at Peak Storage= 0.59'
Bank-Full Depth= 2.00' Flow Area= 26.7 sf, Capacity= 45.76 cfs

20.00' x 2.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 108.0' Slope= 0.0060 '/'
Inlet Invert= 181.00', Outlet Invert= 180.35'



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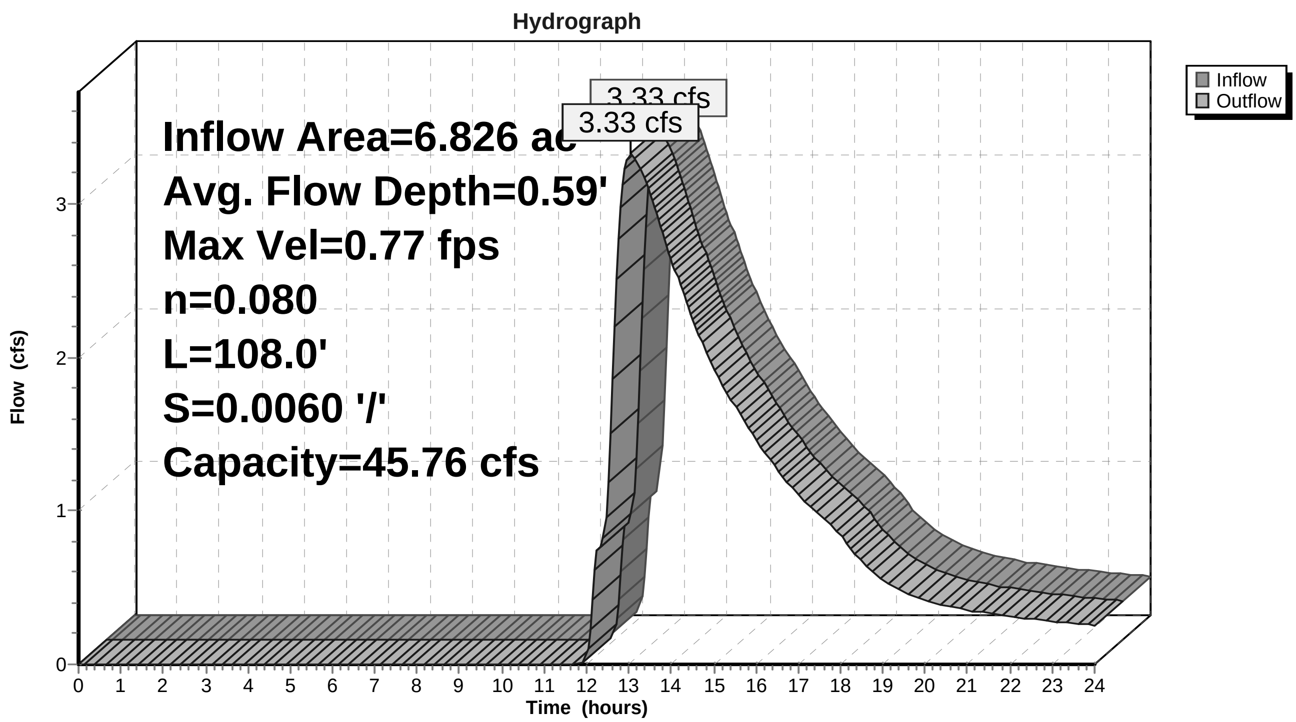
Reach 33bR: Reach #33b



Summary for Reach 33R: Reach #33 Treatment Swale

Inflow Area = 0.389 ac, 37.71% Impervious, Inflow Depth > 2.18" for 25Yr-24Hr event
Inflow = 0.99 cfs @ 12.12 hrs, Volume= 0.071 af
Outflow = 0.82 cfs @ 12.20 hrs, Volume= 0.070 af, Atten= 17%, Lag= 4.6 min

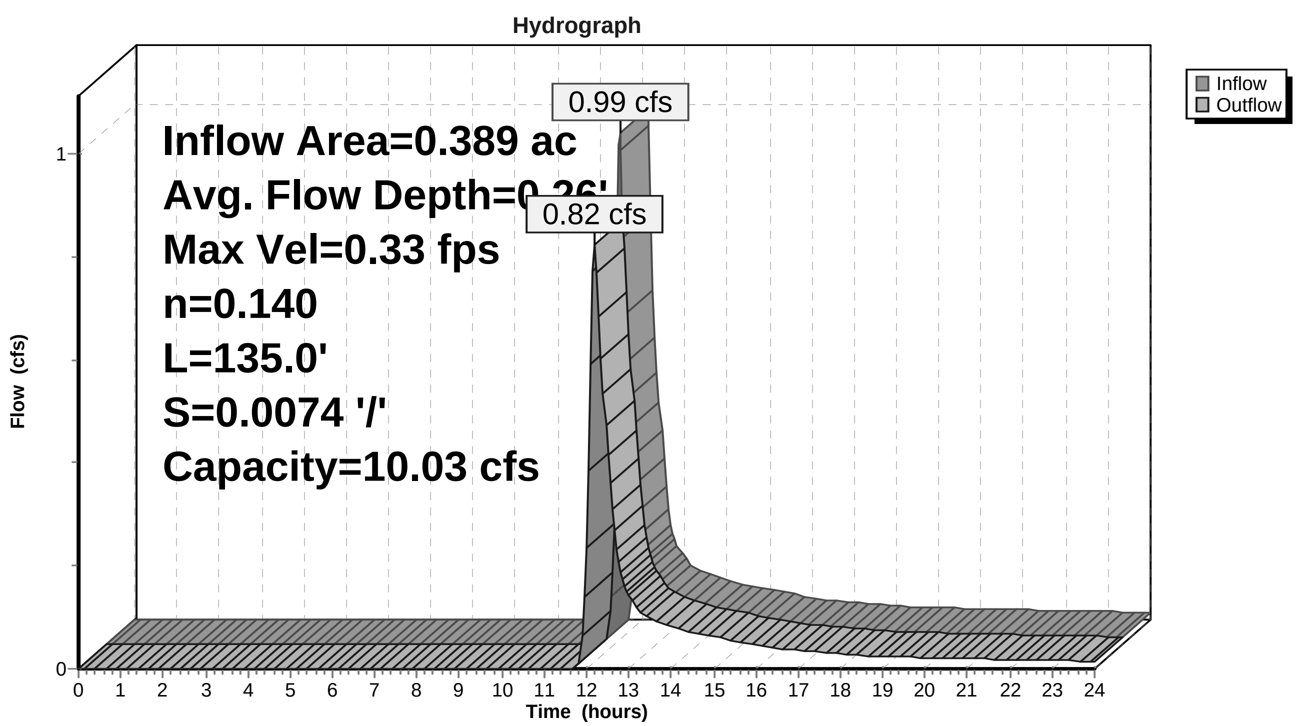
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.33 fps, Min. Travel Time= 6.7 min
Avg. Velocity = 0.12 fps, Avg. Travel Time= 19.3 min

Peak Storage= 332 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 1.00' Flow Area= 14.0 sf, Capacity= 10.03 cfs

8.00' x 1.00' deep channel, n= 0.140
Side Slope Z-value= 6.0 '/' Top Width= 20.00'
Length= 135.0' Slope= 0.0074 '/'
Inlet Invert= 185.00', Outlet Invert= 184.00'

‡

Reach 33R: Reach #33 Treatment Swale



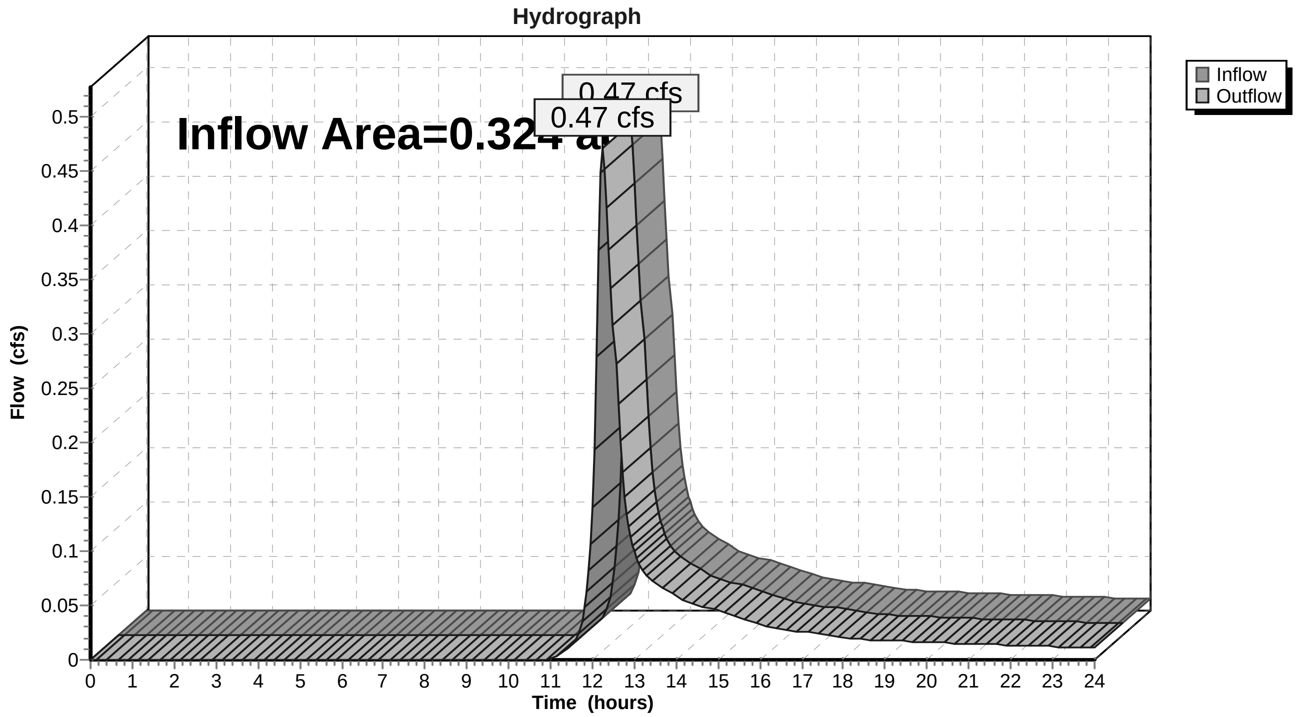
Summary for Reach 100R: Final Reach #100

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

Inflow Area = 0.324 ac, 10.22% Impervious, Inflow Depth > 1.82" for 25Yr-24Hr event
Inflow = 0.47 cfs @ 12.25 hrs, Volume= 0.049 af
Outflow = 0.47 cfs @ 12.25 hrs, Volume= 0.049 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 100R: Final Reach #100



Summary for Reach 101bR: Reach #101b

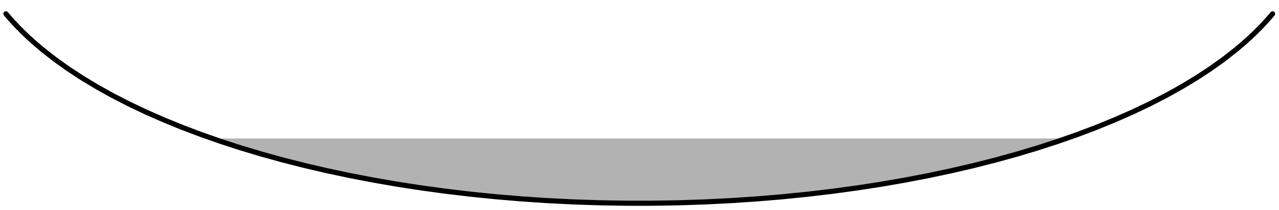
[61] Hint: Exceeded Reach 1R outlet invert by 0.38' @ 13.05 hrs

Inflow Area = 6.437 ac, 2.68% Impervious, Inflow Depth > 1.93" for 25Yr-24Hr event
Inflow = 3.25 cfs @ 12.87 hrs, Volume= 1.035 af
Outflow = 3.18 cfs @ 13.05 hrs, Volume= 1.029 af, Atten= 2%, Lag= 10.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.60 fps, Min. Travel Time= 9.2 min
Avg. Velocity = 0.39 fps, Avg. Travel Time= 14.1 min

Peak Storage= 1,764 cf @ 13.05 hrs
Average Depth at Peak Storage= 0.68'
Bank-Full Depth= 2.00' Flow Area= 26.7 sf, Capacity= 32.37 cfs

20.00' x 2.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 332.0' Slope= 0.0030 '/'
Inlet Invert= 182.00', Outlet Invert= 181.00'



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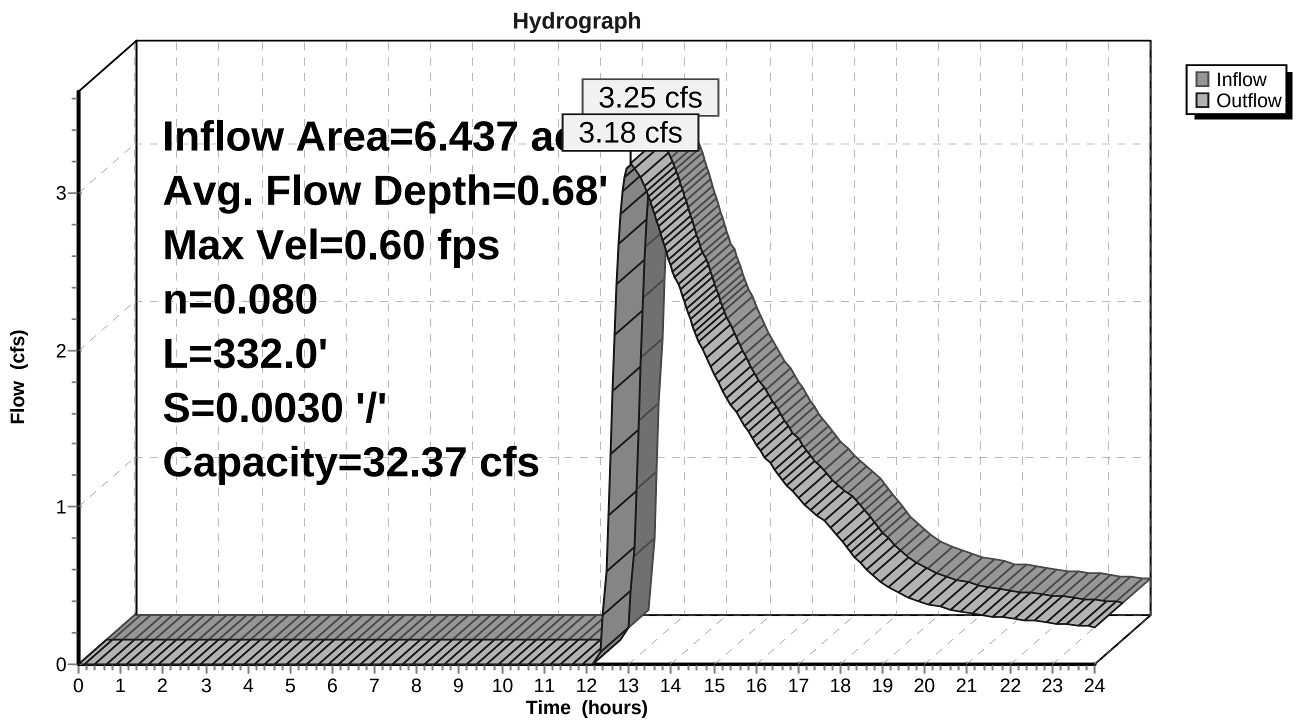
Reach 101bR: Reach #101b



Summary for Reach 103aR: Reach #103aR Stream flow to Final Analysis Point

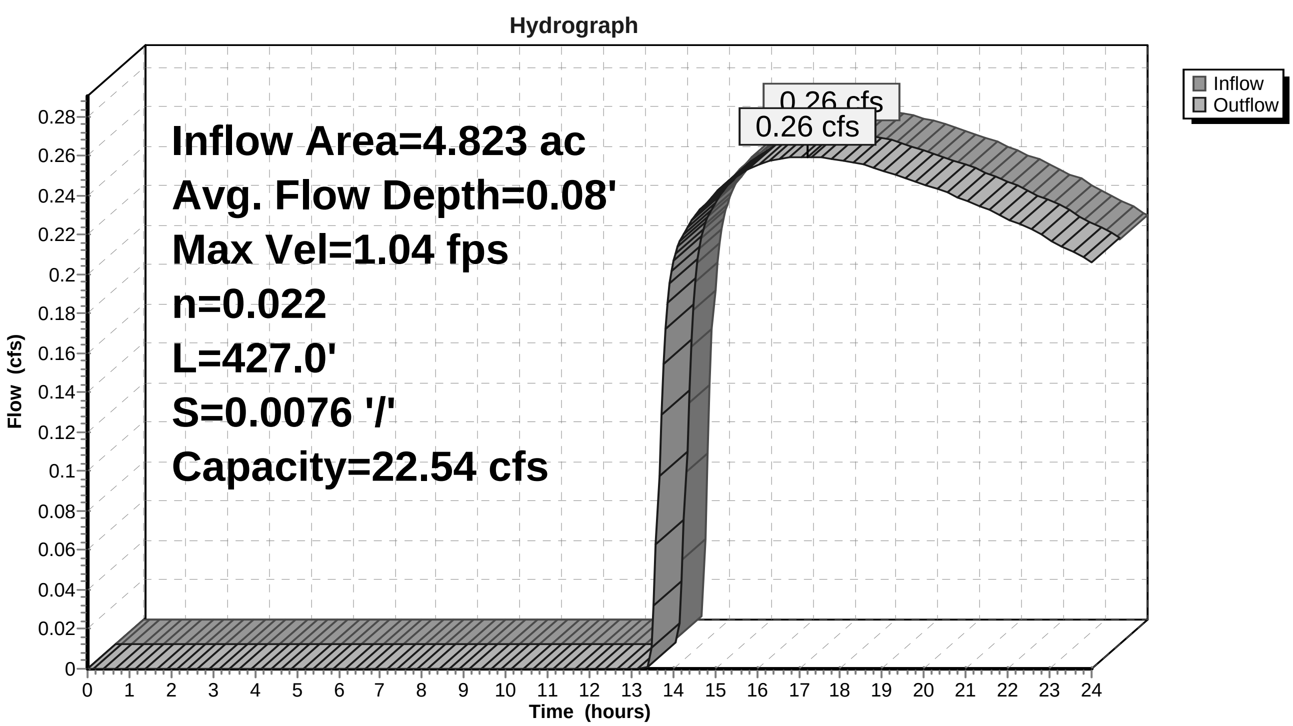
Inflow Area = 4.823 ac, 12.26% Impervious, Inflow Depth > 0.52" for 25Yr-24Hr event
Inflow = 0.26 cfs @ 17.11 hrs, Volume= 0.207 af
Outflow = 0.26 cfs @ 17.20 hrs, Volume= 0.205 af, Atten= 0%, Lag= 5.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 1.04 fps, Min. Travel Time= 6.8 min
Avg. Velocity = 0.99 fps, Avg. Travel Time= 7.2 min

Peak Storage= 106 cf @ 17.20 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 1.00' Flow Area= 5.0 sf, Capacity= 22.54 cfs

3.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 7.00'
Length= 427.0' Slope= 0.0076 '/'
Inlet Invert= 164.75', Outlet Invert= 161.50'

Reach 103aR: Reach #103aR Stream flow to Final Analysis Point



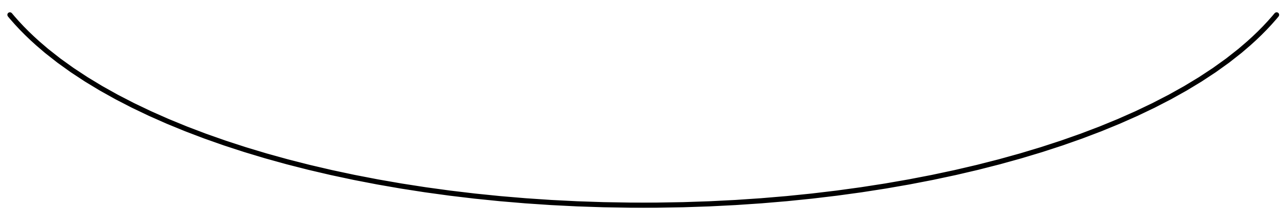
Summary for Reach 103bR: Reach 103aB Overland Flow from Spillway

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 / 3
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= 4.73 cfs

10.00' x 0.50' deep Parabolic Channel, n= 0.080
Length= 393.0' Slope= 0.0254 '/'
Inlet Invert= 175.00', Outlet Invert= 165.00'



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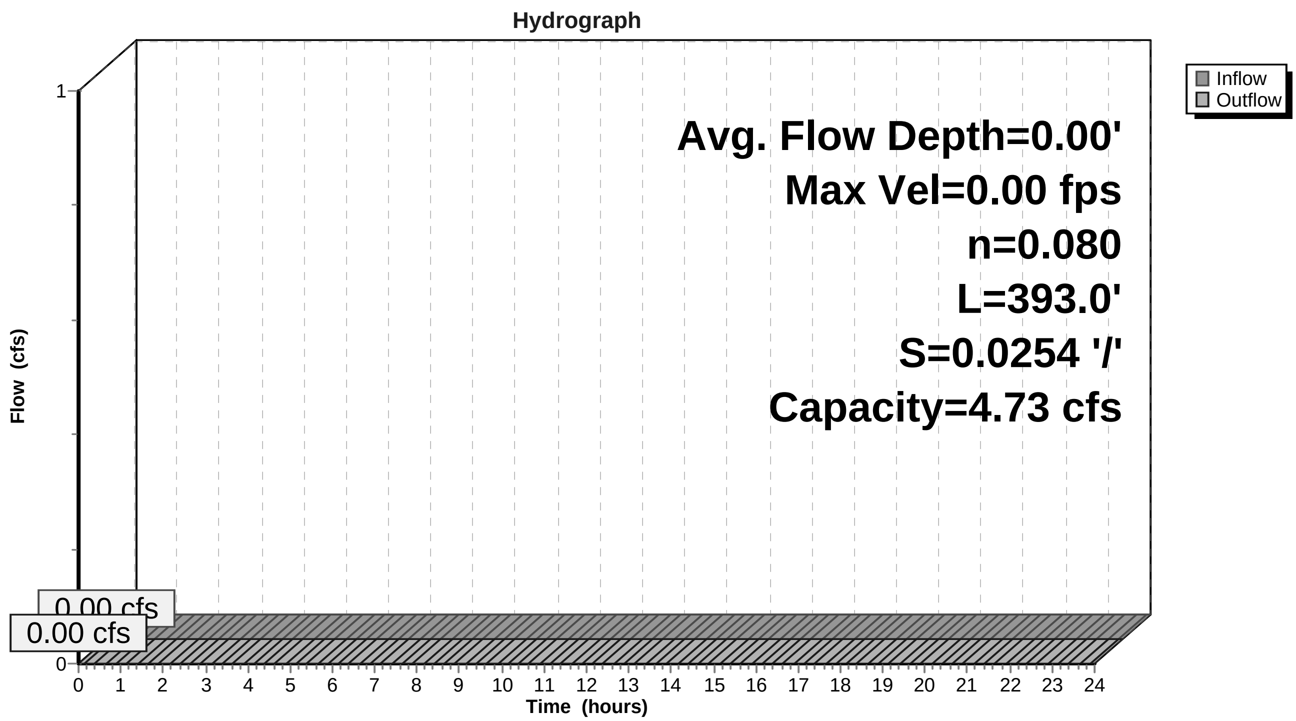
Reach 103bR: Reach 103aB Overland Flow from Spillway



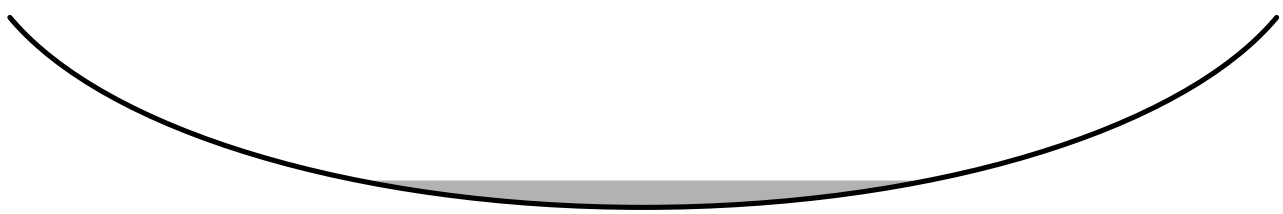
Summary for Reach 103R: Reach #103 Overland Flow to Stream

Inflow Area = 4.823 ac, 12.26% Impervious, Inflow Depth > 0.52" for 25Yr-24Hr event
Inflow = 0.26 cfs @ 16.85 hrs, Volume= 0.209 af
Outflow = 0.26 cfs @ 17.11 hrs, Volume= 0.207 af, Atten= 0%, Lag= 15.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.42 fps, Min. Travel Time= 6.6 min
Avg. Velocity = 0.41 fps, Avg. Travel Time= 6.8 min

Peak Storage= 102 cf @ 17.11 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 0.50' Flow Area= 11.7 sf, Capacity= 18.07 cfs

35.00' x 0.50' deep Parabolic Channel, n= 0.080
Length= 166.0' Slope= 0.0301 '/'
Inlet Invert= 170.00', Outlet Invert= 165.00'



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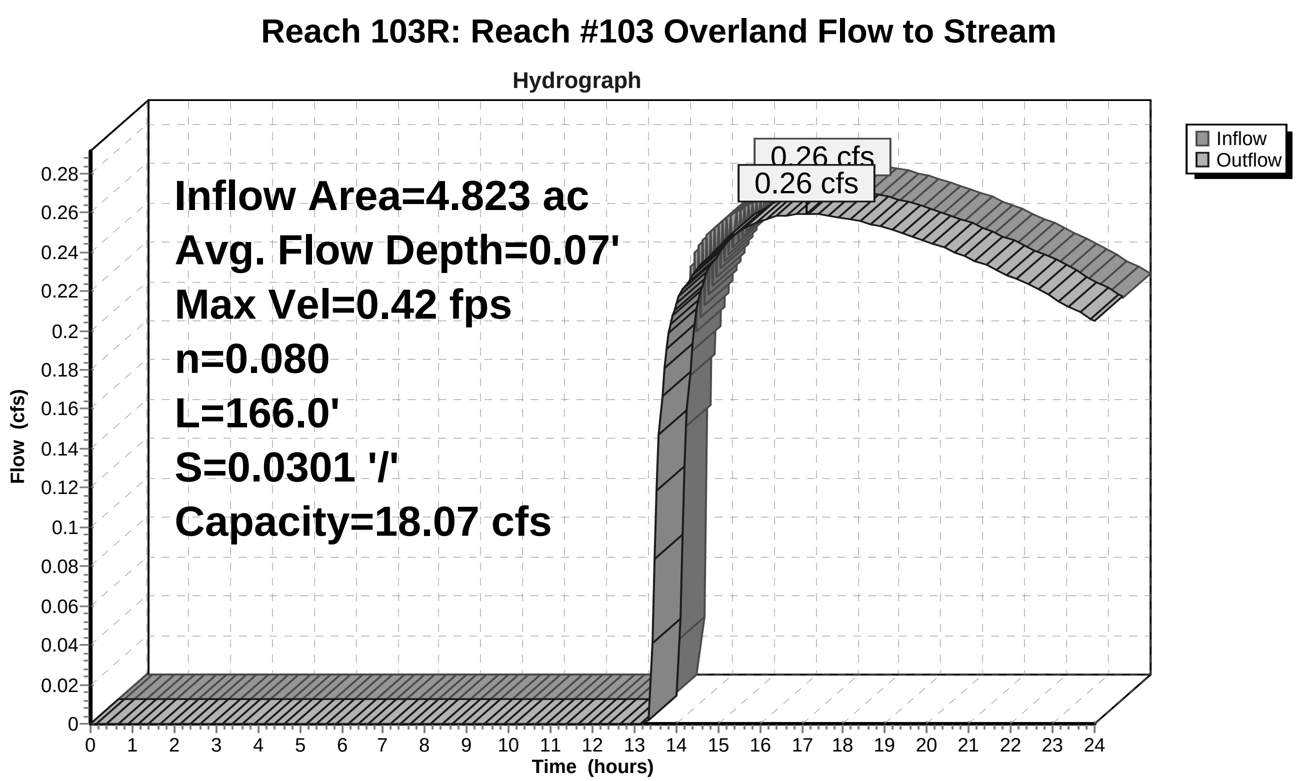


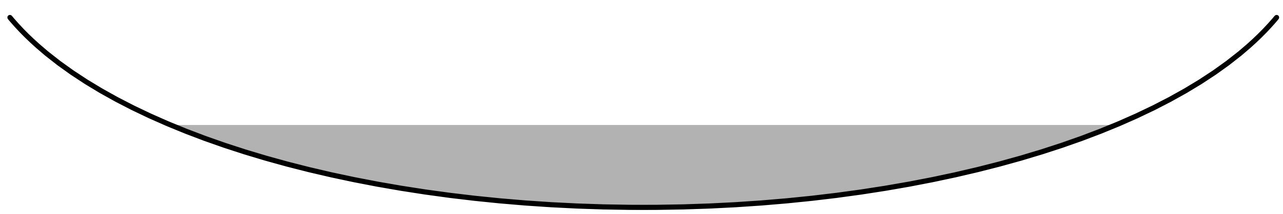
Summary for Reach 106aR: Reach #106a

Inflow Area = 9.319 ac, 14.37% Impervious, Inflow Depth > 1.03" for 25Yr-24Hr event
Inflow = 2.24 cfs @ 12.82 hrs, Volume= 0.801 af
Outflow = 1.83 cfs @ 12.97 hrs, Volume= 0.793 af, Atten= 18%, Lag= 9.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.64 fps, Min. Travel Time= 6.5 min
Avg. Velocity = 0.50 fps, Avg. Travel Time= 8.3 min

Peak Storage= 714 cf @ 12.97 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 0.50' Flow Area= 10.0 sf, Capacity= 11.27 cfs

30.00' x 0.50' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 251.0' Slope= 0.0159 '/'
Inlet Invert= 182.00', Outlet Invert= 178.00'



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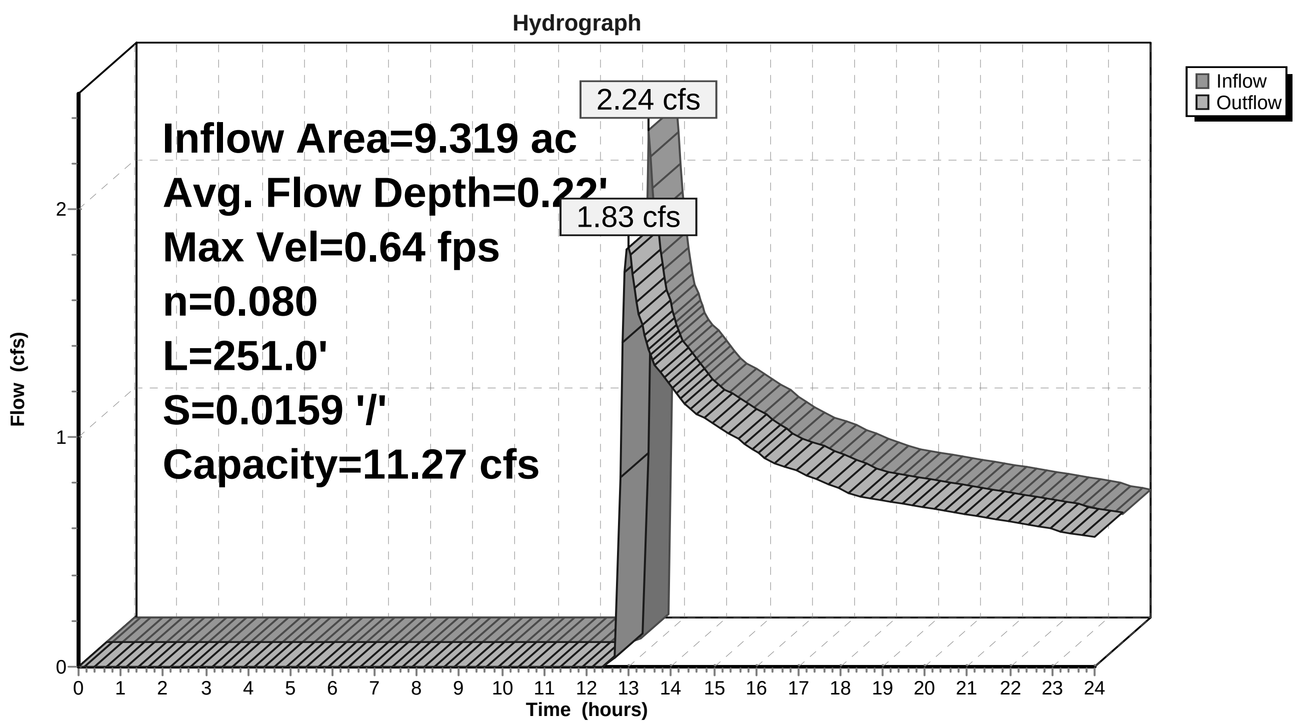
Reach 106aR: Reach #106a



Summary for Reach 106bR: Reach #106b

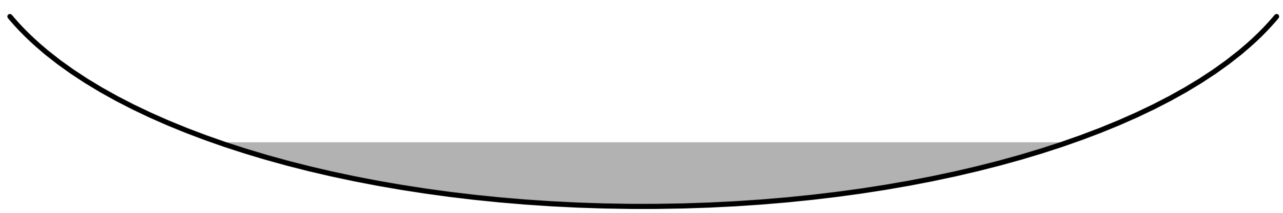
[62] Hint: Exceeded Reach 22bR OUTLET depth by 0.11' @ 21.65 hrs
[62] Hint: Exceeded Reach 106aR OUTLET depth by 0.47' @ 13.25 hrs

Inflow Area = 16.145 ac, 10.27% Impervious, Inflow Depth > 1.40" for 25Yr-24Hr event
Inflow = 4.98 cfs @ 13.06 hrs, Volume= 1.883 af
Outflow = 4.94 cfs @ 13.15 hrs, Volume= 1.874 af, Atten= 1%, Lag= 5.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 1.26 fps, Min. Travel Time= 4.8 min
Avg. Velocity = 0.89 fps, Avg. Travel Time= 6.8 min

Peak Storage= 1,428 cf @ 13.15 hrs
Average Depth at Peak Storage= 0.67'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 51.13 cfs

15.00' x 2.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 365.0' Slope= 0.0137 '/'
Inlet Invert= 178.00', Outlet Invert= 173.00'



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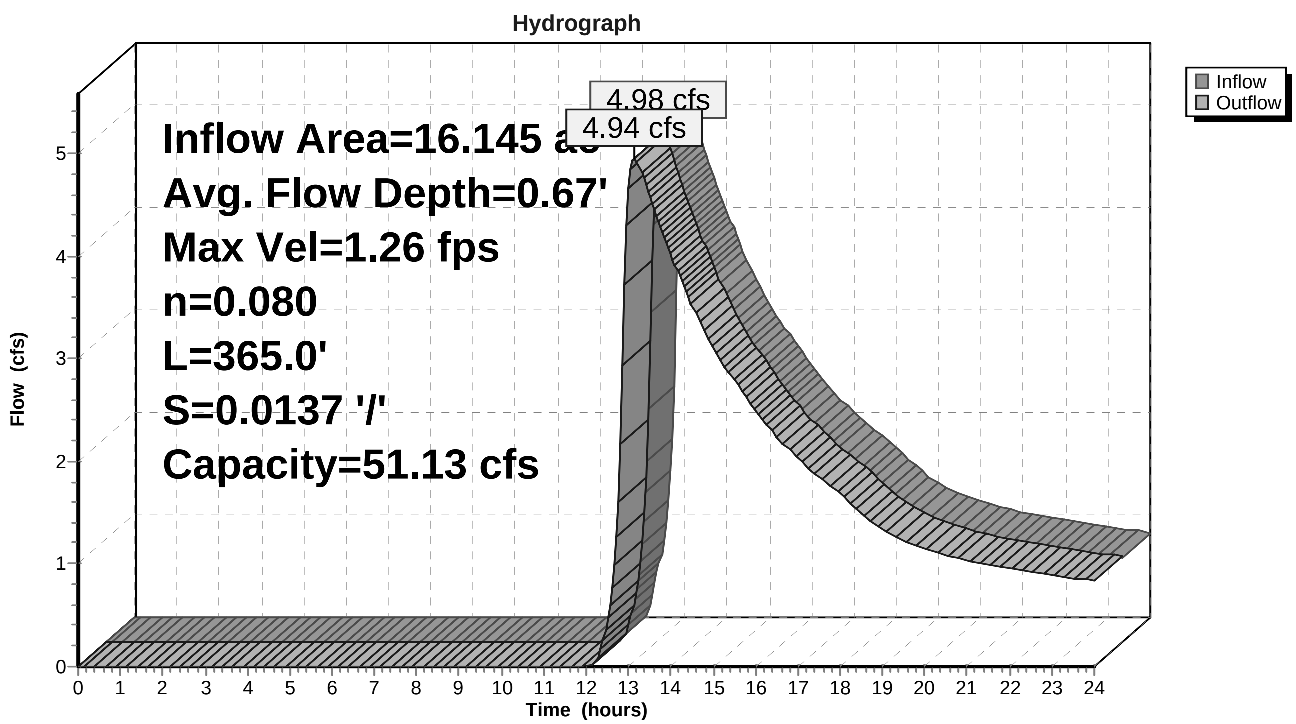
Reach 106bR: Reach #106b



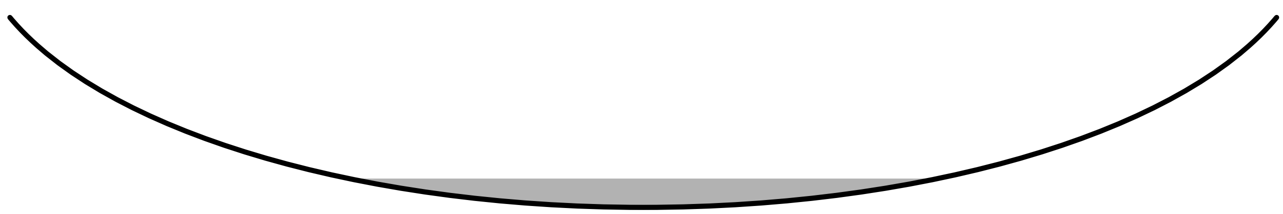
Summary for Reach 107aR: Reach #107a Overland Flow to Final Reach #200

Inflow Area = 1.295 ac, 18.49% Impervious, Inflow Depth > 2.96" for 25Yr-24Hr event
Inflow = 0.58 cfs @ 13.33 hrs, Volume= 0.319 af
Outflow = 0.57 cfs @ 13.68 hrs, Volume= 0.315 af, Atten= 0%, Lag= 21.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.98 fps, Min. Travel Time= 17.9 min
Avg. Velocity = 0.60 fps, Avg. Travel Time= 29.1 min

Peak Storage= 617 cf @ 13.68 hrs
Average Depth at Peak Storage= 0.15'
Bank-Full Depth= 1.00' Flow Area= 10.0 sf, Capacity= 34.39 cfs

15.00' x 1.00' deep Parabolic Channel, n= 0.080
Length= 1,054.0' Slope= 0.0598 '/'
Inlet Invert= 236.00', Outlet Invert= 173.00'



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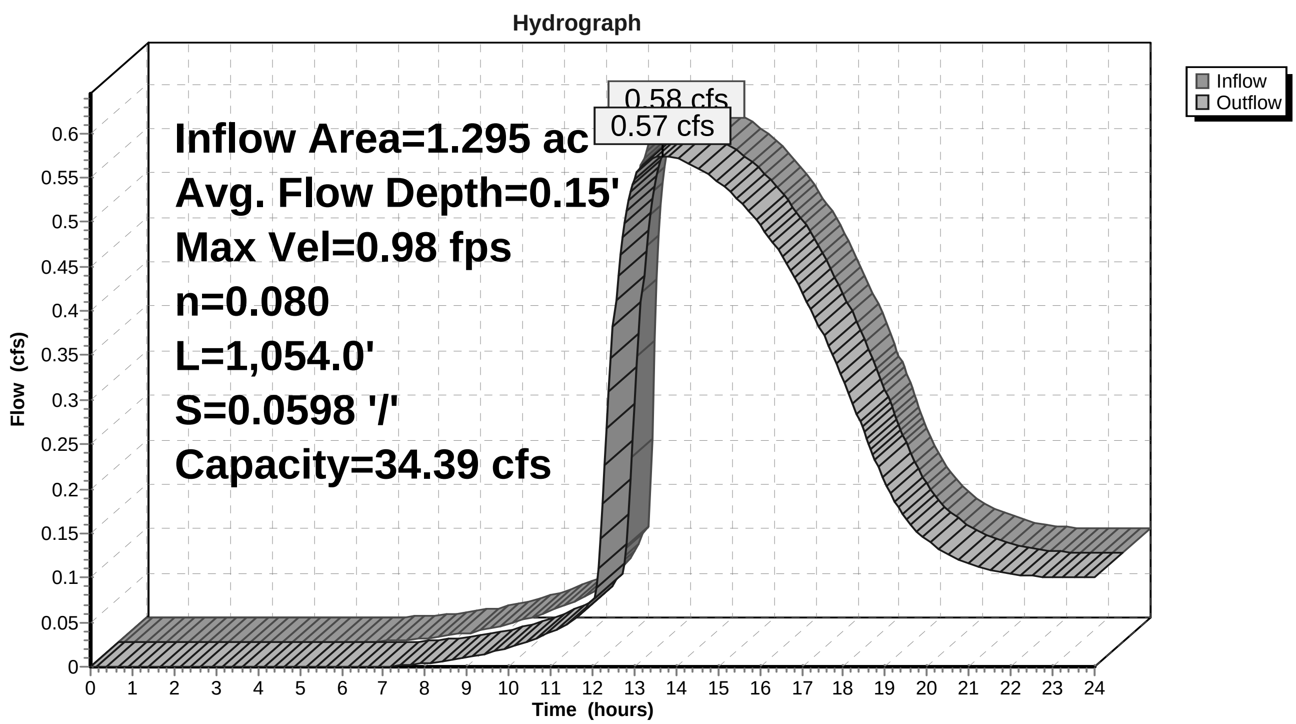
Reach 107aR: Reach #107a Overland Flow to Final Reach #200



Summary for Reach 107bR: Reach #107b

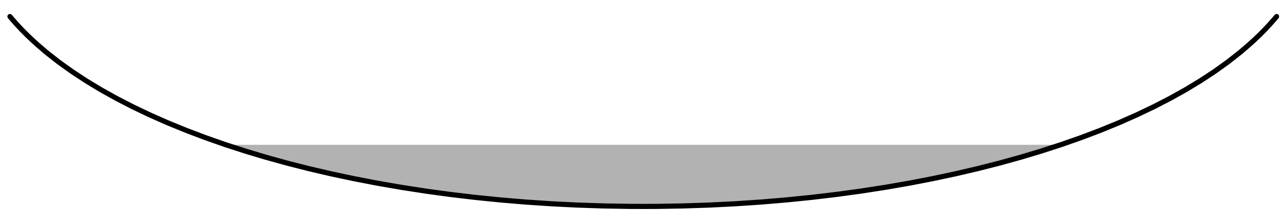
[62] Hint: Exceeded Reach 106bR OUTLET depth by 0.08' @ 12.05 hrs
[62] Hint: Exceeded Reach 107aR OUTLET depth by 0.50' @ 13.35 hrs

Inflow Area = 17.440 ac, 10.88% Impervious, Inflow Depth > 1.51" for 25Yr-24Hr event
Inflow = 5.50 cfs @ 13.15 hrs, Volume= 2.189 af
Outflow = 5.31 cfs @ 13.37 hrs, Volume= 2.166 af, Atten= 4%, Lag= 13.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 1.44 fps, Min. Travel Time= 10.4 min
Avg. Velocity = 0.77 fps, Avg. Travel Time= 19.6 min

Peak Storage= 3,324 cf @ 13.37 hrs
Average Depth at Peak Storage= 0.65'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 59.95 cfs

15.00' x 2.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 902.8' Slope= 0.0188 '/'
Inlet Invert= 173.00', Outlet Invert= 156.00'



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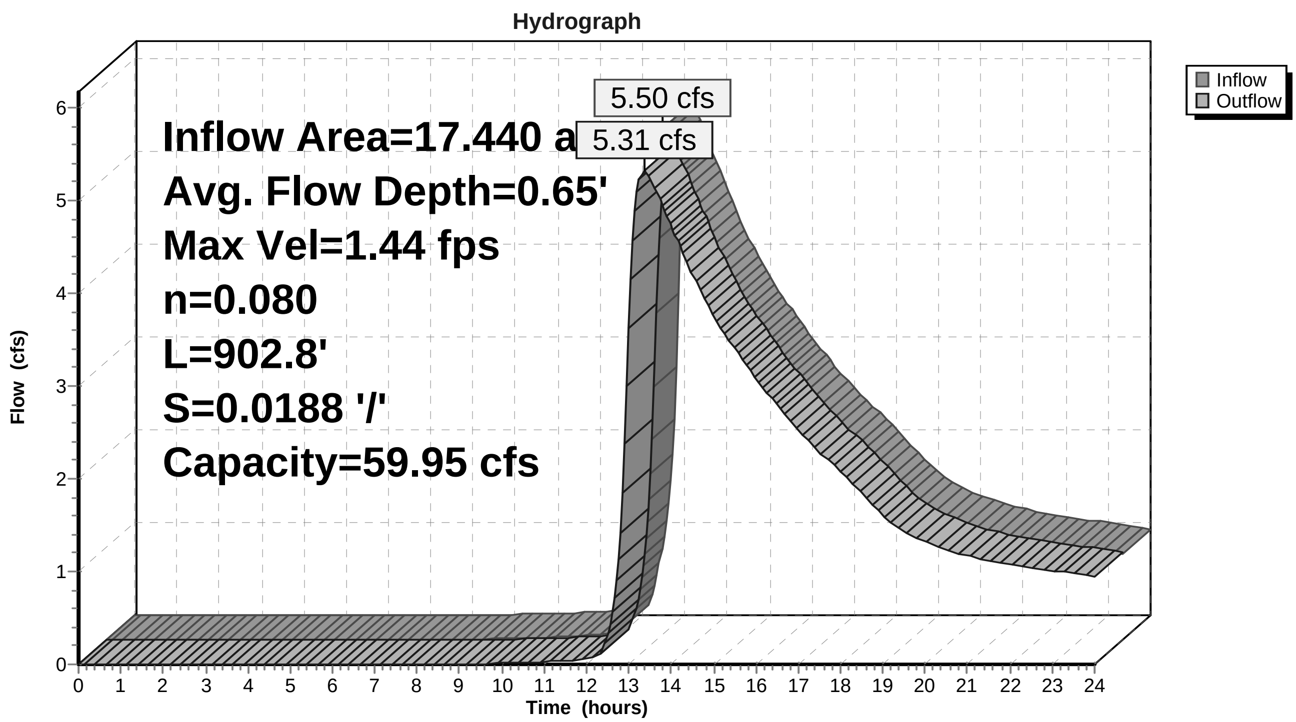
Reach 107bR: Reach #107b



Summary for Reach 108R: Reach #108 Overland Flow to Boundary

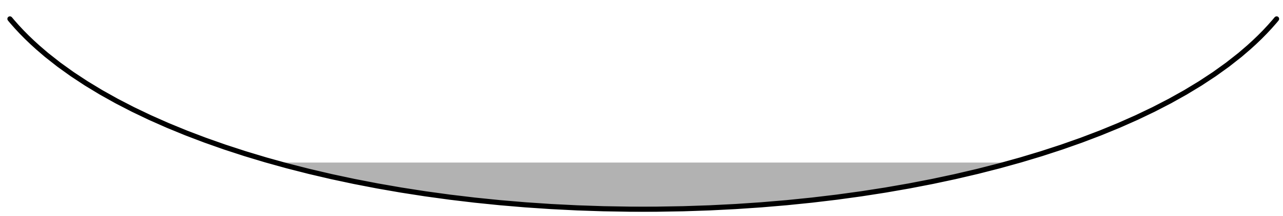
[90] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 1.471 ac, 14.18% Impervious, Inflow Depth > 1.49" for 25Yr-24Hr event
Inflow = 0.95 cfs @ 12.90 hrs, Volume= 0.182 af
Outflow = 0.98 cfs @ 12.86 hrs, Volume= 0.182 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.48 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.27 fps, Avg. Travel Time= 1.6 min

Peak Storage= 52 cf @ 12.86 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 0.50' Flow Area= 16.7 sf, Capacity= 20.64 cfs

50.00' x 0.50' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 26.0' Slope= 0.0192 '/'
Inlet Invert= 183.00', Outlet Invert= 182.50'



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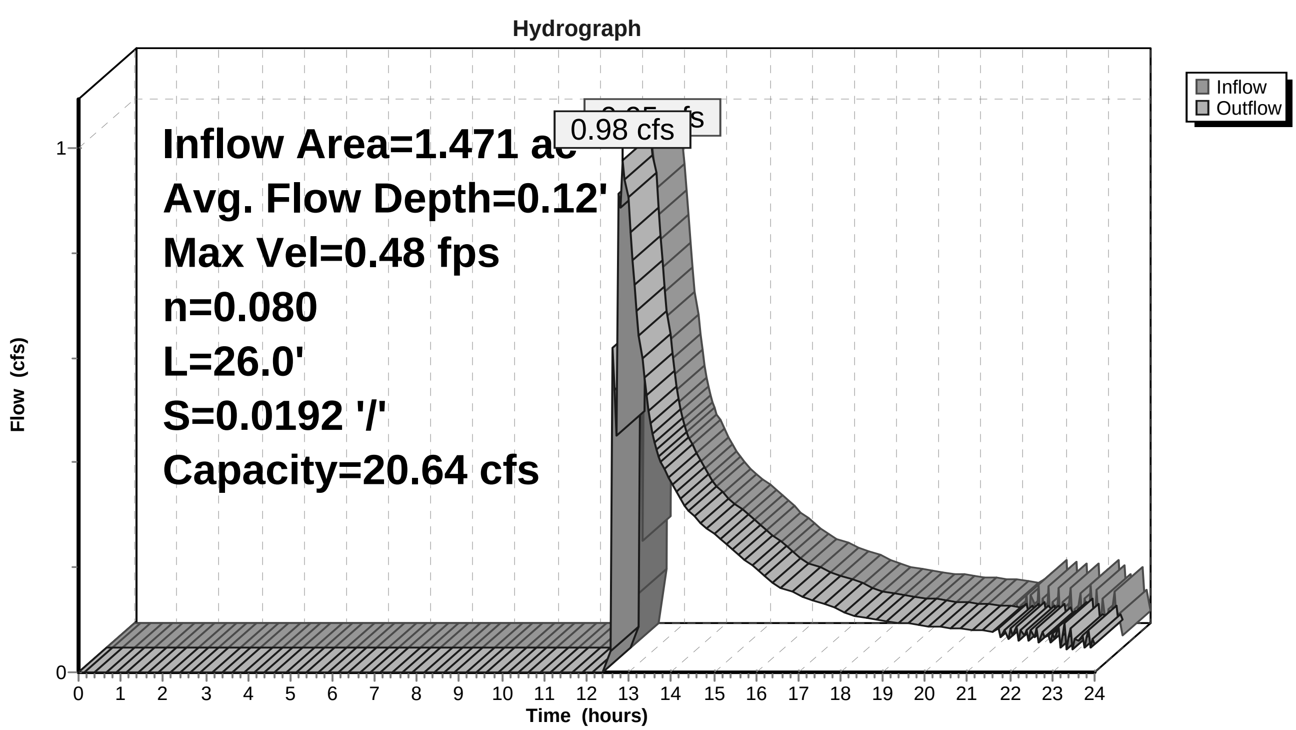
Reach 108R: Reach #108 Overland Flow to Boundary



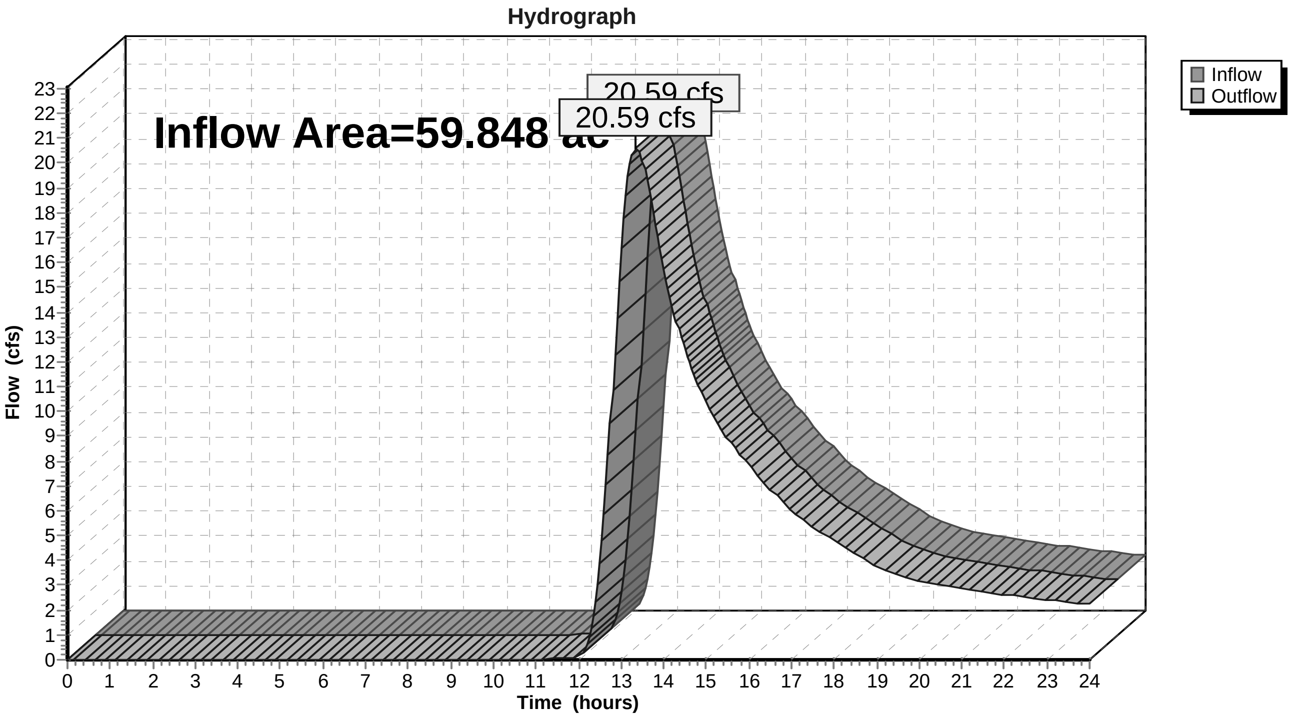
Summary for Reach 200R: Final Reach #200

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

Inflow Area =	59.848 ac,	4.19% Impervious, Inflow Depth > 1.27"	for 25Yr-24Hr event	
Inflow =	20.59 cfs @	13.35 hrs, Volume=	6.332 af	
Outflow =	20.59 cfs @	13.35 hrs, Volume=	6.332 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 200R: Final Reach #200



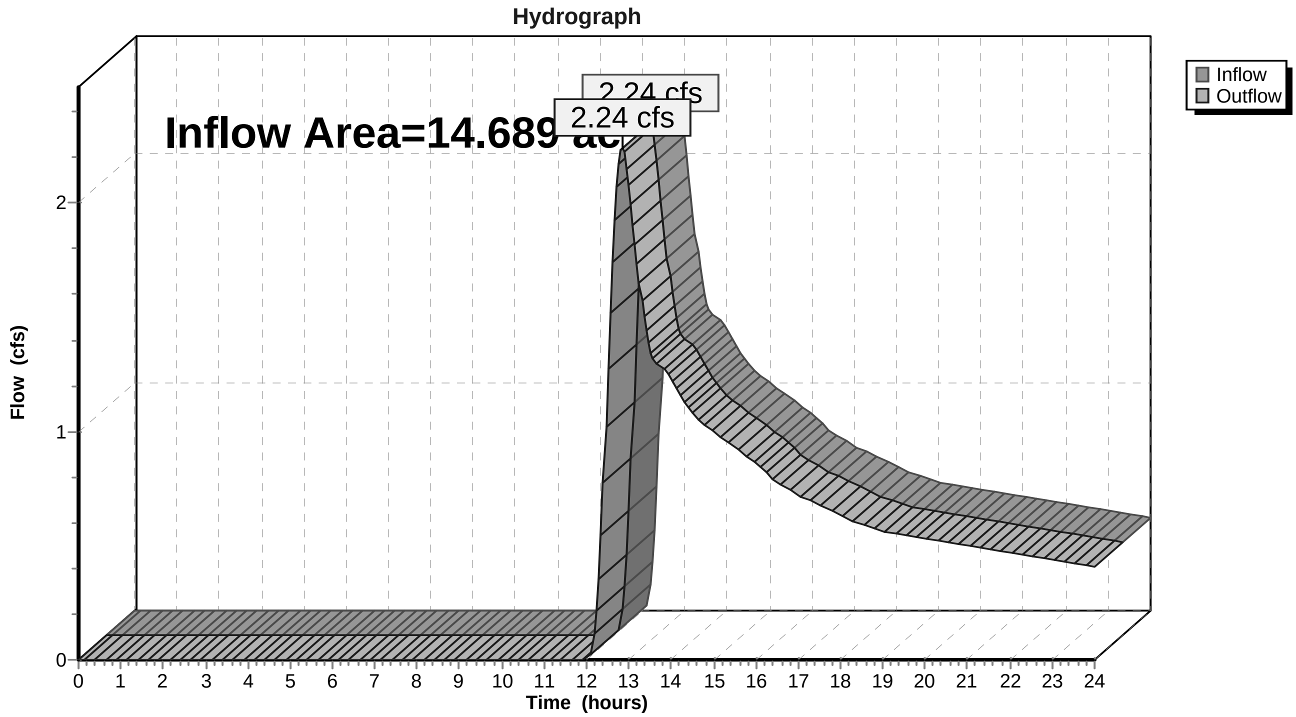
Summary for Reach 300R: Final Reach #300

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

Inflow Area =	14.689 ac,	4.62% Impervious,	Inflow Depth > 0.62"	for 25Yr-24Hr event
Inflow =	2.24 cfs @	12.84 hrs, Volume=	0.757 af	
Outflow =	2.24 cfs @	12.84 hrs, Volume=	0.757 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 300R: Final Reach #300



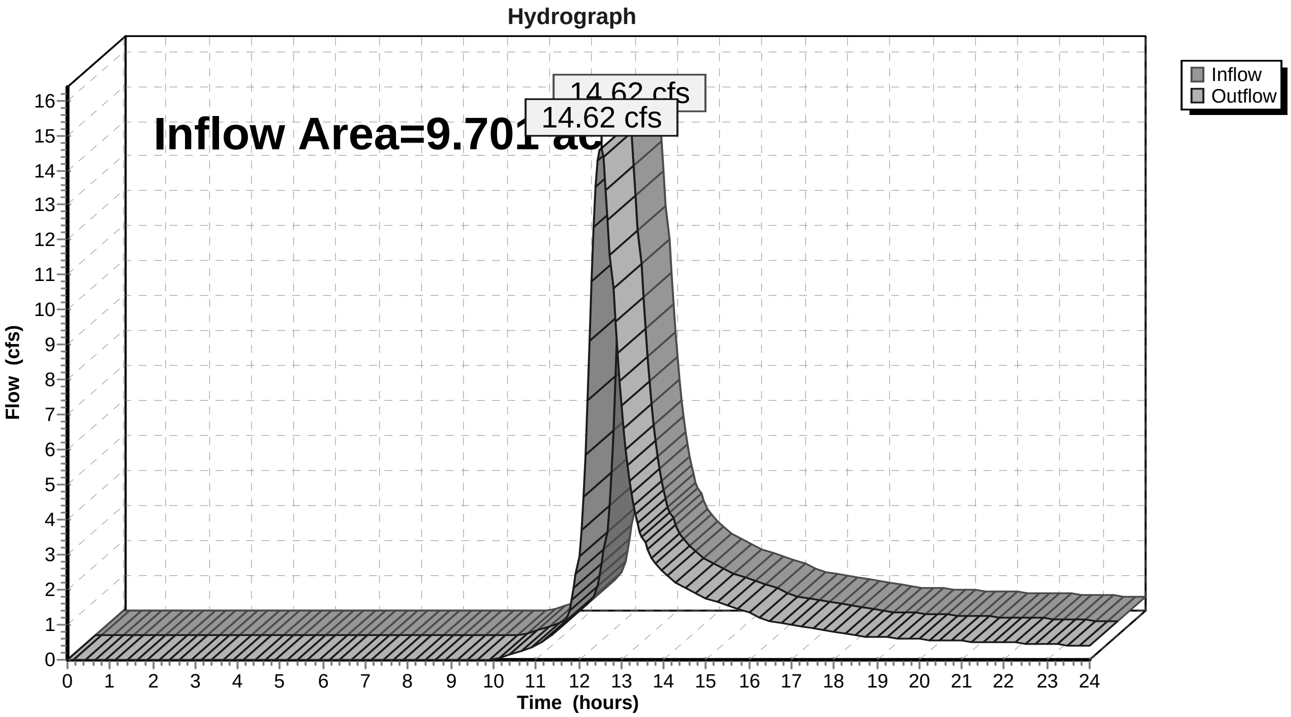
Summary for Reach 400R: Final Reach #400

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

Inflow Area =	9.701 ac,	0.94% Impervious, Inflow Depth > 2.49"	for 25Yr-24Hr event
Inflow =	14.62 cfs @	12.52 hrs, Volume=	2.015 af
Outflow =	14.62 cfs @	12.52 hrs, Volume=	2.015 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 400R: Final Reach #400



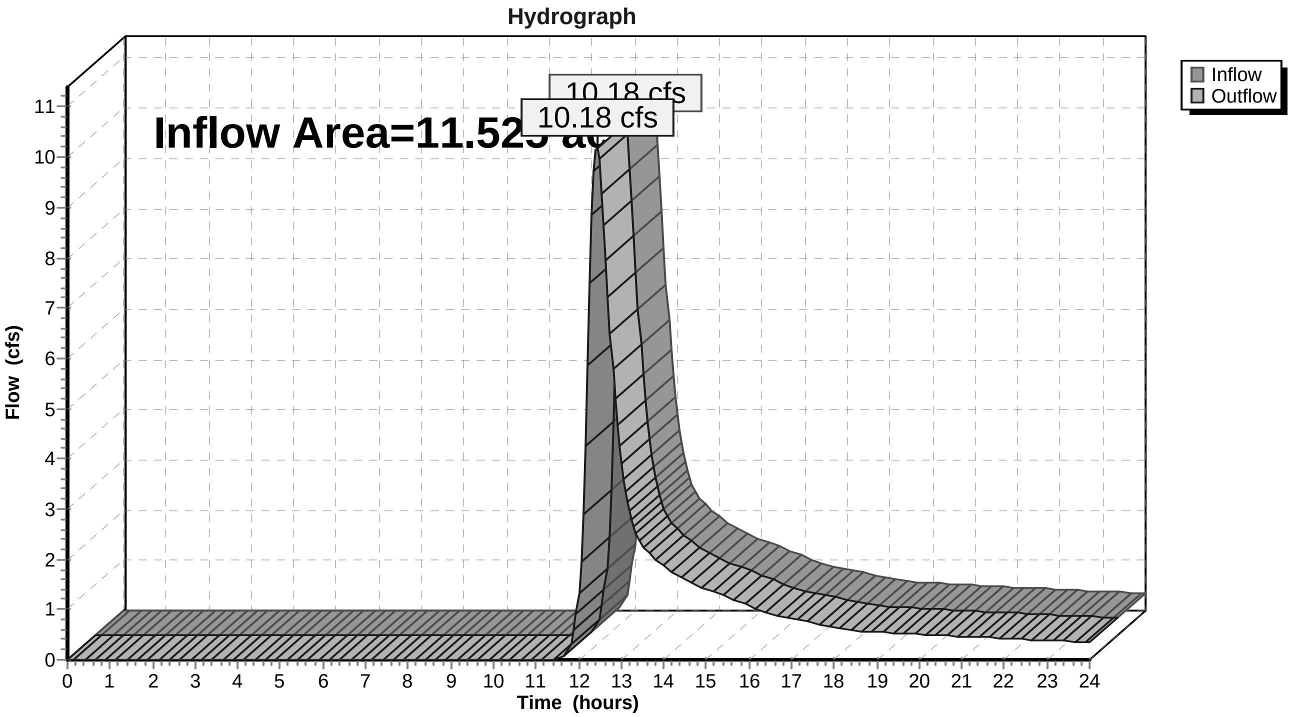
Summary for Reach 500R: Final Reach #500

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

Inflow Area = 11.525 ac, 0.00% Impervious, Inflow Depth > 1.43" for 25Yr-24Hr event
Inflow = 10.18 cfs @ 12.43 hrs, Volume= 1.370 af
Outflow = 10.18 cfs @ 12.43 hrs, Volume= 1.370 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 500R: Final Reach #500



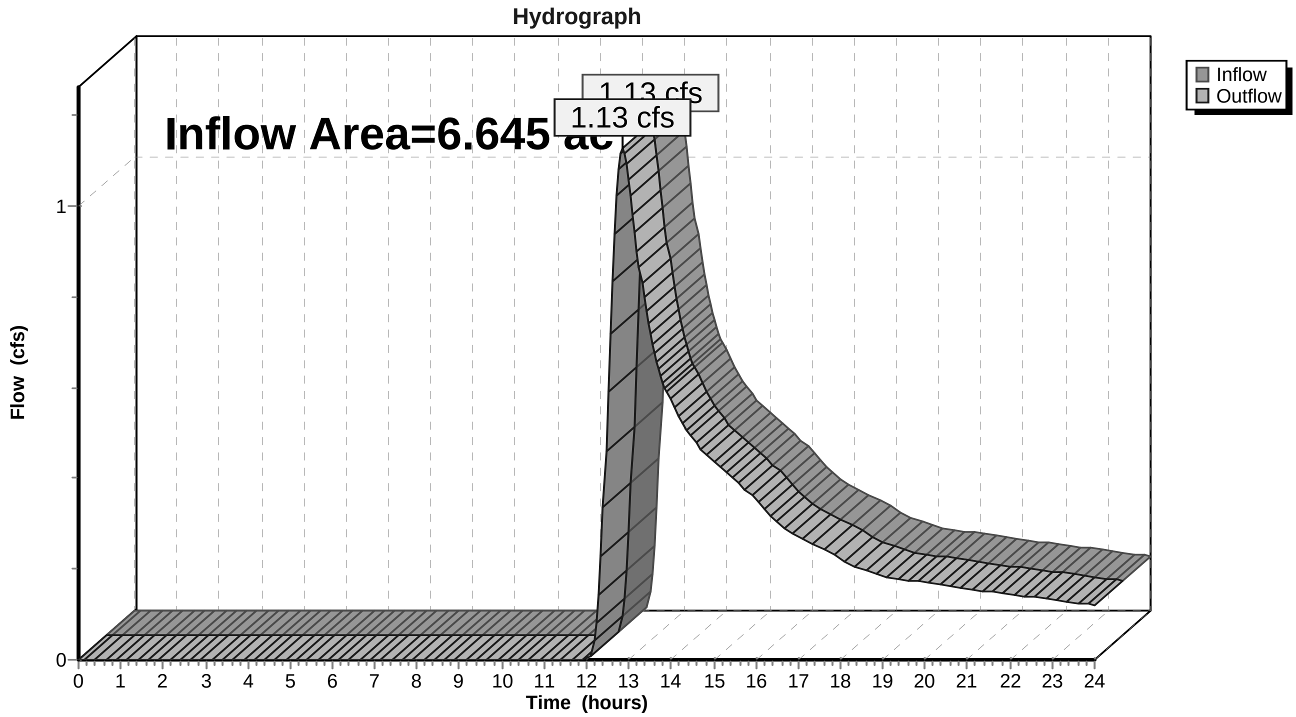
Summary for Reach 600R: Final Reach #600

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

Inflow Area = 6.645 ac, 0.18% Impervious, Inflow Depth > 0.56" for 25Yr-24Hr event
Inflow = 1.13 cfs @ 12.85 hrs, Volume= 0.308 af
Outflow = 1.13 cfs @ 12.85 hrs, Volume= 0.308 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 600R: Final Reach #600



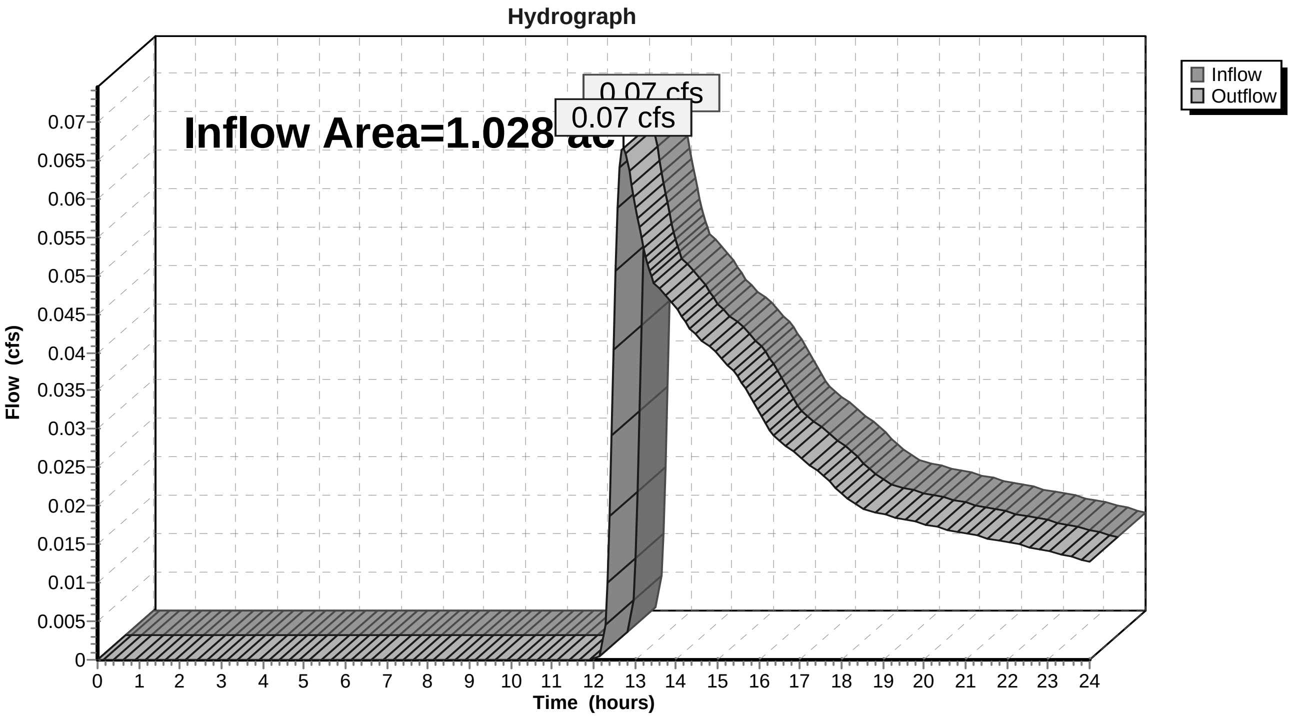
Summary for Reach 700R: Final Reach #700

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

Inflow Area =	1.028 ac,	0.00% Impervious, Inflow Depth > 0.30"	for 25Yr-24Hr event
Inflow =	0.07 cfs @	12.73 hrs, Volume=	0.026 af
Outflow =	0.07 cfs @	12.73 hrs, Volume=	0.026 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 700R: Final Reach #700



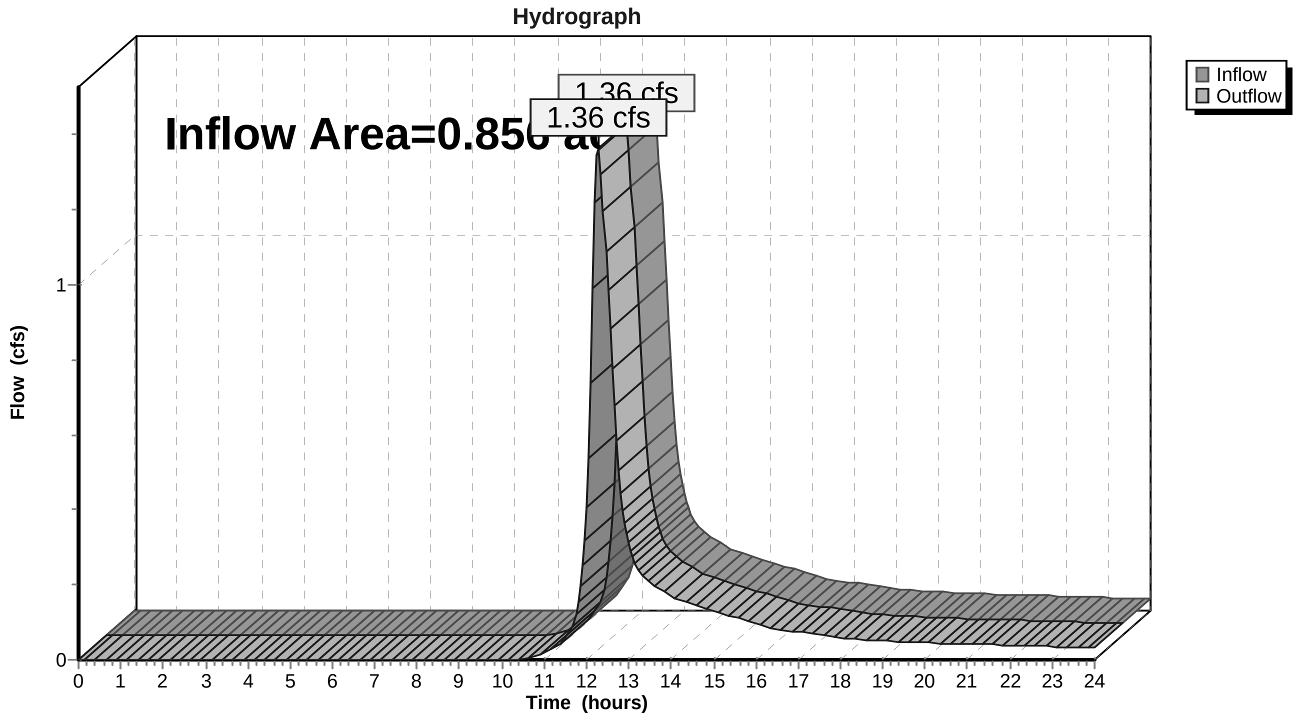
Summary for Reach 800R: Final Reach #800

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

Inflow Area = 0.856 ac, 0.00% Impervious, Inflow Depth > 2.07" for 25Yr-24Hr event
Inflow = 1.36 cfs @ 12.28 hrs, Volume= 0.148 af
Outflow = 1.36 cfs @ 12.28 hrs, Volume= 0.148 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 800R: Final Reach #800



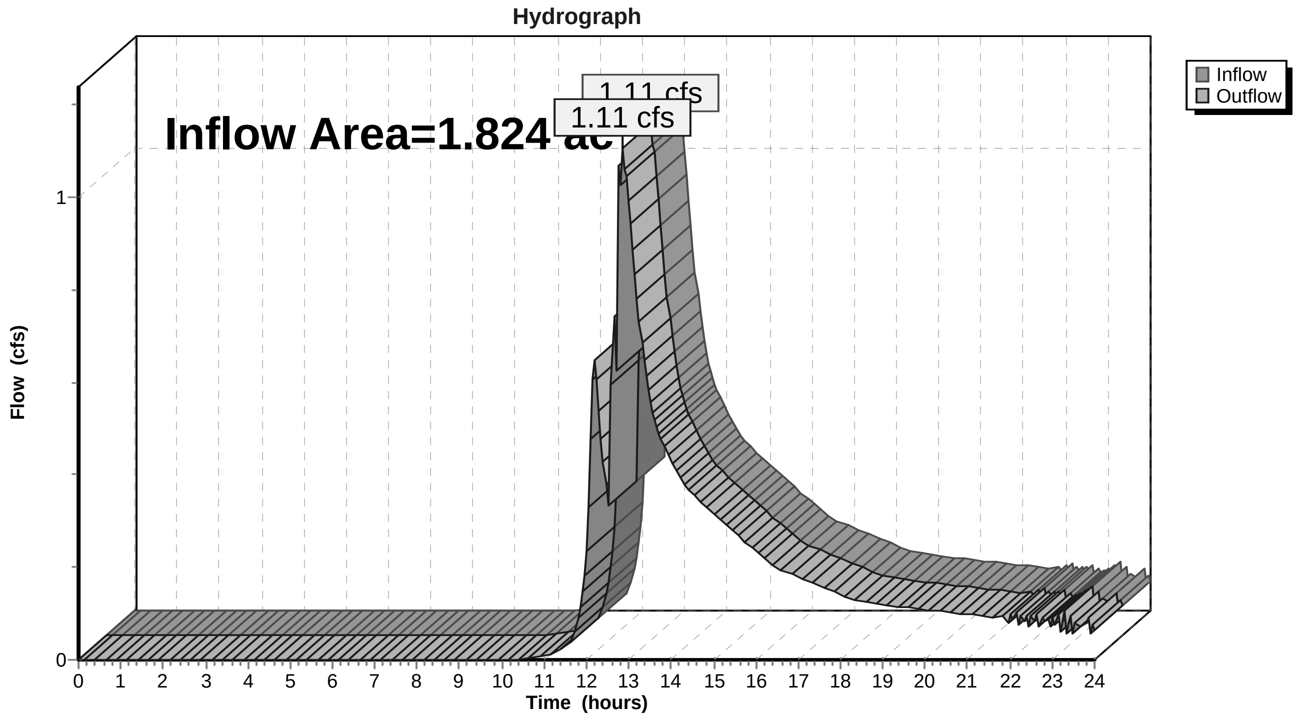
Summary for Reach 900R: Final Reach #900

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

Inflow Area = 1.824 ac, 14.62% Impervious, Inflow Depth > 1.60" for 25Yr-24Hr event
Inflow = 1.11 cfs @ 12.86 hrs, Volume= 0.243 af
Outflow = 1.11 cfs @ 12.86 hrs, Volume= 0.243 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Reach 900R: Final Reach #900



Summary for Pond 1P: Pond #1

Inflow Area =	6.437 ac,	2.68% Impervious,	Inflow Depth > 2.12"	for 25Yr-24Hr event
Inflow =	7.53 cfs @	12.38 hrs, Volume=	1.140 af	
Outflow =	3.27 cfs @	12.86 hrs, Volume=	1.046 af,	Atten= 57%, Lag= 28.8 min
Discarded =	0.01 cfs @	12.87 hrs, Volume=	0.011 af	
Primary =	3.25 cfs @	12.86 hrs, Volume=	1.036 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 183.60' @ 12.87 hrs Surf.Area= 18,423 sf Storage= 12,109 cf

Plug-Flow detention time= 89.0 min calculated for 1.044 af (92% of inflow)
Center-of-Mass det. time= 51.7 min (934.4 - 882.7)

Volume	Invert	Avail.Storage	Storage Description
#1	182.50'	65,416 cf	**Open Water Storage (Irregular)**Listed below (Recalc)

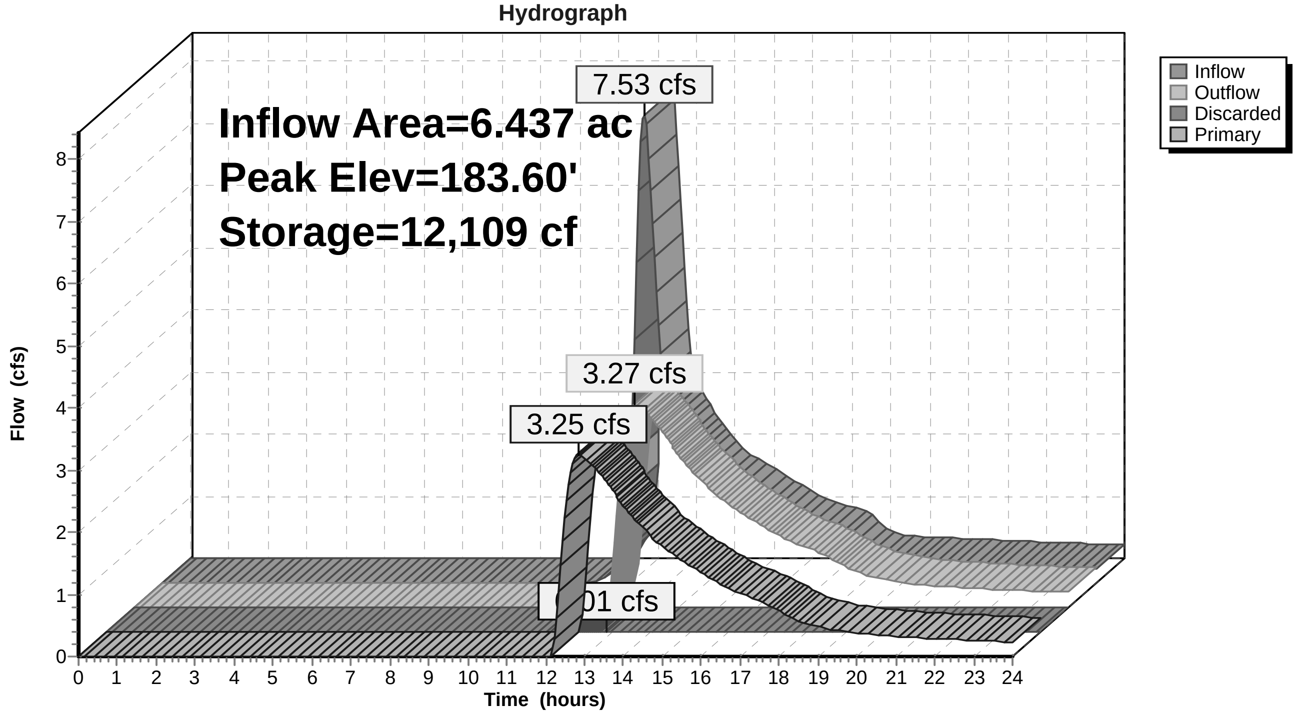
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
182.50	596	133.6	0	0	596
183.00	12,993	630.0	2,729	2,729	30,761
184.00	22,564	840.0	17,560	20,288	55,337
186.00	22,564	840.0	45,128	65,416	57,017

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	**24.0" Round (2) 24" RCP X 2.00 w/ 6.0" inside fill** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 182.50' / 182.00' S= 0.0100 '/' Cc= 0.900 n= 0.024, Flow Area= 2.53 sf
#2	Discarded	182.50'	**0.030 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.87 hrs HW=183.60' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=3.25 cfs @ 12.86 hrs HW=183.60' TW=183.30' (Dynamic Tailwater)
└─**1=(2) 24" RCP** (Outlet Controls 3.25 cfs @ 1.90 fps)

Pond 1P: Pond #1



Summary for Pond 29P: Pond #29

Inflow Area = 0.138 ac, 26.21% Impervious, Inflow Depth > 2.88" for 25Yr-24Hr event
Inflow = 0.46 cfs @ 12.09 hrs, Volume= 0.033 af
Outflow = 0.46 cfs @ 12.10 hrs, Volume= 0.033 af, Atten= 0%, Lag= 0.5 min
Primary = 0.46 cfs @ 12.10 hrs, Volume= 0.033 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 189.06' @ 12.10 hrs Surf.Area= 75 sf Storage= 14 cf
Flood Elev= 190.00' Surf.Area= 205 sf Storage= 140 cf

Plug-Flow detention time= 0.9 min calculated for 0.033 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (834.7 - 834.1)

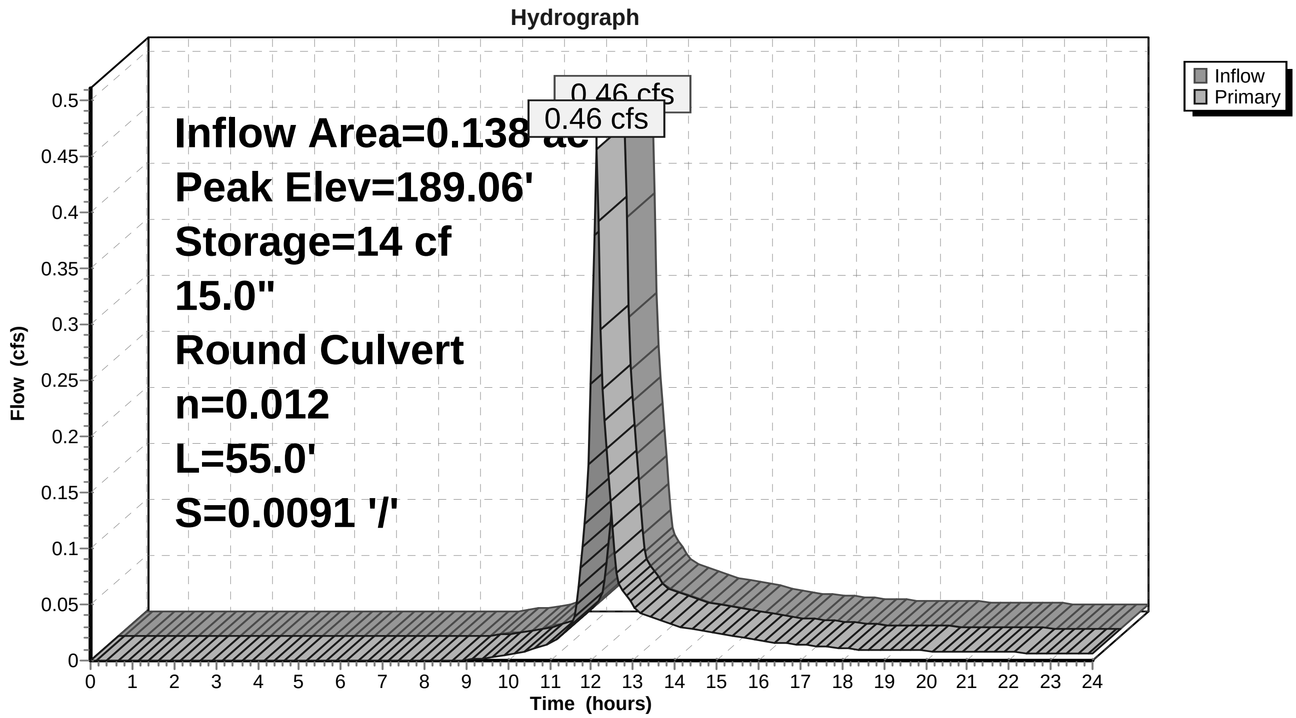
Volume	Invert	Avail.Storage	Storage Description
#1	188.75'	140 cf	**Open Water Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
188.75	15	17.0	0	0	15
189.00	68	32.3	10	10	75
190.00	205	54.5	130	140	235

Device	Routing	Invert	Outlet Devices
#1	Primary	188.75'	**15.0" Round 15" HDPE N-12** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 188.75' / 188.25' S= 0.0091 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.45 cfs @ 12.10 hrs HW=189.06' TW=184.11' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Barrel Controls 0.45 cfs @ 2.84 fps)

Pond 29P: Pond #29



Summary for Pond 30P: Pond #30 Cross Culvert

Inflow Area = 0.918 ac, 7.55% Impervious, Inflow Depth > 2.16" for 25Yr-24Hr event
Inflow = 1.77 cfs @ 12.20 hrs, Volume= 0.165 af
Outflow = 1.33 cfs @ 12.34 hrs, Volume= 0.163 af, Atten= 25%, Lag= 8.6 min
Primary = 1.33 cfs @ 12.34 hrs, Volume= 0.163 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 191.87' @ 12.34 hrs Surf.Area= 2,409 sf Storage= 901 cf
Flood Elev= 192.50' Surf.Area= 4,322 sf Storage= 3,038 cf

Plug-Flow detention time= 17.4 min calculated for 0.163 af (99% of inflow)
Center-of-Mass det. time= 11.6 min (870.5 - 858.8)

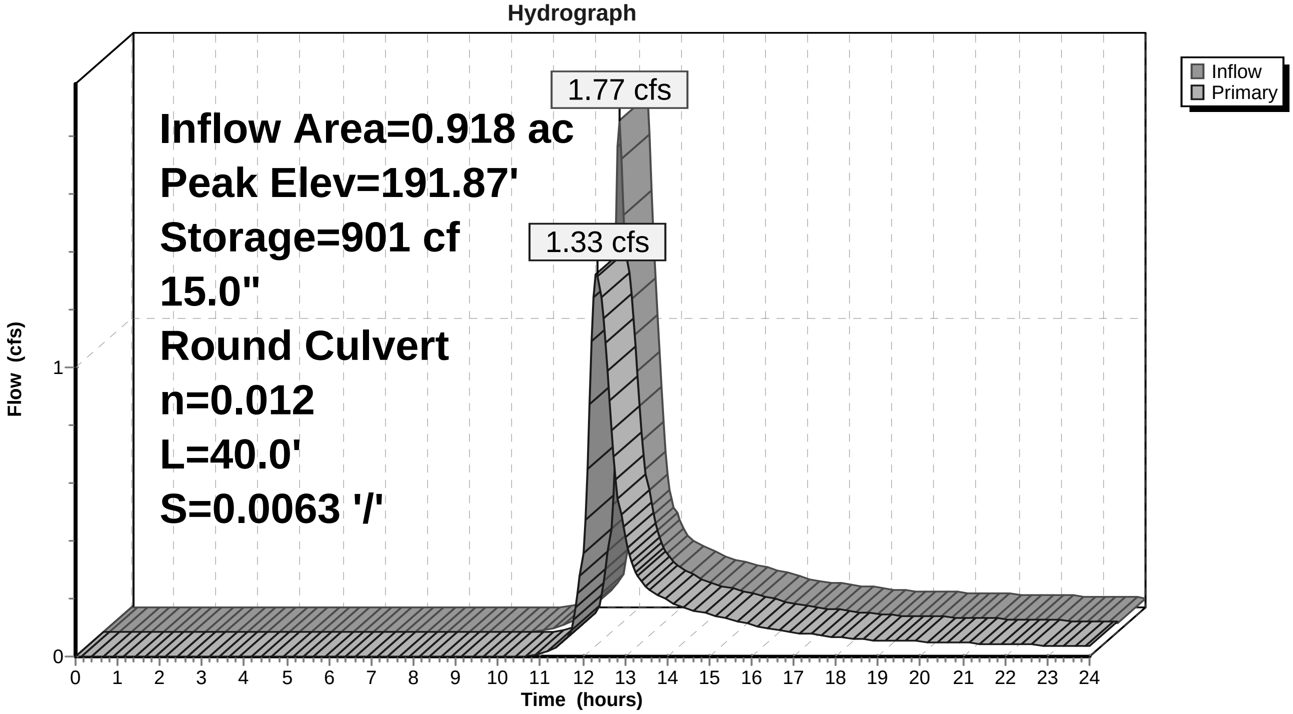
Volume	Invert	Avail.Storage	Storage Description
#1	191.25'	13,659 cf	**Open Water Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
191.25	672	407.0	0	0	672
192.00	2,904	483.0	1,243	1,243	6,065
194.00	10,261	597.0	12,416	13,659	15,922

Device	Routing	Invert	Outlet Devices
#1	Primary	191.25'	**15.0" Round 15" HDPE N-12** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 191.25' / 191.00' S= 0.0063 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.33 cfs @ 12.34 hrs HW=191.87' TW=191.16' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Barrel Controls 1.33 cfs @ 3.20 fps)

Pond 30P: Pond #30 Cross Culvert



Summary for Pond 31P: Pond #31 Cross Culvert

Inflow Area = 0.186 ac, 30.07% Impervious, Inflow Depth > 2.16" for 25Yr-24Hr event
Inflow = 0.45 cfs @ 12.10 hrs, Volume= 0.033 af
Outflow = 0.44 cfs @ 12.11 hrs, Volume= 0.033 af, Atten= 2%, Lag= 0.9 min
Primary = 0.44 cfs @ 12.11 hrs, Volume= 0.033 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 189.34' @ 12.11 hrs Surf.Area= 126 sf Storage= 30 cf
Flood Elev= 191.00' Surf.Area= 990 sf Storage= 835 cf

Plug-Flow detention time= 2.6 min calculated for 0.033 af (100% of inflow)
Center-of-Mass det. time= 1.6 min (854.9 - 853.3)

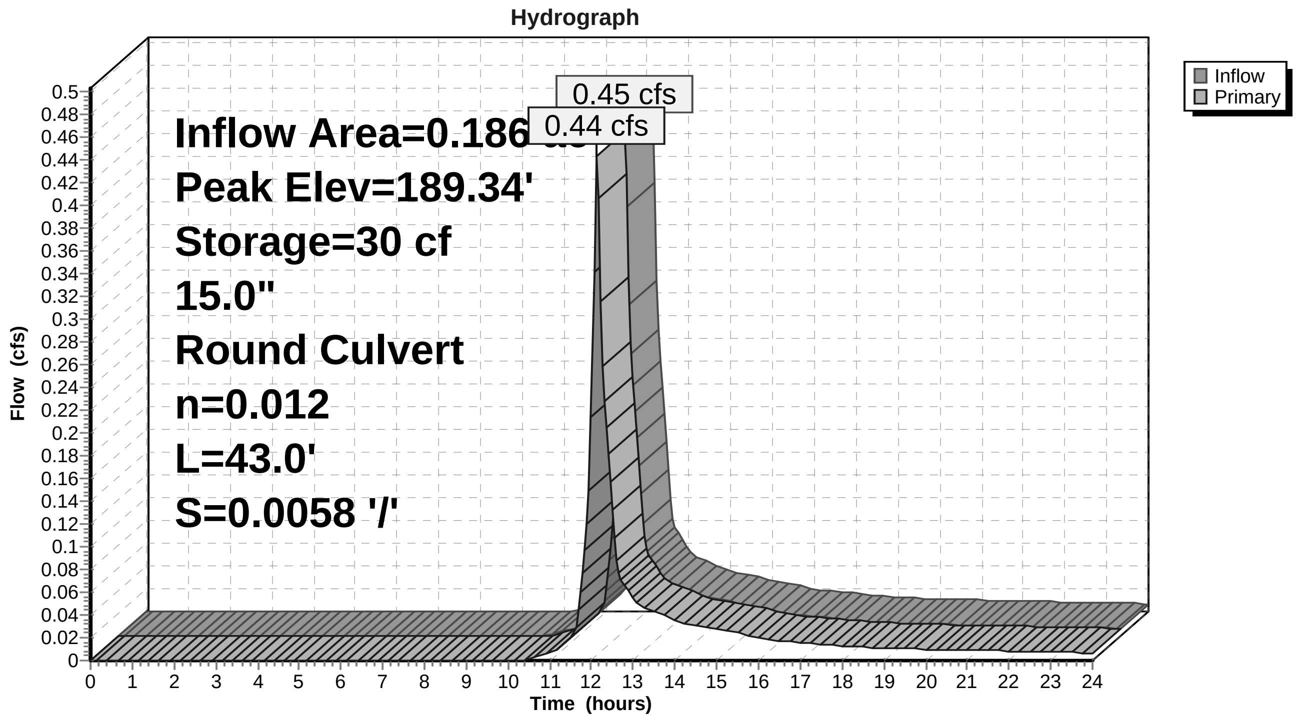
Volume	Invert	Avail.Storage	Storage Description
#1	189.00'	835 cf	**Open Water Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
189.00	51	51.5	0	0	51
190.00	364	116.3	184	184	920
191.00	990	205.1	651	835	3,197

Device	Routing	Invert	Outlet Devices
#1	Primary	189.00'	**15.0" Round 15" HDPE N-12** L= 43.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 189.00' / 188.75' S= 0.0058 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.43 cfs @ 12.11 hrs HW=189.34' TW=188.64' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Barrel Controls 0.43 cfs @ 2.41 fps)

Pond 31P: Pond #31 Cross Culvert



Summary for Pond 32P: Inlet Sump (Lt.)

Inflow Area = 2.822 ac, 18.55% Impervious, Inflow Depth > 3.25" for 25Yr-24Hr event
Inflow = 8.91 cfs @ 12.16 hrs, Volume= 0.765 af
Outflow = 8.24 cfs @ 12.19 hrs, Volume= 0.754 af, Atten= 8%, Lag= 1.5 min
Primary = 8.15 cfs @ 12.18 hrs, Volume= 0.614 af
Secondary = 0.92 cfs @ 13.36 hrs, Volume= 0.207 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 188.88' @ 13.36 hrs Surf.Area= 741 sf Storage= 882 cf
Flood Elev= 189.50' Surf.Area= 945 sf Storage= 1,402 cf

Plug-Flow detention time= 16.0 min calculated for 0.754 af (99% of inflow)
Center-of-Mass det. time= 7.9 min (836.9 - 829.0)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	1,918 cf	**Open Water Storage (Irregular)**Listed below (Recalc)

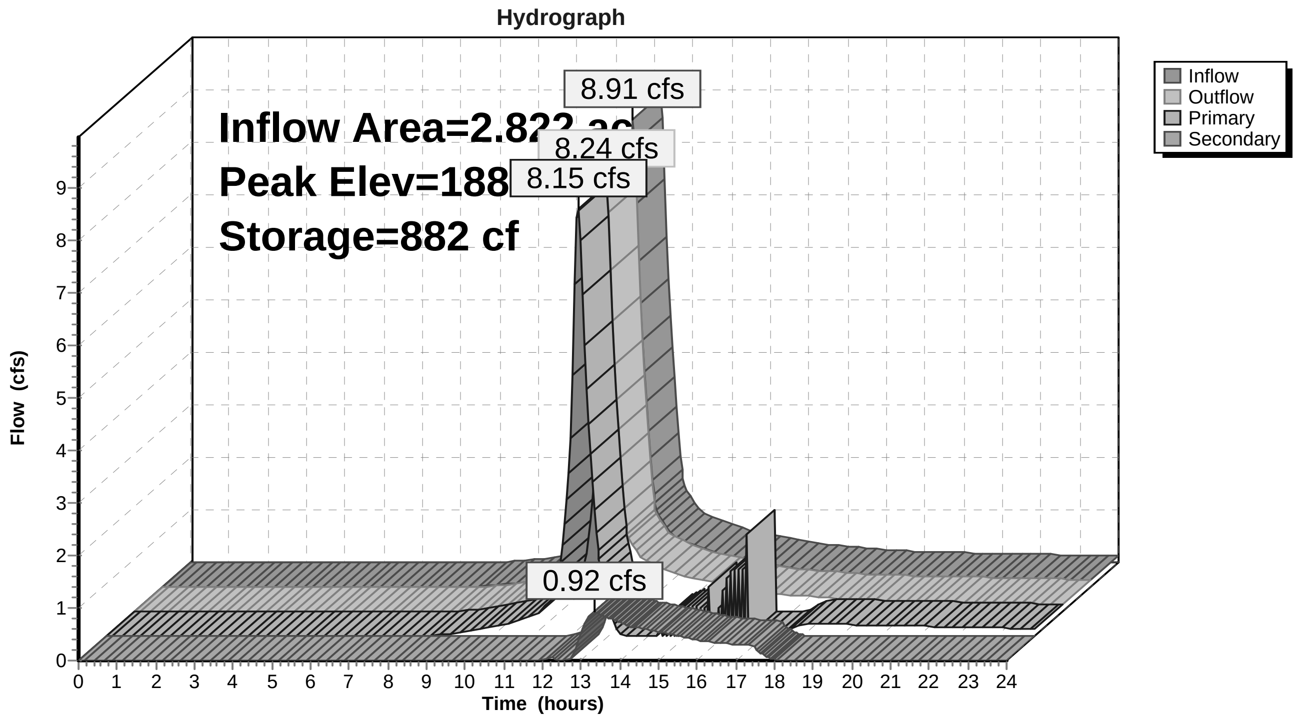
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
187.00	242	63.3	0	0	242
188.00	472	84.0	351	351	496
189.00	781	107.0	620	971	858
190.00	1,125	126.0	948	1,918	1,229

Device	Routing	Invert	Outlet Devices
#1	Primary	187.00'	**18.0" Round 18" HDPE N-12** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 187.00' / 186.00' S= 0.0588 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	188.75'	**8.0' long x 6.0' 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) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=6.95 cfs @ 12.18 hrs HW=188.73' TW=188.07' (Dynamic Tailwater)
└─**1=18" HDPE N-12** (Inlet Controls 6.95 cfs @ 3.93 fps)

Secondary OutFlow Max=0.92 cfs @ 13.36 hrs HW=188.88' TW=187.17' (Dynamic Tailwater)
└─**2=E-Spillway** (Weir Controls 0.92 cfs @ 0.86 fps)

Pond 32P: Inlet Sump (Lt.)



Summary for Pond 33P: Treatment Swale Forebay

[80] Warning: Exceeded Pond C05P by 0.02' @ 13.40 hrs (0.90 cfs 0.355 af)

Inflow Area = 0.222 ac, 66.14% Impervious, Inflow Depth > 3.77" for 25Yr-24Hr event
Inflow = 0.91 cfs @ 12.09 hrs, Volume= 0.070 af
Outflow = 0.85 cfs @ 12.12 hrs, Volume= 0.057 af, Atten= 7%, Lag= 2.0 min
Primary = 0.85 cfs @ 12.12 hrs, Volume= 0.057 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 185.65' @ 12.12 hrs Surf.Area= 1,080 sf Storage= 700 cf

Plug-Flow detention time= 124.3 min calculated for 0.057 af (82% of inflow)
Center-of-Mass det. time= 50.2 min (846.8 - 796.6)

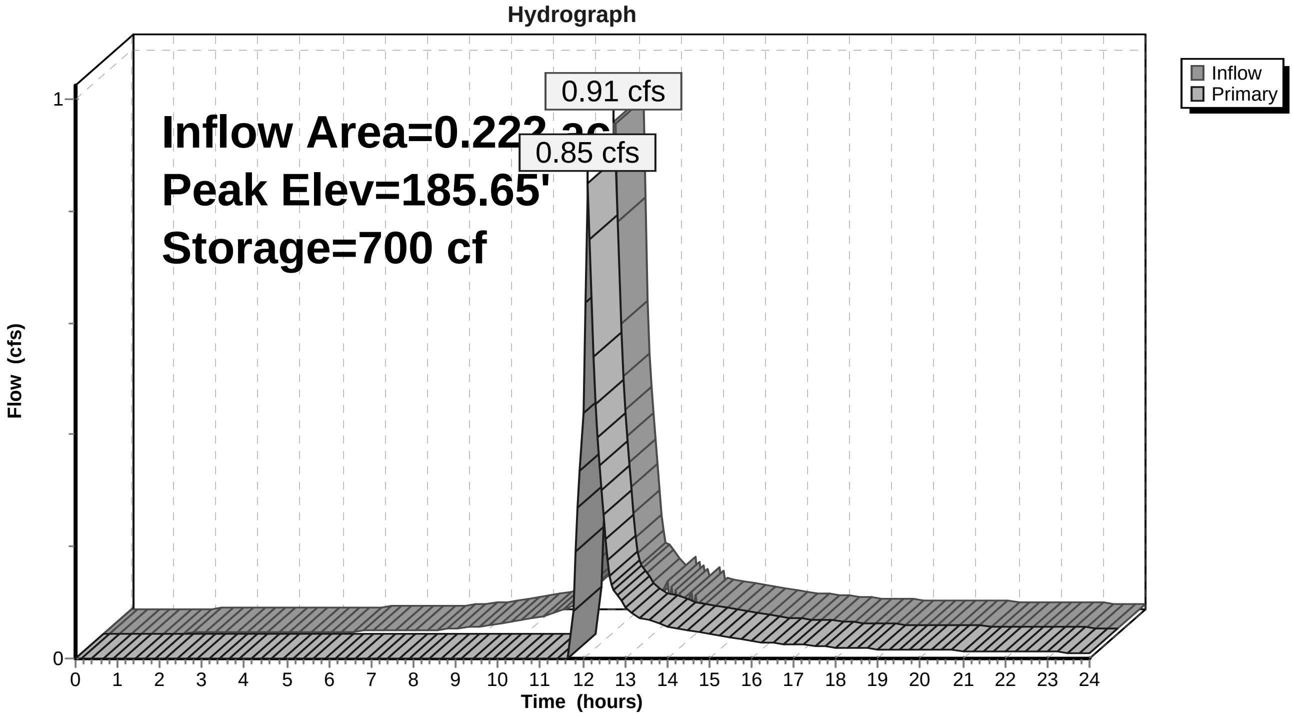
Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	1,155 cf	**Swale Forebay (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.00	50	118.3	0	0	50
185.00	451	238.1	217	217	3,452
186.00	1,531	387.7	938	1,155	10,909

Device	Routing	Invert	Outlet Devices
#1	Primary	185.50'	**6.0' long x 3.0' 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 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.82 cfs @ 12.12 hrs HW=185.65' TW=185.23' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 0.82 cfs @ 0.94 fps)

Pond 33P: Treatment Swale Forebay



Summary for Pond 34P: Inlet Sump (Rt.)

Inflow Area = 0.922 ac, 21.43% Impervious, Inflow Depth > 3.55" for 25Yr-24Hr event
Inflow = 3.46 cfs @ 12.12 hrs, Volume= 0.273 af
Outflow = 3.45 cfs @ 12.12 hrs, Volume= 0.273 af, Atten= 0%, Lag= 0.1 min
Primary = 3.45 cfs @ 12.12 hrs, Volume= 0.273 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 190.88' @ 12.12 hrs Surf.Area= 39 sf Storage= 18 cf
Flood Elev= 193.00' Surf.Area= 319 sf Storage= 310 cf

Plug-Flow detention time= 0.1 min calculated for 0.273 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (819.3 - 819.2)

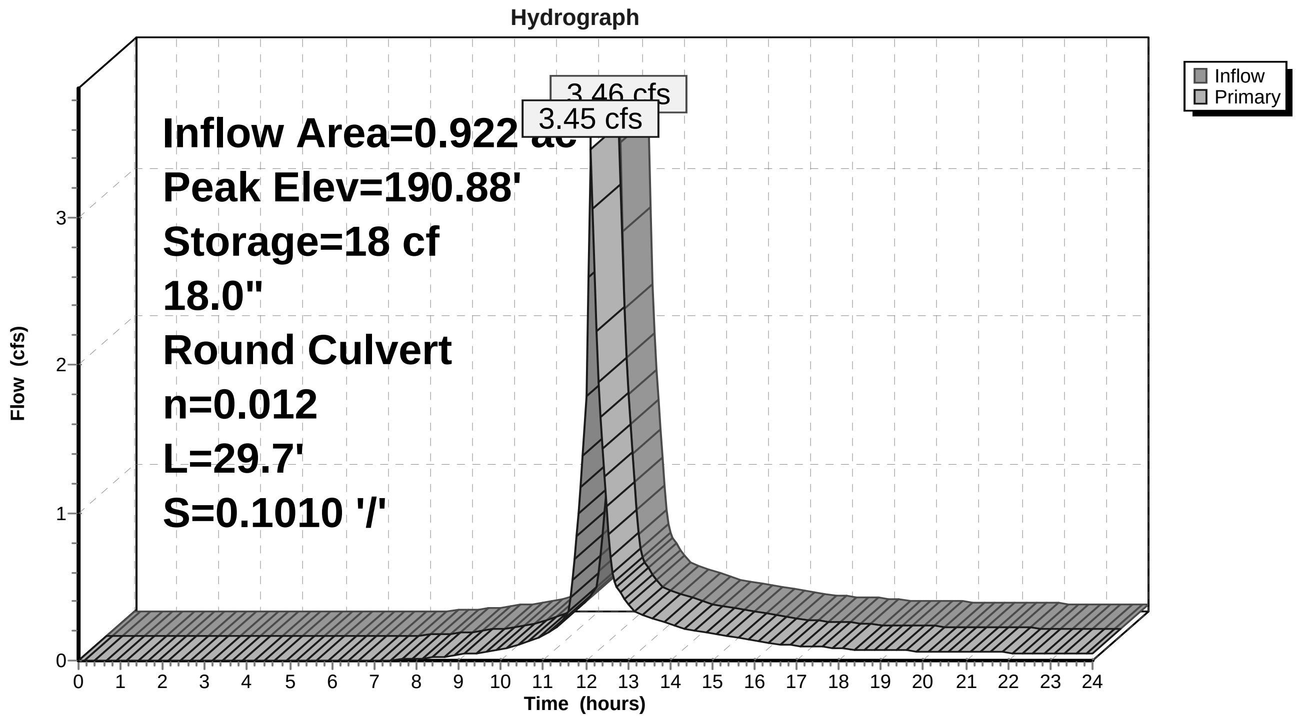
Volume	Invert	Avail.Storage	Storage Description
#1	190.00'	310 cf	**Open Water Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
190.00	6	10.0	0	0	6
191.00	45	27.0	22	22	59
192.00	117	44.2	78	101	163
193.00	319	78.6	210	310	505

Device	Routing	Invert	Outlet Devices
#1	Primary	190.00'	**18.0" Round 18" HDPE N-12** L= 29.7' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 190.00' / 187.00' S= 0.1010 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=3.36 cfs @ 12.12 hrs HW=190.87' TW=187.05' (Dynamic Tailwater)
└**1=18" HDPE N-12** (Inlet Controls 3.36 cfs @ 3.17 fps)

Pond 34P: Inlet Sump (Rt.)



Summary for Pond 102P: Gravel Wetland #102

[80] Warning: Exceeded Pond C04P by 0.02' @ 17.40 hrs (2.18 cfs 0.112 af)

Inflow Area = 5.553 ac, 22.01% Impervious, Inflow Depth > 2.72" for 25Yr-24Hr event
Inflow = 14.94 cfs @ 12.16 hrs, Volume= 1.259 af
Outflow = 0.70 cfs @ 16.60 hrs, Volume= 0.671 af, Atten= 95%, Lag= 266.7 min
Primary = 0.10 cfs @ 12.18 hrs, Volume= 0.110 af
Secondary = 0.61 cfs @ 16.60 hrs, Volume= 0.561 af
Tertiary = 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 / 3
Peak Elev= 188.92' @ 16.60 hrs Surf.Area= 23,501 sf Storage= 33,726 cf
Flood Elev= 191.00' Surf.Area= 27,849 sf Storage= 63,349 cf

Plug-Flow detention time= 345.3 min calculated for 0.670 af (53% of inflow)
Center-of-Mass det. time= 224.4 min (1,050.2 - 825.8)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	6,827 cf	**Forebay (Irregular)** Listed below (Recalc)
#2	184.00'	3,069 cf	**Cell #1 (Irregular)** Listed below (Recalc)
#3	184.00'	2,570 cf	**Cell #2 (Irregular)** Listed below (Recalc)
#4	186.50'	1,755 cf	**Open Water Above Cells (Irregular)** Listed below (Recalc)
#5	187.00'	49,080 cf	**Open Water Storage (Irregular)** Listed below (Recalc)
#6	183.67'	48 cf	**4.00'D x 3.83'H Outlet Structure**
		63,349 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.00	101	37.0	0	0	101
185.00	1,533	240.0	676	676	4,578
186.00	3,259	330.0	2,342	3,018	8,670
187.00	4,386	365.0	3,809	6,827	10,637

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.00	763	113.0	0	0	763
185.00	1,118	134.0	935	935	1,194
186.00	1,521	153.0	1,314	2,249	1,651
186.50	1,760	163.0	820	3,069	1,914

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.00	583	99.0	0	0	583
185.00	920	121.0	745	745	984
186.00	1,316	143.0	1,112	1,857	1,464
186.50	1,538	152.0	713	2,570	1,688

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
186.50	3,278	309.0	0	0	3,278
187.00	3,749	318.0	1,755	1,755	3,754

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
187.00	8,373	601.0	0	0	8,373
188.00	10,211	623.0	9,277	9,277	10,602
189.00	12,233	657.0	11,207	20,484	14,123
190.00	14,304	690.0	13,255	33,739	17,724
191.00	16,403	708.0	15,342	49,080	19,845

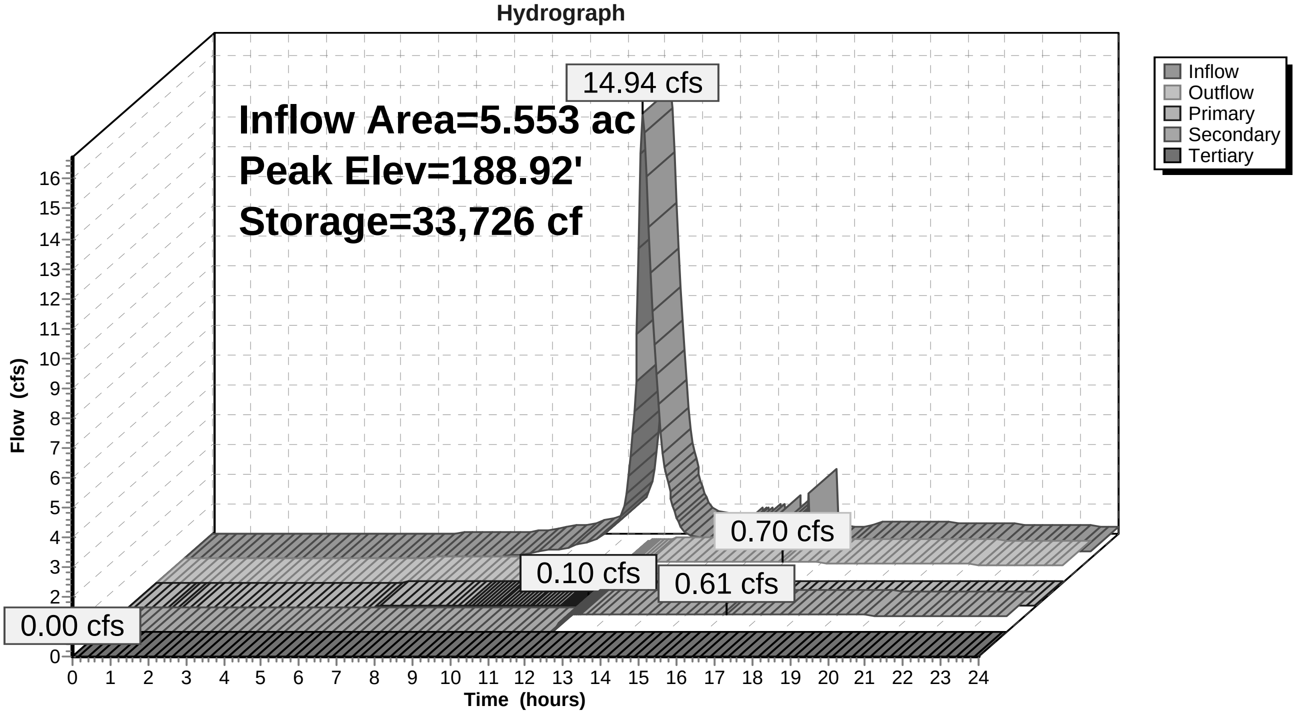
Device	Routing	Invert	Outlet Devices
#1	Primary	183.67'	**6.0" Round 6" Drain** L= 101.2' Ke= 0.500 Inlet / Outlet Invert= 183.67' / 183.50' S= 0.0017 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	183.67'	**1.5" Vert. 1.50" Orifice (Str. A)** C= 0.600
#3	Secondary	185.50'	**24.0" Round 24" HDPE N-12** L= 90.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 185.50' / 185.00' S= 0.0056 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#4	Device 3	186.50'	**4.0" Vert. 4" Orifice (Str. B)** C= 0.600
#5	Device 3	190.00'	**48.0" Horiz. 4' Grate (Str. B)** C= 0.600 Limited to weir flow at low heads
#6	Tertiary	190.50'	**20.0' 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=0.10 cfs @ 12.18 hrs HW=187.36' TW=184.30' (Dynamic Tailwater)
└─**1=6" Drain** (Passes 0.10 cfs of 0.96 cfs potential flow)
  └─**2=1.50" Orifice (Str. A)** (Orifice Controls 0.10 cfs @ 8.42 fps)

Secondary OutFlow Max=0.61 cfs @ 16.60 hrs HW=188.91' TW=186.80' (Dynamic Tailwater)
└─**3=24" HDPE N-12** (Passes 0.61 cfs of 21.99 cfs potential flow)
  ├─**4=4" Orifice (Str. B)** (Orifice Controls 0.61 cfs @ 7.00 fps)
  └─**5=4' Grate (Str. B)** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=183.67' TW=189.50' (Dynamic Tailwater)
└─**6=E-Spillway** (Controls 0.00 cfs)

Pond 102P: Gravel Wetland #102



Summary for Pond 103aP: Level Spreader

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=29)

Inflow Area = 4.823 ac, 12.26% Impervious, Inflow Depth > 0.54" for 25Yr-24Hr event
Inflow = 0.26 cfs @ 17.04 hrs, Volume= 0.218 af
Outflow = 0.26 cfs @ 16.85 hrs, Volume= 0.209 af, Atten= 0%, Lag= 0.0 min
Primary = 0.26 cfs @ 16.85 hrs, Volume= 0.209 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 170.07' @ 17.15 hrs Surf.Area= 535 sf Storage= 409 cf
Flood Elev= 171.00' Surf.Area= 535 sf Storage= 906 cf

Plug-Flow detention time= 28.5 min calculated for 0.209 af (96% of inflow)
Center-of-Mass det. time= 14.3 min (1,118.6 - 1,104.3)

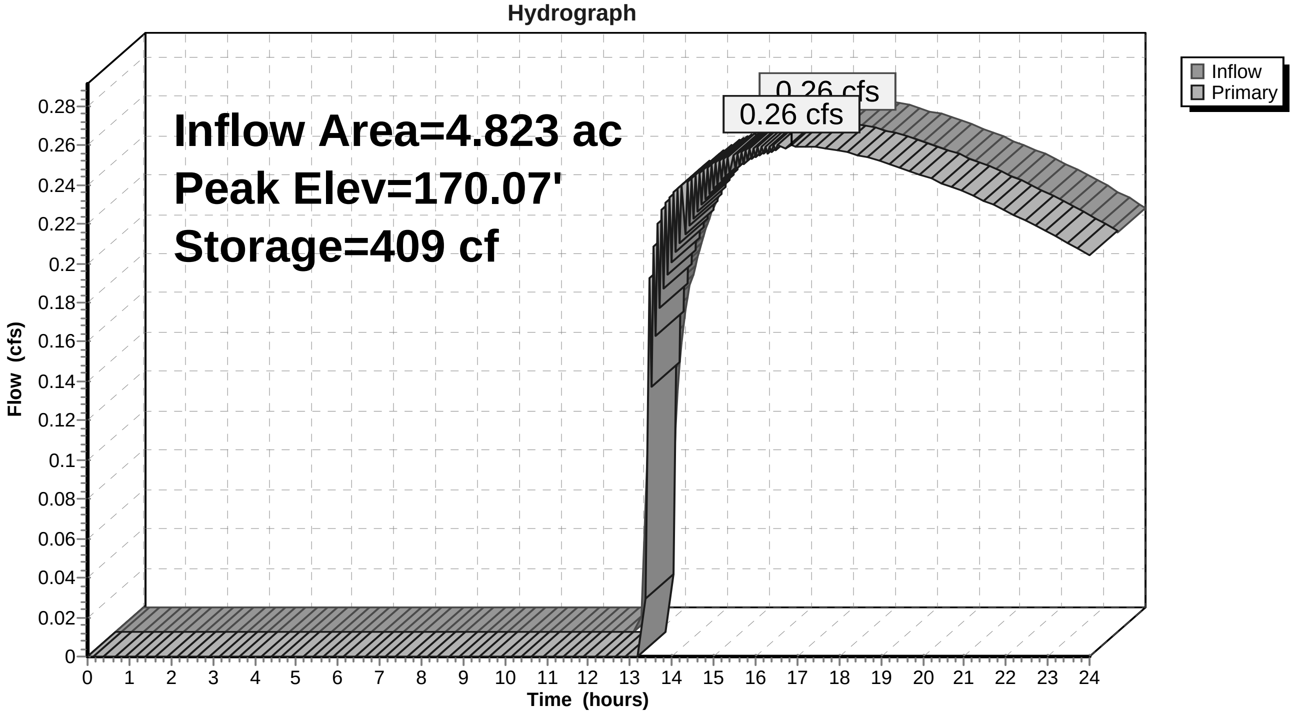
Volume	Invert	Avail.Storage	Storage Description
#1	169.00'	906 cf	**Open Water (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
169.00	228	67.0	0	0	228
170.00	535	106.0	371	371	772
171.00	535	106.0	535	906	878

Device	Routing	Invert	Outlet Devices
#1	Primary	170.00'	**33.0' long x 4.7' breadth Level Lip** 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) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.66 2.69 2.68 2.70 2.73 2.78 2.87 3.01

Primary OutFlow Max=0.26 cfs @ 16.85 hrs HW=170.07' TW=170.07' (Dynamic Tailwater)
└─**1=Level Lip** (Weir Controls 0.26 cfs @ 0.11 fps)

Pond 103aP: Level Spreader



Summary for Pond 103P: Infiltration Rain Garden #103

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=5)

Inflow Area =	4.823 ac,	12.26% Impervious,	Inflow Depth > 2.32"	for 25Yr-24Hr event
Inflow =	8.16 cfs @	12.26 hrs, Volume=	0.934 af	
Outflow =	0.44 cfs @	17.04 hrs, Volume=	0.424 af,	Atten= 95%, Lag= 286.5 min
Discarded =	0.19 cfs @	11.10 hrs, Volume=	0.206 af	
Primary =	0.26 cfs @	17.04 hrs, Volume=	0.218 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 / 3
Peak Elev= 183.08' @ 17.04 hrs Surf.Area= 800 sf Storage= 25,931 cf
Flood Elev= 185.00' Surf.Area= 800 sf Storage= 44,502 cf

Plug-Flow detention time= 341.8 min calculated for 0.424 af (45% of inflow)
Center-of-Mass det. time= 214.7 min (1,071.9 - 857.2)

Volume	Invert	Avail.Storage	Storage Description
#1	178.75'	2,326 cf	**Forebay (Irregular)** Listed below (Recalc) -Impervious
#2	176.00'	160 cf	**Stone (Irregular)** Listed below (Recalc) -Impervious 400 cf Overall x 40.0% Voids
#3	177.00'	120 cf	**BioMedia (Irregular)** Listed below (Recalc) 600 cf Overall x 20.0% Voids
#4	178.50'	20 cf	**Loam Layer (Irregular)** Listed below (Recalc) 100 cf Overall x 20.0% Voids
#5	178.75'	5,694 cf	**Open Water Storage (Irregular)** Listed below (Recalc) -Impervious
#6	180.50'	36,182 cf	**Combined Open Storage (Irregular)** Listed below (Recalc) -Impervious
		44,502 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.75	596	110.0	0	0	596
179.00	877	127.0	183	183	918
180.00	1,279	159.0	1,072	1,255	1,660
180.75	1,583	172.4	1,071	2,326	2,035

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
176.00	400	81.0	0	0	400
177.00	400	81.0	400	400	481

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
177.00	400	81.0	0	0	400
178.50	400	81.0	600	600	522

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.50	400	81.0	0	0	400
178.75	400	81.0	100	100	420

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.75	2,695	220.2	0	0	2,695
179.00	2,861	224.0	694	694	2,840
180.00	3,492	243.0	3,171	3,866	3,584
180.50	3,823	252.0	1,828	5,694	3,960

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
180.50	5,428	327.0	0	0	5,428
181.00	5,926	337.0	2,838	2,838	5,982
182.00	7,062	369.0	6,486	9,323	7,814
183.00	8,231	392.0	7,639	16,962	9,258
184.00	9,490	418.0	8,853	25,815	10,982
185.00	11,269	551.0	10,367	36,182	21,249

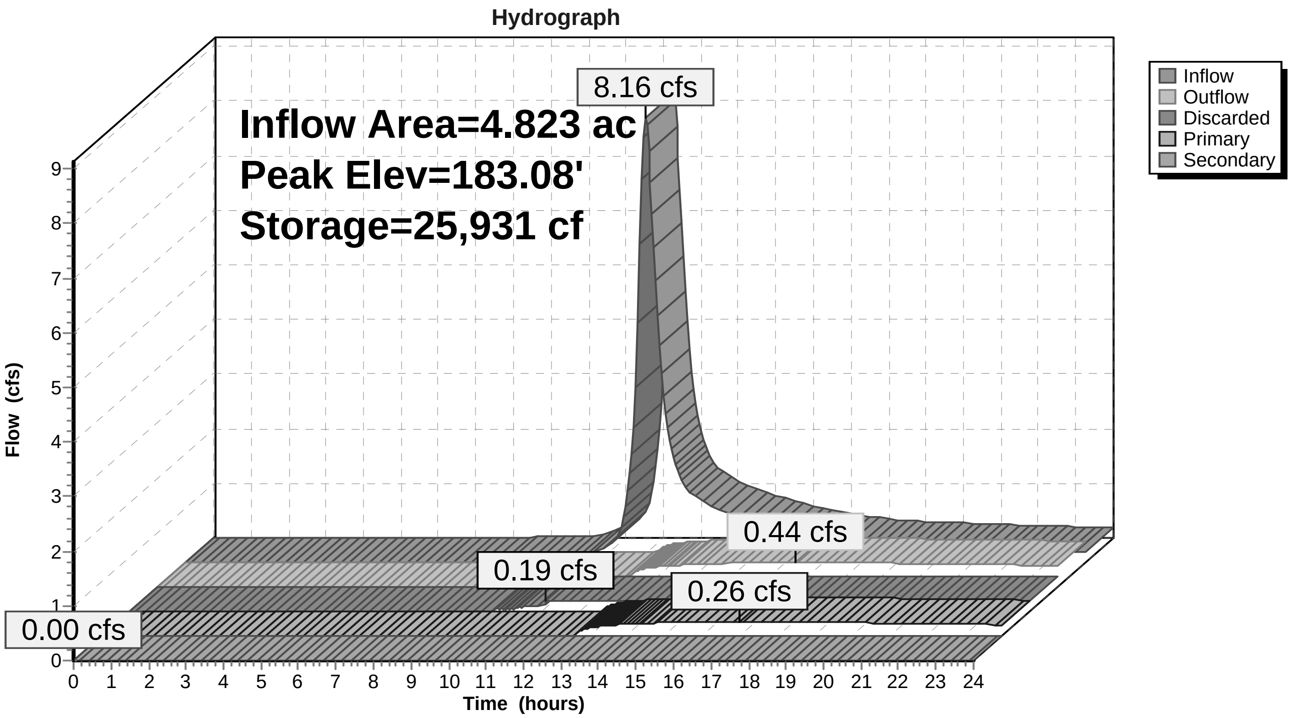
Device	Routing	Invert	Outlet Devices
#1	Discarded	177.00'	**10.000 in/hr Exfiltration over Surface area**
#2	Primary	175.00'	**15.0" Round 15" HDPE N-12** L= 109.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.00' / 171.50' S= 0.0321 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Device 2	181.75'	**3.0" Vert. 3" Orifice** C= 0.600
#4	Device 2	184.40'	**48.0" Horiz. 4' Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	184.50'	**10.0' long x 8.5' 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) 2.45 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.65 2.66 2.67 2.69 2.71

Discarded OutFlow Max=0.19 cfs @ 11.10 hrs HW=178.69' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=0.26 cfs @ 17.04 hrs HW=183.08' TW=170.07' (Dynamic Tailwater)
└─**2=15" HDPE N-12** (Passes 0.26 cfs of 16.13 cfs potential flow)
  ├─**3=3" Orifice** (Orifice Controls 0.26 cfs @ 5.28 fps)
  └─**4=4' Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=176.00' TW=175.00' (Dynamic Tailwater)
└─**5=E-Spillway** (Controls 0.00 cfs)

Pond 103P: Infiltration Rain Garden #103



Summary for Pond 104P: Detention Pond #104

Inflow Area = 0.289 ac, 58.28% Impervious, Inflow Depth > 4.60" for 25Yr-24Hr event
Inflow = 1.46 cfs @ 12.09 hrs, Volume= 0.111 af
Outflow = 0.28 cfs @ 12.53 hrs, Volume= 0.111 af, Atten= 81%, Lag= 26.5 min
Primary = 0.28 cfs @ 12.53 hrs, Volume= 0.111 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 247.31' @ 12.53 hrs Surf.Area= 1,504 sf Storage= 1,589 cf
Flood Elev= 250.00' Surf.Area= 4,003 sf Storage= 8,723 cf

Plug-Flow detention time= 48.2 min calculated for 0.111 af (100% of inflow)
Center-of-Mass det. time= 47.4 min (835.9 - 788.5)

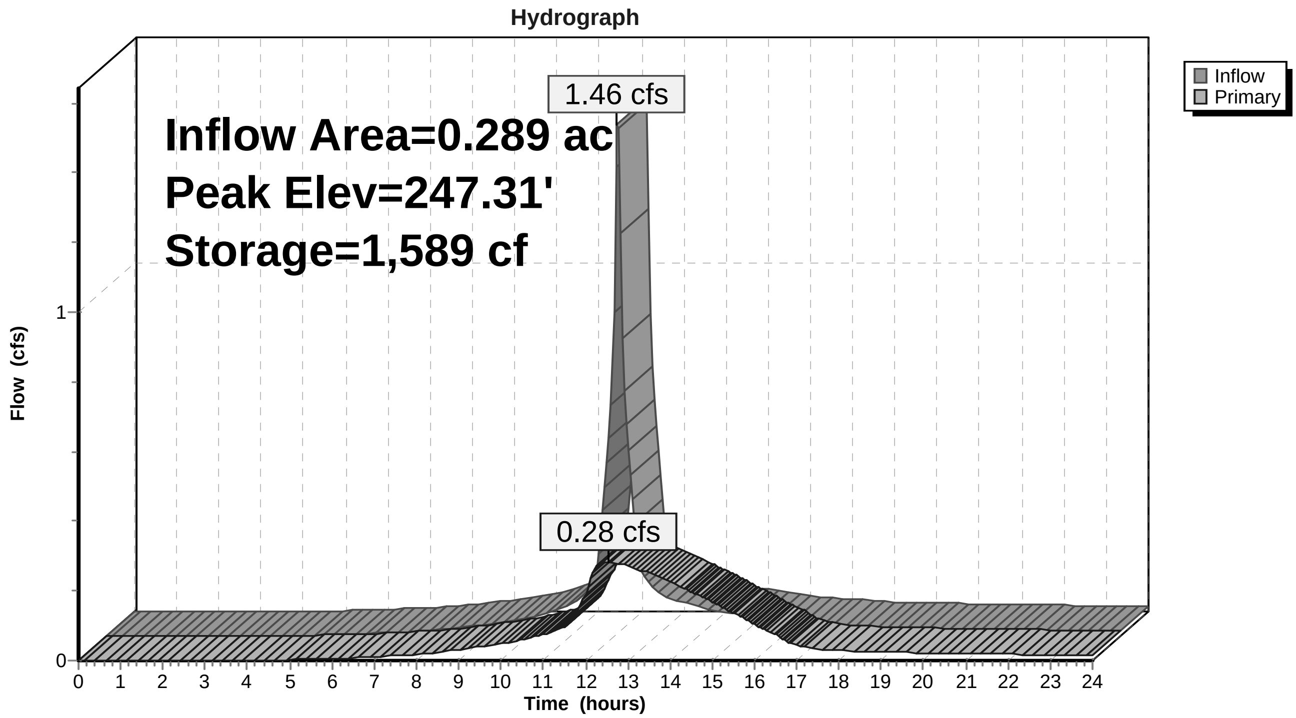
Volume	Invert	Avail.Storage	Storage Description
#1	245.75'	8,723 cf	**Open Water Storage (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
245.75	10	10.0	0	0	10
246.00	871	110.6	81	81	976
247.00	1,295	130.1	1,076	1,157	1,368
248.00	2,028	163.4	1,648	2,805	2,159
249.00	2,930	197.3	2,465	5,270	3,149
250.00	4,003	232.1	3,453	8,723	4,357

Device	Routing	Invert	Outlet Devices
#1	Primary	245.75'	**15.0" Round 15" HDPE N-12** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 245.75' / 244.00' S= 0.0292 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	245.75'	**3.0" Vert. 3" Orifice** C= 0.600
#3	Device 1	249.50'	**48.0" Horiz. 4' Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.28 cfs @ 12.53 hrs HW=247.31' TW=240.67' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Passes 0.28 cfs of 5.71 cfs potential flow)
  ├─**2=3" Orifice** (Orifice Controls 0.28 cfs @ 5.76 fps)
  └─**3=4' Grate** (Controls 0.00 cfs)

Pond 104P: Detention Pond #104



Summary for Pond 105P: Center of Cul-de-sac Pond #105

Inflow Area = 0.287 ac, 57.92% Impervious, Inflow Depth > 4.06" for 25Yr-24Hr event
Inflow = 1.32 cfs @ 12.09 hrs, Volume= 0.097 af
Outflow = 1.32 cfs @ 12.10 hrs, Volume= 0.097 af, Atten= 0%, Lag= 0.4 min
Primary = 1.32 cfs @ 12.10 hrs, Volume= 0.097 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 184.55' @ 12.10 hrs Surf.Area= 107 sf Storage= 34 cf
Flood Elev= 187.50' Surf.Area= 1,781 sf Storage= 2,025 cf

Plug-Flow detention time= 0.8 min calculated for 0.097 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (804.5 - 803.9)

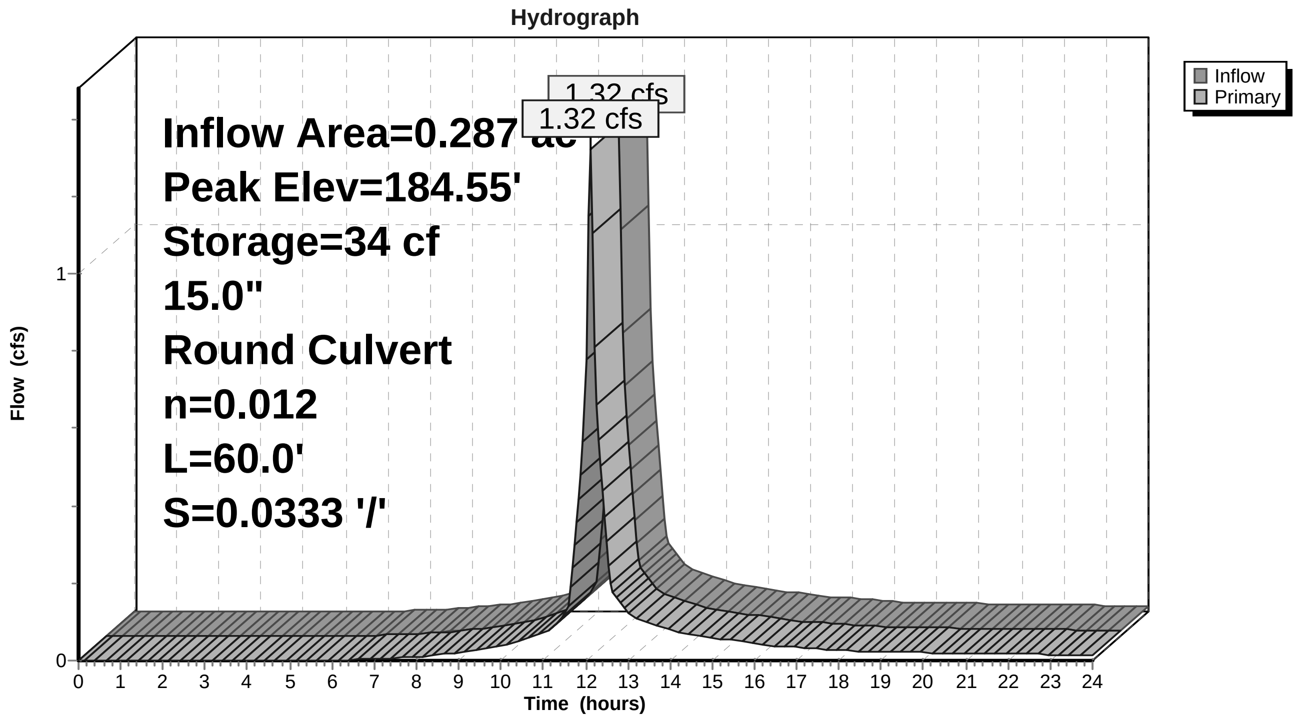
Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	3,126 cf	**Open Water Storage (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.00	26	45.2	0	0	26
185.00	213	77.7	104	104	350
186.00	592	109.9	387	491	840
187.00	1,083	135.4	825	1,316	1,352
188.00	2,652	200.1	1,810	3,126	3,088

Device	Routing	Invert	Outlet Devices
#1	Primary	184.00'	**15.0" Round 15" HDPE N-12** L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 184.00' / 182.00' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.31 cfs @ 12.10 hrs HW=184.55' TW=179.69' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Inlet Controls 1.31 cfs @ 2.52 fps)

Pond 105P: Center of Cul-de-sac Pond #105



Summary for Pond 106P: Infiltration Pond #106

Inflow Area = 9.319 ac, 14.37% Impervious, Inflow Depth > 1.50" for 25Yr-24Hr event
Inflow = 4.79 cfs @ 12.33 hrs, Volume= 1.168 af
Outflow = 2.36 cfs @ 12.82 hrs, Volume= 0.958 af, Atten= 51%, Lag= 29.4 min
Discarded = 0.13 cfs @ 11.70 hrs, Volume= 0.157 af
Primary = 2.24 cfs @ 12.82 hrs, Volume= 0.801 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 186.85' @ 12.82 hrs Surf.Area= 1,828 sf Storage= 9,398 cf
Flood Elev= 188.00' Surf.Area= 1,828 sf Storage= 15,106 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 52.9 min (1,032.1 - 979.2)

Volume	Invert	Avail.Storage	Storage Description
#1	183.25'	91 cf	**Loam Layer (Irregular)**Listed below (Recalc) 457 cf Overall x 20.0% Voids
#2	183.50'	15,015 cf	**Open Water Storage (Irregular)**Listed below (Recalc) -Impervious
		15,106 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
183.25	1,828	197.0	0	0	1,828
183.50	1,828	197.0	457	457	1,877

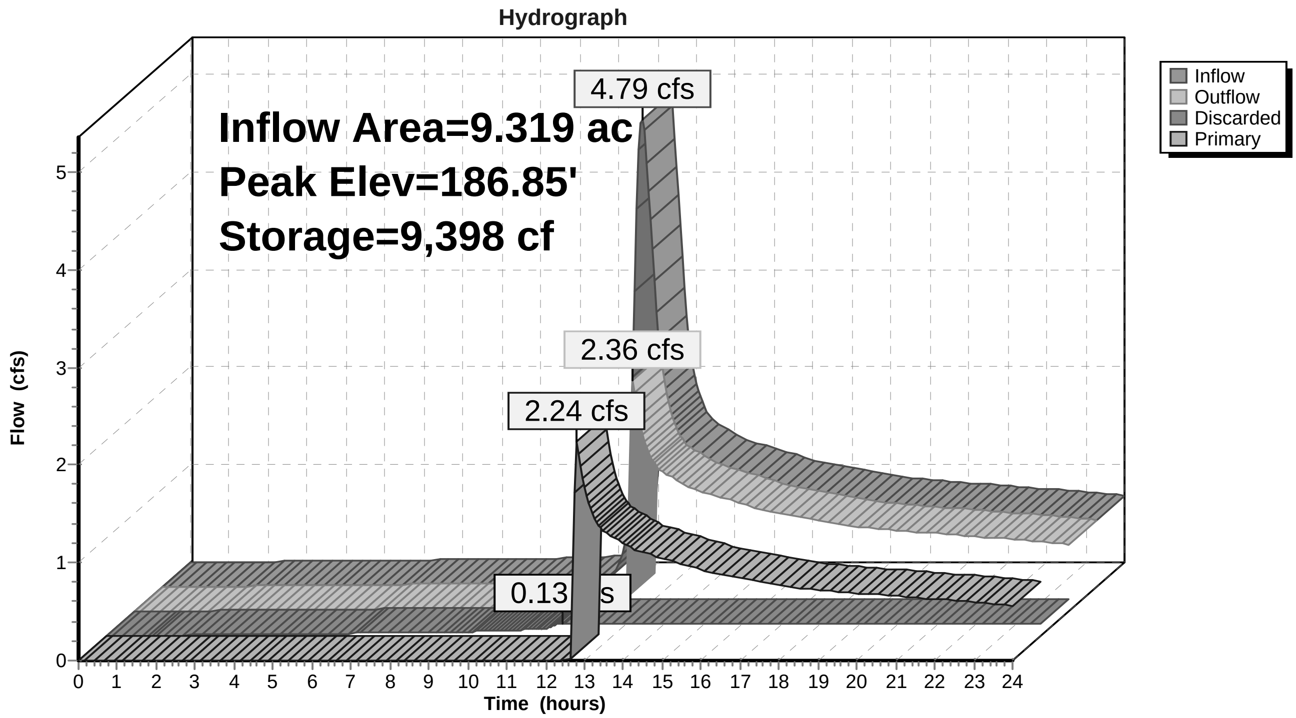
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
183.50	1,828	197.0	0	0	1,828
184.00	2,028	203.0	964	964	2,044
185.00	2,449	216.4	2,235	3,199	2,538
186.00	3,365	246.5	2,895	6,094	3,670
187.00	4,426	279.1	3,883	9,977	5,059
188.00	5,675	316.1	5,038	15,015	6,836

Device	Routing	Invert	Outlet Devices
#1	Discarded	183.25'	**3.000 in/hr Exfiltration (Soil 313) over Surface area**
#2	Primary	186.75'	**30.0' long x 11.0' breadth E-Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

Discarded OutFlow Max=0.13 cfs @ 11.70 hrs HW=183.30' (Free Discharge)
└─**1=Exfiltration (Soil 313)** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=2.17 cfs @ 12.82 hrs HW=186.84' TW=182.16' (Dynamic Tailwater)
└─**2=E-Spillway** (Weir Controls 2.17 cfs @ 0.77 fps)

Pond 106P: Infiltration Pond #106



Summary for Pond 107P: Rain Garden #107

Inflow Area = 1.295 ac, 18.49% Impervious, Inflow Depth > 3.40" for 25Yr-24Hr event
Inflow = 3.24 cfs @ 12.17 hrs, Volume= 0.367 af
Outflow = 0.58 cfs @ 13.33 hrs, Volume= 0.319 af, Atten= 82%, Lag= 69.7 min
Primary = 0.45 cfs @ 13.33 hrs, Volume= 0.198 af
Secondary = 0.12 cfs @ 13.33 hrs, Volume= 0.121 af
Tertiary = 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 / 3
Peak Elev= 240.83' @ 13.33 hrs Surf.Area= 6,879 sf Storage= 6,394 cf
Flood Elev= 244.00' Surf.Area= 7,350 sf Storage= 26,385 cf

Plug-Flow detention time= 173.1 min calculated for 0.319 af (87% of inflow)
Center-of-Mass det. time= 116.6 min (951.0 - 834.4)

Volume	Invert	Avail.Storage	Storage Description
#1	244.00'	990 cf	**Forebay (Irregular)** Listed below (Recalc)
#2	236.50'	917 cf	**Stone (Irregular)** Listed below (Recalc) 2,293 cf Overall x 40.0% Voids
#3	237.50'	688 cf	**BioMedia (Irregular)** Listed below (Recalc) 3,440 cf Overall x 20.0% Voids
#4	239.00'	115 cf	**Loam Layer (Irregular)** Listed below (Recalc) 573 cf Overall x 20.0% Voids
#5	239.25'	24,666 cf	**Open Water Storage (Irregular)** Listed below (Recalc) -Impervious
		27,376 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
244.00	471	107.0	0	0	471
245.00	500	112.0	485	485	611
246.00	510	115.0	505	990	737

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
236.50	2,293	170.0	0	0	2,293
237.50	2,293	170.0	2,293	2,293	2,463

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
237.50	2,293	170.0	0	0	2,293
239.00	2,293	170.0	3,440	3,440	2,548

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
239.00	2,293	170.0	0	0	2,293
239.25	2,293	170.0	573	573	2,336

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
239.25	2,293	170.0	0	0	2,293
240.00	2,834	189.0	1,919	1,919	2,852
242.00	5,436	328.0	8,130	10,049	8,594
244.00	9,357	405.0	14,617	24,666	13,145

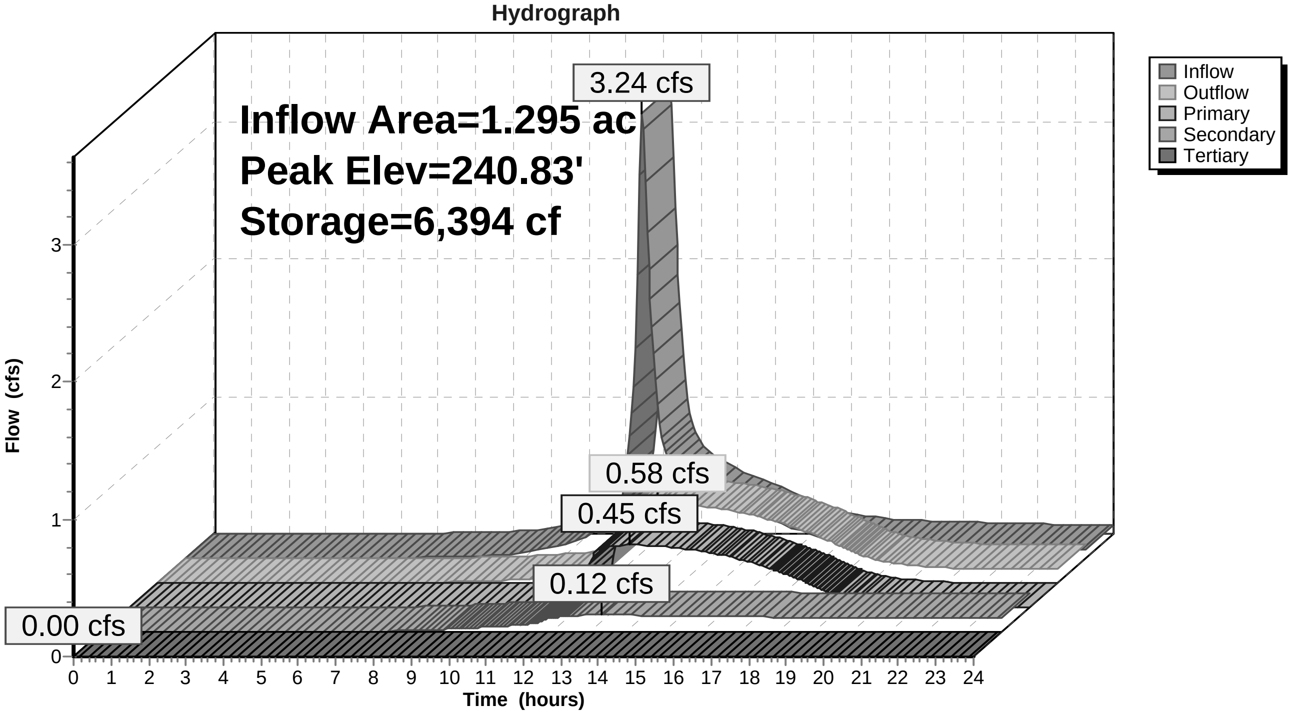
Device	Routing	Invert	Outlet Devices
#1	Primary	236.50'	**15.0" Round 15" HDPE N-12** L= 28.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 236.50' / 236.25' S= 0.0089 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	236.50'	**6.0" Round 6" U.D.** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 236.50' / 236.50' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#3	Device 2	236.50'	**1.5" Vert. 1.5" Orifice End Cap** C= 0.600
#4	Device 3	236.50'	**8.000 in/hr Exfiltration over Surface area**
#5	Device 1	239.50'	**4.0" Vert. 4" Orifice** C= 0.600
#6	Device 1	243.00'	**48.0" Horiz. 4' Grate** C= 0.600 Limited to weir flow at low heads
#7	Tertiary	243.50'	**20.0' 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=0.45 cfs @ 13.33 hrs HW=240.83' TW=236.15' (Dynamic Tailwater)
- **1=15" HDPE N-12** (Passes 0.45 cfs of 11.38 cfs potential flow)
  - **5=4" Orifice** (Orifice Controls 0.45 cfs @ 5.20 fps)
  - **6=4' Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.12 cfs @ 13.33 hrs HW=240.83' TW=236.15' (Dynamic Tailwater)
- **2=6" U.D.** (Passes 0.12 cfs of 1.91 cfs potential flow)
  - **3=1.5" Orifice End Cap** (Orifice Controls 0.12 cfs @ 9.95 fps)
    - **4=Exfiltration** (Passes 0.12 cfs of 1.27 cfs potential flow)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=236.50' TW=236.00' (Dynamic Tailwater)
- **7=E-Spillway** (Controls 0.00 cfs)

Pond 107P: Rain Garden #107



Summary for Pond 108P: Gravel Wetland #108

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=21)

Inflow Area =	1.471 ac,	14.18% Impervious,	Inflow Depth > 2.54"	for 25Yr-24Hr event	
Inflow =	2.60 cfs @	12.34 hrs,	Volume=	0.311 af	
Outflow =	1.64 cfs @	12.48 hrs,	Volume=	0.201 af,	Atten= 37%, Lag= 8.3 min
Primary =	0.02 cfs @	12.26 hrs,	Volume=	0.005 af	
Secondary =	1.47 cfs @	12.48 hrs,	Volume=	0.202 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 185.10' @ 12.85 hrs Surf.Area= 7,863 sf Storage= 5,154 cf
Flood Elev= 185.50' Surf.Area= 8,518 sf Storage= 7,043 cf

Plug-Flow detention time= 176.1 min calculated for 0.201 af (65% of inflow)
Center-of-Mass det. time= 71.2 min (926.5 - 855.2)

Volume	Invert	Avail.Storage	Storage Description
#1	183.50'	869 cf	**Forebay (Irregular)** Listed below (Recalc)
#2	183.50'	1,076 cf	**Cell #1 (Irregular)** Listed below (Recalc)
#3	183.50'	1,097 cf	**Cell #2 (Irregular)** Listed below (Recalc)
#4	184.50'	6,712 cf	**Open Water Storage (Irregular)** Listed below (Recalc)
#5	183.17'	6 cf	**2.00'D x 1.83'H 4' Structure**
		9,759 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
183.50	287	76.3	0	0	287
184.00	458	91.8	185	185	499
185.00	939	259.1	684	869	5,173

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
183.50	886	113.9	0	0	886
184.00	1,073	125.1	489	489	1,107
184.50	1,277	136.4	587	1,076	1,351

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
183.50	905	114.7	0	0	905
184.00	1,094	125.8	499	499	1,126
184.50	1,299	136.9	598	1,097	1,367

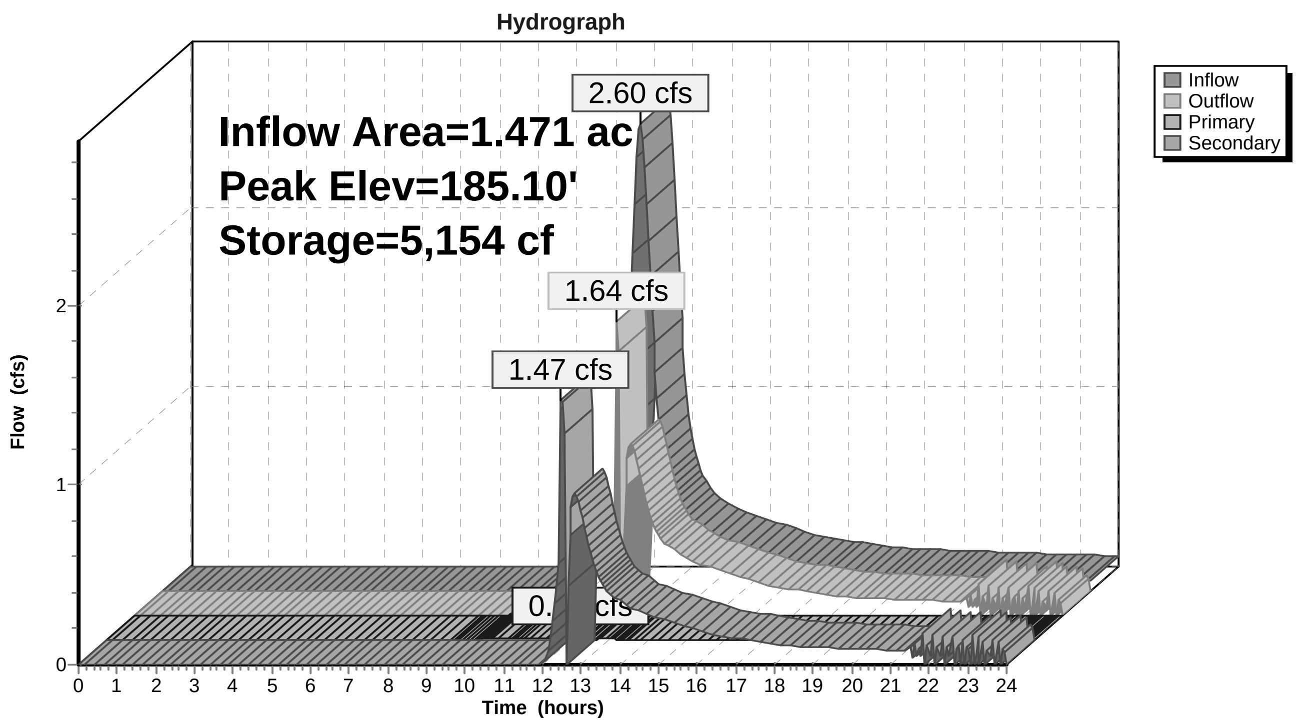
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.50	2,662	217.0	0	0	2,662
185.00	4,197	273.8	1,700	1,700	4,884
186.00	5,873	369.2	5,012	6,712	9,776

Device	Routing	Invert	Outlet Devices
#1	Primary	183.17'	**12.0" Round 12" HDPE** L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 183.17' / 183.00' S= 0.0049 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Secondary	183.25'	**12.0" Round 12" HDPE N-12** L= 47.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 183.25' / 183.00' S= 0.0053 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Device 1	183.17'	**1.0" Vert. 1.0" Orifice** C= 0.600
#4	Device 2	184.00'	**3.0" W x 9.0" H Vert. 3"Wx9"T Slot** C= 0.600
#5	Device 2	184.75'	**60.0" Horiz. 5' Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.02 cfs @ 12.26 hrs HW=184.48' TW=183.79' (Dynamic Tailwater)
└─**1=12" HDPE** (Passes 0.02 cfs of 2.90 cfs potential flow)
  └─**3=1.0" Orifice** (Orifice Controls 0.02 cfs @ 4.00 fps)

Secondary OutFlow Max=1.63 cfs @ 12.48 hrs HW=184.84' TW=184.65' (Dynamic Tailwater)
└─**2=12" HDPE N-12** (Inlet Controls 1.63 cfs @ 2.07 fps)
  ├─**4=3"Wx9"T Slot** (Passes < 0.38 cfs potential flow)
  └─**5=5' Grate** (Passes < 1.39 cfs potential flow)

Pond 108P: Gravel Wetland #108



Summary for Pond 109P: Level Spreader

[80] Warning: Exceeded Pond 108P by 0.11' @ 12.55 hrs (0.01 cfs 0.000 af)
[80] Warning: Exceeded Pond 108P by 0.11' @ 12.55 hrs (1.23 cfs 0.024 af)

Inflow Area = 1.471 ac, 14.18% Impervious, Inflow Depth > 1.68" for 25Yr-24Hr event
Inflow = 1.48 cfs @ 12.48 hrs, Volume= 0.207 af
Outflow = 0.95 cfs @ 12.90 hrs, Volume= 0.181 af, Atten= 36%, Lag= 25.1 min
Primary = 0.95 cfs @ 12.90 hrs, Volume= 0.182 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 185.03' @ 12.90 hrs Surf.Area= 1,035 sf Storage= 1,130 cf

Plug-Flow detention time= 80.0 min calculated for 0.181 af (88% of inflow)
Center-of-Mass det. time= 26.8 min (948.8 - 922.0)

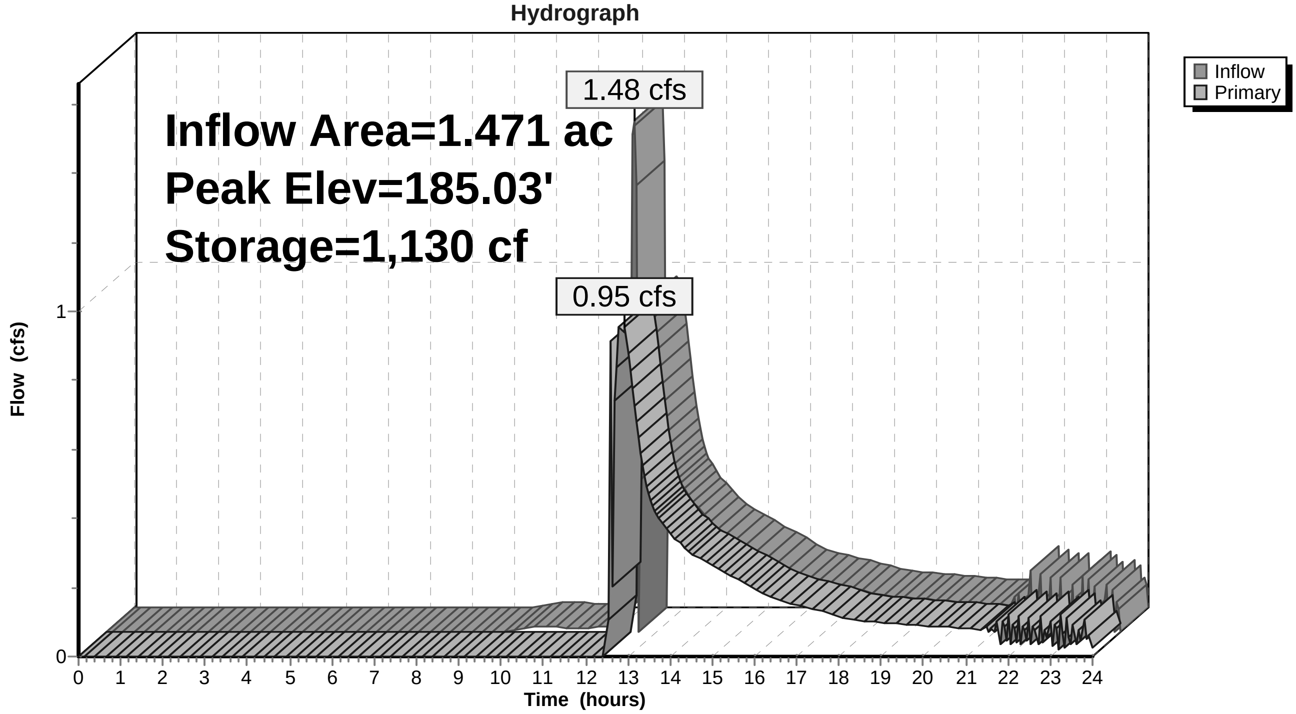
Volume	Invert	Avail.Storage	Storage Description
#1	183.00'	1,615 cf	**Open Water Storage (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
183.00	128	130.0	0	0	128
184.00	553	151.0	316	316	618
185.00	1,035	170.0	782	1,097	1,129
185.50	1,035	170.0	518	1,615	1,214

Device	Routing	Invert	Outlet Devices
#1	Primary	185.00'	**65.0' long x 2.0' breadth Level Lip** 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.95 cfs @ 12.90 hrs HW=185.03' TW=183.12' (Dynamic Tailwater)
└─**1=Level Lip** (Weir Controls 0.95 cfs @ 0.46 fps)

Pond 109P: Level Spreader



Summary for Pond C01P: Catch Basin #1

Inflow Area = 0.078 ac,100.00% Impervious, Inflow Depth > 5.62" for 25Yr-24Hr event
Inflow = 0.43 cfs @ 12.09 hrs, Volume= 0.036 af
Outflow = 0.44 cfs @ 12.09 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.2 min
Primary = 0.44 cfs @ 12.09 hrs, Volume= 0.036 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 214.70' @ 12.09 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 219.55' Surf.Area= 0.000 ac Storage= 0.002 af

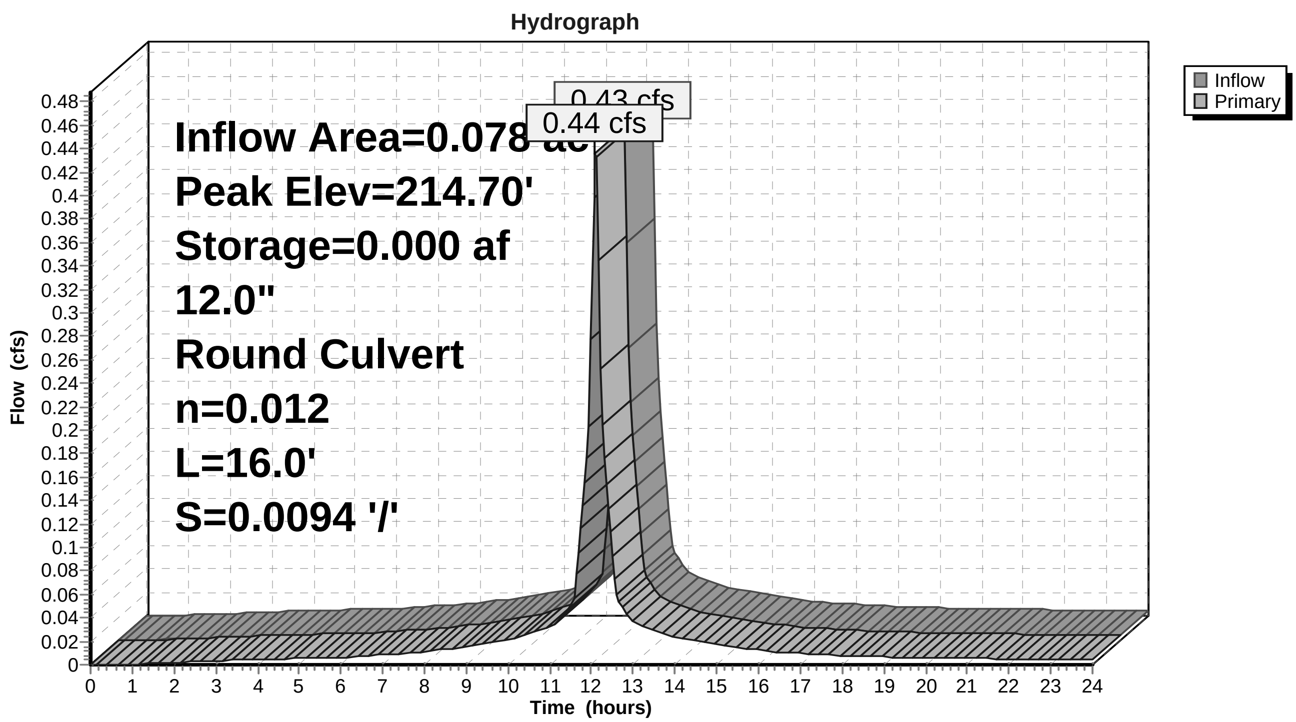
Plug-Flow detention time= 0.6 min calculated for 0.036 af (100% of inflow)
Center-of-Mass det. time= 0.5 min (745.5 - 745.1)

Volume	Invert	Avail.Storage	Storage Description
#1	214.30'	0.002 af	**4.00'D x 5.25'H 4' Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	214.30'	**12.0" Round 12" HDPE N-12** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.30' / 214.15' S= 0.0094 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.42 cfs @ 12.09 hrs HW=214.69' TW=214.52' (Dynamic Tailwater)
└─**1=12" HDPE N-12** (Outlet Controls 0.42 cfs @ 2.22 fps)

Pond C01P: Catch Basin #1



Summary for Pond C02P: Catch Basin #2

Inflow Area = 0.155 ac,100.00% Impervious, Inflow Depth > 5.62" for 25Yr-24Hr event
Inflow = 0.87 cfs @ 12.09 hrs, Volume= 0.072 af
Outflow = 0.87 cfs @ 12.09 hrs, Volume= 0.072 af, Atten= 0%, Lag= 0.1 min
Primary = 0.87 cfs @ 12.09 hrs, Volume= 0.072 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 214.53' @ 12.09 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 219.55' Surf.Area= 0.000 ac Storage= 0.002 af

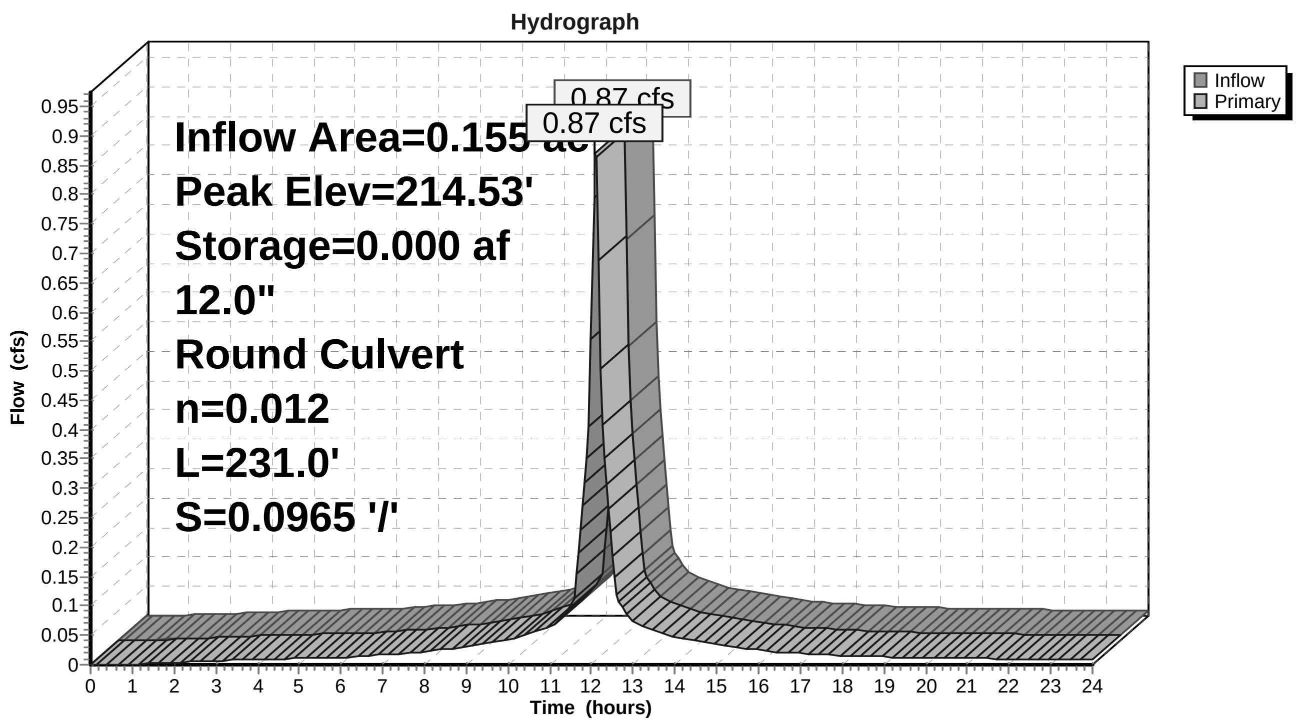
Plug-Flow detention time= 0.4 min calculated for 0.072 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (745.6 - 745.3)

Volume	Invert	Avail.Storage	Storage Description
#1	214.05'	0.002 af	**4.00'D x 5.50'H 4' Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	214.05'	**12.0" Round 12" HDPE N-12** L= 231.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.05' / 191.77' S= 0.0965 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.85 cfs @ 12.09 hrs HW=214.52' TW=192.14' (Dynamic Tailwater)
└─**1=12" HDPE N-12** (Inlet Controls 0.85 cfs @ 2.34 fps)

Pond C02P: Catch Basin #2



Summary for Pond C03P: Catch Basin #3

[80] Warning: Exceeded Pond 32P by 0.11' @ 16.55 hrs (2.78 cfs 0.476 af)

Inflow Area = 2.900 ac, 20.75% Impervious, Inflow Depth > 2.69" for 25Yr-24Hr event
Inflow = 8.43 cfs @ 12.18 hrs, Volume= 0.650 af
Outflow = 8.42 cfs @ 12.18 hrs, Volume= 0.649 af, Atten= 0%, Lag= 0.1 min
Primary = 8.42 cfs @ 12.18 hrs, Volume= 0.649 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 188.93' @ 16.56 hrs Surf.Area= 0.000 ac Storage= 0.001 af
Flood Elev= 191.75' Surf.Area= 0.000 ac Storage= 0.002 af

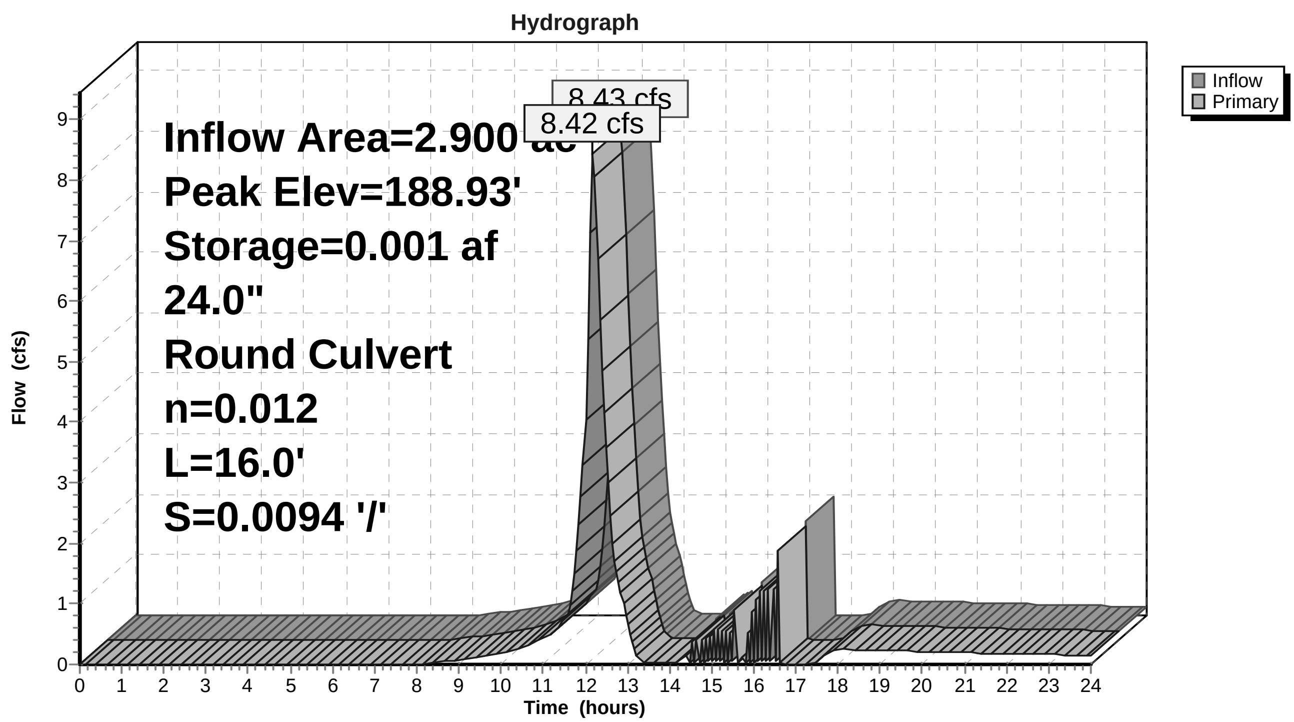
Plug-Flow detention time= 1.2 min calculated for 0.649 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (826.7 - 826.5)

Volume	Invert	Avail.Storage	Storage Description
#1	185.50'	0.002 af	**4.00'D x 6.25'H 4' Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	185.50'	**24.0" Round 24" HDPE N-12** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 185.50' / 185.35' S= 0.0094 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=8.36 cfs @ 12.18 hrs HW=188.05' TW=187.74' (Dynamic Tailwater)
└─**1=24" HDPE N-12** (Inlet Controls 8.36 cfs @ 2.66 fps)

Pond C03P: Catch Basin #3



Summary for Pond C04P: Catch Basin #4

[80] Warning: Exceeded Pond C03P by 0.04' @ 16.90 hrs (3.02 cfs 0.352 af)

Inflow Area = 3.137 ac, 26.73% Impervious, Inflow Depth > 2.91" for 25Yr-24Hr event
Inflow = 9.39 cfs @ 12.17 hrs, Volume= 0.760 af
Outflow = 9.37 cfs @ 12.17 hrs, Volume= 0.759 af, Atten= 0%, Lag= 0.0 min
Primary = 9.37 cfs @ 12.17 hrs, Volume= 0.759 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 188.92' @ 16.56 hrs Surf.Area= 0.000 ac Storage= 0.001 af
Flood Elev= 191.75' Surf.Area= 0.000 ac Storage= 0.002 af

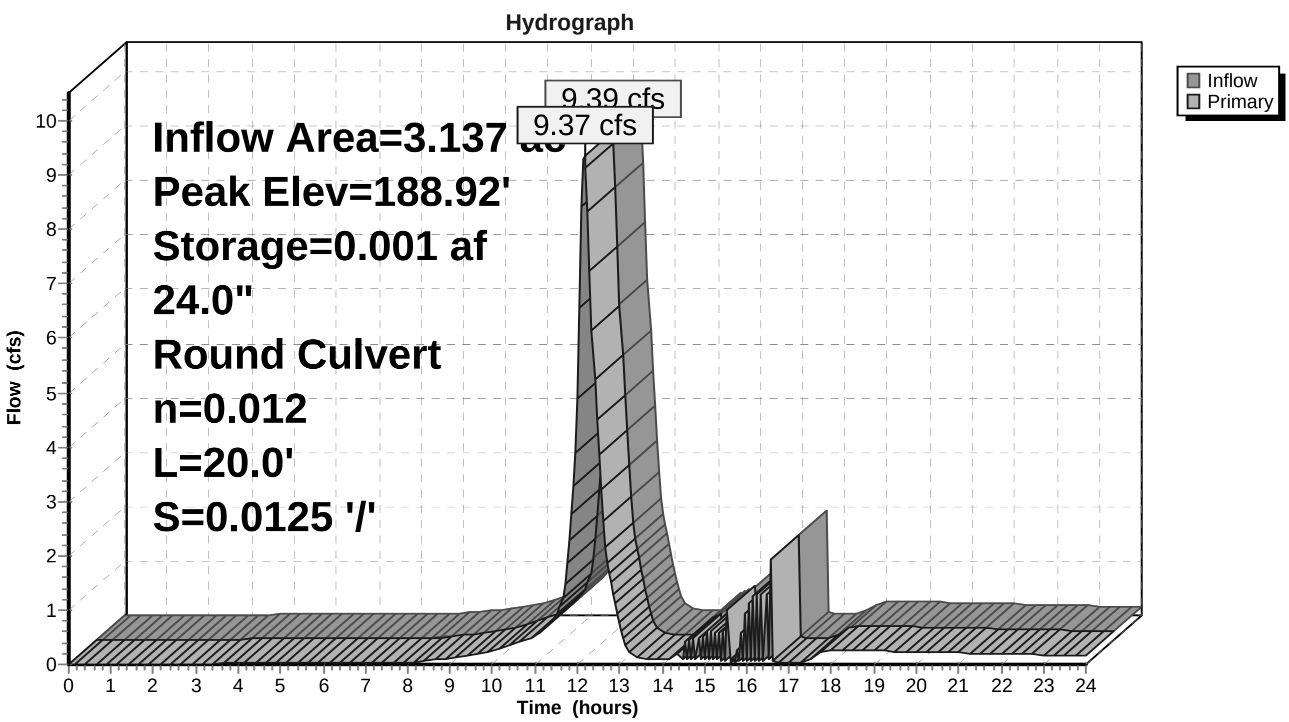
Plug-Flow detention time= 1.0 min calculated for 0.758 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (815.2 - 814.9)

Volume	Invert	Avail.Storage	Storage Description
#1	185.25'	0.002 af	**4.00'D x 6.50'H 4' Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	185.25'	**24.0" Round 24" HDPE N-12** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 185.25' / 185.00' S= 0.0125 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=9.25 cfs @ 12.17 hrs HW=187.67' TW=187.29' (Dynamic Tailwater)
└1=24" HDPE N-12 (Inlet Controls 9.25 cfs @ 2.95 fps)

Pond C04P: Catch Basin #4



Summary for Pond C05P: Rain Guardian #1

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=14)

Inflow Area = 0.056 ac,100.00% Impervious, Inflow Depth > 5.62" for 25Yr-24Hr event
Inflow = 0.31 cfs @ 12.09 hrs, Volume= 0.026 af
Outflow = 0.31 cfs @ 12.09 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.1 min
Primary = 0.31 cfs @ 12.09 hrs, Volume= 0.026 af

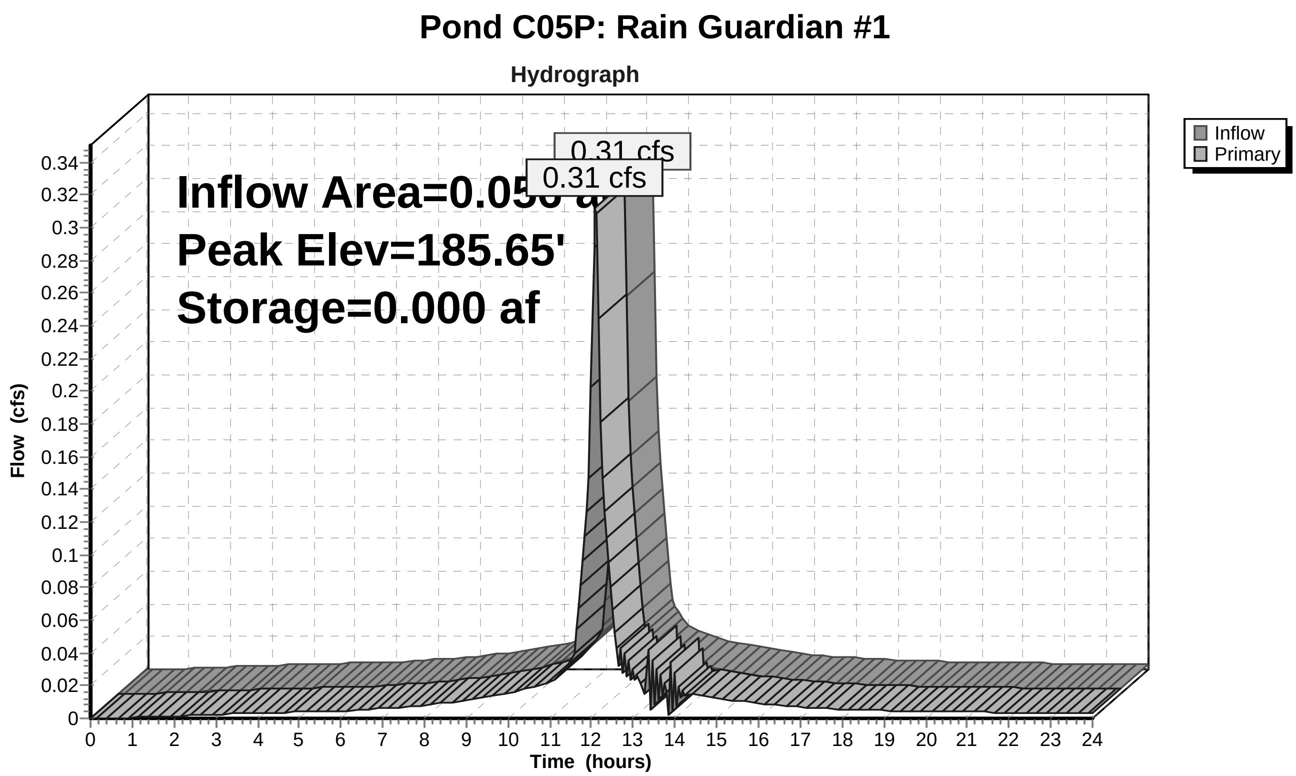
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 185.65' @ 12.12 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 191.75' Surf.Area= 0.000 ac Storage= 0.000 af

Plug-Flow detention time= 6.3 min calculated for 0.026 af (99% of inflow)
Center-of-Mass det. time= 0.3 min (745.4 - 745.1)

Volume	Invert	Avail.Storage	Storage Description
#1	185.10'	0.000 af	**4.00'D x 0.87'H Rain Guardian**

Device	Routing	Invert	Outlet Devices
#1	Primary	185.10'	**36.0" W x 10.5" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.30 cfs @ 12.09 hrs HW=185.64' TW=185.64' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Orifice Controls 0.30 cfs @ 0.19 fps)



Summary for Pond D01P: Drain Manhole #1

Inflow Area = 0.155 ac,100.00% Impervious, Inflow Depth > 5.62" for 25Yr-24Hr event
Inflow = 0.87 cfs @ 12.09 hrs, Volume= 0.072 af
Outflow = 0.87 cfs @ 12.09 hrs, Volume= 0.072 af, Atten= 0%, Lag= 0.1 min
Primary = 0.87 cfs @ 12.09 hrs, Volume= 0.072 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 192.15' @ 12.09 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 196.67' Surf.Area= 0.000 ac Storage= 0.001 af

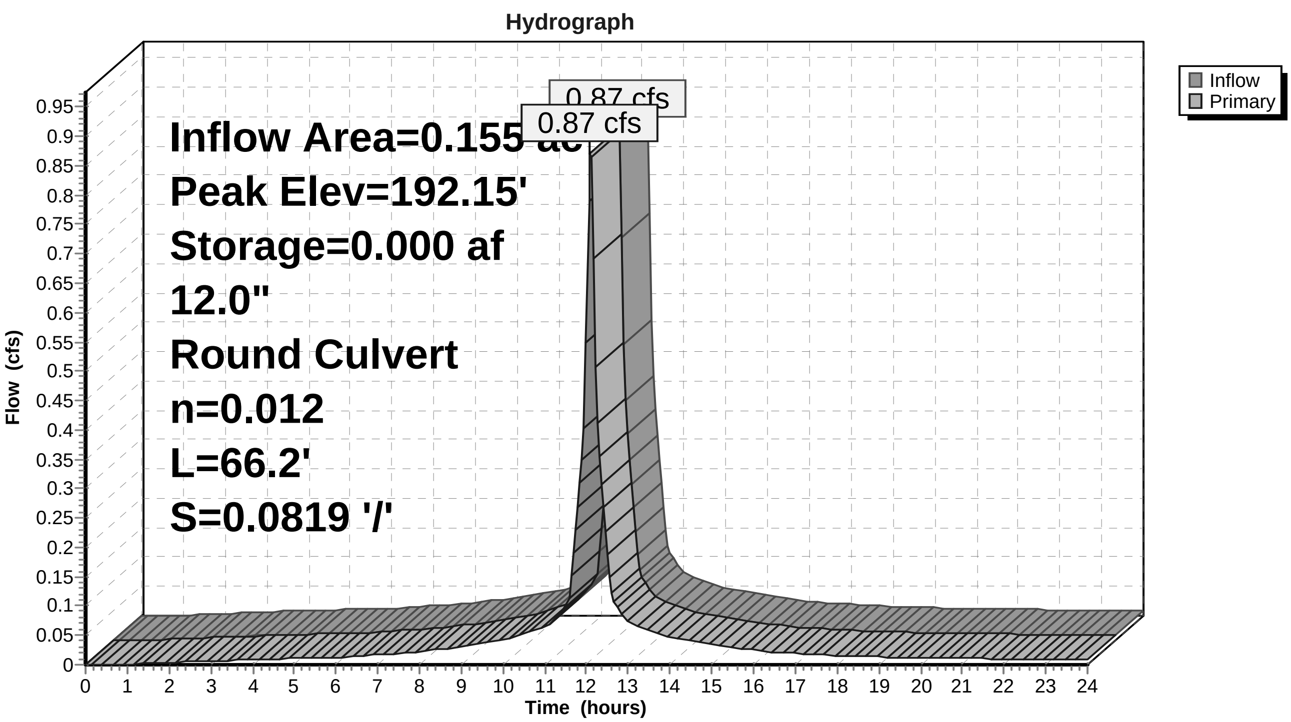
Plug-Flow detention time= 0.4 min calculated for 0.072 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (745.9 - 745.6)

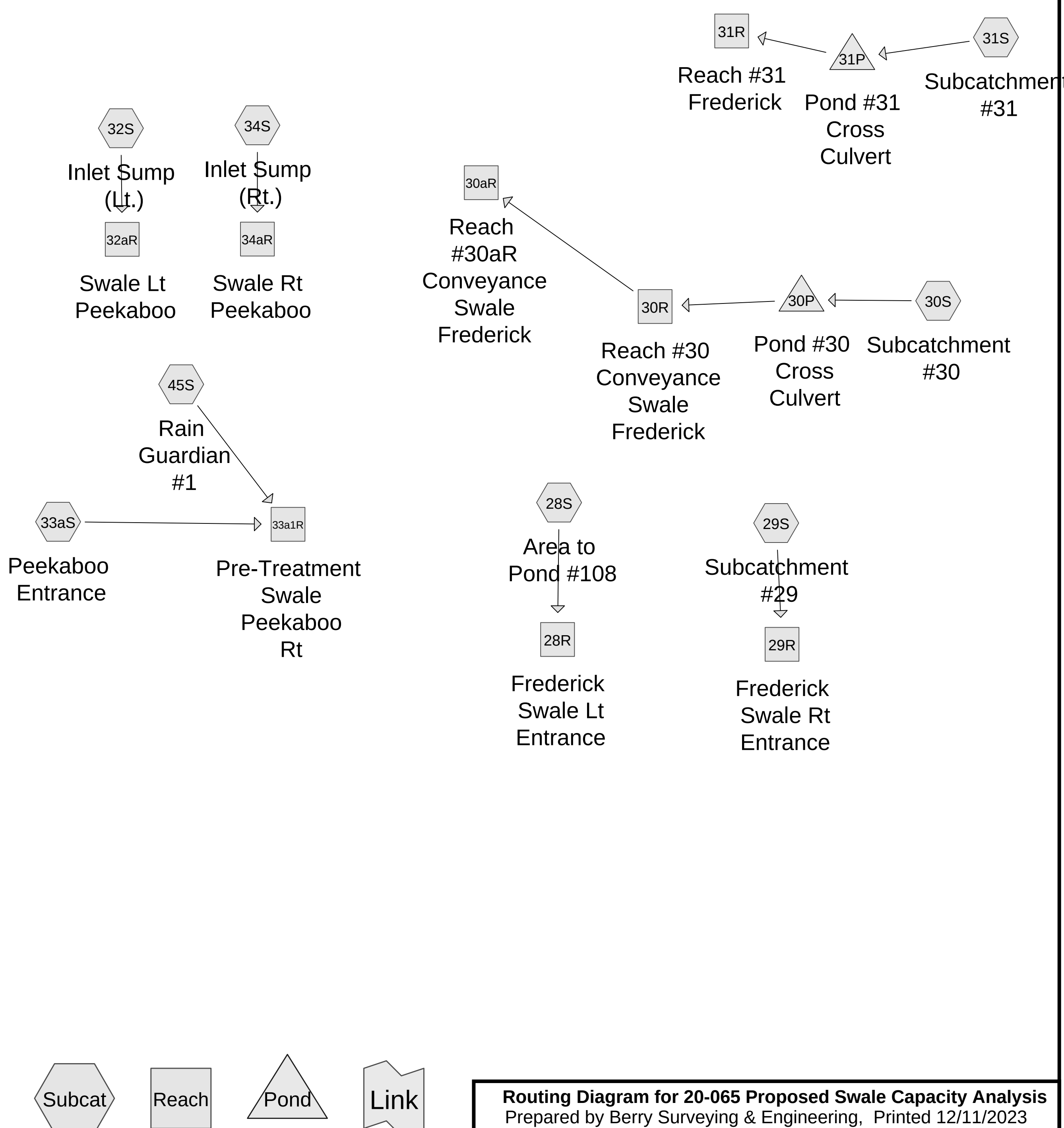
Volume	Invert	Avail.Storage	Storage Description
#1	191.67'	0.001 af	**4.00'D x 5.00'H 4' Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	191.67'	**12.0" Round 12" HDPE N-12** L= 66.2' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 191.67' / 186.25' S= 0.0819 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.85 cfs @ 12.09 hrs HW=192.14' TW=187.15' (Dynamic Tailwater)
└─**1=12" HDPE N-12** (Inlet Controls 0.85 cfs @ 2.34 fps)

Pond D01P: Drain Manhole #1





Routing Diagram for 20-065 Proposed Swale Capacity Analysis
Prepared by Berry Surveying & Engineering, Printed 12/11/2023
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.251	39	>75% Grass cover, Good, HSG A (30S, 31S, 32S, 33aS, 34S)
1.132	61	>75% Grass cover, Good, HSG B (28S, 29S, 30S, 31S, 32S, 33aS)
1.892	74	>75% Grass cover, Good, HSG C (28S, 30S, 32S, 34S)
0.010	96	Gravel surface, HSG A (31S, 32S, 33aS)
0.036	96	Gravel surface, HSG B (28S, 29S, 30S, 31S, 33aS)
0.022	96	Gravel surface, HSG C (28S, 30S, 32S, 34S)
0.976	71	Meadow, non-grazed, HSG C (32S)
0.151	98	Paved parking, HSG A (30S, 31S, 32S, 33aS, 45S)
0.312	98	Paved parking, HSG B (28S, 29S, 30S, 31S, 32S, 33aS)
0.500	98	Paved parking, HSG C (28S, 30S, 32S, 34S)
0.048	98	Roofs, HSG B (28S, 32S)
0.190	98	Roofs, HSG C (32S, 34S)
0.530	55	Woods, Good, HSG B (28S, 29S, 30S, 32S)
0.491	70	Woods, Good, HSG C (28S, 30S, 32S, 34S)
6.540	**73**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.412	HSG A	30S, 31S, 32S, 33aS, 34S, 45S
2.058	HSG B	28S, 29S, 30S, 31S, 32S, 33aS
4.071	HSG C	28S, 30S, 32S, 34S
0.000	HSG D	
0.000	Other	
6.540		**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
0.251	1.132	1.892	0.000	0.000	3.275	>75% Grass cover, Good	28S, 29S, 30S, 31S, 32S, 33aS, 34S
0.010	0.036	0.022	0.000	0.000	0.067	Gravel surface	28S, 29S, 30S, 31S, 32S, 33aS, 34S
0.000	0.000	0.976	0.000	0.000	0.976	Meadow, non-grazed	32S
0.151	0.312	0.500	0.000	0.000	0.963	Paved parking	28S, 29S, 30S, 31S, 32S, 33aS, 34S, 45S
0.000	0.048	0.190	0.000	0.000	0.238	Roofs	28S, 32S, 34S
0.000	0.530	0.491	0.000	0.000	1.021	Woods, Good	28S, 29S, 30S, 32S, 34S
0.412	**2.058**	**4.071**	**0.000**	**0.000**	**6.540**	**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	30P	191.25	191.00	40.0	0.0063	0.012	15.0	0.0	0.0
2	31P	189.00	188.75	43.0	0.0058	0.012	15.0	0.0	0.0

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points x 3
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 28S: Area to Pond #108 Runoff Area=58,076 sf 12.93% Impervious Runoff Depth>3.40"
Flow Length=247' Tc=24.0 min CN=68 Runoff=3.31 cfs 0.378 af

Subcatchment 29S: Subcatchment #29 Runoff Area=6,005 sf 26.21% Impervious Runoff Depth>3.83"
Tc=6.0 min CN=72 Runoff=0.61 cfs 0.044 af

Subcatchment 30S: Subcatchment #30 Runoff Area=40,007 sf 7.55% Impervious Runoff Depth>3.00"
Flow Length=159' Tc=13.1 min CN=64 Runoff=2.52 cfs 0.230 af

Subcatchment 31S: Subcatchment #31 Runoff Area=8,090 sf 30.07% Impervious Runoff Depth>3.01"
Tc=6.0 min CN=64 Runoff=0.64 cfs 0.047 af

Subcatchment 32S: Inlet Sump (Lt.) Runoff Area=122,911 sf 18.55% Impervious Runoff Depth>4.26"
Flow Length=809' Tc=11.6 min CN=76 Runoff=11.65 cfs 1.001 af

Subcatchment 33aS: Peekaboo Entrance Runoff Area=7,232 sf 54.76% Impervious Runoff Depth>4.15"
Tc=6.0 min CN=75 Runoff=0.79 cfs 0.057 af

Subcatchment 34S: Inlet Sump (Rt.) Runoff Area=40,148 sf 21.43% Impervious Runoff Depth>4.59"
Flow Length=594' Tc=8.6 min CN=79 Runoff=4.45 cfs 0.352 af

Subcatchment 45S: Rain Guardian #1 Runoff Area=2,431 sf 100.00% Impervious Runoff Depth>6.77"
Tc=6.0 min CN=98 Runoff=0.37 cfs 0.031 af

Reach 28R: Frederick Swale Lt Entrance Avg. Flow Depth=0.25' Max Vel=4.49 fps Inflow=3.31 cfs 0.378 af
n=0.022 L=10.0' S=0.0400 '/' Capacity=256.95 cfs Outflow=3.31 cfs 0.378 af

Reach 29R: Frederick Swale Rt Entrance Avg. Flow Depth=0.10' Max Vel=2.62 fps Inflow=0.61 cfs 0.044 af
n=0.022 L=10.0' S=0.0400 '/' Capacity=256.95 cfs Outflow=0.61 cfs 0.044 af

Reach 30aR: Reach #30aR Conveyance Avg. Flow Depth=0.21' Max Vel=1.54 fps Inflow=1.86 cfs 0.227 af
n=0.045 L=201.0' S=0.0199 '/' Capacity=29.56 cfs Outflow=1.85 cfs 0.226 af

Reach 30R: Reach #30 Conveyance Avg. Flow Depth=0.20' Max Vel=1.07 fps Inflow=1.87 cfs 0.228 af
n=0.045 L=205.0' S=0.0098 '/' Capacity=30.09 cfs Outflow=1.86 cfs 0.227 af

Reach 31R: Reach #31 Frederick Avg. Flow Depth=0.17' Max Vel=1.32 fps Inflow=0.63 cfs 0.046 af
n=0.045 L=158.0' S=0.0222 '/' Capacity=19.07 cfs Outflow=0.60 cfs 0.046 af

Reach 32aR: Swale Lt Peekaboo Avg. Flow Depth=0.63' Max Vel=3.57 fps Inflow=11.65 cfs 1.001 af
n=0.069 L=10.0' S=0.0850 '/' Capacity=352.11 cfs Outflow=11.65 cfs 1.001 af

Reach 33a1R: Pre-Treatment Swale Avg. Flow Depth=0.21' Max Vel=2.06 fps Inflow=1.17 cfs 0.089 af
n=0.022 L=10.0' S=0.0100 '/' Capacity=24.04 cfs Outflow=1.17 cfs 0.089 af

Reach 34aR: Swale Rt Peekaboo Avg. Flow Depth=0.38' Max Vel=2.70 fps Inflow=4.45 cfs 0.352 af
n=0.069 L=10.0' S=0.0850 '/' Capacity=352.11 cfs Outflow=4.45 cfs 0.352 af

Pond 30P: Pond #30 Cross Culvert Peak Elev=192.01' Storage=1,260 cf Inflow=2.52 cfs 0.230 af
15.0" Round Culvert n=0.012 L=40.0' S=0.0063 '/' Outflow=1.87 cfs 0.228 af

Pond 31P: Pond #31 Cross Culvert Peak Elev=189.41' Storage=39 cf Inflow=0.64 cfs 0.047 af
15.0" Round Culvert n=0.012 L=43.0' S=0.0058 '/' Outflow=0.63 cfs 0.046 af

Total Runoff Area = 6.540 ac Runoff Volume = 2.141 af Average Runoff Depth = 3.93"
81.63% Pervious = 5.339 ac 18.37% Impervious = 1.201 ac

Summary for Subcatchment 28S: Area to Pond #108

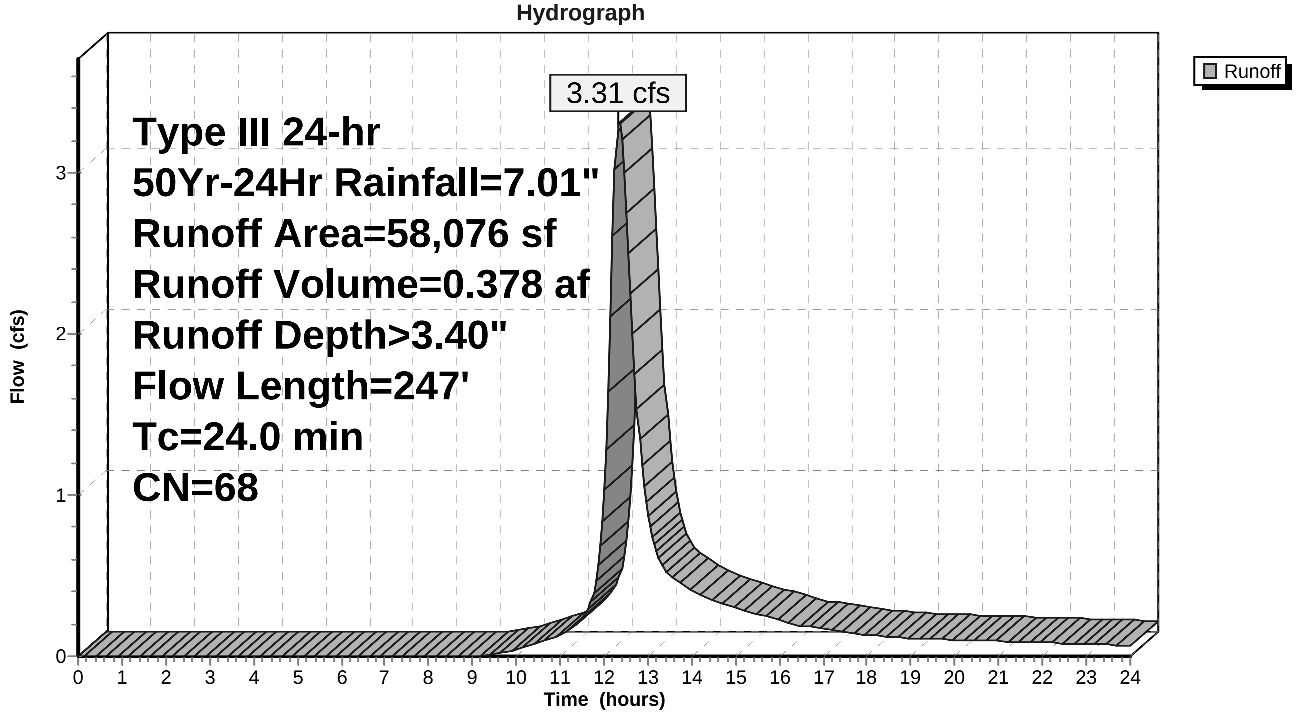
Runoff = 3.31 cfs @ 12.34 hrs, Volume= 0.378 af, Depth> 3.40"

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 50Yr-24Hr Rainfall=7.01"

Area (sf)	CN	Description
1,584	98	Roofs, HSG B
26,908	61	>75% Grass cover, Good, HSG B
5,660	98	Paved parking, HSG B
8,948	55	Woods, Good, HSG B
641	96	Gravel surface, HSG B
4,142	74	>75% Grass cover, Good, HSG C
268	98	Paved parking, HSG C
9,909	70	Woods, Good, HSG C
16	96	Gravel surface, HSG C
58,076	68	Weighted Average
50,564		87.07% Pervious Area
7,512		12.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.0	100	0.0200	0.08		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
1.0	69	0.0508	1.13		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
1.0	78	0.0319	1.25		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
24.0	247	Total			

Subcatchment 28S: Area to Pond #108



Summary for Subcatchment 29S: Subcatchment #29

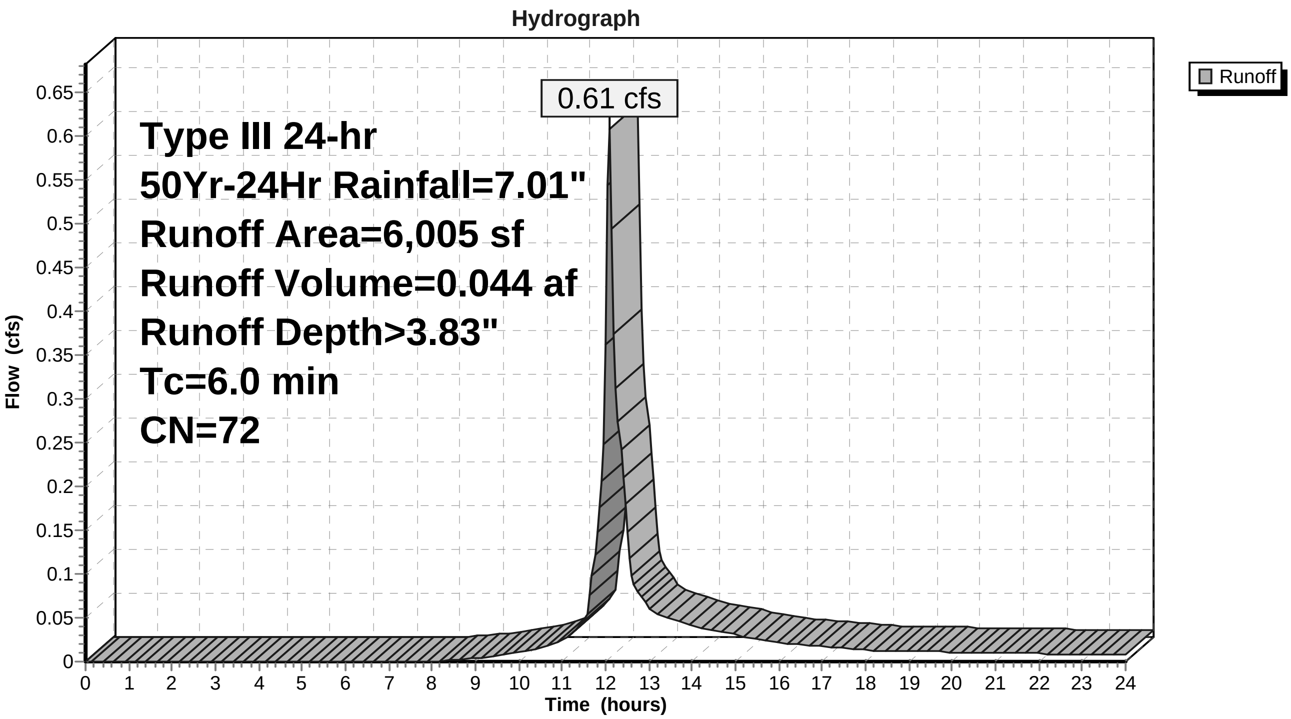
Runoff = 0.61 cfs @ 12.09 hrs, Volume= 0.044 af, Depth> 3.83"

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 50Yr-24Hr Rainfall=7.01"

Area (sf)	CN	Description
3,178	61	>75% Grass cover, Good, HSG B
1,574	98	Paved parking, HSG B
317	96	Gravel surface, HSG B
936	55	Woods, Good, HSG B
6,005	72	Weighted Average
4,431		73.79% Pervious Area
1,574		26.21% Impervious Area

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

Subcatchment 29S: Subcatchment #29



Summary for Subcatchment 30S: Subcatchment #30

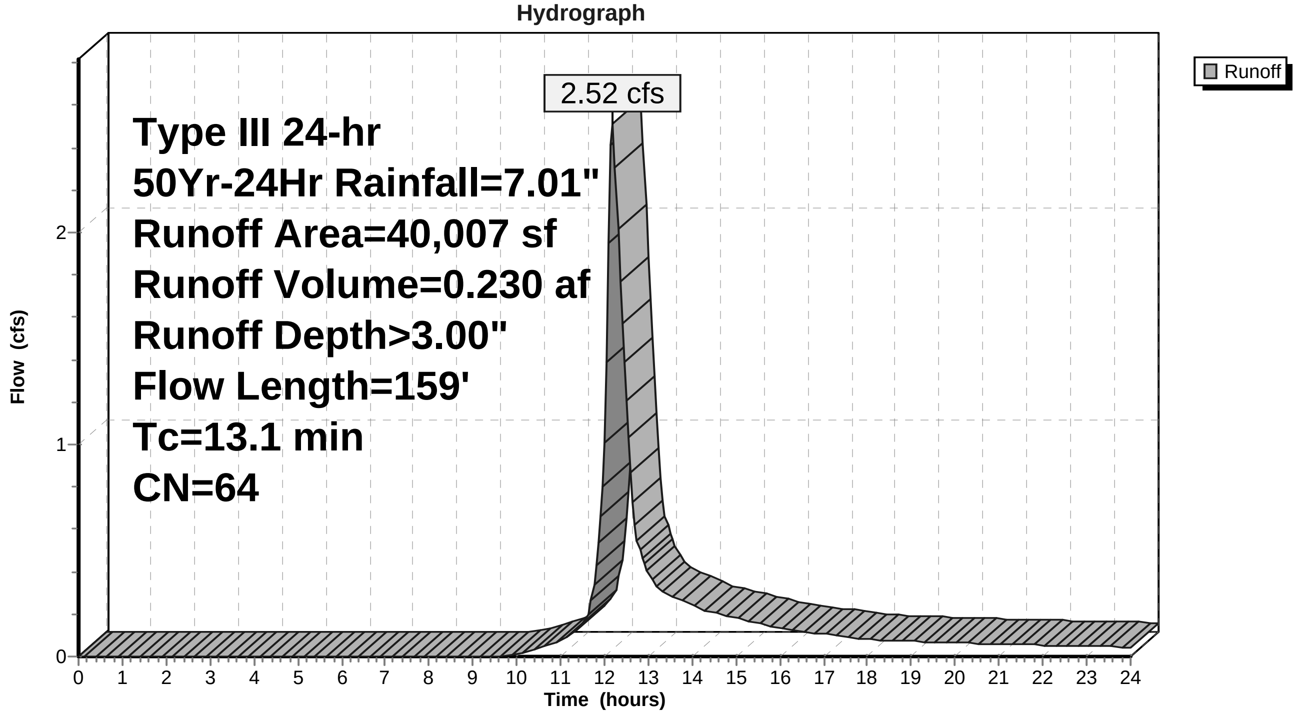
Runoff = 2.52 cfs @ 12.19 hrs, Volume= 0.230 af, Depth> 3.00"

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 50Yr-24Hr Rainfall=7.01"

Area (sf)	CN	Description
3,175	39	>75% Grass cover, Good, HSG A
126	98	Paved parking, HSG A
10,042	61	>75% Grass cover, Good, HSG B
1,715	98	Paved parking, HSG B
11,216	55	Woods, Good, HSG B
322	96	Gravel surface, HSG B
4,652	74	>75% Grass cover, Good, HSG C
1,178	98	Paved parking, HSG C
7,329	70	Woods, Good, HSG C
252	96	Gravel surface, HSG C
40,007	64	Weighted Average
36,988		92.45% Pervious Area
3,019		7.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	100	0.0900	0.14		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.06"
0.7	36	0.0277	0.83		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
0.4	23	0.0216	1.03		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
13.1	159	Total			

Subcatchment 30S: Subcatchment #30



Summary for Subcatchment 31S: Subcatchment #31

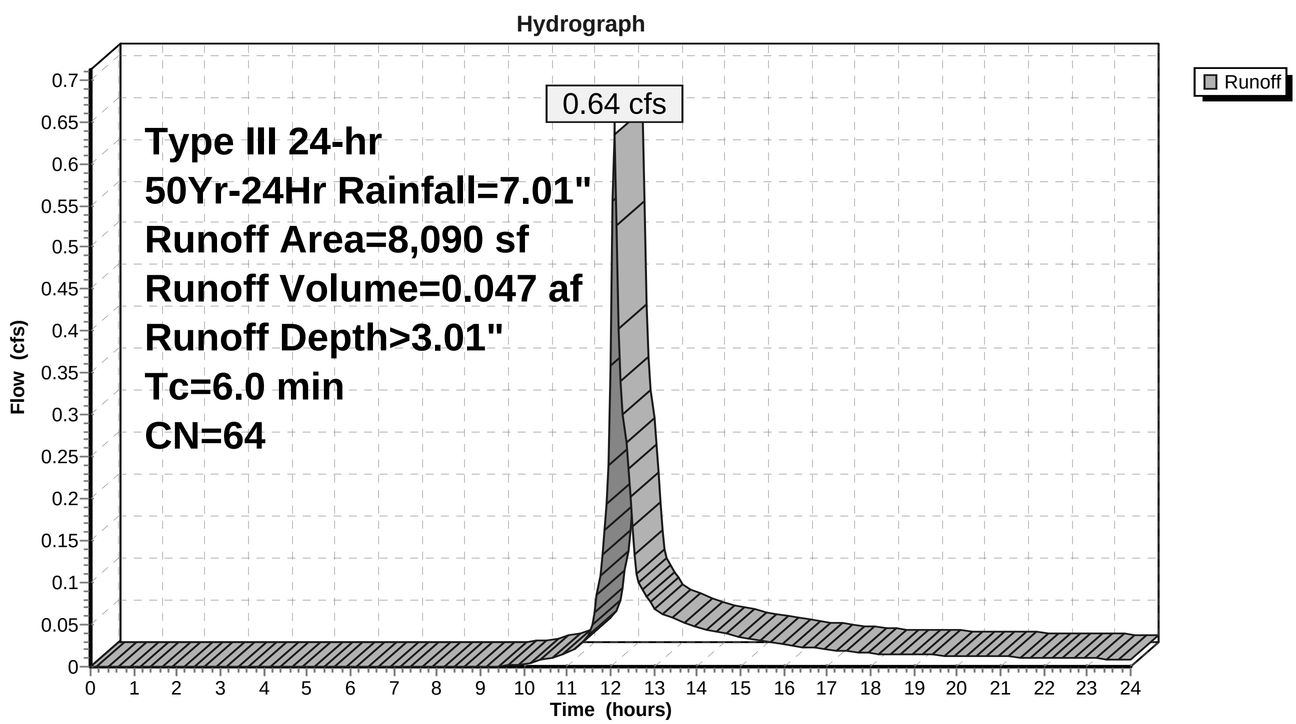
Runoff = 0.64 cfs @ 12.10 hrs, Volume= 0.047 af, Depth> 3.01"

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 50Yr-24Hr Rainfall=7.01"

Area (sf)	CN	Description
3,590	39	>75% Grass cover, Good, HSG A
838	98	Paved parking, HSG A
83	96	Gravel surface, HSG A
1,763	61	>75% Grass cover, Good, HSG B
1,595	98	Paved parking, HSG B
221	96	Gravel surface, HSG B
8,090	64	Weighted Average
5,657		69.93% Pervious Area
2,433		30.07% Impervious Area

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

Subcatchment 31S: Subcatchment #31



Summary for Subcatchment 32S: Inlet Sump (Lt.)

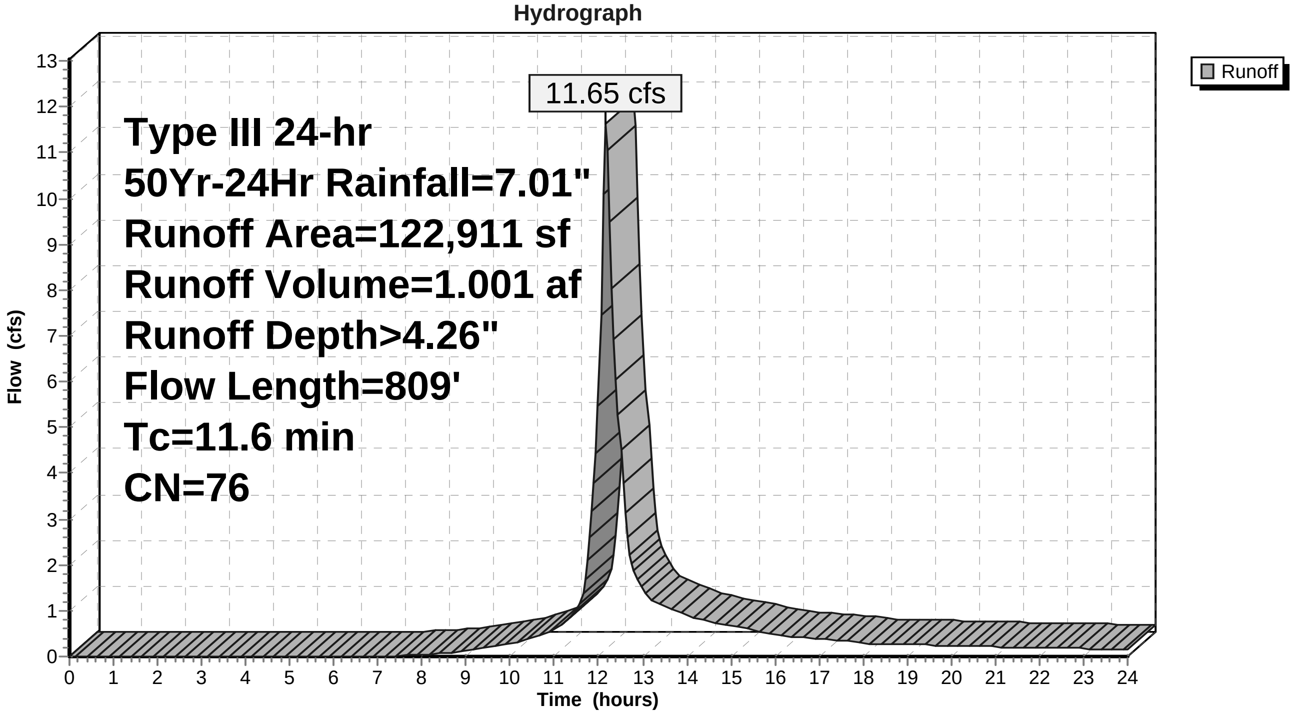
Runoff = 11.65 cfs @ 12.16 hrs, Volume= 1.001 af, Depth> 4.26"

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 50Yr-24Hr Rainfall=7.01"

Area (sf)	CN	Description
1,449	39	>75% Grass cover, Good, HSG A
174	98	Paved parking, HSG A
16	96	Gravel surface, HSG A
7,170	61	>75% Grass cover, Good, HSG B
504	98	Roofs, HSG B
2,102	98	Paved parking, HSG B
1,984	55	Woods, Good, HSG B
6,192	98	Roofs, HSG C
42,536	71	Meadow, non-grazed, HSG C
42,536	74	>75% Grass cover, Good, HSG C
13,827	98	Paved parking, HSG C
4,116	70	Woods, Good, HSG C
305	96	Gravel surface, HSG C
122,911	76	Weighted Average
100,112		81.45% Pervious Area
22,799		18.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	100	0.0750	0.28		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 3.06"
0.2	25	0.0800	1.98		**Shallow Concentrated Flow, Segment #2** Short Grass Pasture Kv= 7.0 fps
0.0	9	0.3300	4.02		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
5.5	675	0.0844	2.03		**Shallow Concentrated Flow, Segment #4** Short Grass Pasture Kv= 7.0 fps
11.6	809	Total			

Subcatchment 32S: Inlet Sump (Lt.)



Summary for Subcatchment 33aS: Peekaboo Entrance

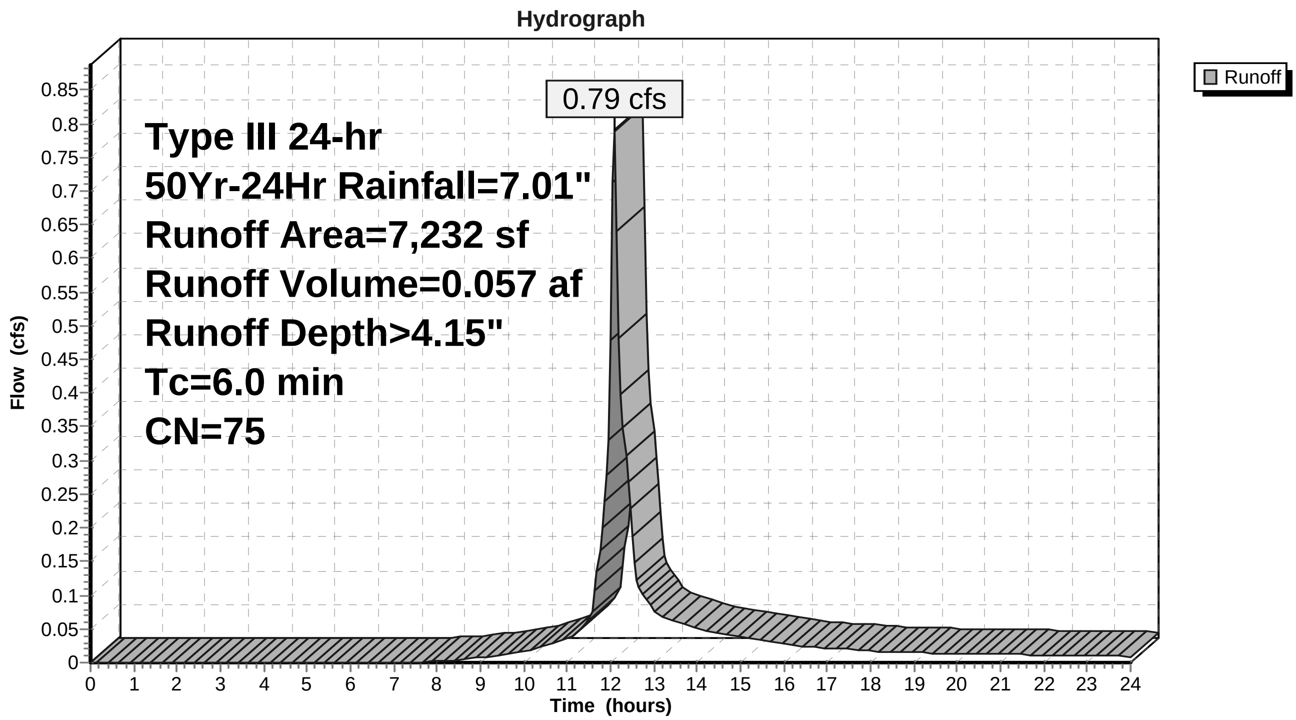
Runoff = 0.79 cfs @ 12.09 hrs, Volume= 0.057 af, Depth> 4.15"

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 50Yr-24Hr Rainfall=7.01"

Area (sf)	CN	Description
2,648	39	>75% Grass cover, Good, HSG A
3,022	98	Paved parking, HSG A
316	96	Gravel surface, HSG A
251	61	>75% Grass cover, Good, HSG B
938	98	Paved parking, HSG B
57	96	Gravel surface, HSG B
7,232	75	Weighted Average
3,272		45.24% Pervious Area
3,960		54.76% Impervious Area

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

Subcatchment 33aS: Peekaboo Entrance



Summary for Subcatchment 34S: Inlet Sump (Rt.)

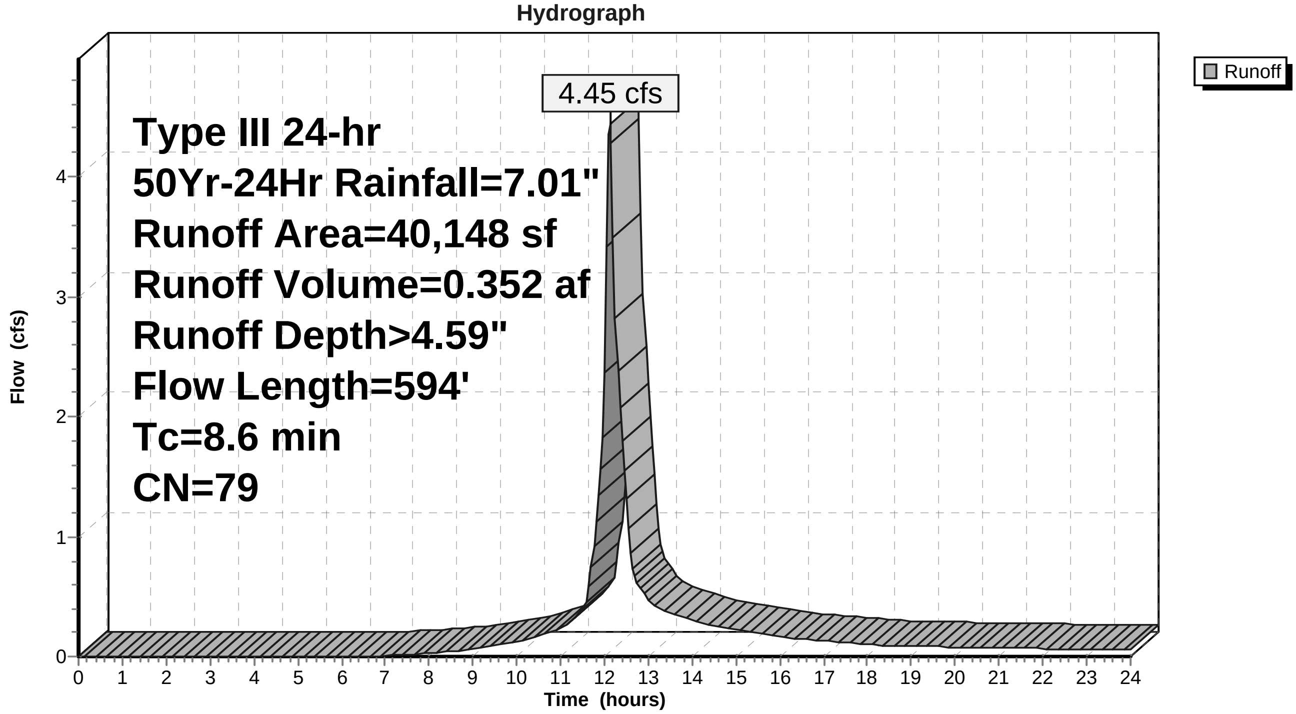
Runoff = 4.45 cfs @ 12.12 hrs, Volume= 0.352 af, Depth> 4.59"

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 50Yr-24Hr Rainfall=7.01"

Area (sf)	CN	Description
63	39	>75% Grass cover, Good, HSG A
31,078	74	>75% Grass cover, Good, HSG C
6,517	98	Paved parking, HSG C
2,088	98	Roofs, HSG C
372	96	Gravel surface, HSG C
30	70	Woods, Good, HSG C
40,148	79	Weighted Average
31,543		78.57% Pervious Area
8,605		21.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	92	0.1087	0.32		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 3.06"
0.0	9	0.3300	4.02		**Shallow Concentrated Flow, Segment #2** Short Grass Pasture Kv= 7.0 fps
3.8	493	0.0953	2.16		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
8.6	594	Total			

Subcatchment 34S: Inlet Sump (Rt.)



Summary for Subcatchment 45S: Rain Guardian #1

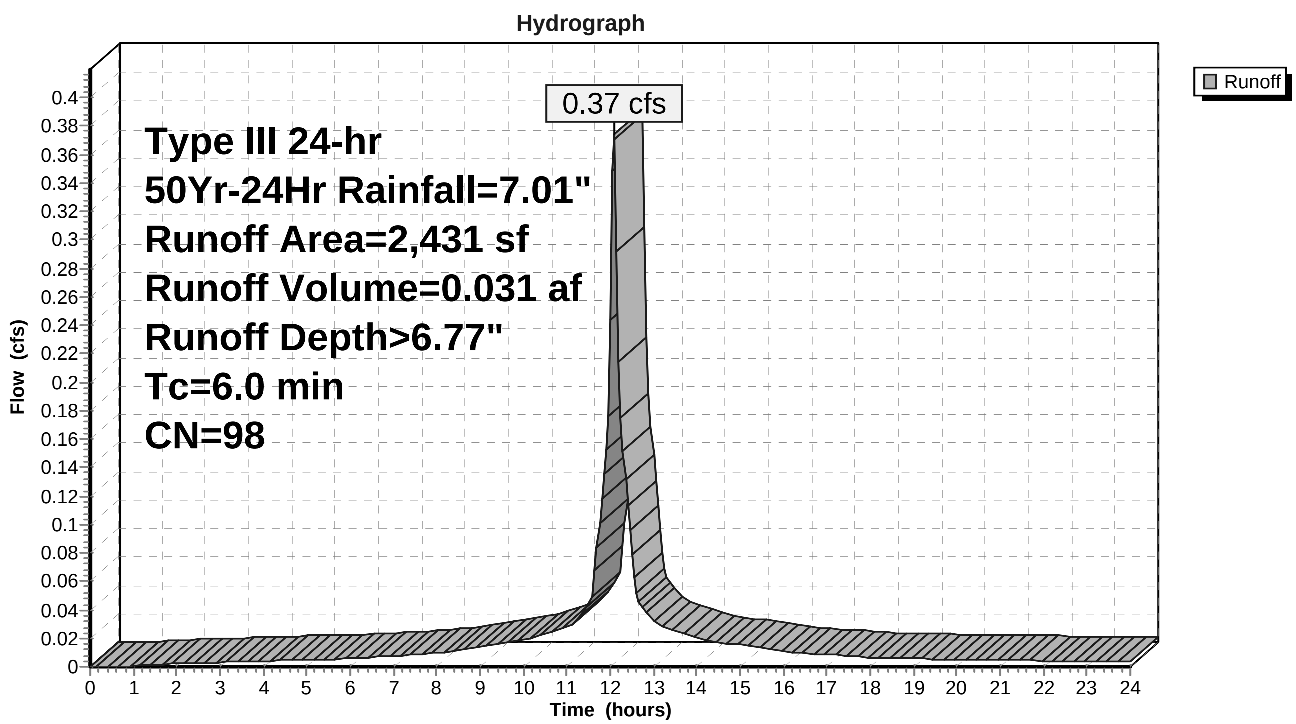
Runoff = 0.37 cfs @ 12.09 hrs, Volume= 0.031 af, Depth> 6.77"

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 50Yr-24Hr Rainfall=7.01"

Area (sf)	CN	Description
2,431	98	Paved parking, HSG A
2,431		100.00% Impervious Area

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

Subcatchment 45S: Rain Guardian #1



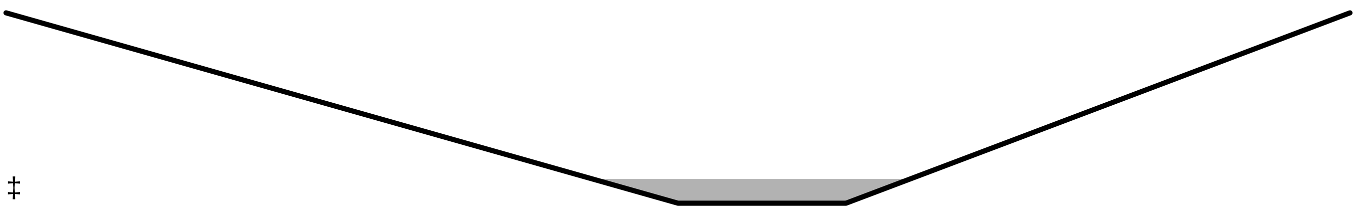
Summary for Reach 28R: Frederick Swale Lt Entrance

Inflow Area = 1.333 ac, 12.93% Impervious, Inflow Depth > 3.40" for 50Yr-24Hr event
Inflow = 3.31 cfs @ 12.34 hrs, Volume= 0.378 af
Outflow = 3.31 cfs @ 12.34 hrs, Volume= 0.378 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 4.49 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.75 fps, Avg. Travel Time= 0.1 min

Peak Storage= 7 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.25'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 256.95 cfs

2.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 4.0 3.0 '/' Top Width= 16.00'
Length= 10.0' Slope= 0.0400 '/'
Inlet Invert= 188.00', Outlet Invert= 187.60'



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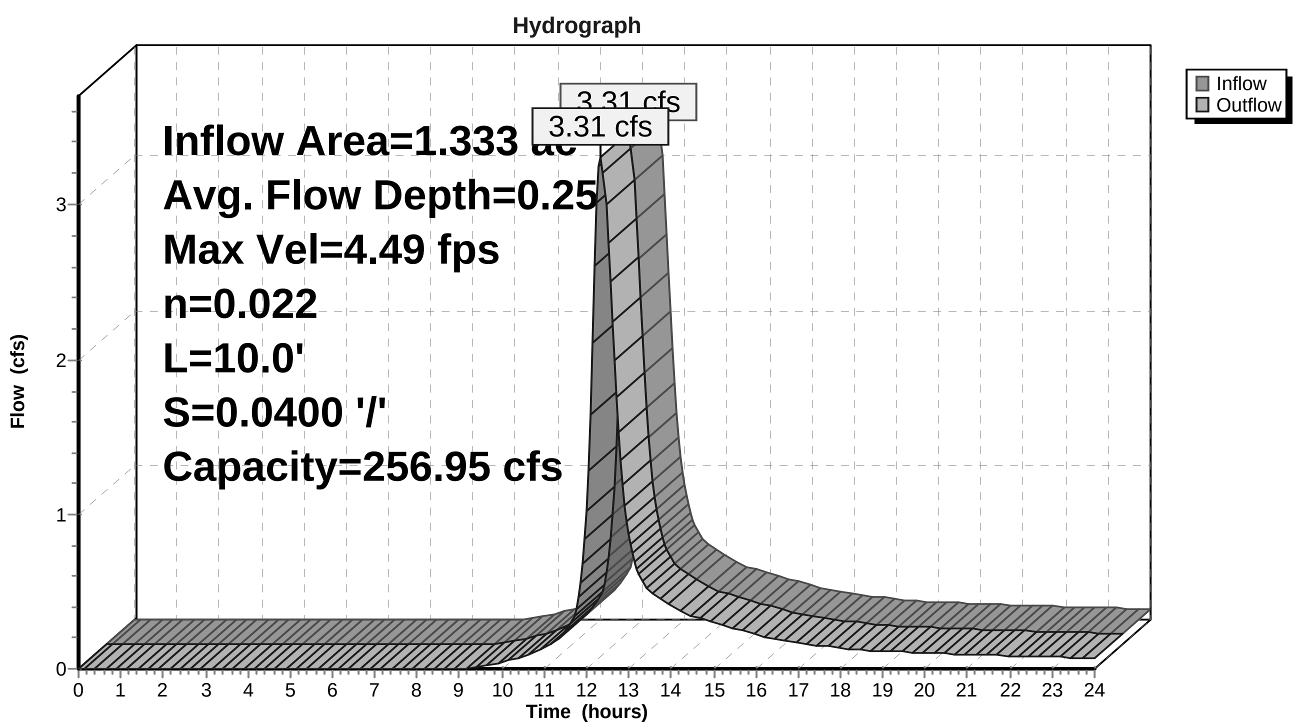
Reach 28R: Frederick Swale Lt Entrance



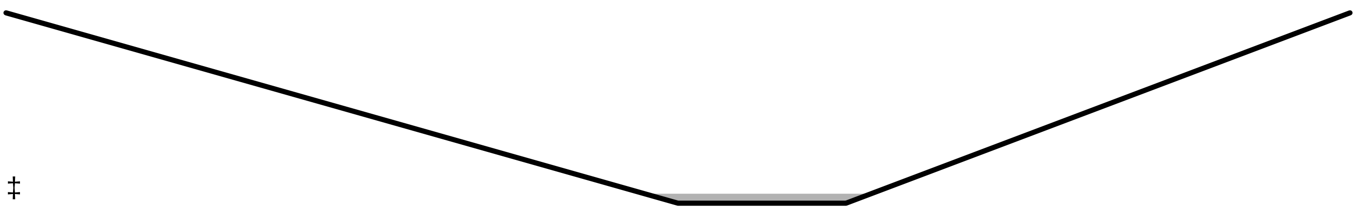
Summary for Reach 29R: Frederick Swale Rt Entrance

Inflow Area = 0.138 ac, 26.21% Impervious, Inflow Depth > 3.83" for 50Yr-24Hr event
Inflow = 0.61 cfs @ 12.09 hrs, Volume= 0.044 af
Outflow = 0.61 cfs @ 12.09 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 2.62 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.04 fps, Avg. Travel Time= 0.2 min

Peak Storage= 2 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 256.95 cfs

2.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 4.0 3.0 '/' Top Width= 16.00'
Length= 10.0' Slope= 0.0400 '/'
Inlet Invert= 192.00', Outlet Invert= 191.60'



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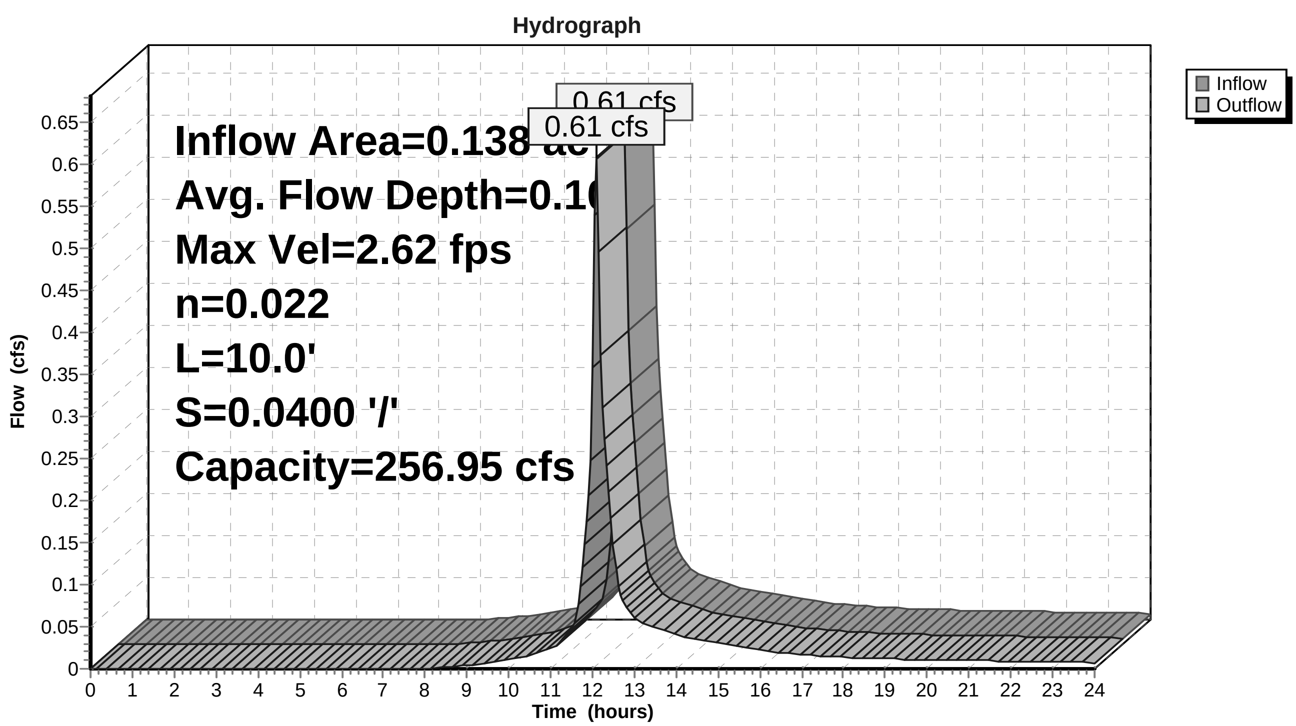
Reach 29R: Frederick Swale Rt Entrance



Summary for Reach 30aR: Reach #30aR Conveyance Swale Frederick

[62] Hint: Exceeded Reach 30R OUTLET depth by 0.02' @ 12.70 hrs

Inflow Area = 0.918 ac, 7.55% Impervious, Inflow Depth > 2.96" for 50Yr-24Hr event
Inflow = 1.86 cfs @ 12.37 hrs, Volume= 0.227 af
Outflow = 1.85 cfs @ 12.40 hrs, Volume= 0.226 af, Atten= 0%, Lag= 1.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 1.54 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 5.9 min

Peak Storage= 242 cf @ 12.40 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 29.56 cfs

5.00' x 1.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 201.0' Slope= 0.0199 '/'
Inlet Invert= 189.00', Outlet Invert= 185.00'

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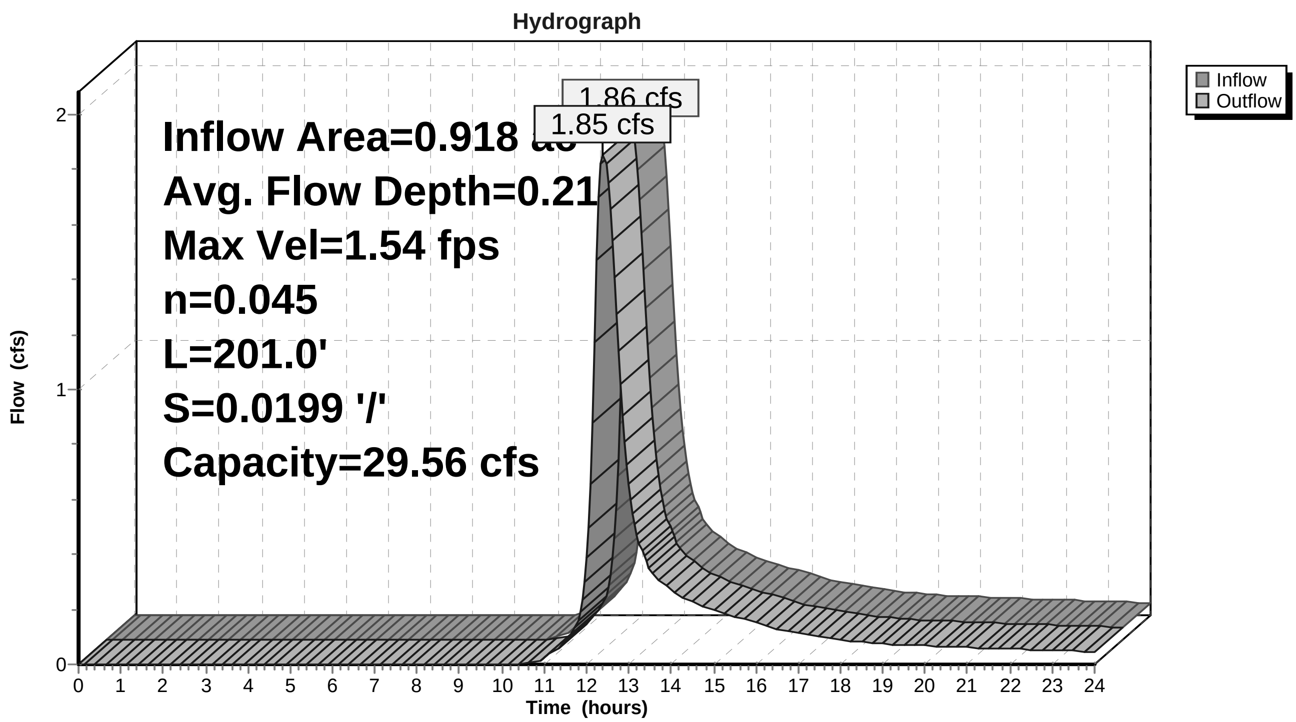
Reach 30aR: Reach #30aR Conveyance Swale Frederick



Summary for Reach 30R: Reach #30 Conveyance Swale Frederick

Inflow Area = 0.918 ac, 7.55% Impervious, Inflow Depth > 2.98" for 50Yr-24Hr event
Inflow = 1.87 cfs @ 12.33 hrs, Volume= 0.228 af
Outflow = 1.86 cfs @ 12.37 hrs, Volume= 0.227 af, Atten= 1%, Lag= 2.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 1.07 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 0.38 fps, Avg. Travel Time= 8.9 min

Peak Storage= 356 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 1.00' Flow Area= 11.0 sf, Capacity= 30.09 cfs

8.00' x 1.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 205.0' Slope= 0.0098 '/'
Inlet Invert= 191.00', Outlet Invert= 189.00'

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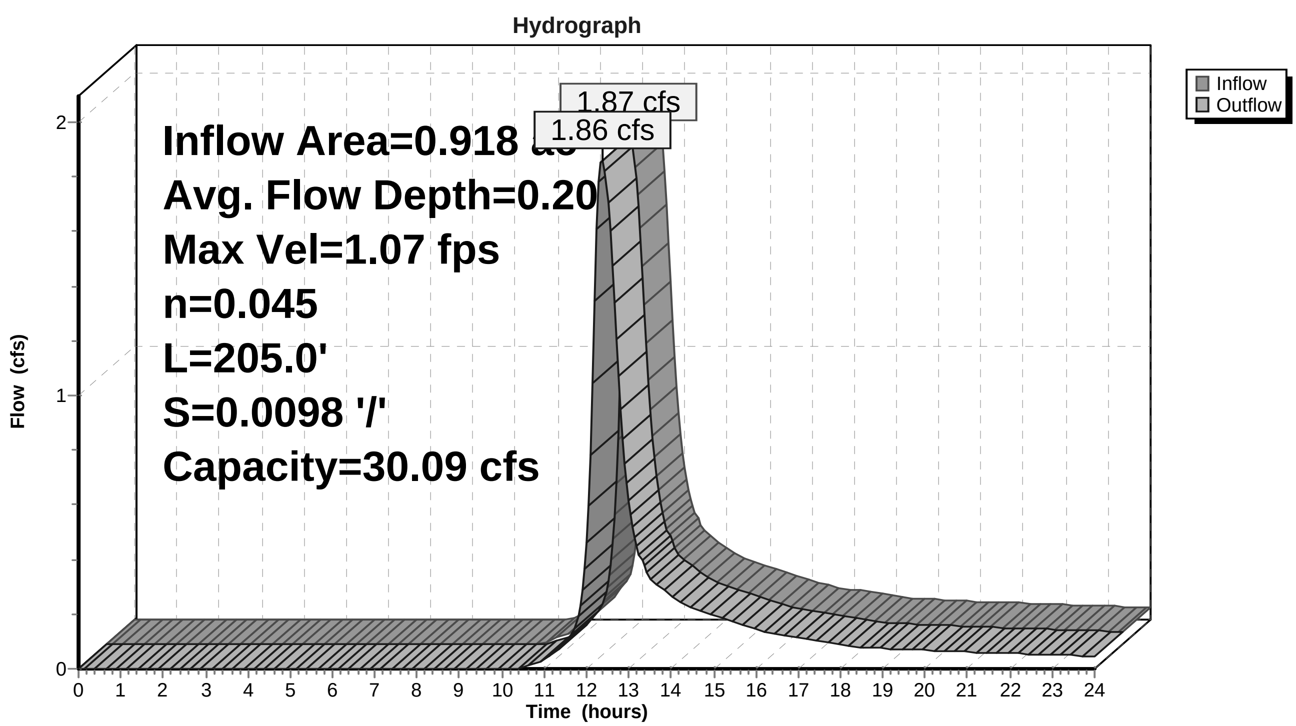
Reach 30R: Reach #30 Conveyance Swale Frederick



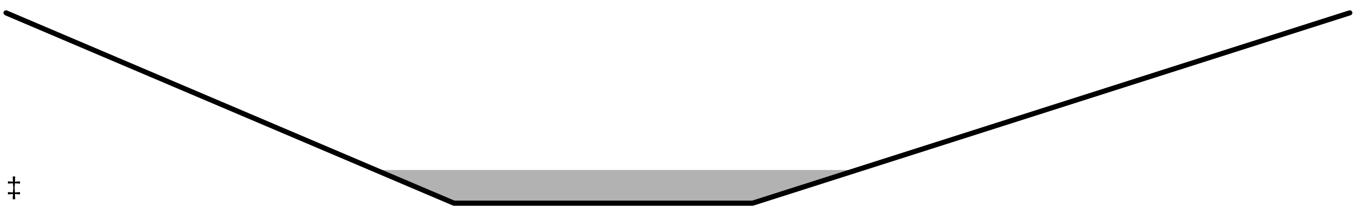
Summary for Reach 31R: Reach #31 Frederick

Inflow Area = 0.186 ac, 30.07% Impervious, Inflow Depth > 3.00" for 50Yr-24Hr event
Inflow = 0.63 cfs @ 12.11 hrs, Volume= 0.046 af
Outflow = 0.60 cfs @ 12.14 hrs, Volume= 0.046 af, Atten= 4%, Lag= 1.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 1.32 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 6.0 min

Peak Storage= 72 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.17'
Bank-Full Depth= 1.00' Flow Area= 5.5 sf, Capacity= 19.07 cfs

2.00' x 1.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 4.0 '/' Top Width= 9.00'
Length= 158.0' Slope= 0.0222 '/'
Inlet Invert= 188.50', Outlet Invert= 185.00'



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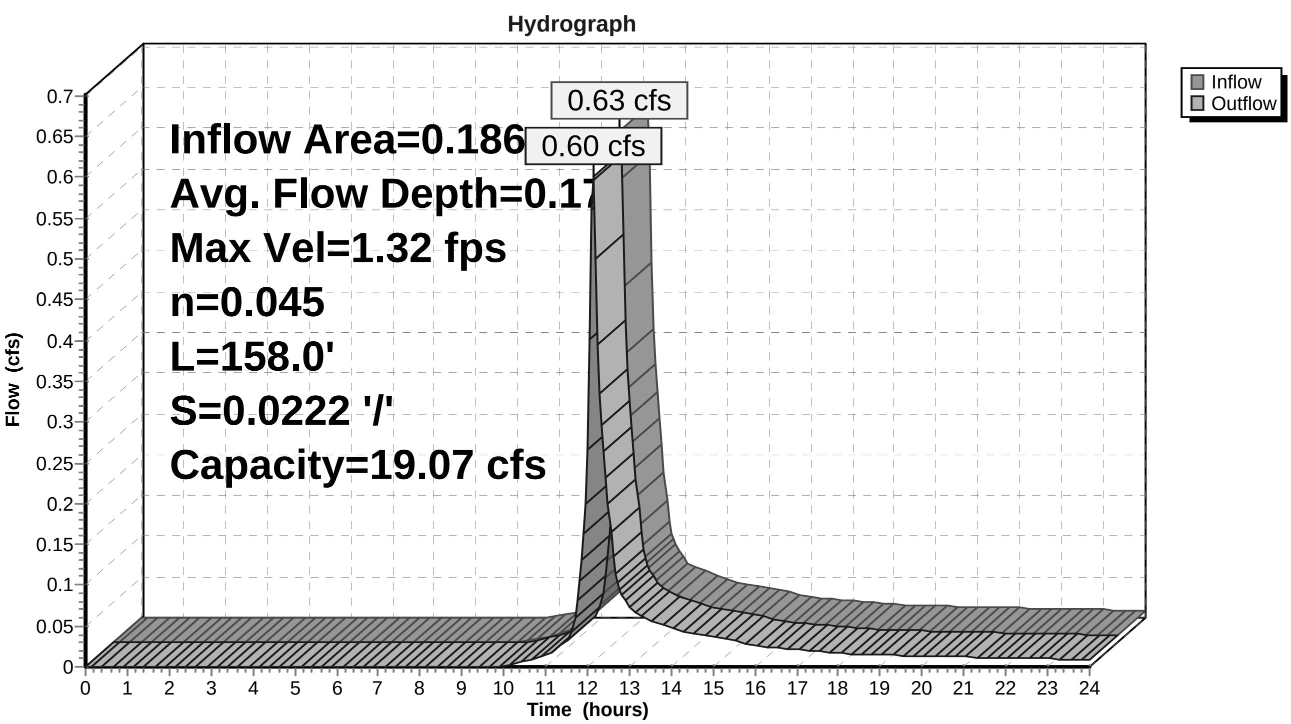
Reach 31R: Reach #31 Frederick



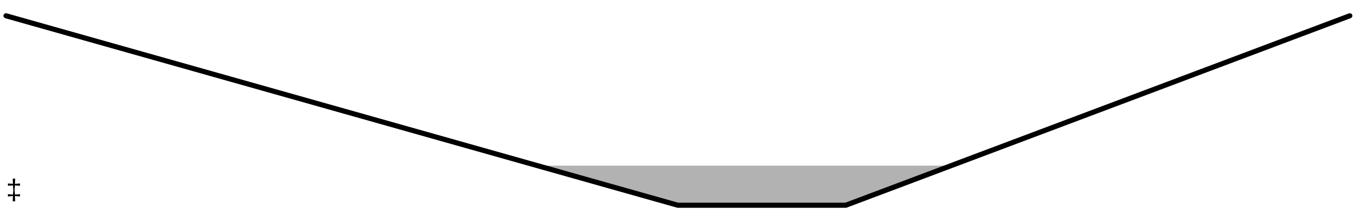
Summary for Reach 32aR: Swale Lt Peekaboo

Inflow Area = 2.822 ac, 18.55% Impervious, Inflow Depth > 4.26" for 50Yr-24Hr event
Inflow = 11.65 cfs @ 12.16 hrs, Volume= 1.001 af
Outflow = 11.65 cfs @ 12.16 hrs, Volume= 1.001 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 3.57 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.25 fps, Avg. Travel Time= 0.1 min

Peak Storage= 33 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.63'
Bank-Full Depth= 3.00' Flow Area= 40.5 sf, Capacity= 352.11 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 4.0 3.0 '/' Top Width= 24.00'
Length= 10.0' Slope= 0.0850 '/'
Inlet Invert= 191.85', Outlet Invert= 191.00'



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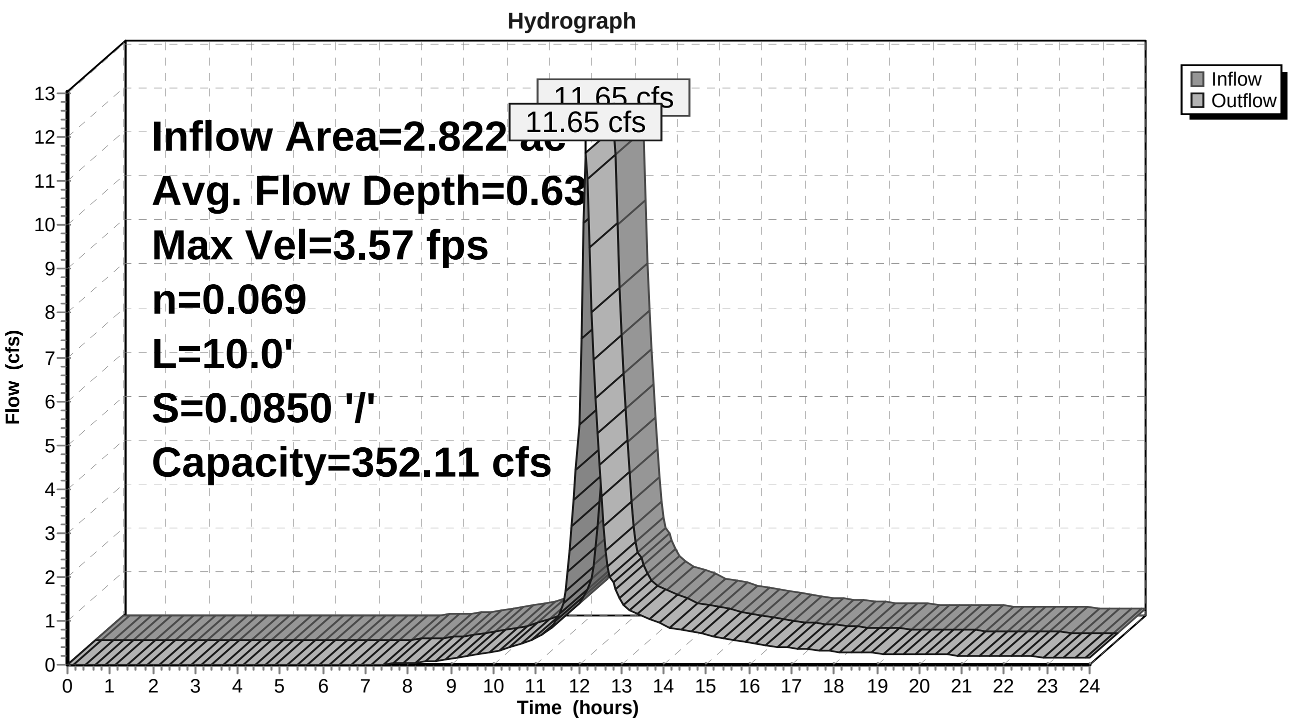
Reach 32aR: Swale Lt Peekaboo



Summary for Reach 33a1R: Pre-Treatment Swale Peekaboo Rt

Inflow Area =	0.222 ac, 66.14% Impervious, Inflow Depth > 4.81" for 50Yr-24Hr event		
Inflow =	1.17 cfs @ 12.09 hrs, Volume=	0.089 af	
Outflow =	1.17 cfs @ 12.09 hrs, Volume=	0.089 af,	Atten= 0%, Lag= 0.1 min

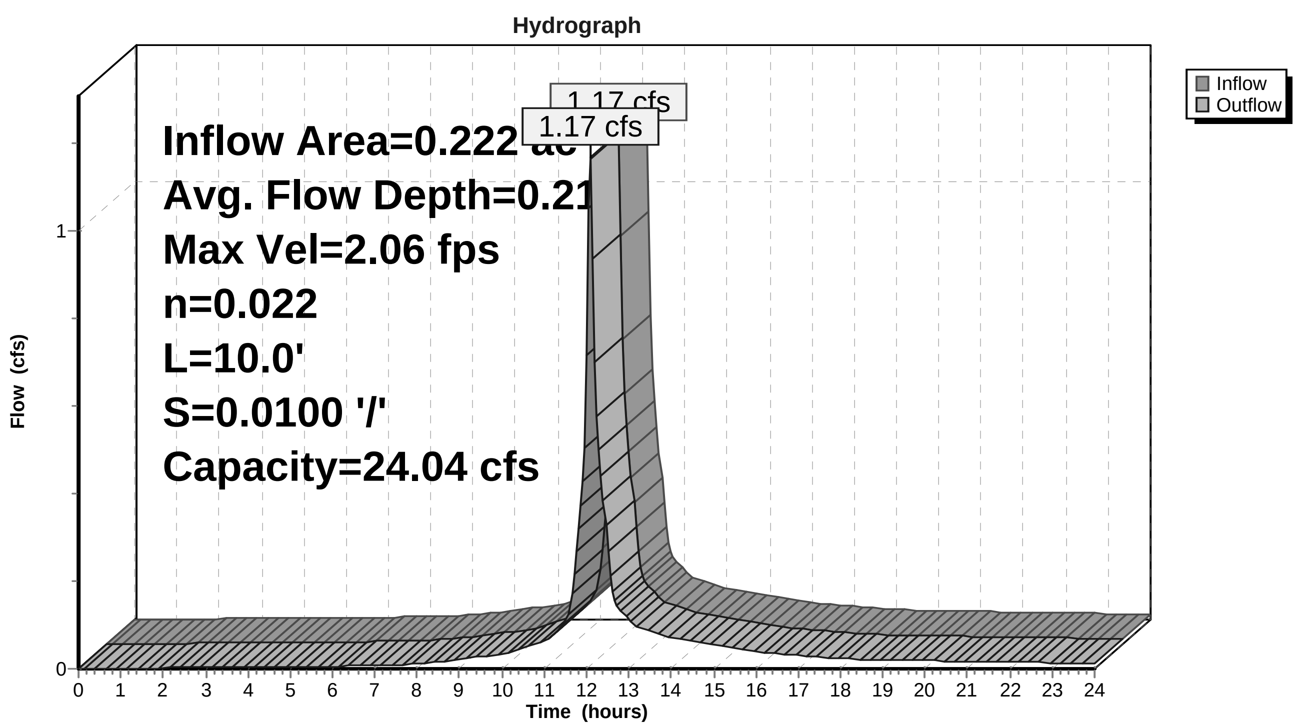
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 2.06 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.54 fps, Avg. Travel Time= 0.3 min

Peak Storage= 6 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 1.00' Flow Area= 5.0 sf, Capacity= 24.04 cfs

2.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 8.00'
Length= 10.0' Slope= 0.0100 '/'
Inlet Invert= 184.10', Outlet Invert= 184.00'

‡

Reach 33a1R: Pre-Treatment Swale Peekaboo Rt



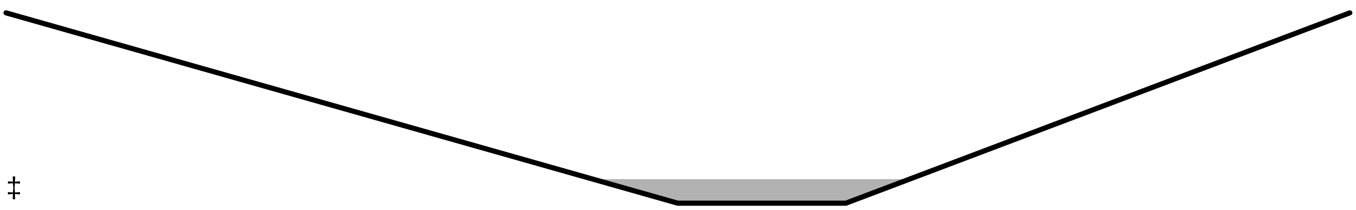
Summary for Reach 34aR: Swale Rt Peekaboo

Inflow Area = 0.922 ac, 21.43% Impervious, Inflow Depth > 4.59" for 50Yr-24Hr event
Inflow = 4.45 cfs @ 12.12 hrs, Volume= 0.352 af
Outflow = 4.45 cfs @ 12.12 hrs, Volume= 0.352 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 2.70 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.87 fps, Avg. Travel Time= 0.2 min

Peak Storage= 16 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.38'
Bank-Full Depth= 3.00' Flow Area= 40.5 sf, Capacity= 352.11 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 4.0 3.0 '/' Top Width= 24.00'
Length= 10.0' Slope= 0.0850 '/'
Inlet Invert= 191.85', Outlet Invert= 191.00'



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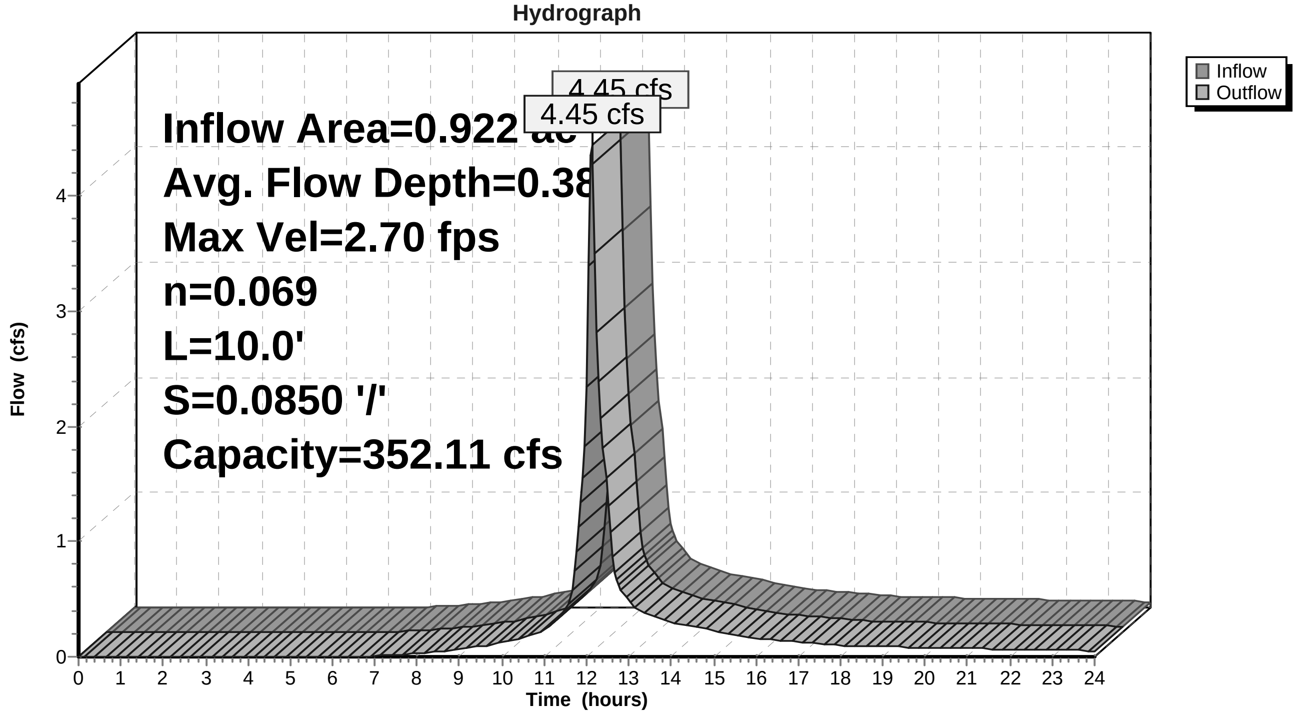
Reach 34aR: Swale Rt Peekaboo



Summary for Pond 30P: Pond #30 Cross Culvert

Inflow Area = 0.918 ac, 7.55% Impervious, Inflow Depth > 3.00" for 50Yr-24Hr event
Inflow = 2.52 cfs @ 12.19 hrs, Volume= 0.230 af
Outflow = 1.87 cfs @ 12.33 hrs, Volume= 0.228 af, Atten= 26%, Lag= 8.5 min
Primary = 1.87 cfs @ 12.33 hrs, Volume= 0.228 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 192.01' @ 12.33 hrs Surf.Area= 2,919 sf Storage= 1,260 cf
Flood Elev= 192.50' Surf.Area= 4,322 sf Storage= 3,038 cf

Plug-Flow detention time= 16.0 min calculated for 0.227 af (99% of inflow)
Center-of-Mass det. time= 11.1 min (860.2 - 849.1)

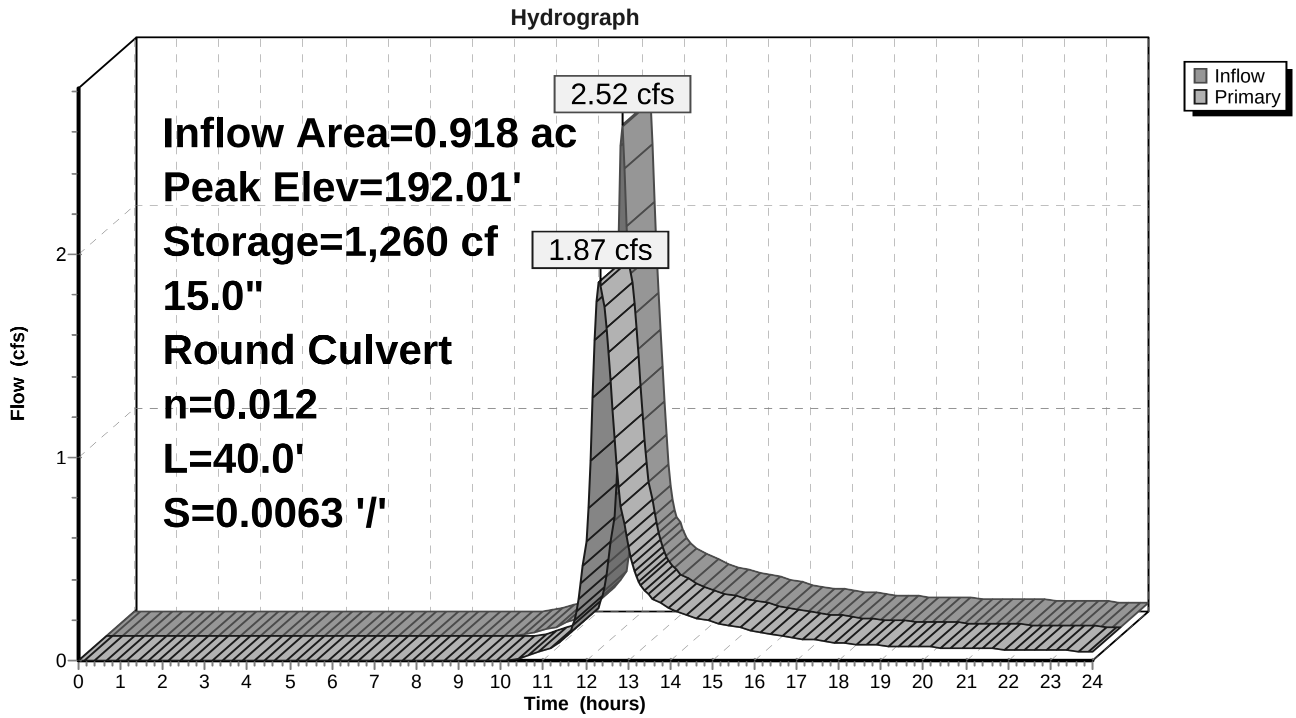
Volume	Invert	Avail.Storage	Storage Description
#1	191.25'	13,659 cf	**Open Water Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
191.25	672	407.0	0	0	672
192.00	2,904	483.0	1,243	1,243	6,065
194.00	10,261	597.0	12,416	13,659	15,922

Device	Routing	Invert	Outlet Devices
#1	Primary	191.25'	**15.0" Round 15" HDPE N-12** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 191.25' / 191.00' S= 0.0063 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.86 cfs @ 12.33 hrs HW=192.00' TW=191.20' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Barrel Controls 1.86 cfs @ 3.45 fps)

Pond 30P: Pond #30 Cross Culvert



Summary for Pond 31P: Pond #31 Cross Culvert

Inflow Area = 0.186 ac, 30.07% Impervious, Inflow Depth > 3.01" for 50Yr-24Hr event
Inflow = 0.64 cfs @ 12.10 hrs, Volume= 0.047 af
Outflow = 0.63 cfs @ 12.11 hrs, Volume= 0.046 af, Atten= 1%, Lag= 0.8 min
Primary = 0.63 cfs @ 12.11 hrs, Volume= 0.046 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 189.41' @ 12.11 hrs Surf.Area= 146 sf Storage= 39 cf
Flood Elev= 191.00' Surf.Area= 990 sf Storage= 835 cf

Plug-Flow detention time= 2.3 min calculated for 0.046 af (100% of inflow)
Center-of-Mass det. time= 1.5 min (845.0 - 843.5)

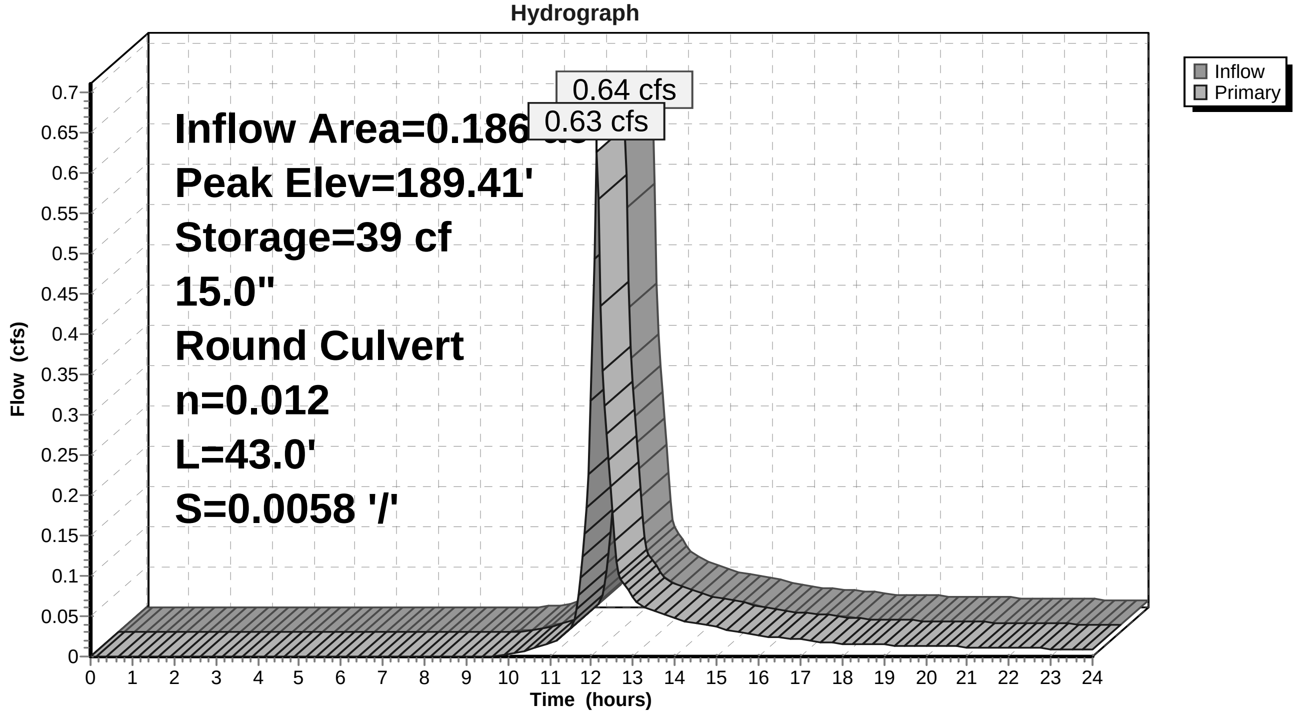
Volume	Invert	Avail.Storage	Storage Description
#1	189.00'	835 cf	**Open Water Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
189.00	51	51.5	0	0	51
190.00	364	116.3	184	184	920
191.00	990	205.1	651	835	3,197

Device	Routing	Invert	Outlet Devices
#1	Primary	189.00'	**15.0" Round 15" HDPE N-12** L= 43.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 189.00' / 188.75' S= 0.0058 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.61 cfs @ 12.11 hrs HW=189.41' TW=188.67' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Barrel Controls 0.61 cfs @ 2.63 fps)

Pond 31P: Pond #31 Cross Culvert



Extreme Precipitation Tables

Northeast Regional Climate Center

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

Smoothing	Yes
State	New Hampshire
Location	
Longitude	71.062 degrees West
Latitude	43.138 degrees North
Elevation	0 feet
Date/Time	Fri, 18 Feb 2022 10:48:20 -0500

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.26	0.40	0.50	0.65	0.81	1.03	**1yr**	0.70	0.98	1.20	1.53	1.97	2.56	2.78	**1yr**	2.26	2.68	3.09	3.80	4.38	**1yr**
2yr	0.32	0.49	0.61	0.80	1.01	1.28	**2yr**	0.87	1.16	1.49	1.89	2.40	3.06	3.40	**2yr**	2.71	3.27	3.77	4.49	5.12	**2yr**
5yr	0.37	0.57	0.72	0.96	1.23	1.58	**5yr**	1.06	1.44	1.85	2.36	3.02	3.87	4.35	**5yr**	3.43	4.19	4.80	5.68	6.42	**5yr**
10yr	0.41	0.64	0.81	1.10	1.43	1.86	**10yr**	1.23	1.70	2.18	2.81	3.61	4.63	5.25	**10yr**	4.10	5.05	5.76	6.78	7.63	**10yr**
25yr	0.47	0.75	0.95	1.31	1.75	2.29	**25yr**	1.51	2.10	2.71	3.52	4.55	5.86	6.73	**25yr**	5.19	6.47	7.33	8.58	9.59	**25yr**
50yr	0.53	0.84	1.08	1.51	2.04	2.70	**50yr**	1.76	2.48	3.21	4.19	5.43	7.01	8.12	**50yr**	6.21	7.81	8.81	10.26	11.41	**50yr**
100yr	0.59	0.96	1.24	1.75	2.37	3.18	**100yr**	2.05	2.92	3.79	4.97	6.47	8.39	9.81	**100yr**	7.43	9.43	10.59	12.28	13.58	**100yr**
200yr	0.66	1.08	1.40	2.01	2.77	3.75	**200yr**	2.39	3.44	4.50	5.92	7.74	10.04	11.85	**200yr**	8.89	11.39	12.72	14.70	16.17	**200yr**
500yr	0.78	1.29	1.68	2.43	3.41	4.65	**500yr**	2.94	4.28	5.61	7.44	9.77	12.75	15.22	**500yr**	11.28	14.63	16.23	18.66	20.39	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.23	0.36	0.44	0.59	0.73	0.90	**1yr**	0.63	0.88	0.95	1.27	1.55	2.00	2.49	**1yr**	1.77	2.40	2.86	3.40	3.87	**1yr**
2yr	0.31	0.48	0.60	0.81	1.00	1.18	**2yr**	0.86	1.15	1.35	1.81	2.33	2.96	3.27	**2yr**	2.62	3.14	3.64	4.36	4.98	**2yr**
5yr	0.35	0.54	0.67	0.92	1.17	1.40	**5yr**	1.01	1.37	1.60	2.13	2.75	3.52	3.91	**5yr**	3.11	3.76	4.34	5.32	5.85	**5yr**
10yr	0.38	0.59	0.73	1.02	1.32	1.60	**10yr**	1.14	1.56	1.81	2.42	3.10	3.98	4.46	**10yr**	3.53	4.29	4.95	6.17	6.59	**10yr**
25yr	0.44	0.67	0.83	1.19	1.57	1.90	**25yr**	1.35	1.86	2.11	2.82	3.63	4.67	5.28	**25yr**	4.13	5.08	5.90	7.50	8.36	**25yr**
50yr	0.49	0.74	0.92	1.33	1.79	2.17	**50yr**	1.54	2.13	2.37	3.18	4.09	5.25	5.97	**50yr**	4.65	5.74	6.73	8.70	9.62	**50yr**
100yr	0.55	0.83	1.03	1.49	2.05	2.49	**100yr**	1.77	2.44	2.67	3.56	4.59	5.90	6.75	**100yr**	5.22	6.49	7.70	10.08	11.05	**100yr**
200yr	0.61	0.92	1.16	1.68	2.34	2.84	**200yr**	2.02	2.78	2.99	4.00	5.16	6.59	8.89	**200yr**	5.84	8.54	8.81	11.70	12.70	**200yr**
500yr	0.71	1.06	1.36	1.98	2.82	3.41	**500yr**	2.43	3.34	3.49	4.66	6.05	7.60	10.78	**500yr**	6.73	10.37	10.52	14.26	15.23	**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	1.08	**1yr**	0.76	1.05	1.23	1.71	2.17	2.79	3.14	**1yr**	2.47	3.02	3.43	4.08	4.80	**1yr**
2yr	0.33	0.51	0.62	0.84	1.04	1.24	**2yr**	0.90	1.22	1.46	1.93	2.47	3.22	3.57	**2yr**	2.85	3.43	3.95	4.64	5.29	**2yr**
5yr	0.39	0.61	0.76	1.04	1.32	1.58	**5yr**	1.14	1.54	1.84	2.45	3.13	4.24	4.83	**5yr**	3.75	4.64	5.29	6.04	7.01	**5yr**
10yr	0.46	0.71	0.88	1.23	1.59	1.92	**10yr**	1.37	1.87	2.22	2.97	3.76	5.27	6.09	**10yr**	4.67	5.86	6.62	7.40	8.66	**10yr**
25yr	0.57	0.86	1.07	1.53	2.02	2.47	**25yr**	1.74	2.42	2.85	3.84	4.80	7.04	8.32	**25yr**	6.23	8.00	8.90	9.72	10.79	**25yr**
50yr	0.66	1.00	1.25	1.80	2.42	2.99	**50yr**	2.09	2.93	3.45	4.65	5.79	8.77	10.56	**50yr**	7.77	10.15	11.16	11.95	13.18	**50yr**
100yr	0.77	1.17	1.46	2.12	2.90	3.62	**100yr**	2.50	3.54	4.19	5.66	7.00	10.94	13.40	**100yr**	9.68	12.88	13.97	14.69	16.11	**100yr**
200yr	0.90	1.36	1.72	2.49	3.48	4.40	**200yr**	3.00	4.30	5.09	6.89	8.44	13.69	15.12	**200yr**	12.12	14.54	17.50	18.05	19.73	**200yr**
500yr	1.11	1.66	2.13	3.10	4.41	5.67	**500yr**	3.81	5.54	6.56	8.94	10.84	18.44	20.32	**500yr**	16.32	19.54	23.56	23.76	25.82	**500yr**

RIP RAP CALCULATIONS

Residences at Fort Hill
Smoke Street
Nottingham, NH

Berry Surveying & Engineering
335 Second Crown Point Road
Barrington, NH
2/15/2023/Rev: 12/11/2023

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)

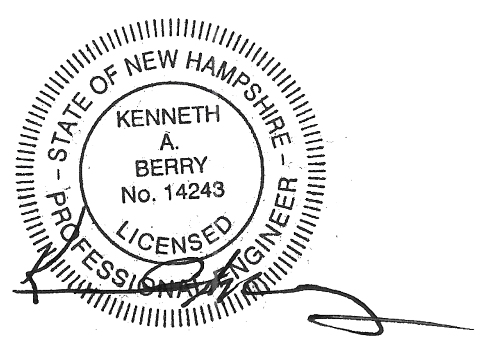
TAILWATER < HALF THE Do

La = (1.8 x Q) / Do 3/2 + (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
24" HDPE (Pond #1)	0.40	3.25	2.00	16.1	22.1	0.12	0.00	0.00
24" HDPE (Pond #1)	0.40	3.25	2.00	16.1	22.1	0.12	0.00	0.00
24" HDPE (Pond #C04P)	0.40	9.37	2.00	20.0	26.0	0.49	0.50	1.20
15" HDPE (Pond #104)	0.25	0.28	1.25	9.1	12.9	0.01	0.50	1.20
15" HDPE (Pond #107)	0.25	0.58	1.25	9.5	13.2	0.03	0.50	1.20
15" HDPE (Pond #108)	0.25	1.47	1.25	10.6	14.4	0.11	0.50	1.20
15" HDPE (Pond #29)	0.25	0.46	1.25	9.3	13.1	0.02	0.50	1.20
15" HDPE (Pond #30)	0.25	1.33	1.25	10.5	14.2	0.09	0.50	1.20
15" HDPE (Pond #31)	0.25	0.44	1.25	9.3	13.1	0.02	0.50	1.20
15" HDPE (Pond #105)	0.25	1.32	1.25	10.5	14.2	0.09	0.50	1.20
15" HDPE (Pond #103)	0.25	0.26	1.25	9.1	12.8	0.01	0.50	1.20

Please note that the designer chose to use the 25 Year Event for the dimensional calculations.

d50 Size =	0.5	Feet	6	Inches
% of Weight Smaller		Size of Stone (Inches)		
Than the Given d50 Size		From		To
100%		9		12
85%		8		11
50%		6		9
15%		2		3



NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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

0.39	ac	Area of HSG A soil that was replaced by impervious cover	0.40"
1.18	ac	Area of HSG B soil that was replaced by impervious cover	0.25"
1.72	ac	Area of HSG C soil that was replaced by impervious cover	0.10"
-	ac	Area of HSG D soil or impervious cover that was replaced by impervious cover	0.0"
0.19	inches	Rd = Weighted groundwater recharge depth	
0.6202	ac-in	GRV = AI * Rd	
2,251	cf	GRV conversion (ac-in x 43,560 sf/ac x 1ft/12”)	

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

Rain Garden #103 = 16,755 CF of Infiltration Capacity

Infiltration Pond #106 = 8,997 CF Infiltration Capacity

GRAVEL WETLAND DESIGN CRITERIA
(Env-Wq 1508.05)

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Type/Node Name: **Subsurface Gravel Wetland #102 Pond #102**

Enter the node name in the drainage analysis if applicable.

5.55	ac	A = Area draining to the practice	
1.22	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)	
1.38	ac-in	WQV= 1" x Rv x A	
5,001	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
500	cf	10% x WQV (check calc for sediment forebay)	
2,250	cf	45% x WQV (check calc for gravel wetland treatment bay volume)	
6,827	cf	V_{SED} = Sediment forebay volume	**$\geq$ 10%WQV**
3,069	cf	V_{TB1} = Volume of treatment bay 1 [1]	**$\geq$ 45%WQV**
2,570	cf	V_{TB2} = Volume of treatment bay 2 [1]	**$\geq$ 45%WQV**
0.12	cfs	$2Q_{avg}$ = 2* WQV / 24 hrs * (1hr / 3600 sec) [2]	
185.61	ft	E_{WQV} = Elevation of WQV (attach stage-storage table)	
0.08	cfs	Q_{WQV} = Discharge at the E_{WQV} (attach stage-discharge table)	**< $2Q_{avg}$**
34.73	hours	T_{ED} = Drawdown time of extended detention = $2WQV/Q_{WQV}$	**$\geq$ 24-hrs**
3.00	:1	Pond side slopes	**$\geq$ 3:1**
188.50	ft	Elevation of SHWT	
186.50	ft	SHWT - 2 feet	
183.67	ft	Epp = Elevation of the permanent pool (elevation of lowest orifice) [3]	**$\leq E_{SHWT}$ - 2 ft**
40 & 35	ft	Length of the flow path between the inlet and outlet in each cell	**$\geq$ 15 ft**
Angle Grate		What mechanism is proposed to prevent the outlet structure from clogging (applicable for orifices/weirs with a dimension of $\leq$6")?	
189.27	ft	Peak elevation of the 50-year storm event (E_{50})	
191.00	ft	Berm elevation of the pond	
YES		$E_{50} \leq$ the berm elevation?	**← yes**

Qualified professional that developed the planting plan
Name, Profession: KRP/KAB

1. Volume stored above the wetland soil and below the high flow by-pass.
2. To ensure orifice is sized so that WQV is released at a relatively stable rate.
3. 4" to 8" below the wetland soil. If lowest orifice is higher than (SHWT - 2 feet), and saturated hydraulic conductivity (Ksat) is greater than 0.015 in/hr, the system must be lined.

Designer's Notes: K Sat Deerfield and Hinkley derived Udorthents > 0.015 in/hr -
System to be lined with a low perm material liner

Summary for Pond 102P: Gravel Wetland #102

[80] Warning: Exceeded Pond C04P by 0.02' @ 16.55 hrs (2.39 cfs 0.292 af)

Inflow Area = 5.553 ac, 22.01% Impervious, Inflow Depth > 2.93" for 50Yr-24Hr event
Inflow = 17.19 cfs @ 12.14 hrs, Volume= 1.358 af
Outflow = 0.75 cfs @ 14.20 hrs, Volume= 0.720 af, Atten= 96%, Lag= 123.9 min
Primary = 0.10 cfs @ 12.11 hrs, Volume= 0.120 af
Secondary = 0.66 cfs @ 14.20 hrs, Volume= 0.600 af
Tertiary = 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 / 3
Peak Elev= 189.27' @ 14.07 hrs Surf.Area= 24,220 sf Storage= 38,118 cf
Flood Elev= 191.00' Surf.Area= 27,849 sf Storage= 63,349 cf

Plug-Flow detention time= 350.9 min calculated for 0.719 af (53% of inflow)
Center-of-Mass det. time= 231.8 min (1,042.7 - 810.9)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	6,827 cf	**Forebay (Irregular)** Listed below (Recalc)
#2	184.00'	3,069 cf	**Cell #1 (Irregular)** Listed below (Recalc)
#3	184.00'	2,570 cf	**Cell #2 (Irregular)** Listed below (Recalc)
#4	186.50'	1,755 cf	**Open Water Above Cells (Irregular)** Listed below (Recalc)
#5	187.00'	49,080 cf	**Open Water Storage (Irregular)** Listed below (Recalc)
#6	183.67'	48 cf	**4.00'D x 3.83'H Outlet Structure**
		63,349 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.00	101	37.0	0	0	101
185.00	1,533	240.0	676	676	4,578
186.00	3,259	330.0	2,342	3,018	8,670
187.00	4,386	365.0	3,809	6,827	10,637

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.00	763	113.0	0	0	763
185.00	1,118	134.0	935	935	1,194
186.00	1,521	153.0	1,314	2,249	1,651
186.50	1,760	163.0	820	3,069	1,914

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.00	583	99.0	0	0	583
185.00	920	121.0	745	745	984
186.00	1,316	143.0	1,112	1,857	1,464
186.50	1,538	152.0	713	2,570	1,688

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
186.50	3,278	309.0	0	0	3,278
187.00	3,749	318.0	1,755	1,755	3,754

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
187.00	8,373	601.0	0	0	8,373
188.00	10,211	623.0	9,277	9,277	10,602
189.00	12,233	657.0	11,207	20,484	14,123
190.00	14,304	690.0	13,255	33,739	17,724
191.00	16,403	708.0	15,342	49,080	19,845

Device	Routing	Invert	Outlet Devices
#1	Primary	183.67'	**6.0" Round 6" Drain** L= 101.2' Ke= 0.500 Inlet / Outlet Invert= 183.67' / 183.50' S= 0.0017 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	183.67'	**1.5" Vert. 1.50" Orifice (Str. A)** C= 0.600
#3	Secondary	185.50'	**24.0" Round 24" HDPE N-12** L= 90.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 185.50' / 185.00' S= 0.0056 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#4	Device 3	186.50'	**4.0" Vert. 4" Orifice (Str. B)** C= 0.600
#5	Device 3	190.00'	**48.0" Horiz. 4' Grate (Str. B)** C= 0.600 Limited to weir flow at low heads
#6	Tertiary	190.50'	**20.0' 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=0.10 cfs @ 12.11 hrs HW=187.62' TW=184.64' (Dynamic Tailwater)
└─**1=6" Drain** (Passes 0.10 cfs of 0.94 cfs potential flow)
  └─**2=1.50" Orifice (Str. A)** (Orifice Controls 0.10 cfs @ 8.31 fps)

Secondary OutFlow Max=0.66 cfs @ 14.20 hrs HW=189.27' TW=186.82' (Dynamic Tailwater)
└─**3=24" HDPE N-12** (Passes 0.66 cfs of 23.66 cfs potential flow)
  ├─**4=4" Orifice (Str. B)** (Orifice Controls 0.66 cfs @ 7.53 fps)
  └─**5=4' Grate (Str. B)** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=183.67' TW=189.50' (Dynamic Tailwater)
└─**6=E-Spillway** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 102P: Gravel Wetland #102

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
183.67	0	188.97	34,387
183.77	1	189.07	35,614
183.87	3	189.17	36,861
183.97	4	189.27	38,129
184.07	109	189.37	39,417
184.17	271	189.47	40,725
184.27	448	189.57	42,054
184.37	642	189.67	43,404
184.47	855	189.77	44,774
184.57	1,089	189.87	46,166
184.67	1,345	189.97	47,580
184.77	1,625	190.07	49,014
184.87	1,932	190.17	50,469
184.97	2,266	190.27	51,944
185.07	2,629	190.37	53,440
185.17	3,013	190.47	54,957
185.27	3,421	190.57	56,495
185.37	3,851	190.67	58,054
185.47	4,306	190.77	59,634
185.57	4,786	190.87	61,235
185.67	5,292	190.97	**62,858**
185.77	5,824		
185.87	6,384		
185.97	6,972		
186.07	7,586		
186.17	8,221		
186.27	8,875		
186.37	9,549		
186.47	10,244		
186.57	10,957		
186.67	11,691		
186.77	12,446		
186.87	13,222		
186.97	14,019		
187.07	14,854		
187.17	15,714		
187.27	16,591		
187.37	17,487		
187.47	18,400		
187.57	19,331		
187.67	20,280		
187.77	21,248		
187.87	22,235		
187.97	23,240		
188.07	24,265		
188.17	25,310		
188.27	26,374		
188.37	27,458		
188.47	28,561		
188.57	29,685		
188.67	30,830		
188.77	31,995		
188.87	33,180		

WQV Elev.: 185.61

WQV = 5,001 CF

Stage-Discharge for Pond 102P: Gravel Wetland #102

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Tertiary (cfs)
183.67	0.00	0.00	0.00	0.00
183.87	0.02	0.02	0.00	0.00
184.07	0.03	0.03	0.00	0.00
184.27	0.04	0.04	0.00	0.00
184.47	0.05	0.05	0.00	0.00
184.67	0.06	0.06	0.00	0.00
184.87	0.06	0.06	0.00	0.00
185.07	0.07	0.07	0.00	0.00
185.27	0.07	0.07	0.00	0.00
185.47	0.08	0.08	0.00	0.00
185.67	0.08	0.08	0.00	0.00
185.87	0.09	0.09	0.00	0.00
186.07	0.09	0.09	0.00	0.00
186.27	0.09	0.09	0.00	0.00
186.47	0.10	0.10	0.00	0.00
186.67	0.16	0.10	0.06	0.00
186.87	0.29	0.10	0.19	0.00
187.07	0.37	0.11	0.27	0.00
187.27	0.44	0.11	0.33	0.00
187.47	0.49	0.11	0.38	0.00
187.67	0.54	0.12	0.42	0.00
187.87	0.58	0.12	0.46	0.00
188.07	0.62	0.12	0.50	0.00
188.27	0.66	0.13	0.53	0.00
188.47	0.69	0.13	0.56	0.00
188.67	0.73	0.13	0.59	0.00
188.87	0.76	0.13	0.62	0.00
189.07	0.79	0.14	0.65	0.00
189.27	0.82	0.14	0.68	0.00
189.47	0.85	0.14	0.70	0.00
189.67	0.87	0.14	0.73	0.00
189.87	0.90	0.15	0.75	0.00
190.07	1.68	0.15	1.54	0.00
190.27	6.71	0.15	6.56	0.00
190.47	14.21	0.15	14.06	0.00
190.67	26.98	0.16	23.38	3.45
190.87	**43.20**	**0.16**	**31.62**	**11.42**

WQV Elev.: 185.61

WQV Discharge = 0.08 CFS

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

FILTRATION PRACTICE DESIGN CRITERIA (Env-Wq 1508.07)

Type/Node Name: **Infiltration Rain Garden #103 (103P)**

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 1508.07(a).	
4.82	ac	A = Area draining to the practice	
0.59	ac	A_I = Impervious area draining to the practice	
0.12	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.16	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.77	ac-in	WQV= 1" x Rv x A	
2,807	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
702	cf	25% x WQV (check calc for sediment forebay volume)	
2,105	cf	75% x WQV (check calc for surface sand filter volume)	
Forebay		Method of Pretreatment? (not required for clean or roof runoff)	
2,326 cf		V_{SED} = Sediment forebay volume, if used for pretreatment	**≥ 25%WQV**
Calculate time to drain if system IS NOT underdrained:			
400	sf	A_{SA} = Surface area of the practice	
3.00	iph	$Ksat_{DESIGN}$ = Design infiltration rate[1]	
No	Yes/No	If Ksat (prior to factor of safety) is < 0.50 iph, has an underdrain been provided? (Use the calculations below)	
28.1	hours	T_{DRAIN} = Drain time = V / (A_{SA} * I_{DESIGN})	**≤ 72-hrs**
Calculate time to drain if system IS underdrained:			
-	ft	E_{WQV} = Elevation of WQV (attach stage-storage table)	
-	cfs	Q_{WQV} = Discharge at the E_{WQV} (attach stage-discharge table)	
-	hours	T_{DRAIN} = Drain time = 2WQV/Q_{WQV}	**≤ 72-hrs**
177.00	feet	E_{FC} = Elevation of the bottom of the filter course material[2]	
-	feet	E_{UD} = Invert elevation of the underdrain (UD), if applicable	
176.00	feet	E_{SHWT} = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
172.00	feet	E_{ROCK} = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
177.00	feet	$D_{FC\ to\ UD}$ = Depth to UD from the bottom of the filter course	**≥ 1'**
5.00	feet	$D_{FC\ to\ ROCK}$ = Depth to bedrock from the bottom of the filter course	**≥ 1'**
1.00	feet	$D_{FC\ to\ SHWT}$ = Depth to SHWT from the bottom of the filter course	**≥ 1'**
184.26	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
185.00	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**
16,755	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-103	Note what sheet in the plan set contains the filter course specification	
3.0	:1	Pond side slopes	**≥ 3:1**
Sheet	P-103	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: 16,755 CF Infiltrated

Summary for Pond 103P: Infiltration Rain Garden #103

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=5)

Inflow Area =	4.823 ac, 12.26% Impervious,	Inflow Depth > 3.19"	for 50Yr-24Hr event	
Inflow =	11.45 cfs @	12.25 hrs, Volume=	1.282 af	
Outflow =	0.55 cfs @	17.23 hrs, Volume=	0.545 af,	Atten= 95%, Lag= 298.5 min
Discarded =	0.19 cfs @	10.50 hrs, Volume=	0.216 af	
Primary =	0.37 cfs @	17.23 hrs, Volume=	0.330 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 / 3
Peak Elev= 184.26' @ 17.23 hrs Surf.Area= 800 sf Storage= 36,708 cf
Flood Elev= 185.00' Surf.Area= 800 sf Storage= 44,502 cf

Plug-Flow detention time= 343.6 min calculated for 0.545 af (43% of inflow)
Center-of-Mass det. time= 218.4 min (1,066.7 - 848.2)

Volume	Invert	Avail.Storage	Storage Description
#1	178.75'	2,326 cf	**Forebay (Irregular)** Listed below (Recalc) -Impervious
#2	176.00'	160 cf	**Stone (Irregular)** Listed below (Recalc) -Impervious 400 cf Overall x 40.0% Voids
#3	177.00'	120 cf	**BioMedia (Irregular)** Listed below (Recalc) 600 cf Overall x 20.0% Voids
#4	178.50'	20 cf	**Loam Layer (Irregular)** Listed below (Recalc) 100 cf Overall x 20.0% Voids
#5	178.75'	5,694 cf	**Open Water Storage (Irregular)** Listed below (Recalc) -Impervious
#6	180.50'	36,182 cf	**Combined Open Storage (Irregular)** Listed below (Recalc) -Impervious
		44,502 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.75	596	110.0	0	0	596
179.00	877	127.0	183	183	918
180.00	1,279	159.0	1,072	1,255	1,660
180.75	1,583	172.4	1,071	2,326	2,035

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
176.00	400	81.0	0	0	400
177.00	400	81.0	400	400	481

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
177.00	400	81.0	0	0	400
178.50	400	81.0	600	600	522

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.50	400	81.0	0	0	400
178.75	400	81.0	100	100	420

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.75	2,695	220.2	0	0	2,695
179.00	2,861	224.0	694	694	2,840
180.00	3,492	243.0	3,171	3,866	3,584
180.50	3,823	252.0	1,828	5,694	3,960

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
180.50	5,428	327.0	0	0	5,428
181.00	5,926	337.0	2,838	2,838	5,982
182.00	7,062	369.0	6,486	9,323	7,814
183.00	8,231	392.0	7,639	16,962	9,258
184.00	9,490	418.0	8,853	25,815	10,982
185.00	11,269	551.0	10,367	36,182	21,249

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.00'	**10.000 in/hr Exfiltration over Surface area**
#2	Primary	175.00'	**15.0" Round 15" HDPE N-12** L= 109.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.00' / 171.50' S= 0.0321 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Device 2	181.75'	**3.0" Vert. 3" Orifice** C= 0.600
#4	Device 2	184.40'	**48.0" Horiz. 4' Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	184.50'	**10.0' long x 8.5' 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) 2.45 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.65 2.66 2.67 2.69 2.71

Discarded OutFlow Max=0.19 cfs @ 10.50 hrs HW=178.68' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=0.37 cfs @ 17.23 hrs HW=184.26' TW=170.08' (Dynamic Tailwater)
└─**2=15" HDPE N-12** (Passes 0.37 cfs of 17.37 cfs potential flow)
  ├─**3=3" Orifice** (Orifice Controls 0.37 cfs @ 7.44 fps)
  └─**4=4' Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=176.00' TW=175.00' (Dynamic Tailwater)
└─**5=E-Spillway** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 103P: Infiltration Rain Garden #103

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
176.00	0	0	181.30	800	12,984
176.10	0	16	181.40	800	13,616
176.20	0	32	181.50	800	14,258
176.30	0	48	181.60	800	14,912
176.40	0	64	181.70	800	15,577
176.50	0	80	181.80	800	16,254
176.60	0	96	181.90	800	16,943
176.70	0	112	182.00	800	17,643
176.80	0	128	182.10	800	18,355
176.90	0	144	182.20	800	19,078
177.00	400	160	182.30	800	19,813
177.10	400	168	182.40	800	20,559
177.20	400	176	182.50	800	21,316
177.30	400	184	182.60	800	22,086
177.40	400	192	182.70	800	22,867
177.50	400	200	182.80	800	23,660
177.60	400	208	182.90	800	24,465
177.70	400	216	183.00	800	25,282
177.80	400	224	183.10	800	26,111
177.90	400	232	183.20	800	26,953
178.00	400	240	183.30	800	27,806
178.10	400	248	183.40	800	28,673
178.20	400	256	183.50	800	29,551
178.30	400	264	183.60	800	30,442
178.40	400	272	183.70	800	31,346
178.50	**800**	280	183.80	800	32,263
178.60	800	288	183.90	800	33,193
178.70	800	296	184.00	800	34,135
178.80	800	467	184.10	800	35,093
178.90	800	813	184.20	800	36,067
179.00	800	1,177	184.30	800	37,059
179.10	800	1,556	184.40	800	38,069
179.20	800	1,944	184.50	800	39,096
179.30	800	2,343	184.60	800	40,141
179.40	800	2,751	184.70	800	41,204
179.50	800	3,170	184.80	800	42,285
179.60	800	3,599	184.90	800	43,384
179.70	800	4,038	185.00	800	**44,502**
179.80	800	4,488			
179.90	800	4,949			
180.00	800	5,420			
180.10	800	5,903			
180.20	800	6,395			
180.30	800	6,899			
180.40	800	7,412			
180.50	800	7,937			
180.60	800	8,635			
180.70	800	9,346			
180.80	800	9,992			
180.90	800	10,570			
181.00	800	11,157			
181.10	800	11,755			
181.20	800	12,364			

Lowest outlet elev: 181.75
16,755 CF Storage

INFILTRATION PRACTICE CRITERIA
(Env-Wq 1508.06)

NEW HAMPSHIRE DEPARTMENT OF **Environmental Services**

Type/Node Name: **Infiltration Pond #106 Pond #106**

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

Yes		Have you reviewed Env-Wq 1508.06(a) to ensure that infiltration is allowed?	← **yes**
9.32	ac	A = Area draining to the practice	
1.34	ac	A_I = Impervious area draining to the practice	
0.14	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.18	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
1.67	ac-in	WQV= 1" x Rv x A	
6,066	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
1,516	cf	25% x WQV (check calc for sediment forebay volume)	
Behind GW 102		Method of pretreatment? (not required for clean or roof runoff)	
	cf	V_{SED} = Sediment forebay volume, if used for pretreatment	**≥ 25%WQV**
8,997	cf	V = Volume[1] (attach a stage-storage table)	**≥ WQV**
1,828	sf	A_{SA} = Surface area of the bottom of the pond	
3.00	iph	$Ksat_{DESIGN}$ = Design infiltration rate[2]	
13.3	hours	T_{DRAIN} = Drain time = V / (A_{SA} * I_{DESIGN})	**≤ 72-hrs**
183.25	feet	E_{BTM} = Elevation of the bottom of the basin	
181.20	feet	E_{SHWT} = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
179.98	feet	E_{ROCK} = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
2.05	feet	D_{SHWT} = Separation from SHWT	**≥ *** [3]
3.3	feet	D_{ROCK} = Separation from bedrock	**≥ *** [3]
	ft	D_{amend} = Depth of amended soil, if applicable due high infiltation rate	**≥ 24"**
	ft	D_T = Depth of trench, if trench proposed	**4 - 10 ft**
	Yes/No	If a trench or underground system is proposed, has observation well been provided?	← **yes**
		If a trench is proposed, does materialmeet Env-Wq 1508.06(k)(2) requirements.[4]	← **yes**
Yes	Yes/No	If a basin is proposed, Is the perimeter curvilinear, and basin floor flat?	← **yes**
2 or 6	:1	If a basin is proposed, pond side slopes.	**≥3:1**
186.80	ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
186.93	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
188.00	ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES		10 peak elevation ≤ Elevation of the top of the trench?[5]	← **yes**
YES		If a basin is proposed, 50-year peak elevation ≤ Elevation of berm?	← **yes**

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

Designer's Notes: Receives treated stormwater from GW #102 and residential roofs and driveways that sheet down the hill to the BMP

Summary for Pond 106P: Infiltration Pond #106

Inflow Area = 9.319 ac, 14.37% Impervious, Inflow Depth > 1.04" for 10Yr-24Hr event
Inflow = 2.56 cfs @ 12.37 hrs, Volume= 0.809 af
Outflow = 0.90 cfs @ 14.25 hrs, Volume= 0.600 af, Atten= 65%, Lag= 112.9 min
Discarded = 0.13 cfs @ 12.00 hrs, Volume= 0.150 af
Primary = 0.78 cfs @ 14.25 hrs, Volume= 0.449 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 186.80' @ 14.25 hrs Surf.Area= 1,828 sf Storage= 9,194 cf
Flood Elev= 188.00' Surf.Area= 1,828 sf Storage= 15,106 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 79.5 min (1,077.0 - 997.5)

Volume	Invert	Avail.Storage	Storage Description
#1	183.25'	91 cf	**Loam Layer (Irregular)**Listed below (Recalc) 457 cf Overall x 20.0% Voids
#2	183.50'	15,015 cf	**Open Water Storage (Irregular)**Listed below (Recalc) -Impervious
		15,106 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
183.25	1,828	197.0	0	0	1,828
183.50	1,828	197.0	457	457	1,877

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
183.50	1,828	197.0	0	0	1,828
184.00	2,028	203.0	964	964	2,044
185.00	2,449	216.4	2,235	3,199	2,538
186.00	3,365	246.5	2,895	6,094	3,670
187.00	4,426	279.1	3,883	9,977	5,059
188.00	5,675	316.1	5,038	15,015	6,836

Device	Routing	Invert	Outlet Devices
#1	Discarded	183.25'	**3.000 in/hr Exfiltration (Soil 313) over Surface area**
#2	Primary	186.75'	**30.0' long x 11.0' breadth E-Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

Discarded OutFlow Max=0.13 cfs @ 12.00 hrs HW=183.33' (Free Discharge)
└─**1=Exfiltration (Soil 313)** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=0.78 cfs @ 14.25 hrs HW=186.80' TW=182.13' (Dynamic Tailwater)
└─**2=E-Spillway** (Weir Controls 0.78 cfs @ 0.55 fps)

Summary for Pond 106P: Infiltration Pond #106

Inflow Area = 9.319 ac, 14.37% Impervious, Inflow Depth > 1.86" for 50Yr-24Hr event
Inflow = 7.11 cfs @ 12.31 hrs, Volume= 1.444 af
Outflow = 6.00 cfs @ 12.52 hrs, Volume= 1.234 af, Atten= 16%, Lag= 12.3 min
Discarded = 0.13 cfs @ 11.25 hrs, Volume= 0.164 af
Primary = 5.87 cfs @ 12.52 hrs, Volume= 1.070 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 186.93' @ 12.52 hrs Surf.Area= 1,828 sf Storage= 9,770 cf
Flood Elev= 188.00' Surf.Area= 1,828 sf Storage= 15,106 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 39.4 min (996.2 - 956.8)

Volume	Invert	Avail.Storage	Storage Description
#1	183.25'	91 cf	**Loam Layer (Irregular)** Listed below (Recalc) 457 cf Overall x 20.0% Voids
#2	183.50'	15,015 cf	**Open Water Storage (Irregular)** Listed below (Recalc) -Impervious
		15,106 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
183.25	1,828	197.0	0	0	1,828
183.50	1,828	197.0	457	457	1,877

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
183.50	1,828	197.0	0	0	1,828
184.00	2,028	203.0	964	964	2,044
185.00	2,449	216.4	2,235	3,199	2,538
186.00	3,365	246.5	2,895	6,094	3,670
187.00	4,426	279.1	3,883	9,977	5,059
188.00	5,675	316.1	5,038	15,015	6,836

Device	Routing	Invert	Outlet Devices
#1	Discarded	183.25'	**3.000 in/hr Exfiltration (Soil 313) over Surface area**
#2	Primary	186.75'	**30.0' long x 11.0' breadth E-Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

Discarded OutFlow Max=0.13 cfs @ 11.25 hrs HW=183.32' (Free Discharge)
└─**1=Exfiltration (Soil 313)** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=5.59 cfs @ 12.52 hrs HW=186.93' TW=182.27' (Dynamic Tailwater)
└─**2=E-Spillway** (Weir Controls 5.59 cfs @ 1.06 fps)

Stage-Area-Storage for Pond 106P: Infiltration Pond #106

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
183.25	**1,828**	0	185.90	1,828	5,853
183.30	1,828	18	185.95	1,828	6,018
183.35	1,828	37	186.00	1,828	6,185
183.40	1,828	55	186.05	1,828	6,355
183.45	1,828	73	186.10	1,828	6,527
183.50	1,828	91	186.15	1,828	6,701
183.55	1,828	183	186.20	1,828	6,878
183.60	1,828	276	186.25	1,828	7,058
183.65	1,828	370	186.30	1,828	7,240
183.70	1,828	465	186.35	1,828	7,424
183.75	1,828	561	186.40	1,828	7,612
183.80	1,828	658	186.45	1,828	7,802
183.85	1,828	755	186.50	1,828	7,994
183.90	1,828	854	186.55	1,828	8,189
183.95	1,828	954	186.60	1,828	8,387
184.00	1,828	1,055	186.65	1,828	8,588
184.05	1,828	1,157	186.70	1,828	8,791
184.10	1,828	1,260	186.75	1,828	8,997
184.15	1,828	1,364	186.80	1,828	9,206
184.20	1,828	1,469	186.85	1,828	9,417
184.25	1,828	1,575	186.90	1,828	9,632
184.30	1,828	1,682	186.95	1,828	9,849
184.35	1,828	1,790	187.00	1,828	10,068
184.40	1,828	1,899	187.05	1,828	10,291
184.45	1,828	2,009	187.10	1,828	10,517
184.50	1,828	2,120	187.15	1,828	10,746
184.55	1,828	2,232	187.20	1,828	10,977
184.60	1,828	2,345	187.25	1,828	11,212
184.65	1,828	2,460	187.30	1,828	11,450
184.70	1,828	2,575	187.35	1,828	11,690
184.75	1,828	2,692	187.40	1,828	11,934
184.80	1,828	2,809	187.45	1,828	12,181
184.85	1,828	2,928	187.50	1,828	12,431
184.90	1,828	3,047	187.55	1,828	12,684
184.95	1,828	3,168	187.60	1,828	12,941
185.00	1,828	3,290	187.65	1,828	13,200
185.05	1,828	3,414	187.70	1,828	13,463
185.10	1,828	3,539	187.75	1,828	13,728
185.15	1,828	3,667	187.80	1,828	13,997
185.20	1,828	3,797	187.85	1,828	14,270
185.25	1,828	3,929	187.90	1,828	14,545
185.30	1,828	4,063	187.95	1,828	14,824
185.35	1,828	4,200	188.00	1,828	**15,106**
185.40	1,828	4,339			
185.45	1,828	4,480			
185.50	1,828	4,623			
185.55	1,828	4,769			
185.60	1,828	4,917			
185.65	1,828	5,067			
185.70	1,828	5,219			
185.75	1,828	5,374			
185.80	1,828	5,532			
185.85	1,828	5,691			

Lowest outlet elev: 186.75
8,997 CF Storage

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

FILTRATION PRACTICE DESIGN CRITERIA
(Env-Wq 1508.07)

Type/Node Name: **Rain Garden #107 Pond #107**

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 1508.07(a).	
1.30	ac	A = Area draining to the practice	
0.24	ac	A_I = Impervious area draining to the practice	
0.18	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.22	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.28	ac-in	WQV= 1" x Rv x A	
1,017	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
254	cf	25% x WQV (check calc for sediment forebay volume)	
763	cf	75% x WQV (check calc for surface sand filter volume)	
Forebay		Method of Pretreatment? (not required for clean or roof runoff)	
990	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:			
239.34	ft	E_{WQV} = Elevation of WQV (attach stage-storage table)	
0.10	cfs	Q_{WQV} = Discharge at the E_{WQV} (attach stage-discharge table)	
5.65	hours	T_{DRAIN} = Drain time = 2WQV/Q_{WQV}	**≤ 72-hrs**
237.50	feet	E_{FC} = Elevation of the bottom of the filter course material[2]	
236.50	feet	E_{UD} = Invert elevation of the underdrain (UD), if applicable	
237.50	feet	E_{SHWT} = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
230.00	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'**
7.50	feet	$D_{FC\ to\ ROCK}$ = Depth to bedrock from the bottom of the filter course	**≥ 1'**
-	feet	$D_{FC\ to\ SHWT}$ = Depth to SHWT from the bottom of the filter course	**≥ 1'**
241.35	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
244.00	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
1,398	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	P107	Note what sheet in the plan set contains the filter course specification	
3.0	:1	Pond side slopes	≥ 3:1
Sheet	P-07	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 107P: Rain Garden #107

Inflow Area = 1.295 ac, 18.49% Impervious, Inflow Depth > 4.41" for 50Yr-24Hr event
Inflow = 4.23 cfs @ 12.16 hrs, Volume= 0.476 af
Outflow = 0.67 cfs @ 13.45 hrs, Volume= 0.423 af, Atten= 84%, Lag= 77.0 min
Primary = 0.55 cfs @ 13.45 hrs, Volume= 0.292 af
Secondary = 0.13 cfs @ 13.45 hrs, Volume= 0.131 af
Tertiary = 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 / 3
Peak Elev= 241.35' @ 13.45 hrs Surf.Area= 6,879 sf Storage= 8,548 cf
Flood Elev= 244.00' Surf.Area= 7,350 sf Storage= 26,385 cf

Plug-Flow detention time= 181.3 min calculated for 0.423 af (89% of inflow)
Center-of-Mass det. time= 130.8 min (960.6 - 829.9)

Volume	Invert	Avail.Storage	Storage Description
#1	244.00'	990 cf	**Forebay (Irregular)** Listed below (Recalc)
#2	236.50'	917 cf	**Stone (Irregular)** Listed below (Recalc) 2,293 cf Overall x 40.0% Voids
#3	237.50'	688 cf	**BioMedia (Irregular)** Listed below (Recalc) 3,440 cf Overall x 20.0% Voids
#4	239.00'	115 cf	**Loam Layer (Irregular)** Listed below (Recalc) 573 cf Overall x 20.0% Voids
#5	239.25'	24,666 cf	**Open Water Storage (Irregular)** Listed below (Recalc) -Impervious
		27,376 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
244.00	471	107.0	0	0	471
245.00	500	112.0	485	485	611
246.00	510	115.0	505	990	737

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
236.50	2,293	170.0	0	0	2,293
237.50	2,293	170.0	2,293	2,293	2,463

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
237.50	2,293	170.0	0	0	2,293
239.00	2,293	170.0	3,440	3,440	2,548

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
239.00	2,293	170.0	0	0	2,293
239.25	2,293	170.0	573	573	2,336

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
239.25	2,293	170.0	0	0	2,293
240.00	2,834	189.0	1,919	1,919	2,852
242.00	5,436	328.0	8,130	10,049	8,594
244.00	9,357	405.0	14,617	24,666	13,145

Device	Routing	Invert	Outlet Devices
#1	Primary	236.50'	**15.0" Round 15" HDPE N-12** L= 28.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 236.50' / 236.25' S= 0.0089 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	236.50'	**6.0" Round 6" U.D.** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 236.50' / 236.50' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#3	Device 2	236.50'	**1.5" Vert. 1.5" Orifice End Cap** C= 0.600
#4	Device 3	236.50'	**8.000 in/hr Exfiltration over Surface area**
#5	Device 1	239.50'	**4.0" Vert. 4" Orifice** C= 0.600
#6	Device 1	243.00'	**48.0" Horiz. 4' Grate** C= 0.600 Limited to weir flow at low heads
#7	Tertiary	243.50'	**20.0' 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 @ 13.45 hrs HW=241.35' TW=236.16' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Passes 0.55 cfs of 12.15 cfs potential flow)
  ├─**5=4" Orifice** (Orifice Controls 0.55 cfs @ 6.25 fps)
  └─**6=4' Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.13 cfs @ 13.45 hrs HW=241.35' TW=236.16' (Dynamic Tailwater)
└─**2=6" U.D.** (Passes 0.13 cfs of 2.03 cfs potential flow)
  └─**3=1.5" Orifice End Cap** (Orifice Controls 0.13 cfs @ 10.54 fps)
    └─**4=Exfiltration** (Passes 0.13 cfs of 1.27 cfs potential flow)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=236.50' TW=236.00' (Dynamic Tailwater)
└─**7=E-Spillway** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 107P: Rain Garden #107

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
236.50	2,293	0	241.80	6,879	10,712
236.60	2,293	92	241.90	6,879	11,233
236.70	2,293	183	242.00	6,879	11,769
236.80	2,293	275	242.10	6,879	12,321
236.90	2,293	367	242.20	6,879	12,890
237.00	2,293	459	242.30	6,879	13,477
237.10	2,293	550	242.40	6,879	14,082
237.20	2,293	642	242.50	6,879	14,704
237.30	2,293	734	242.60	6,879	15,345
237.40	2,293	825	242.70	6,879	16,005
237.50	4,586	917	242.80	6,879	16,683
237.60	4,586	963	242.90	6,879	17,380
237.70	4,586	1,009	243.00	6,879	18,097
237.80	4,586	1,055	243.10	6,879	18,833
237.90	4,586	1,101	243.20	6,879	19,589
238.00	4,586	1,147	243.30	6,879	20,366
238.10	4,586	1,192	243.40	6,879	21,162
238.20	4,586	1,238	243.50	6,879	21,980
238.30	4,586	1,284	243.60	6,879	22,818
238.40	4,586	1,330	243.70	6,879	23,677
238.50	4,586	1,376	243.80	6,879	24,558
238.60	4,586	1,422	243.90	6,879	25,461
238.70	4,586	1,468	244.00	7,350	26,385
238.80	4,586	1,513	244.10	7,353	26,433
238.90	4,586	1,559	244.20	7,356	26,480
239.00	6,879	1,605	244.30	7,359	26,528
239.10	6,879	1,651	244.40	7,361	26,576
239.20	6,879	1,697	244.50	7,364	26,625
239.30	6,879	1,835	244.60	7,367	26,673
239.40	6,879	2,071	244.70	7,370	26,722
239.50	6,879	2,315	244.80	7,373	26,771
239.60	6,879	2,565	244.90	7,376	26,821
239.70	6,879	2,822	245.00	7,379	26,871
239.80	6,879	3,087	245.10	7,380	26,921
239.90	6,879	3,359	245.20	7,381	26,971
240.00	6,879	3,639	245.30	7,382	27,021
240.10	6,879	3,928	245.40	7,383	27,072
240.20	6,879	4,228	245.50	7,384	27,122
240.30	6,879	4,539	245.60	7,385	27,173
240.40	6,879	4,862	245.70	7,386	27,223
240.50	6,879	5,197	245.80	7,387	27,274
240.60	6,879	5,543	245.90	7,388	27,325
240.70	6,879	5,902	246.00	**7,389**	**27,376**
240.80	6,879	6,273			
240.90	6,879	6,657			
241.00	6,879	7,053			
241.10	6,879	7,463			
241.20	6,879	7,886			
241.30	6,879	8,322			
241.40	6,879	8,772			
241.50	6,879	9,235			
241.60	6,879	9,713			
241.70	6,879	10,205			

WQV =
1,017 CF

WQV Elev
= 239.34

Stage-Discharge for Pond 107P: Rain Garden #107

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Tertiary (cfs)
236.50	0.00	0.00	0.00	0.00
236.70	0.02	0.00	0.02	0.00
236.90	0.03	0.00	0.03	0.00
237.10	0.04	0.00	0.04	0.00
237.30	0.05	0.00	0.05	0.00
237.50	0.06	0.00	0.06	0.00
237.70	0.06	0.00	0.06	0.00
237.90	0.07	0.00	0.07	0.00
238.10	0.07	0.00	0.07	0.00
238.30	0.08	0.00	0.08	0.00
238.50	0.08	0.00	0.08	0.00
238.70	0.09	0.00	0.09	0.00
238.90	0.09	0.00	0.09	0.00
239.10	0.09	0.00	0.09	0.00
239.30	0.10	0.00	0.10	0.00
239.50	0.10	0.00	0.10	0.00
239.70	0.19	0.08	0.10	0.00
239.90	0.31	0.20	0.11	0.00
240.10	0.39	0.28	0.11	0.00
240.30	0.45	0.33	0.11	0.00
240.50	0.50	0.38	0.12	0.00
240.70	0.55	0.43	0.12	0.00
240.90	0.59	0.47	0.12	0.00
241.10	0.63	0.50	0.13	0.00
241.30	0.67	0.54	0.13	0.00
241.50	0.70	0.57	0.13	0.00
241.70	0.73	0.60	0.13	0.00
241.90	0.76	0.63	0.14	0.00
242.10	0.79	0.66	0.14	0.00
242.30	0.82	0.68	0.14	0.00
242.50	0.85	0.71	0.14	0.00
242.70	0.88	0.73	0.15	0.00
242.90	0.90	0.76	0.15	0.00
243.10	2.23	2.08	0.15	0.00
243.30	7.71	7.55	0.15	0.00
243.50	15.07	14.92	0.16	0.00
243.70	19.71	15.15	0.16	4.40
243.90	28.44	15.38	0.16	12.90
244.10	40.86	15.61	0.16	25.10
244.30	54.49	15.83	0.16	38.50
244.50	69.81	16.05	0.17	53.60
244.70	86.89	16.26	0.17	70.46
244.90	105.10	16.48	0.17	88.46
245.10	123.72	16.69	0.17	106.86
245.30	144.58	16.89	0.17	127.51
245.50	166.62	17.10	0.18	149.34
245.70	190.04	17.30	0.18	172.55
245.90	**214.59**	**17.50**	**0.18**	**196.91**

WQV Elev = 239.34

WQV Discharge = 0.10 CFS

Stage-Area-Storage for Pond 107P: Rain Garden #107

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
236.50	2,293	0
236.60	2,293	92
236.70	2,293	183
236.80	2,293	275
236.90	2,293	367
237.00	2,293	459
237.10	2,293	550
237.20	2,293	642
237.30	2,293	734
237.40	2,293	825
237.50	4,586	917
237.60	4,586	963
237.70	4,586	1,009
237.80	4,586	1,055
237.90	4,586	1,101
238.00	4,586	1,147
238.10	4,586	1,192
238.20	4,586	1,238
238.30	4,586	1,284
238.40	4,586	1,330
238.50	4,586	1,376
238.60	4,586	1,422
238.70	4,586	1,468
238.80	4,586	1,513
238.90	4,586	1,559
239.00	6,879	1,605
239.10	6,879	1,651
239.20	6,879	1,697
239.30	6,879	1,835
239.40	6,879	2,071
239.50	6,879	2,315
239.60	6,879	2,565
239.70	6,879	2,822
239.80	6,879	3,087
239.90	6,879	3,359
240.00	6,879	3,639
240.10	6,879	3,928
240.20	6,879	4,228
240.30	6,879	4,539
240.40	6,879	4,862
240.50	6,879	5,197
240.60	6,879	5,543
240.70	6,879	5,902
240.80	6,879	6,273
240.90	6,879	6,657
241.00	6,879	7,053
241.10	6,879	7,463
241.20	6,879	7,886
241.30	6,879	8,322
241.40	6,879	8,772
241.50	6,879	9,235
241.60	6,879	9,713
241.70	6,879	10,205
241.80	6,879	10,712
241.90	6,879	11,233
242.00	6,879	11,769
242.10	6,879	12,321
242.20	6,879	12,890
242.30	6,879	13,477
242.40	6,879	14,082
242.50	6,879	14,704
242.60	6,879	15,345
242.70	6,879	16,005
242.80	6,879	16,683
242.90	6,879	17,380
243.00	6,879	18,097
243.10	6,879	18,833
243.20	6,879	19,589
243.30	6,879	20,366
243.40	6,879	21,162
243.50	6,879	21,980
243.60	6,879	22,818
243.70	6,879	23,677
243.80	6,879	24,558
243.90	6,879	25,461
244.00	7,350	26,385
244.10	7,353	26,433
244.20	7,356	26,480
244.30	7,359	26,528
244.40	7,361	26,576
244.50	7,364	26,625
244.60	7,367	26,673
244.70	7,370	26,722
244.80	7,373	26,771
244.90	7,376	26,821
245.00	7,379	26,871
245.10	7,380	26,921
245.20	7,381	26,971
245.30	7,382	27,021
245.40	7,383	27,072
245.50	7,384	27,122
245.60	7,385	27,173
245.70	7,386	27,223
245.80	7,387	27,274
245.90	7,388	27,325
246.00	**7,389**	**27,376**

Lowest outlet = 239.50

Total Storage = 1,398 CF

GRAVEL WETLAND DESIGN CRITERIA
(Env-Wq 1508.05)

Type/Node Name: **Subsurface Gravel Wetland #108 (108P)**

Enter the node name in the drainage analysis if applicable.

1.47	ac	A = Area draining to the practice	
0.21	ac	A_I = Impervious area draining to the practice	
0.14	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.18	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.26	ac-in	WQV= 1" x Rv x A	
948	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
95	cf	10% x WQV (check calc for sediment forebay)	
427	cf	45% x WQV (check calc for gravel wetland treatment bay volume)	
869	cf	V_{SED} = Sediment forebay volume	**$\geq$ 10%WQV**
1,076	cf	V_{TB1} = Volume of treatment bay 1 [1]	**$\geq$ 45%WQV**
1,097	cf	V_{TB2} = Volume of treatment bay 2 [1]	**$\geq$ 45%WQV**
0.02	cfs	$2Q_{avg}$ = 2* WQV / 24 hrs * (1hr / 3600 sec)[2]	
183.91	ft	E_{WQV} = Elevation of WQV (attach stage-storage table)	
0.02	cfs	Q_{WQV} = Discharge at the E_{WQV} (attach stage-discharge table)	**$< 2Q_{avg}$**
26.35	hours	T_{ED} = Drawdown time of extended detention = $2WQV/Q_{WQV}$	**$\geq$ 24-hrs**
2 or 4	:1	Pond side slopes	**$\geq$ 3:1**
188.70	ft	Elevation of SHWT	
186.70	ft	SHWT - 2 feet	
183.17	ft	Epp = Elevation of the permanent pool (elevation of lowest orifice)[3]	**$\leq E_{SHWT}$ - 2 ft**
31 & 30	ft	Length of the flow path between the inlet and outlet in each cell	**$\geq$ 15 ft**
Angle Grate		What mechanism is proposed to prevent the outlet structure from clogging (applicable for orifices/weirs with a dimension of $\leq$6")?	
185.31	ft	Peak elevation of the 50-year storm event (E_{50})	
185.50	ft	Berm elevation of the pond	
YES		$E_{50} \leq$ the berm elevation?	**← yes**

Qualified professional that developed the planting plan
Name, Profession:

1. Volume stored above the wetland soil and below the high flow by-pass.
2. To ensure orifice is sized so that WQV is released at a relatively stable rate.
3. 4" to 8" below the wetland soil. If lowest orifice is higher than (SHWT - 2 feet), and saturated hydraulic conductivity (Ksat) is greater than 0.015 in/hr, the system must be lined.

Designer's Notes: K Sat Sutton > 0.015 in/hr - system to be lined with low perm material

Summary for Pond 108P: Gravel Wetland #108

Inflow Area = 1.471 ac, 14.18% Impervious, Inflow Depth > 3.44" for 50Yr-24Hr event
Inflow = 3.56 cfs @ 12.33 hrs, Volume= 0.422 af
Outflow = 2.11 cfs @ 12.30 hrs, Volume= 0.312 af, Atten= 41%, Lag= 0.0 min
Primary = 0.02 cfs @ 12.16 hrs, Volume= 0.006 af
Secondary = 2.39 cfs @ 12.33 hrs, Volume= 0.316 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 185.31' @ 12.68 hrs Surf.Area= 8,202 sf Storage= 6,117 cf
Flood Elev= 185.50' Surf.Area= 8,518 sf Storage= 7,043 cf

Plug-Flow detention time= 139.9 min calculated for 0.312 af (74% of inflow)
Center-of-Mass det. time= 51.5 min (898.0 - 846.5)

Volume	Invert	Avail.Storage	Storage Description
#1	183.50'	869 cf	**Forebay (Irregular)** Listed below (Recalc)
#2	183.50'	1,076 cf	**Cell #1 (Irregular)** Listed below (Recalc)
#3	183.50'	1,097 cf	**Cell #2 (Irregular)** Listed below (Recalc)
#4	184.50'	6,712 cf	**Open Water Storage (Irregular)** Listed below (Recalc)
#5	183.17'	6 cf	**2.00'D x 1.83'H 4' Structure**
		9,759 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
183.50	287	76.3	0	0	287
184.00	458	91.8	185	185	499
185.00	939	259.1	684	869	5,173

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
183.50	886	113.9	0	0	886
184.00	1,073	125.1	489	489	1,107
184.50	1,277	136.4	587	1,076	1,351

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
183.50	905	114.7	0	0	905
184.00	1,094	125.8	499	499	1,126
184.50	1,299	136.9	598	1,097	1,367

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.50	2,662	217.0	0	0	2,662
185.00	4,197	273.8	1,700	1,700	4,884
186.00	5,873	369.2	5,012	6,712	9,776

Device	Routing	Invert	Outlet Devices
#1	Primary	183.17'	**12.0" Round 12" HDPE** L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 183.17' / 183.00' S= 0.0049 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Secondary	183.25'	**12.0" Round 12" HDPE N-12** L= 47.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 183.25' / 183.00' S= 0.0053 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Device 1	183.17'	**1.0" Vert. 1.0" Orifice** C= 0.600
#4	Device 2	184.00'	**3.0" W x 9.0" H Vert. 3"Wx6"T Slot** C= 0.600
#5	Device 2	184.75'	**60.0" Horiz. 5' Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.02 cfs @ 12.16 hrs HW=184.55' TW=183.93' (Dynamic Tailwater)
└─**1=12" HDPE** (Passes 0.02 cfs of 2.96 cfs potential flow)
  └─**3=1.0" Orifice** (Orifice Controls 0.02 cfs @ 3.76 fps)

Secondary OutFlow Max=1.20 cfs @ 12.33 hrs HW=184.91' TW=184.81' (Dynamic Tailwater)
└─**2=12" HDPE N-12** (Inlet Controls 1.20 cfs @ 1.53 fps)
  ├─**4=3"Wx6"T Slot** (Passes < 0.29 cfs potential flow)
  └─**5=5' Grate** (Passes < 2.92 cfs potential flow)

Stage-Area-Storage for Pond 108P: Gravel Wetland #108

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
183.17	0	184.23	1,811	185.29	6,030
183.19	0	184.25	1,870	185.31	6,123
183.21	0	184.27	1,929	185.33	6,217
183.23	0	184.29	1,988	185.35	6,312
183.25	0	184.31	2,048	185.37	6,408
183.27	0	184.33	2,109	185.39	6,504
183.29	0	184.35	2,169	185.41	6,600
183.31	0	184.37	2,231	185.43	6,698
183.33	1	184.39	2,293	185.45	6,796
183.35	1	184.41	2,355	185.47	6,894
183.37	1	184.43	2,418	185.49	6,994
183.39	1	184.45	2,482	185.51	7,094
183.41	1	184.47	2,546	185.53	7,194
183.43	1	184.49	2,611	185.55	7,296
183.45	1	184.51	2,677	185.57	7,398
183.47	1	184.53	2,745	185.59	7,500
183.49	1	184.55	2,814	185.61	7,604
183.51	22	184.57	2,885	185.63	7,708
183.53	64	184.59	2,957	185.65	7,812
183.55	106	184.61	3,030	185.67	7,918
183.57	149	184.63	3,105	185.69	8,024
183.59	193	184.65	3,181	185.71	8,131
183.61	236	184.67	3,259	185.73	8,238
183.63	280	184.69	3,338	185.75	8,347
183.65	325	184.71	3,418	185.77	8,455
183.67	370	184.73	3,500	185.79	8,565
183.69	415	184.75	3,583	185.81	8,675
183.71	461	184.77	3,667	185.83	8,786
183.73	507	184.79	3,753	185.85	8,898
183.75	554	184.81	3,841	185.87	9,010
183.77	601	184.83	3,930	185.89	9,124
183.79	649	184.85	4,020	185.91	9,237
183.81	697	184.87	4,112	185.93	9,352
183.83	745	184.89	4,206	185.95	9,467
183.85	794	184.91	4,301	185.97	9,583
183.87	843	184.93	4,397	185.99	**9,700**
183.89	893	184.95	4,495		
183.91	943	184.97	4,595		
183.93	994	184.99	4,696		
183.95	1,045	185.01	4,789		
183.97	1,097	185.03	4,874		
183.99	1,149	185.05	4,959		
184.01	1,202	185.07	5,045		
184.03	1,255	185.09	5,131		
184.05	1,308	185.11	5,218		
184.07	1,362	185.13	5,306		
184.09	1,417	185.15	5,394		
184.11	1,472	185.17	5,483		
184.13	1,527	185.19	5,573		
184.15	1,583	185.21	5,663		
184.17	1,639	185.23	5,754		
184.19	1,696	185.25	5,845		
184.21	1,754	185.27	5,937		

WQV Elev.: 183.91

WQV = 948 CF

Stage-Discharge for Pond 108P: Gravel Wetland #108

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
183.17	0.00	0.00	0.00
183.22	0.00	0.00	0.00
183.27	0.01	0.01	0.00
183.32	0.01	0.01	0.00
183.37	0.01	0.01	0.00
183.42	0.01	0.01	0.00
183.47	0.01	0.01	0.00
183.52	0.01	0.01	0.00
183.57	0.02	0.02	0.00
183.62	0.02	0.02	0.00
183.67	0.02	0.02	0.00
183.72	0.02	0.02	0.00
183.77	0.02	0.02	0.00
183.82	0.02	0.02	0.00
183.87	0.02	0.02	0.00
183.92	0.02	0.02	0.00
183.97	0.02	0.02	0.00
184.02	0.03	0.02	0.00
184.07	0.04	0.02	0.01
184.12	0.06	0.03	0.03
184.17	0.08	0.03	0.06
184.22	0.11	0.03	0.08
184.27	0.14	0.03	0.11
184.32	0.17	0.03	0.15
184.37	0.21	0.03	0.18
184.42	0.25	0.03	0.22
184.47	0.29	0.03	0.26
184.52	0.33	0.03	0.30
184.57	0.38	0.03	0.35
184.62	0.42	0.03	0.39
184.67	0.47	0.03	0.44
184.72	0.52	0.03	0.49
184.77	0.72	0.03	0.69
184.82	1.57	0.03	1.53
184.87	2.79	0.03	2.75
184.92	3.67	0.03	3.64
184.97	3.77	0.03	3.74
185.02	3.87	0.04	3.83
185.07	3.96	0.04	3.93
185.12	4.05	0.04	4.02
185.17	4.14	0.04	4.11
185.22	4.23	0.04	4.19
185.27	4.32	0.04	4.28
185.32	4.40	0.04	4.36
185.37	4.48	0.04	4.44
185.42	4.56	0.04	4.52
185.47	4.64	0.04	4.60
185.52	4.72	0.04	4.68
185.57	4.80	0.04	4.76
185.62	4.87	0.04	4.83
185.67	4.95	0.04	4.91
185.72	5.02	0.04	4.98
185.77	5.09	0.04	5.05
185.82	5.16	0.04	5.12
185.87	5.23	0.04	5.19
185.92	5.30	0.04	5.26
185.97	**5.37**	**0.04**	**5.33**

WQV Elev.:
183.91

WQV Discharge
= 0.02 CFS

TREATMENT SWALE DESIGN CRITERIA
(Env-Wq 1508.08)

Node Name: Treatment Swale #1 Reach 33

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

yes	Yes/No	Have you reviewed the restrictions on unlined swales outlined in Env-Wq 1508.08(a)?	
YES	Yes/No	Is the system lined? (required if not treated or if above SHWT)	
0.39	ac	A = Area draining to the practice	
0.15	ac	A_I = Impervious area draining to the practice	
6.0	minutes	T_c = Time of Concentration	
0.38	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.39	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.15	ac-in	WQV= 1" x Rv x A	
550	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
1	inches	P = Amount of rainfall. For WQF in NH, P = 1".	
0.39	inches	D_{WQ} = Water quality depth. D_{WQ} = WQV/A	
92	unitless	CN = Unit peak discharge curve number. CN =1000/(10+5P+10Q–10*[Q^2 + 1.25*Q*P]$^{0.5}$)	
0.90	inches	S = Potential maximum retention. S = (1000/CN) - 10	
0.181	inches	Ia = initial abstraction. Ia = 0.2S	
645	cfs/mi^2/in	q_u = Unit peak discharge. Obtain this value from TR-55 exhibits 4-II and 4-III	
0.15	cfs	WQF = q_u x WQV. Conversion: to convert "cfs/mi^2/in * ac-in" to "cfs" multiply by 1mi^2/640ac	
135.00	feet	L = Swale length [1]	**≥ 100'**
8.00	feet	w = Bottom of the swale width[2]	**0 - 8 feet**
182.00	feet	E_{SHWT} = Elevation of SHWT. If none found, use the lowest elev. of test pit.	
184.00	feet	E_{BTM} = Elevation of the bottom of the practice	**≥ E_{SHWT}**
6.00	:1	SS_{RIGHT} = Right side slope	**≥3:1**
6.00	:1	SS_{LEFT} = Left side slope	**≥3:1**
0.01	ft/ft	S = Slope of swale in decimal form[3]	**0.005 - .05**
1.14	inches	d = Flow depth in swale at WQF (attach stage-discharge table)	**≤ 4"**
0.15	unitless	d must be < 4", therefore Manning's n = 0.15	
0.81	ft^2	Cross-sectional area check (assume trapezoidal channel)	
9.16	feet	Check wetted perimeter	
0.14	cfs	WQF_{check}.[4]	**WQF_{check} = WQF?**
-10%		Percent difference between WQF_{check} and WQF [4]	**+/- 10%**
12	minutes	HRT = hydraulic residence time during the WQF	**≥ 10 min**
185.18	ft	Peak elevation of the 10-year storm event[5]	
186.00	ft	Elevation of the top of the swale	
YES	Yes/No	10 peak elevation ≤ the top of swale	**← yes**

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

Designer's Notes: Forebay CF size is 217 CF at elevation 185.0 10% WQV = 55 CF Pre-Treatment Req.
provided

GENERAL CALCULATIONS - WQV and WQF
(optional worksheet)

This worksheet may be useful when designing a BMP **that does not fit into one of the specific worksheets already provided** (i.e. for a technology which is not a stormwater wetland, infiltration practice, etc.)

Water Quality Volume (WQV)

0.39	ac	A = Area draining to the practice
0.15	ac	A_I = Impervious area draining to the practice
0.38	decimal	I = Percent impervious area draining to the practice, in decimal form
0.39	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)
0.15	ac-in	WQV= 1” x Rv x A
550	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12”)

Water Quality Flow (WQF)

1	inches	P = Amount of rainfall. For WQF in NH, P = 1".
0.39	inches	Q = Water quality depth. Q = WQV/A
92	unitless	CN = Unit peak discharge curve number. CN =1000/(10+5P+10Q–10*$[Q^2 + 1.25*Q*P]^{0.5}$)
0.9	inches	S = Potential maximum retention. S = (1000/CN) - 10
0.181	inches	Ia = Initial abstraction. Ia = 0.2S
6.0	minutes	T_c = Time of Concentration
645.0	$cfs/mi^2/in$	q_u is the unit peak discharge. Obtain this value from TR-55 exhibits 4-II and 4-III.
0.153	cfs	WQF = q_u x WQV. Conversion: to convert "$cfs/mi^2/in$ * ac-in" to "cfs" multiply by $1mi^2$/640ac.

Designer's Notes:

Summary for Reach 33R: Reach #33 Treatment Swale

Inflow Area = 0.389 ac, 37.71% Impervious, Inflow Depth > 1.36" for 10Yr-24Hr event
Inflow = 0.63 cfs @ 12.14 hrs, Volume= 0.044 af
Outflow = 0.44 cfs @ 12.26 hrs, Volume= 0.044 af, Atten= 29%, Lag= 7.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.27 fps, Min. Travel Time= 8.3 min
Avg. Velocity = 0.10 fps, Avg. Travel Time= 22.4 min

Peak Storage= 222 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 1.00' Flow Area= 14.0 sf, Capacity= 10.03 cfs

8.00' x 1.00' deep channel, n= 0.140
Side Slope Z-value= 6.0 '/' Top Width= 20.00'
Length= 135.0' Slope= 0.0074 '/'
Inlet Invert= 185.00', Outlet Invert= 184.00'

‡

Stage-Discharge for Reach 33R: Reach #33 Treatment Swale

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)	Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
185.00	0.00	0.00	185.53	0.50	2.99
185.01	0.04	0.00	185.54	0.51	3.09
185.02	0.07	0.01	185.55	0.51	3.20
185.03	0.09	0.02	185.56	0.52	3.31
185.04	0.10	0.03	185.57	0.53	3.42
185.05	0.12	0.05	185.58	0.53	3.53
185.06	0.14	0.07	185.59	0.54	3.64
185.07	0.15	0.09	185.60	0.54	3.76
185.08	0.16	0.11	185.61	0.55	3.88
185.09	0.18	0.14	185.62	0.55	4.00
185.10	0.19	0.16	185.63	0.56	4.12
185.11	0.20	0.19	185.64	0.56	4.24
185.12	0.21	0.22	185.65	0.56	4.37
185.13	0.22	0.25	185.66	0.57	4.50
185.14	0.23	0.29	185.67	0.57	4.63
185.15	0.24	0.32	185.68	0.58	4.76
185.16	0.25	0.36	185.69	0.58	4.89
185.17	0.26	0.40	185.70	0.59	5.03
185.18	0.27	0.44	185.71	0.59	5.16
185.19	0.28	0.48	185.72	0.60	5.30
185.20	0.29	0.53	185.73	0.60	5.44
185.21	0.30	0.58	185.74	0.61	5.59
185.22	0.30	0.62	185.75	0.61	5.73
185.23	0.31	0.67	185.76	0.62	5.88
185.24	0.32	0.73	185.77	0.62	6.03
185.25	0.33	0.78	185.78	0.62	6.18
185.26	0.34	0.83	185.79	0.63	6.33
185.27	0.34	0.89	185.80	0.63	6.49
185.28	0.35	0.95	185.81	0.64	6.64
185.29	0.36	1.01	185.82	0.64	6.80
185.30	0.36	1.07	185.83	0.65	6.96
185.31	0.37	1.14	185.84	0.65	7.13
185.32	0.38	1.20	185.85	0.65	7.29
185.33	0.39	1.27	185.86	0.66	7.46
185.34	0.39	1.34	185.87	0.66	7.63
185.35	0.40	1.41	185.88	0.67	7.80
185.36	0.41	1.48	185.89	0.67	7.98
185.37	0.41	1.56	185.90	0.68	8.15
185.38	0.42	1.63	185.91	0.68	8.33
185.39	0.42	1.71	185.92	0.68	8.51
185.40	0.43	1.79	185.93	0.69	8.69
185.41	0.44	1.87	185.94	0.69	8.88
185.42	0.44	1.95	185.95	0.70	9.06
185.43	0.45	2.04	185.96	0.70	9.25
185.44	0.45	2.13	185.97	0.70	9.44
185.45	0.46	2.22	185.98	0.71	9.64
185.46	0.47	2.31	185.99	0.71	9.83
185.47	0.47	2.40	186.00	**0.72**	**10.03**
185.48	0.48	2.49			
185.49	0.48	2.59			
185.50	0.49	2.68			
185.51	0.49	2.78			
185.52	0.50	2.89			

WQF = 0.15 CFS

WQF Flow depth = 185.095 (1.14 in)

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

BUFFER DESIGN CRITERIA
(Env-Wq 1508.09)

Type **Roadway Buffer Frederick Lane RT 0+00-2+00**

Enter the type of buffer (e.g., residential buffer) and the node name in the drainage analysis, if applicable.

Yes	Yes/No	Is the buffer adjacent to the area that you are treating?	← **yes**
Yes	Yes/No	Does the runoff enter the buffer as sheet flow (naturally or with a level spreader?)	
No	Yes/No	Has a level spreader been provided?	
100.0	%F	% Forest (F) cover in the buffer (remaining assumed to be meadow (M))	
-	%M	% Meadow cover in the buffer	
-	%A	Hydrologic soil group (HSG) in buffer (%A, %B, %C). Remaining assumed to be D soil	
100.0	%B		
-	%C		
-	%D		
6.0	%	Buffer slope	**≤ 15%**

If a Residential or Small Pervious Area Buffer is Proposed:

	Yes/No	Is the runoff from a single family or duplex residential lot?	← **yes**
		L_{FP} = Maximum flow path to the buffer	
	ac	A = Area draining to the buffer	
	ac	A_{IMP} = Impervious area draining to the buffer	
-	%	I = Percent impervious area draining to the buffer	**≤ 10%**
FALSE		Option A check: $A_{IMP} \le 1$ ac & $L_{FP} \le 100'$	← **yes for**
FALSE		Option B check: $I \le 10\%$ & $L_{FP} \le 150'$	**A or B**
No		Level Spreader proposed? (Sheet flow without the aid of a LS)	← **no**
Good		Slope check	**≤ 15%**
45	feet	Buffer base length due to soil type (weighted based on HSG)	
12	feet	Buffer length adjustment due to steepness of buffer	
-	feet	Buffer length adjustment due to percent of meadow in buffer	
57	feet	Minimum buffer length required [1]	

If a Developed Area Buffer with a Level Spreader is Proposed:

No		Is a level spreader proposed?	← **yes**
	ac	A = Area draining to the buffer [2]	
	ac	A_I = Impervious area draining to the buffer [2]	
-	%	Percent impervious of the area that is draining to the buffer	
Good		Slope check	**≤ 15%**
-	sf	Buffer base area due to soil type in the buffer (weighted based on HSG)	
-	sf	Buffer area adjustment due to impervious cover draining to buffer	
-	sf	Buffer area adjustment due to steepness of buffer	
-	sf	Buffer area adjustment due to percent of meadow in buffer	
-	sf	A_{MIN} = Minimum buffer area required	
	ft	L_{LS} = **Total** length of level spreader(s) provided [3]	
	ft	L_B = Buffer length [4]	
-	sf	A_B = Buffer area provided	**≥ A_{MIN}**

If a Roadway Buffer is Proposed:

No	Yes/No	LS proposed? Roadway/shoulder must sheet directly to the buffer.	← **no**
No	Yes/No	Do any other areas drain to the buffer (other than roadway & shoulder)?	← **no**
Yes	Yes/No	Is the road parallel to the contours of the buffer slope?	← **yes**
Good		Natural slope check [5]	**≤ 20%**
-	feet	How much embankment slope counts toward the buffer? [6]	**0 - 20 feet**
1.0	Lane(s)	Number of travel lanes draining to the buffer	
50.0		Minimum buffer flow path (L_{MIN})	
50.0	feet	Buffer flow path	**≥ L_{MIN}**

If a Ditch Turn Out Buffer is Proposed:

No		Level spreader proposed?	← **yes**
	feet	Level spreader length [7]	
	Yes/No	Do any other areas drain to the buffer (other than roadway & shoulder)?	← **no**
	sf	Drainage area to the ditch	**≤ 6000 sf**
Good		Slope check	**≤ 15%**
-	feet	Buffer base length due to soil type (weighted based on HSG)	
12	feet	Buffer length adjustment due to steepness of buffer	
-	feet	Buffer length adjustment due to percent of meadow in buffer	
50	feet	Minimum buffer length required [8]	

1. Minimum buffer length is the total of the above three cells OR 45', whichever is greater.
2. If a detention structure is used upstream of the level spreader, the drainage area draining to the buffer shall considered equal to 1 acre of impervious area for every 1 cfs of peak 2-year, 24-hr outflow from the detention structure.
3. Minimum level spreader length is 20 feet and maximum is 50 feet. You may use multiple level spreaders if the stormwater is evenly distributed to them.

Example: A_{MIN} = 6,000 sf with a 100' buffer available. Therefore the LS lengths must total 60 feet (6,000 sf/ 100'); however LS lengths must be between 20' and 50' so one 60' long level spreader is not permitted. The design would have two LS, each 30'. As long as a collection basin is provided to evenly distribute the flow to the two level spreaders.

4. Minimum buffer length 50 feet.
5. If the slope is man-made, it must be 15% or flatter.
6. 20' (max) of the roadway embankment slope may count towards the buffer length if it is 3:1 or flatter.
7. Minimum level spreader length is 20 feet and maximum is 50 feet. You may use multiple level spreaders if the stormwater is evenly distributed to them. For example, you may have a total length of 100 feet for the level spreaders as long as you have two 50' level spreaders.
8. Minimum buffer length is the total of the above three cells OR 50', whichever is greater.

Designer's Notes:

Embankment is 2:1, does not count towards buffer length

NH DIVISION OF FORESTS AND LANDS

Request for NHB Review of Potential Impacts from the NHB DataCheck Tool

NHB ID # NHB23-0799

Date Submitted: 03/13/2023

Applicant: Kenneth Berry
Berry Surveying & Engineering
335 Second Crown Point Road
Barrington NH 03825

Landowner: Fredrick Fernald
Po Box 1805
Wolfeboro NH 03290

Project Location: Tax Map: 23
Tax Lot#: 11
Address: Smoke Street
Town: Nottingham

Payment Information. These fields MUST be filled out.

Check, Money Order or Voucher Number: ______________________________
(Make out to "Treasurer - State of NH")

Account Name: ______________________________
(As printed on the check, money order or voucher)

Enclose this completed form with a check, money order or voucher for $25.00, made out to "Treasurer, State of NH".

Send the check, money order or voucher and the completed form to the following address:

Dept. of Natural and Cultural Resources
Attn: NHB Reviews
172 Pembroke Road
Concord, NH 03301

NHB reviews will be completed 5-20 working days from payment, depending on permit type.

IMPORTANT: your submission is considered complete if all of the following is included/filled out:

1. This completed form;
2. A $25 check that is completely filled out (including a signature, date, payable to Treasurer of NH, and the NHB ID # in the memo); and
3. The envelope is addressed Attn: NHB Reviews.

NHB is unable to process incomplete submissions.

United States Department of Agriculture

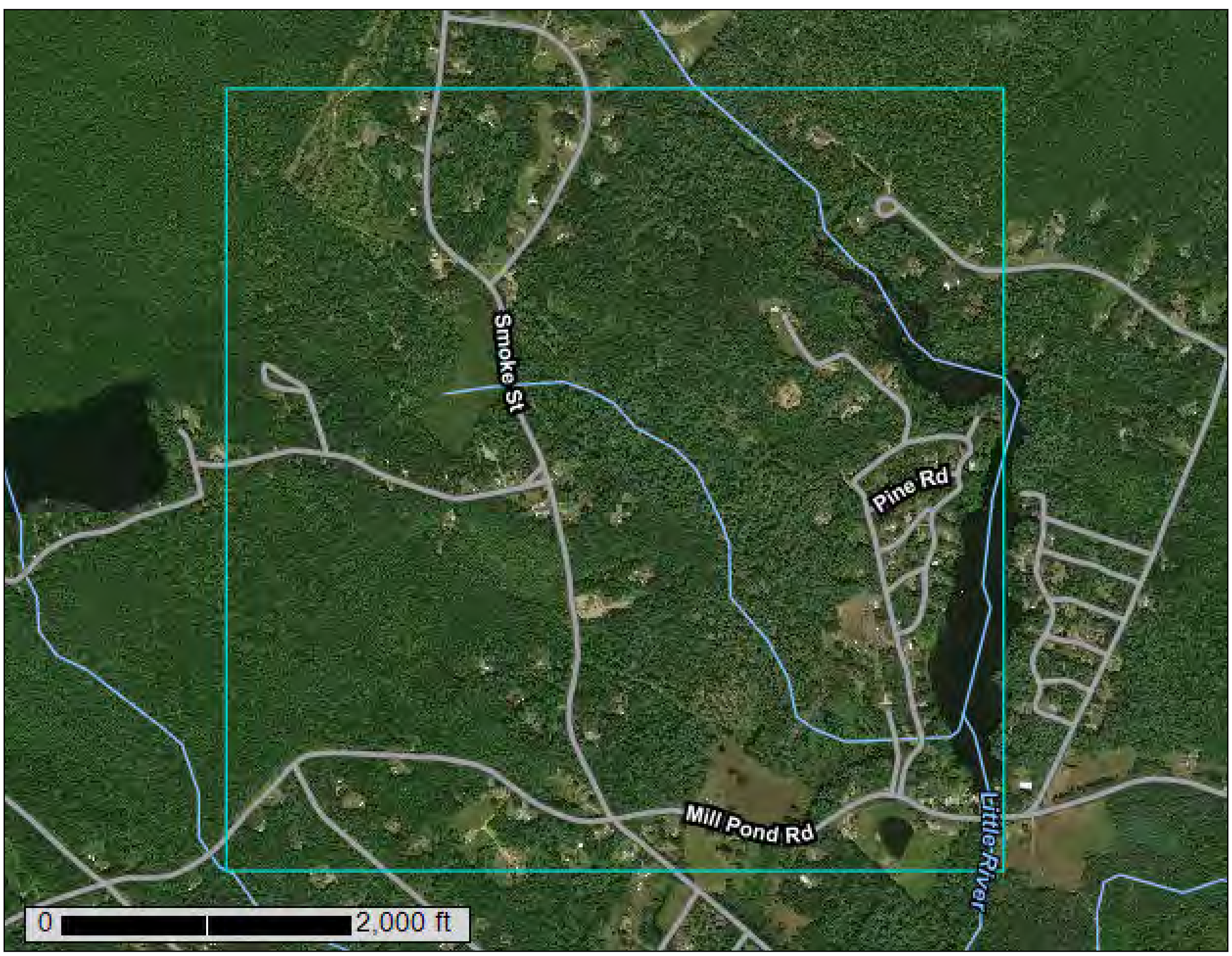
NRCS

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

Rockingham County, New Hampshire



February 18, 2022

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.

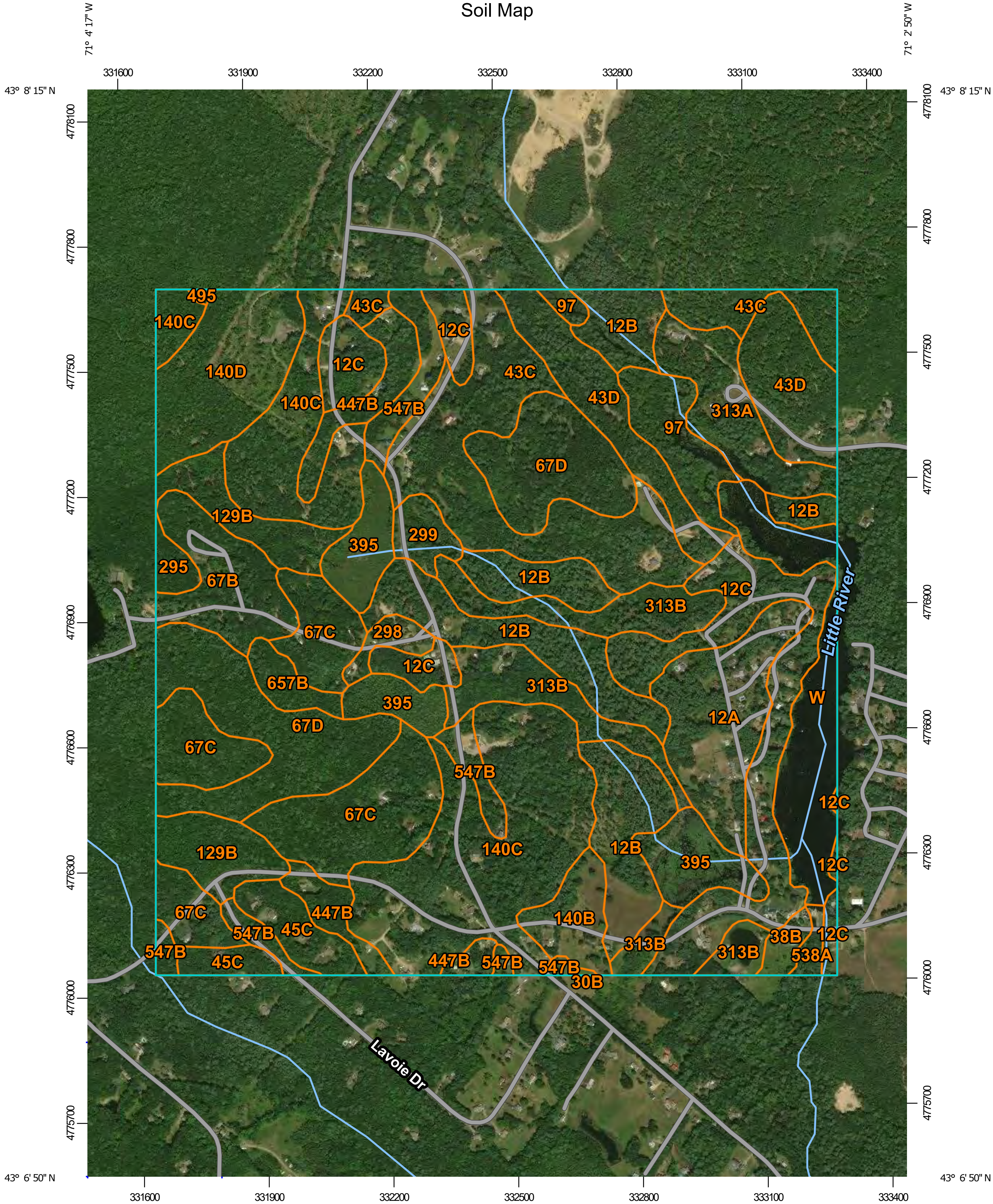
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree 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.

Soil Map



Map Scale: 1:12,700 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 150, 300, 600, 900

Feet: 0, 500, 1000, 2000, 3000

N

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

Soil Survey Area: Rockingham County, New Hampshire
Survey Area Data: Version 24, Aug 31, 2021

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

Date(s) aerial images were photographed: Aug 28, 2015—May 15, 2017

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
12A	Hinckley loamy sand, 0 to 3 percent slopes	26.6	4.0%
12B	Hinckley loamy sand, 3 to 8 percent slopes	55.9	8.4%
12C	Hinckley loamy sand, 8 to 15 percent slopes	54.9	8.2%
30B	Unadilla very fine sandy loam, 3 to 8 percent slopes	0.2	0.0%
38B	Eldridge fine sandy loam, 3 to 8 percent slopes	2.9	0.4%
43C	Canton fine sandy loam, 8 to 15 percent slopes, very stony	54.1	8.1%
43D	Canton fine sandy loam, 15 to 25 percent slopes, very stony	34.3	5.1%
45C	Montauk fine sandy loam, 8 to 15 percent slopes, very stony	12.3	1.8%
67B	Paxton fine sandy loam, 0 to 8 percent slopes, very stony	17.9	2.7%
67C	Paxton fine sandy loam, 8 to 15 percent slopes, very stony	49.9	7.5%
67D	Paxton fine sandy loam, 15 to 25 percent slopes, very stony	51.1	7.6%
97	Freetown and Natchaug mucky peats, ponded, 0 to 2 percent slopes	13.8	2.1%
129B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	21.6	3.2%
140B	Chatfield-Hollis-Canton complex, 0 to 8 percent slopes, rocky	9.5	1.4%
140C	Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, rocky	83.5	12.5%
140D	Chatfield-Hollis-Canton complex, 15 to 35 percent slopes, rocky	25.3	3.8%
295	Freetown mucky peat, 0 to 2 percent slopes	2.9	0.4%
298	Pits, sand and gravel	3.6	0.5%
299	Udorthents, smoothed	5.2	0.8%
313A	Deerfield loamy fine sand, 0 to 3 percent slopes	18.0	2.7%
313B	Deerfield loamy fine sand, 3 to 8 percent slopes	33.4	5.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
395	Swansea mucky peat, 0 to 2 percent slopes	25.1	3.7%
447B	Scituate-Newfields complex, 3 to 8 percent slopes, very stony	15.9	2.4%
495	Natchaug mucky peat, 0 to 2 percent slopes	0.3	0.1%
538A	Squamscott fine sandy loam, 0 to 5 percent slopes	2.0	0.3%
547B	Walpole very fine sandy loam, 3 to 8 percent slopes, very stony	16.8	2.5%
657B	Ridgebury fine sandy loam, 3 to 8 percent slopes, very stony	5.0	0.7%
W	Water	26.1	3.9%
Totals for Area of Interest		**668.1**	**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.

Rockingham County, New Hampshire

12A—Hinckley loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svm7
Elevation: 0 to 1,420 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

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash terraces, outwash plains, kame terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 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): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent
Landform: Outwash deltas, outwash terraces, kame terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Outwash deltas, outwash terraces, kame terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Outwash deltas, kame terraces, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

12B—Hinckley loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svm8
Elevation: 0 to 1,430 feet
Mean annual precipitation: 36 to 53 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash deltas, outwash terraces, kames, kame terraces, moraines, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Concave, convex, linear

Across-slope shape: Convex, linear, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 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: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 8 percent
Landform: Outwash deltas, outwash terraces, moraines, eskers, kames, outwash plains, kame terraces
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Outwash deltas, outwash terraces, moraines, outwash plains, kame terraces
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope, side slope, base slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Agawam

Percent of map unit: 2 percent

Landform: Moraines, eskers, kames, outwash plains, kame terraces, outwash deltas, outwash terraces
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

12C—Hinckley loamy sand, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2svm9
Elevation: 0 to 1,480 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

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash deltas, outwash terraces, moraines, eskers, kames, outwash plains, kame terraces
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, riser
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 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): 4e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 5 percent
Landform: Moraines, eskers, kames, outwash deltas, outwash terraces, outwash plains, kame terraces
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, riser
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Outwash deltas, moraines, outwash plains, kame terraces, outwash terraces
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Merrimac

Percent of map unit: 5 percent
Landform: Kames, outwash plains, outwash terraces, moraines, eskers
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, riser
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

30B—Unadilla very fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9cmz
Elevation: 90 to 1,800 feet
Mean annual precipitation: 28 to 55 inches
Mean annual air temperature: 45 to 54 degrees F
Frost-free period: 110 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Unadilla and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Unadilla

Typical profile

H1 - 0 to 4 inches: very fine sandy loam
H2 - 4 to 30 inches: very fine sandy loam
H3 - 30 to 60 inches: very fine sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 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: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F144AY024NY - Well Drained Eolian Outwash
Hydric soil rating: No

Minor Components

Slope inclusion

Percent of map unit: 5 percent
Hydric soil rating: No

Scio

Percent of map unit: 5 percent
Hydric soil rating: No

Eldridge

Percent of map unit: 5 percent
Hydric soil rating: No

38B—Eldridge fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9cnb
Elevation: 90 to 1,000 feet
Mean annual precipitation: 30 to 55 inches
Mean annual air temperature: 45 to 54 degrees F
Frost-free period: 120 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Eldridge and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Eldridge

Setting

Parent material: Outwash over glaciolacustrine

Typical profile

H1 - 0 to 8 inches: fine sandy loam
H2 - 8 to 23 inches: loamy fine sand
H3 - 23 to 62 inches: loamy very fine sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: No

Minor Components

Boxford

Percent of map unit: 5 percent
Hydric soil rating: No

Well drained inclusion

Percent of map unit: 5 percent
Hydric soil rating: No

Scitico

Percent of map unit: 5 percent
Landform: Marine terraces
Hydric soil rating: Yes

Squamscott

Percent of map unit: 5 percent
Landform: Marine terraces
Hydric soil rating: Yes

43C—Canton fine sandy loam, 8 to 15 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w814
Elevation: 0 to 1,160 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

Canton, very stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Very Stony

Setting

Landform: Moraines, ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam

2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
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: More than 80 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 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Montauk, very stony

Percent of map unit: 6 percent
Landform: Recessionial moraines, ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Scituate, very stony

Percent of map unit: 5 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Chatfield, very stony

Percent of map unit: 3 percent
Landform: Hills, ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Swansea

Percent of map unit: 1 percent
Landform: Marshes, depressions, bogs, swamps, kettles
Down-slope shape: Concave

Across-slope shape: Concave
Hydric soil rating: Yes

43D—Canton fine sandy loam, 15 to 25 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w81h
Elevation: 70 to 1,120 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

Canton, very stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Very Stony

Setting

Landform: Moraines, hills, ridges
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 over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Medium
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: More than 80 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 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Chatfield, very stony

Percent of map unit: 6 percent
Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Montauk, very stony

Percent of map unit: 5 percent
Landform: Hills, drumlins, recessionial moraines, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Newfields, very stony

Percent of map unit: 4 percent
Landform: Ground moraines, hills, moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

45C—Montauk fine sandy loam, 8 to 15 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w80w
Elevation: 0 to 1,120 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

Montauk, very stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Montauk, Very Stony

Setting

Landform: Hills, recessionial moraines, ground moraines, 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 over sandy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 6 inches: fine sandy loam
Bw1 - 6 to 28 inches: fine sandy loam
Bw2 - 28 to 36 inches: sandy loam
2Cd - 36 to 74 inches: gravelly loamy sand

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 high (0.00 to 1.42 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 5.6 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

Scituate, very stony

Percent of map unit: 6 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Canton, 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, linear

Across-slope shape: Convex
Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 4 percent
Landform: 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

67B—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

67C—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: 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

67D—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

97—Freetown and Natchaug mucky peats, ponded, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w690
Elevation: 10 to 930 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, ponded, and similar soils: 38 percent
Natchaug, ponded, and similar soils: 37 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Freetown, Ponded

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 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): 8w
Hydrologic Soil Group: B/D
Ecological site: F144AY043MA - Acidic Organic Wetlands
Hydric soil rating: Yes

Description of Natchaug, Ponded

Setting

Landform: Depressions, depressions, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Moderately decomposed organic material over loamy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy till

Typical profile

Oe1 - 0 to 12 inches: mucky peat
Oe2 - 12 to 31 inches: mucky peat
2Cg1 - 31 to 39 inches: silt loam
2Cg2 - 39 to 79 inches: fine sandy loam

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 (0.01 to 14.17 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 25 percent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 14.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: B/D
Ecological site: F144AY042NY - Semi-Rich Organic Wetlands
Hydric soil rating: Yes

Minor Components

Scarboro, ponded

Percent of map unit: 9 percent
Landform: Depressions, outwash terraces, drainageways, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Maybid, ponded

Percent of map unit: 8 percent
Landform: Depressions, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scitico

Percent of map unit: 4 percent
Landform: Depressions, depressions
Down-slope shape: Concave

Across-slope shape: Concave
Hydric soil rating: Yes

Ridgebury, very stony

Percent of map unit: 4 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

129B—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

140B—Chatfield-Hollis-Canton complex, 0 to 8 percent slopes, rocky

Map Unit Setting

National map unit symbol: 2w82m
Elevation: 380 to 1,070 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

Chatfield, very stony, and similar soils: 35 percent
Hollis, very stony, and similar soils: 25 percent
Canton, very stony, and similar soils: 25 percent

Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chatfield, Very Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 2 inches: fine sandy loam
Bw - 2 to 30 inches: gravelly fine sandy loam
2R - 30 to 40 inches: bedrock

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 41 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 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 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Hollis, Very Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: gravelly fine sandy loam
Bw - 7 to 16 inches: gravelly fine sandy loam
2R - 16 to 26 inches: bedrock

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 8 to 23 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 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: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Canton, Very Stony

Setting

Landform: Moraines, hills, ridges
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 over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
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: More than 80 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 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Newfields, very stony

Percent of map unit: 5 percent
Landform: Ground moraines, hills, moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Freetown

Percent of map unit: 5 percent
Landform: Marshes, depressions, bogs, kettles, swamps
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Walpole, very stony

Percent of map unit: 3 percent
Landform: Deltas, depressions, outwash plains, depressions, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Rock outcrop

Percent of map unit: 2 percent
Landform: Ridges, hills
Hydric soil rating: Unranked

140C—Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, rocky

Map Unit Setting

National map unit symbol: 2w82s
Elevation: 0 to 980 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

Chatfield, very stony, and similar soils: 35 percent

Hollis, very stony, and similar soils: 25 percent
Canton, very stony, and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chatfield, Very Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 2 inches: fine sandy loam
Bw - 2 to 30 inches: gravelly fine sandy loam
2R - 30 to 40 inches: bedrock

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 41 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 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 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Hollis, Very Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: gravelly fine sandy loam

Bw - 7 to 16 inches: gravelly fine sandy loam
2R - 16 to 26 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 8 to 23 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 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: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Canton, Very Stony

Setting

Landform: Moraines, hills, ridges
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 over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
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: More than 80 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 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Freetown

Percent of map unit: 5 percent
Landform: Marshes, depressions, bogs, kettles, swamps
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Newfields, very stony

Percent of map unit: 5 percent
Landform: Moraines, ground moraines, hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Scarboro, very stony

Percent of map unit: 3 percent
Landform: Depressions, outwash terraces, drainageways, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Rock outcrop

Percent of map unit: 2 percent
Landform: Ridges, hills
Hydric soil rating: Unranked

140D—Chatfield-Hollis-Canton complex, 15 to 35 percent slopes, rocky

Map Unit Setting

National map unit symbol: 2w82p
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: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Chatfield, very stony, and similar soils: 35 percent
Hollis, very stony, and similar soils: 25 percent
Canton, very stony, and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chatfield, Very Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 2 inches: fine sandy loam
Bw - 2 to 30 inches: gravelly fine sandy loam
2R - 30 to 40 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 41 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 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 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Hollis, Very Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: gravelly fine sandy loam
Bw - 7 to 16 inches: gravelly fine sandy loam
2R - 16 to 26 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 8 to 23 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 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: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Canton, Very Stony

Setting

Landform: Moraines, hills, ridges
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 over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Medium
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: More than 80 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 3.4 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Montauk, very stony
Percent of map unit: 7 percent
Landform: Recessionial moraines, ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Scarboro, very stony
Percent of map unit: 6 percent
Landform: Depressions, outwash terraces, drainageways, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Rock outcrop
Percent of map unit: 2 percent
Landform: Ridges, hills
Hydric soil rating: Unranked

295—Freetown mucky peat, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: 2w68v
Elevation: 0 to 860 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: 82 percent
Minor components: 18 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 1 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

Minor Components

Swansea

Percent of map unit: 8 percent
Landform: Marshes, depressions, bogs, swamps, kettles
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Natchaug

Percent of map unit: 6 percent
Landform: Depressions, depressions, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 3 percent
Landform: Outwash terraces, outwash deltas, depressions, drainageways
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman

Percent of map unit: 1 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

298—Pits, sand and gravel

Map Unit Composition

Pits: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

299—Udorthents, smoothed

Map Unit Setting

National map unit symbol: 9cmt
Elevation: 0 to 840 feet
Mean annual precipitation: 44 to 49 inches
Mean annual air temperature: 48 degrees F
Frost-free period: 155 to 165 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Properties and qualities

Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

313A—Deerfield loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2xfg8
Elevation: 0 to 1,100 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: Farmland of local importance

Map Unit Composition

Deerfield and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Deerfield

Setting

Landform: Outwash terraces, outwash deltas, outwash plains, kame terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Parent material: Sandy outwash derived from granite, gneiss, and/or quartzite

Typical profile

Ap - 0 to 9 inches: loamy fine sand
Bw - 9 to 25 inches: loamy fine sand
BC - 25 to 33 inches: fine sand
Cg - 33 to 60 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: About 15 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 7 percent
Landform: Outwash terraces, kame terraces, outwash deltas, outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Wareham

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Sudbury

Percent of map unit: 2 percent
Landform: Outwash plains, kame terraces, outwash deltas, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Ninigret

Percent of map unit: 1 percent
Landform: Kame terraces, outwash plains, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex, linear
Across-slope shape: Convex, concave
Hydric soil rating: No

313B—Deerfield loamy fine sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2xfg9
Elevation: 0 to 1,190 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

Deerfield and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Deerfield

Setting

Landform: Outwash deltas, outwash terraces, outwash plains, kame terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Parent material: Sandy outwash derived from granite, gneiss, and/or quartzite

Typical profile

Ap - 0 to 9 inches: loamy fine sand
Bw - 9 to 25 inches: loamy fine sand

BC - 25 to 33 inches: fine sand
Cg - 33 to 60 inches: sand

Properties and qualities
Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: About 15 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: No

Minor Components

Windsor
Percent of map unit: 7 percent
Landform: Outwash terraces, outwash plains, kame terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Wareham
Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Sudbury
Percent of map unit: 2 percent
Landform: Kame terraces, outwash deltas, outwash terraces, outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Ninigret
Percent of map unit: 1 percent
Landform: Outwash plains, outwash terraces, kame terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex, linear
Across-slope shape: Convex, concave
Hydric soil rating: No

395—Swansea mucky peat, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w68x
Elevation: 0 to 950 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

Swansea and similar soils: 83 percent
Minor components: 17 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Swansea

Setting

Landform: Marshes, depressions, kettles, bogs, swamps
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

Freetown

Percent of map unit: 7 percent
Landform: Depressions, kettles, marshes, bogs, swamps
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Outwash deltas, depressions, outwash terraces, drainageways
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Walpole

Percent of map unit: 5 percent
Landform: Depressions, outwash terraces, drainageways, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

447B—Scituate-Newfields complex, 3 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 9cnr
Elevation: 0 to 1,000 feet
Mean annual precipitation: 35 to 56 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Scituate and similar soils: 50 percent
Newfields and similar soils: 25 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Scituate

Typical profile

H1 - 0 to 8 inches: fine sandy loam
H2 - 8 to 32 inches: cobbly fine sandy loam
H3 - 32 to 60 inches: gravelly loamy 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: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Description of Newfields

Setting
Parent material: Till

Typical profile
H1 - 0 to 9 inches: fine sandy loam
H2 - 9 to 35 inches: fine sandy loam
H3 - 35 to 64 inches: gravelly loamy 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: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY008CT - Moist Till Uplands
Hydric soil rating: No

Minor Components

Walpole
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

Canton

Percent of map unit: 5 percent
Hydric soil rating: No

Montauk

Percent of map unit: 5 percent
Hydric soil rating: No

Not named

Percent of map unit: 5 percent
Hydric soil rating: No

495—Natchaug mucky peat, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w691
Elevation: 0 to 910 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

Natchaug and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Natchaug

Setting

Landform: Depressions, depressions, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Moderately decomposed organic material over loamy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy till

Typical profile

Oe1 - 0 to 12 inches: mucky peat
Oe2 - 12 to 31 inches: mucky peat
2Cg1 - 31 to 39 inches: silt loam
2Cg2 - 39 to 79 inches: fine sandy loam

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 (0.01 to 14.17 in/hr)

Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 25 percent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 14.4 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: B/D
Ecological site: F144AY042NY - Semi-Rich Organic Wetlands
Hydric soil rating: Yes

Minor Components

Scarboro
Percent of map unit: 4 percent
Landform: Depressions, outwash terraces, drainageways, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Walpole
Percent of map unit: 4 percent
Landform: Deltas, depressions, outwash plains, depressions, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Maybid
Percent of map unit: 2 percent
Landform: Depressions, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

538A—Squamscott fine sandy loam, 0 to 5 percent slopes

Map Unit Setting
National map unit symbol: 9cp9
Elevation: 0 to 1,000 feet
Mean annual precipitation: 30 to 55 inches
Mean annual air temperature: 45 to 54 degrees F
Frost-free period: 120 to 180 days
Farmland classification: Farmland of local importance

Map Unit Composition
Squamscott and similar soils: 85 percent

Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Squamscott

Setting

Landform: Marine terraces

Typical profile

H1 - 0 to 4 inches: fine sandy loam
H2 - 4 to 12 inches: loamy sand
H3 - 12 to 19 inches: fine sand
H4 - 19 to 65 inches: silt loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 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: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Ecological site: F144AY019NH - Wet Lake Plain
Hydric soil rating: Yes

Minor Components

Eldridge

Percent of map unit: 5 percent
Hydric soil rating: No

Maybid

Percent of map unit: 5 percent
Landform: Marine terraces
Hydric soil rating: Yes

Scitico

Percent of map unit: 5 percent
Landform: Marine terraces
Hydric soil rating: Yes

547B—Walpole very fine sandy loam, 3 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 9cpd
Elevation: 0 to 2,100 feet
Mean annual precipitation: 28 to 48 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 100 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Walpole and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Walpole

Setting

Landform: Depressions

Typical profile

H1 - 0 to 7 inches: very fine sandy loam
H2 - 7 to 16 inches: sandy loam
H3 - 16 to 60 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 0.1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly 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 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A/D
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

Minor Components

Scarboro

Percent of map unit: 10 percent
Landform: Depressions

Hydric soil rating: Yes

Newfields

Percent of map unit: 5 percent
Hydric soil rating: No

Squamscott

Percent of map unit: 5 percent
Landform: Marine terraces
Hydric soil rating: Yes

657B—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

W—Water

Map Unit Setting

National map unit symbol: 9cq3
Elevation: 200 to 2,610 feet
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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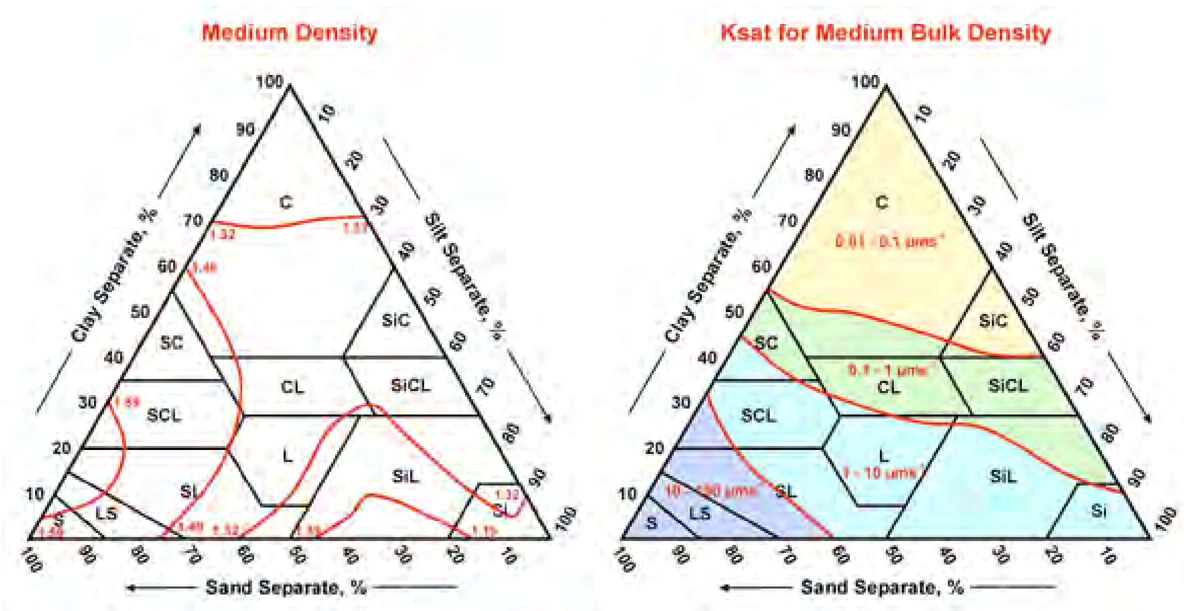
K_{sat} VALUES
FOR
NEW HAMPSHIRE SOILS
(Including Hydrologic and DES Soil Lot Sizing Groups)



From: Guide for Estimating Ksat from Soil Properties (**Exhibit 618-9**). (http://soils.usda.gov/technical/handbook/contents/part618ex.html)

Sponsored by the Society of Soil Scientists of Northern New England
SSSNNE Special Publication No. 5
September, 2009

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
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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.

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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.

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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

no longer recognized
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	ɔamy 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

(dark grey)	no longer recognized
(light grey)	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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6/22/22

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335 Second Crown Point Road
Barrington NH 03825

Job # 20-020

6/10/22 - 6/16/22
Site Specific Soil Survey
Map 23 Lot 11
Smoke Street Nottingham, NH

Dear Chris,

This letter report presents the findings of a Site Specific Soil Survey conducted on the referenced properties by John P. Hayes III between June 10 and June 16, 2022. The soil survey was conducted in accordance with the New Hampshire Supplement of the Site-Specific Soil Mapping Standard For New Hampshire and Vermont, Version 5.0, December 2017, Special Publication # 3, published by the Society of Soil Scientist of Northern New England.

The properties that are subject of the soil survey is located east side of Smoke street, north of Mill Pond road, and west of Fort Hill road, in Nottingham, NH. The parcel is 110.2 acres in size. The plans used for these soil maps are a 100 scale plan, where 1 inch equals 100 feet, with two foot contours.

The purpose of the soil survey is to provide the client with soils information for urban and suburban or rural land planning. Soil characteristics on the property were evaluated through observation of numerous test pits, and hand auger probes conducted throughout the property. Slope phases were determined with the use of the topography provided on the plan. The Site-specific Soil Map Units identified are taken from the New Hampshire State-Wide Numerical Soils Legend, Issue #10 January 2011, and are briefly described below. Official Series Descriptions (OSD) for each of these soil series are enclosed with this report. The soil map units comply with the Range In Characteristics described in the OSD. Any limiting enclusions on the site, do not exceed 15 percent of any of the soil map units. Dissimilar inclusions, if any, will be noted in the report. Limits of the Site Specific mapping units are highlighted on the plan. The Hydrological Soil Groups for each of the soil series was determined using SSSNNE Publication No. 5 Ksat Values for New Hampshire Soils September 2009. Limits of the Site Specific mapping units are highlighted on the plan.

Soil parent materials on this site include Glacial Till and Glaciofuvial deposits. The portions of the soil map that are identified with the map unit 40/Rk, are a Chatfield Hollis soil complex that is shallow to ledge, with varing depths to ledge that are less than 40 in in depth. Portions of the soil map with the map unit denominator P and VP, are poorly drained, and very poorly drained soils respectively. Portions of the soil map,with the map lable 400, contain disturbed soils that have been excavated and/or regraded, that are sandy or gravelly in texture. Portions of the soil map,with the map lable 500, contain disturbed soils that have been excavated and/or regraded, that are loamy in texture. Portions of the soil map,with the map lable 900/P, contain disturbed soils that have been excavated down to, or near the water table. A Disturbed Soil Mapping Unit Supplement for New Hampshire DES AoT Site Specific Soil Maps, is also included. This supplement explains the additional information given about each of the disturbed soil map units that are present on the site.

MAP UNIT #	SOIL TAXANOMIC NAME	SLOPES	HYDRO LOGIC SOIL GROUP	DESCRIPTION
12	**Hinckley**	**B C D E**	**A**	The Hinckley series consists of very deep, excessively drained soils formed in glaciofluvial materials. These soils are located mostly in the southeastern portion of the parcel. The soil textures are loamy sand over gravelly sand. They are deep to bedrock. Saturated hydraulic conductivity is high to very high. Some inclusions of somewhat excessively drained Windsor, and moderately well drained Sudbury and Deerfield soils may be present, but are less than 10 percent of the mapped areas. Estimated seasonal high water tables in these soils ranges from 38 to 60 inches.
26	**Windsor**	**B D**	**A**	The Windsor series consists of very deep, excessively drained soils formed in sandy outwash or eolian deposits. A small are of this soil series is located on a hill on the southeastern portion of the parcel. The soil textures are loamy sand over sand. They are deep to bedrock. Saturated hydraulic conductivity is high to very high. Some inclusions of moderately well drained Deerfield soils may be present, but are less than 10 percent of the mapped areas. Estimated seasonal high water tables in these soils ranges from 40 to 55 inches.
29	**Woodbridge**	**B C D E**	**C**	The Woodbridge series consists of moderately well drained loamy soils formed in lodgment till. These soils are located mostly in the northern portion of the lot between Smoke street and the Little River. The soil textures are fine sandy loam over a gravelly fine sandy loam that has a firm restrictive layer. They are deep to bedrock. Saturated hydraulic conductivity ranges from moderately high to high in the surface layer and subsoil and low or moderately low in the dense substratum. Some inclusions of well drained Paxton and Canton, and somewhat poorly drained Ridgebury soils may be present, but are less than 10 percent of the mapped areas. Estimated seasonal high water tables in these soils ranges from 20 to 36 inches.

MAP UNIT #	SOIL TAXANOMIC NAME	SLOPES	HYDRO LOGIC SOIL GROUP	DESCRIPTION
40 Rk	**Chatfield Hollis Complex (well Drained**	**B C**	**C/D**	The Chatfield series consists of well drained soils formed in loamy melt-out till that have densic contact between 20 and 40 inches. Saturated hydraulic conductivity is moderately high or high in the mineral soil. The Hollis series consists of well drained and somewhat excessively drained soils formed in a thin mantle of till that have densic contact within 20 inches of the soil surface. Saturated hydraulic conductivity is moderately high or high. These soils are located on the southwestern portion of the parcel, near Smoke street. The soil textures are fine sandy loamy over bedrock. Some inclusions of moderately well drained Sutton or Deerfield soils may be present, but are less than 10 percent of the mapped areas. These shallow to ledge soils have no estimated seasonal high water tables
43	**Canton (very stony)**	**B C D E**	**B**	The Canton series consists of very deep, well drained soils formed in a loamy mantle underlain by sandy till. These soils are located mostly in the northern portion of the parcel between Smoke street and the Little River. There are also some located on the southwestern part of the lot near Smoke street. The soil textures are fine sandy loam over gravelly loamy sand. These soils are deep to bedrock. Saturated hydraulic conductivity is moderately high or high in the solum and high or very high in the substratum. Some inclusions of well drained Paxton, and moderately well drained Woodbridge soils may be present, but are less than 10 percent of the mapped areas. Estimated seasonal high water tables in these soils ranges from 38 to 65 inches.

MAP UNIT #	SOIL TAXANOMIC NAME	SLOPES	HYDRO LOGIC SOIL GROUP	DESCRIPTION
67	**Paxton (very stony)**	**B C D E**	**C**	The Paxton series consists of well drained loamy soils formed in lodgment till.These soils are located mostly on the hills and steep slopes on the northeastern portion of the parcel.The soil textures are fine sandy loam over a gravelly fine sandy loam that has a firm restrictive layer. These soils are deep to bedrock. Saturated hydraulic conductivity is moderately high or high in the surface layer and subsoil and low or moderately low in the substratum.Some inclusions of well drained Canton, and moderately well drained Woodbridge soils may be present, but are less than 10 percent of the mapped areas. Estimated seasonal high water tables in these soils ranges from 38 to 60 inches.
68	**Sutton**	**B C**	**B**	The Sutton series consists of very deep, moderately well drained loamy soils formed in melt-out till.These soils are located on the southwestern portion of the parcel, near Smoke street. The soil textures are fine sandy loam over a gravelly fine sandy loam that has a firm restrictive layer. These soils are deep to bedrock. Saturated hydraulic conductivity is moderately high or high. Some inclusions of well drained Canton, and moderately well drained Deerfield soils may be present, but are less than 10 percent of the mapped areas. Estimated seasonal high water tables in these soils ranges from 20 to 36 inches.
115 VPD	**Scarboro**	**A**	**D**	The Scarboro series consists of very deep, very poorly drained soils in sandy glaciofluvial deposits. These soils run through the wetland area that is in the central portion of the property, from east to west.There are also some of these soils in the wetland on the southeast corner of the lot. These soils are deep to bedrock. Saturated hydraulic conductivity is high to very high. Organic layers in this soil range from 4 to 16 inches. Some inclusions of poorly drained Walpole soils may be present, but are less than 10 percent of the mapped areas.These soils are permanantly saturated.

MAP UNIT #	SOIL TAXANOMIC NAME	SLOPES	HYDRO LOGIC SOIL GROUP	DESCRIPTION
118	**Sudbury**	**B C D E**	**B**	The Sudbury series consists of very deep, moderately well drained soils on outwash plains. These soils are located in the central portion of the parcel, mostly along the eastern side. The soil textures are fine sandy loam over a gravelly coarse sand. These soils are deep to bedrock. Saturated hydraulic conductivity is moderately high or high in the upper solum and high or very high in the lower solum and substratum. Some inclusions of excessively drained Hinkley, and moderately well drained Deerfield soils may be present, but are less than 10 percent of the mapped areas. Estimated seasonal high water tables in these soils range from 20 to 36 inches.
313	**Deerfield**	**B C D E**	**B**	The Deerfield series consists of very deep, moderately well drained soils formed in glaciofluvial deposits. These soils are found in the lower areas throughout the property. The soil textures are loamy fine sandy loam over sand. These soils are deep to bedrock. Saturated hydraulic conductivity is high or very high. Some inclusions of excessively drained Hinkley , moderately well drained Sudbury, and somewhat poorly drained Deerfield Variant soils may be present, but are less than 10 percent of the mapped areas. Estimated seasonal high water tables in these soils range from 18 to 36 inches.
400 (abada)	**Udorthents (sandy or gravelly)**	**A B C D**	**A**	Udorthents are disturbed soils that have been excavated and/or regraded and are sandy or gravelly in texture. These disturbed soils are located on the western portion of the parcel, near Smoke street. The area appears to be an old gravel pit. These disturbed soils appear to be mostly derrived from the Hinkley soil series, and are somewhat excessively drained. The soils are deep to bedrock. The saturated hydralic conductivity is high to very high. Estimated seasonal high water tables in these soils range from 18 to 60 inches.

MAP UNIT #	SOIL TAXANOMIC NAME	SLOPES	HYDRO LOGIC SOIL GROUP	DESCRIPTION
496 VP	**Natchaug Variant**	**A**	**D**	The Natchaug series consists of very deep, very poorly drained soils formed in woody and herbaceous organic materials overlying loamy deposits in outwash. These soils are located on the northeast side of the property, in and along the Little River. These soils are deep to bedrock. Saturated hydraulic conductivity is moderately high or high in the organic layers and moderately low to high in the loamy material. Some inclusions of the Walpole soil series may be present, but are less than 10 percent of the mapped areas. These soils are permanantly saturated.
500 (cccdc)	**Udorthents loamy**	**B**	**C**	Udorthents are disturbed soils that have been excavated and/or regraded and are loamy in texture. These disturbed soils are located in the center of the lot, at the eastern side of the disturbed area.These disturbed soils are mostly derrived from the well drained Paxton soil series, and are moderately well drained. The soils are deep to bedrock. The saturated hydralic conductivity is moderately high in the upper portion of the soil profile, and moderately low in the firm substratum. Estimated seasonal high water tables in these soils range from 20 to 34 inches.
547 P	**Walpole (very stony)**	**B**	**C**	The Walpole Series consists of very deep, poorly drained sandy soils formed in outwash and stratified drift. These soils are present throughout the property in the wetland areas. The soil textures are fine sandy loam over a gravelly loamy sand. The soils are deep to bedrock. Saturated hydraulic conductivity is moderately high or high in the surface layer and subsoil, and high or very high in the substratum. Estimated seasonal high water tables in these soils range from 0 to 10 inches.

MAP UNIT #	SOIL TAXANOMIC NAME	SLOPES	HYDRO LOGIC SOIL GROUP	DESCRIPTION
900 **P** **(fbadc)**	**Endoquents (sandy or gravelly)**	**A**	**C**	This map unit represents areas of poorly drained soils where soil material was excavated down to, or near the water table. These disturbed soils are located in the southeast portion northeasr portion of the lot near Smoke street. The area appears to be part of an old gravel pit where the upper soil layers have been excavated. And it has been dug down to, or near the water table.These disturbed soils appear to be mostly derrived from the excessively drained Hinkley soil series, but are now poorly drained. These soils are deep to bedrock. Saturated hydraulic conductivity is moderately high or high. Estimated seasonal high water table in these soils is less than 10 inches.

Slope Phases

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

I trust that this Soil Survey and report meet your current planning needs. Please do not hesitate to contact me if you have any questions.

Sincerely:

John P. Hayes III

STATE OF NEW HAMPSHIRE
JOHN
P.
HAYES III
NO. 087
CERTIFIED SOIL SCIENTIST

John P. Hayes III CSS, CWS

Disturbed Soil Mapping Unit Supplement for New Hampshire DES AoT Site Specific Soil Maps

Introduction

The NRCS NH State-Wide Legend, as amended, contains a number of distinct map units used for identifying areas of soils altered or disturbed by human influence. However, in preparing the required Site Specific Soils Maps for compliance with NH Department of Environmental Services Alteration of Terrain (AoT) rules, additional information is often needed and desired. This supplement provides a means to supply the user a more detailed soil mapping unit description to meet this need.

Purpose

To provide soil scientists with additional soil mapping tools for disturbed sites and miscellaneous areas to enhance site specific soil maps and interpretations to reflect new requirements under the revised NH Alteration of Terrain regulations. This supplement is intended to allow the creation of soil maps with mapping units that can be expanded beyond those of the NRCS NH State-Wide Numerical Legend and the standards of the National Cooperative Soil Survey for disturbed units in order to provide specific information useful in preparation of site specific soils maps and reports to comply with NHDES Env-Wq 1500-Alteration of Terrain.

Note that the disturbed soil supplement has been created by SSSNNE and is not a product of the NRCS or the National Cooperative Soil Survey. Additionally, the supplemental legend can only be used in conjunction with the Site Specific Soil Mapping standards and cannot be used to create a stand-alone soils map.

For the purposes of this supplement, the definition of disturbed land, including excavate and fill, is as defined by RSA 485-A: 6, VIII; RSA 485-A: 17, and NHDES Env-Wq 1500.

Map Notation

Notation on the Site Specific Soil Map completed to comply with the NH AoT rules should include the following disclaimer:

Site-Specific Soil Map

1. This detailed Site-Specific Soil Map conforms to the standards of SSSNNE Publication No. 3, as amended, "Site-Specific Soil Mapping Standards for NH and VT".

2. This map has been prepared to comply with soil mapping requirements of RSA 485 A: 17and NHDES Env-Wq 1500, Alteration of Terrain.

3. See accompanying narrative report for methodology, map symbol legend, and interpretations.

Map Symbol Denominators for Disturbed Unit Supplements

The map symbols for Site-Specific Soil Mapping of disturbed soils in New Hampshire is a two part symbol with parts separated by a forward slash (/).

The first part consists of the USDA-NRCS Disturbed Map Unit symbol from the NH State-Wide Numerical Soil Legend. The map symbol is composed of 1 to 3 digits followed by a capital letter designating slope.

The second part consists of symbols of the SSSNNE NH Disturbed Soil Supplement to the Site Specific Soil Survey Standards, as detailed below. The disturbed map symbol is composed of 5 lower case letters.

Thus a Site Specific map symbol for a map prepared for an AoT application would be formatted as follows:

400A/aaaaa

These SSSNNE NH Disturbed Soil Supplemental symbols can only be used in conjunction with the USDA-NRCS Disturbed Map Unit symbols for the NH Statewide Numerical Soil Legend.

Supplemental Symbols

The five components of the Disturbed Soil Mapping Unit Supplement are as follows:

Symbol 1: Drainage Class
a-Excessively Drained
b-Somewhat Excessively Drained
c-Well Drained
d-Moderately Well Drained
e-Somewhat Poorly Drained
f-Poorly Drained
g-Very Poorly Drained
h-Not Determined

Symbol 2: Parent Material (of naturally formed soil only, if present)
a-No natural soil within 60"
b-Glaciofluvial Deposits (outwash/terraces of sand or sand and gravel)
c-Glacial Till Material (active ice)
d-Glaciolacustrine very fine sand and silt deposits (glacial lakes)
e-Loamy/sandy over Silt/Clay deposits
f-Marine Silt and Clay deposits (ocean waters)
g-Alluvial Deposits (floodplains)
h-Organic Materials-Fresh water Bogs, etc
i- Organic Materials-Tidal Marsh

Symbol 3: Restrictive/Impervious Layers
a-None
b-Bouldery surface with more than 15% of the surface covered with boulders
c-Mineral restrictive layer(s) are present in the soil profile less than 40 inches below the soil surface such as hard pan, platy structure or clayey texture with consistence of at least firm (i.e. more than 20 newtons). For other examples of soil characteristics that qualify for restrictive layers, see "Soil Manual for Site evaluations in NH" 2nd Ed., (page 3-17, figure 3-14)
d-Bedrock in the soil profile; 0-20 inches
e-Bedrock in the soil profile; 20-60 inches
f-Areas where depth to bedrock is so variable that a single soil type cannot be applied, will be mapped as a complex of soil types
g-Subject to Flooding
h–Man-made impervious surface including pavement, concrete, or built-up surfaces (i.e. buildings) with no morphological restrictive layer within control section

Symbol 4: Estimated Ksat* (most limiting layer excluding symbol 3h above).
a- High.
b-Moderate
c-Low
d-Not determined
*See "Guidelines for Ksat Class Placement" in Chapter 3 of the Soil Survey Manual, USDA

Symbol 5: Hydrologic Soil Group*
a-Group A
b-Group B
c-Group C
d-Group D
e-Not determined

*excluding man-made surface impervious/restrictive layers

Disturbed Map Units

This edition of the New Hampshire State-Wide Numerical Soil Legend contains eleven distinct map units used for identifying areas of soils altered or disturbed by human influence and the addition of one naturally formed map unit. These map units were designed for the Order 2 and Order 3 levels of mapping intensity, but can be used in Order 1 mapping if appropriate.

The definition of disturbed map units is intentionally brief and vague. Classification at the Great Group level allows for a wide range in soil properties and behavioral characteristics. The variability in soil properties typically requires on-site investigations before any interpretation can be developed. The map unit descriptions are intended to provide guidance in differentiating map units. The author of the soil map is expected to provide additional information to reflect the nature of the disturbed areas within the survey area.

I. Excavated land

300 Udipsamments

This map unit is characterized by soil textures of loamy fine sand to sand and gravel throughout the entire particle-size class control section (25 - 100 cm or 10 - 40 inches). Saturated hydraulic conductivity (K_{sat}) is high or very high. Drainage class ranges from excessively drained to well drained. The Hydrologic Soil Group (HSG) is A. Typical sand pit.

350 Udipsamments, wet substratum

This map unit is characterized by soil textures of loamy fine sand to sand and gravel throughout the entire particle-size class control section (25 - 100 cm or 10 - 40 inches). Saturated hydraulic conductivity (K_{sat}) is high or very high. Drainage class ranges from moderately well drained to somewhat poorly drained.

400 Udorthents, sandy or gravelly

This map unit typically includes the following concepts: 1) very gravelly (> 35%) sand or very gravelly loamy sand; Or 2) sand or loamy sand textures that may have lenses of loamy very fine sand or finer somewhere in the particle-size class control section (25 - 100 cm or 10 - 40"). Saturated hydraulic conductivity (K_{sat}) is high or very high. Drainage class ranges from excessively drained to somewhat poorly drained. Typical gravel pit.

Disturbed Map Units (continued)

500 Udorthents, loamy

This map unit is characterized typically by soil textures that are sandy loam, loam, or silt loam within the particle size control section (25 – 100cm or 10 – 40"). Saturated hydraulic conductivity (K_{sat}) is low through high. Drainage class ranges from well drained to somewhat poorly drained. These areas typically represent excavated glacial till or perhaps areas where sand and gravel was excavated down to the loamy underlying material.

550 Udorthents, Bedrock substratum

This map unit is characterized by soil textures of sandy loam, loam, or silt loam within the particle-size class control section (25 - 100 cm or 10 - 40 inches). These areas typically represent excavated soil materials where the range in depth to bedrock is 10 - 60 inches (25 - 152 cm). Saturated hydraulic conductivity (K_{sat}) is low through high. Drainage class ranges from somewhat excessively drained to somewhat poorly drained.

600 Endoaquents, loamy

This map unit represents areas where soil material was excavated down to, or near the water table. Soil material is typically sandy loam, loam or silt loam within the particle-size class control section (25 - 100 cm or 10 - 40 inches). Saturated hydraulic conductivity (K_{sat}) is low through high. Drainage class is poorly or very poorly drained. The Hydrologic Soil Group (HSG) is D.

900 Endoaquents, sandy or gravelly

This map unit represents areas where soil material was excavated down to / near the water table. This map unit is characterized typically by soil textures of: 1) very gravelly (> 35% gravel) sand or very gravelly loamy sand or; 2) sand or loamy sand textures that may have lenses of loamy very fine sand or finer somewhere in the particle-size class control section (25 - 100 cm or 10 - 40"). Saturated hydraulic conductivity (K_{sat}) is high or very high. Drainage class is poorly or very poorly drained. The Hydrologic Soil Group (HSG) is D. Typical gravel pit dug down to or close to the water table.

Disturbed Map Units (continued)

II. Filled land

100 Udorthents, wet substratum

This map unit represents areas that have been filled and leveled over what were originally hydric soils.

199 Dumps, bark chips, and organic material

This map unit consists of man-made deposits of bark, wood chips, sawdust, paper mill sludge, cinders, waste paper, ashes, and other similar refuse from the operation of paper mills and sawmills.

200 Udorthents, refuse substratum

This map unit represents alternating layers of soil and refuse such as in sanitary landfills. Closed landfills typically have 2 feet of loamy material capping the area.

299 Udorthents, smoothed

This map unit represents areas that have been cut and filled to create a large level or nearly level area. Soil material making up the map units typically came from the immediate area. School athletic fields are an example (unless they were created on hydric soils – see Map Unit 100).

III. Bottom Land

7 Fluvaquents

This map unit represents areas of various kinds of soil materials on the bottom lands of streams and rivers. The soil material ranges in texture from silt loam to sand and gravel within the particle-size class control section (25 - 100 cm or 10 - 40 inches). Drainage class is poorly or very poorly drained. The Hydrologic Soil Group (HSG) is D.

Established Series
Rev. MFF-SMF
05/2014

WALPOLE SERIES

The Walpole Series consists of very deep, poorly drained sandy soils formed in outwash and stratified drift. They are nearly level to gently sloping soils in low-lying positions on terraces and plains. Slope ranges from 0 to 8 percent. Saturated hydraulic conductivity is moderately high or high in the surface layer and subsoil, and high or very high in the substratum. Mean annual temperature is about 48 degrees F., and mean annual precipitation is about 43 inches.

TAXONOMIC CLASS: Sandy, mixed, mesic Aeric Endoaquepts

TYPICAL PEDON: Walpole sandy loam - forested, 2 percent slope. (Colors are for moist soil.)

Oe--0 to 3 cm (0 to 1 in); black (10YR 2/1) moderately decomposed forest plant material. (0 to 7 cm thick)

A--3 to 18 cm (1 to 7 in); very dark brown (10YR 2/2) sandy loam; weak medium granular structure; very friable; many fine and medium roots; 8 percent gravel; very strongly acid; clear smooth boundary. (8 to 33 cm thick)

Bg--18 to 53 cm (7 to 21 in); dark grayish brown (2.5Y 4/2) sandy loam; massive; friable; common fine and few medium roots in the upper part of the horizon and few fine roots in the lower part; 10 percent gravel; common medium prominent strong brown (7.5YR 5/6) and common medium prominent yellowish brown (10YR 5/4) and yellowish brown (10YR 5/6) masses of iron accumulation and common medium distinct light brownish gray (10YR 6/2) iron depletions; strongly acid; gradual smooth boundary.

BC--53 to 63 cm (21 to 25 in); light olive brown (2.5Y 5/4) gravelly sandy loam; massive; friable; 20 percent gravel; common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation and light brownish gray (10YR 6/2) and dark grayish brown (2.5Y 4/2) iron depletions; strongly acid; clear smooth boundary. (Combined thickness of the Bg and BC horizons is 36 to 61 cm.)

C1--63 to 104 cm (25 to 41 in); light yellowish brown (2.5Y 6/4) very gravelly loamy sand; single grain; very friable; 30 percent gravel and 5 percent cobbles; common medium distinct strong brown (7.5YR 5/6) and yellowish brown (10YR 5/4) masses of iron accumulation; strongly acid; gradual smooth boundary. (25 to 102 cm thick)

C2--104 to 165 cm (41 to 65 in); light brownish gray (10YR 6/2) very gravelly sand, few brown (10YR 5/3) streaks; single grain; loose; 35 percent gravel and 5 percent cobbles; moderately acid.

TYPE LOCATION: Windham County, Connecticut; town of Killingly, 400 feet north along North Shore Drive from the intersection with Connecticut Route 101, 500 feet east of North Shore Drive; USGS Danielson topographic quadrangle; latitude 41 degrees 50 minutes 58 seconds N. and longitude 71 degrees 54 minutes 28 seconds W., NAD 27

RANGE IN CHARACTERISTICS: Thickness of the solum and depth to sand or loamy sand substratum layers range from 46 to 71 cm. Rock fragments range from 0 to 25 percent by volume in the solum and from 0 to

50 percent in individual layers of the substratum. Typically, 70 percent or more of the rock fragments are rounded gravel. Reaction ranges from very strongly acid to neutral throughout.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. Disturbed pedons have a Ap horizon 5 to 10 inches thick with value of 2 to 4 and chroma of 1 to 3. Dry value is 6 or more. The A or Ap horizon is sandy loam, fine sandy loam, or very fine sandy loam in the fine-earth fraction. It commonly has weak or moderate granular structure but the range includes subanular blocky in some pdons and is friable or very friable.

Some pedons have an Eg horizon with hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. Texture and structure are similar to the A horizon.

The B horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 4. Chroma of 3 or 4 is limited to subhorizons and chroma of 1 or 2 is in some subhorizon within a depth of 20 inches. The horizon has distinct or prominent redoximorphic features. Fine-earth texture is sandy loam or fine sandy loam with more than 50 percent fine or coarser sand. Structure is weak granular or weak subangular blocky, or the horizon is massive. Consistence is friable or very friable.

The BC horizon, where present, has hue of 10YR to 5Y, value of 4 to 6, and chroma of 3 or 4. The horizon has distinct or prominent redoximorphic features. Texture is similar to the B horizon. Structure is weak subangular blocky or the horizon is massive.

The C horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 4. Texture of individual layers ranges from loamy fine sand to coarse sand in the fine-earth fraction.

COMPETING SERIES: There are no other series currently in the same family.

The Busti, Fredon, Lamson, Leicester, Massena, Moosilauke, Neversink, Newstead, Norwell, Punsit, Raypol, Red Hook, Ridgebury, Scarboro, Stafford, Stissing, Sudbury, Sun, and Wareham series are similar soils in related families. Busti, Lamson, Leicester, Massena, Neversink, Newstead, Punsit, Red Hook, Ridgebury, Stissing, and Sun soils are coarse-loamy. Norwell, Ridgebury and Stissing soils have a dense substratum. Fredon and Raypol soils are coarse-loamy over sandy or sandy-skeletal. Moosilauke soils are frigid. Scarboro soils have a histic epipedon. Stafford and Wareham soils do not have a cambic horizon. Sudbury soils have matrix chroma of 3 or more in the B horizon to a depth of 50 cm.

GEOGRAPHIC SETTING: Walpole soils are nearly level and gently sloping soils in shallow drainageways and low-lying areas on terraces and plains. Slope ranges from 0 to 8 percent. The soils formed in sandy glaciofluvial and stratified drift materials derived mainly from crystalline rocks. Mean annual temperature ranges from 7 to 12 degrees C., mean annual precipitation ranges from 940 to 1270 mm, and the growing season ranges from 120 to 190 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Agawam, Branford, Canton, Charlton, Deerfield, Enfield, Hartford, Haven, Hinckley, Gloucester, Leicester, Manchester, Merrimac, Ninigret, Occum, Pootatuck, Raypol, Rippowam, Ridgebury, Scarboro, Stissing, Sudbury, Tisbury, and Windsor soils. The excessively drained Hinckley, somewhat excessively drained Merrimac, and the moderately well drained Sudbury soils are common drainage associates. Agawam, Branford, Enfield, Haven, Ninigret, and Tisbury soils are better drained terrace associates that are loamy over stratified sand and gravel. The well drained Canton and Charlton soils and the somewhat excessively drained Gloucester soils are on nearby till uplands. Deerfield, Hartford, Manchester, and Windsor soils are coarse-textured soils on nearby glaciofluvial landforms. Occum, Pootatuck, and Rippowam soils are on flood plains.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Poorly drained. Surface runoff is slow. Saturated hydraulic conductivity is moderately high or high in the surface layer and subsoil, and high or very high in the substratum. Walpole soils have a water table at or near the surface much of the year.

USE AND VEGETATION: Most areas are wooded. Cleared areas are used for hay and pasture. Drained areas are used for silage corn and hay. hemlockThe typical vegetation consists of a forested community with canopy trees of Red Maple, American Elm, and/or scattered black gum, swamp white oak and yellow birch and/or eastern hemlock; with an shrub understory of spicebush, silky dogwood, northern arrow-wood with sweet pepperbush, and winterberry in slightly wetter situations; and a herb layer of cinnamon fern, royal fern, false hellebore, violets, wood-reed grass, with skunk cabbage and sedges.

DISTRIBUTION AND EXTENT: Late Wisconsin glaciofluvial landforms in Connecticut, Massachusetts, New Hampshire, eastern New York, Rhode Island, and Vermont; MLRAs 101, 142, 144A, and 145. Walpole series has been correlated in some published surveys in Maine, but after conducting temperature studies, Maine currently includes only frigid and cryic soil temperature regimes. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Windham County, Connecticut, 1947.

REMARKS: Diagnostic horizons and features recognized in this pedon include:

1. Ochric epipedon - the zone from 0 to 18 cm (Oe and A horizons).
2. Cambic horizon - the zone from 18 to 63 cm (Bg and BC horizons).
3. Aquic moisture regime - indicated by chroma of 2 in Bg horizon but with chroma too high within 76 cm (chroma of 4 in BC horizon) to qualify for Typic Endoaquepts.
4. Endoaquepts subgroup based on saturation to a depth of 200 cm from the mineral soil surface.
5. Aeric great group based on matrix color and chroma of 3 or more in one subhorizon between the Ap and 75 cm. (BC horizon).
6. Particle-size class - averages sandy in the control section from 25 to 102 cm does not meet contrasting criteria.

LOCATION WINDSOR CT+MA NH NY RI VT

Established Series
Rev. MFF-SMF-DCP
03/2014

WINDSOR SERIES

The Windsor series consists of very deep, excessively drained soils formed in sandy outwash or eolian deposits. They are nearly level through very steep soils on glaciofluvial landforms. Slope ranges from 0 through 60 percent. Saturated hydraulic conductivity is high or very high. Mean annual temperature is about 10 degrees C and mean annual precipitation is about 1092 mm.

TAXONOMIC CLASS: Mixed, mesic Typic Udipsamments

TYPICAL PEDON: Windsor loamy sand - forested, 3 percent slope, at an elevation of about 24 meters. (Colors are for moist soil.)

Oe--0 to 3 cm; black (10YR 2/1) moderately decomposed forest plant material; many very fine and fine roots; very strongly acid; abrupt smooth boundary. (0 to 8 cm thick.)

A--3 to 8 cm; very dark grayish brown (10YR 3/2) loamy sand; weak medium granular structure; very friable; many very fine and fine roots; strongly acid; abrupt wavy boundary. (3 to 25 cm thick.)

Bw1--8 to 23 cm; strong brown (7.5YR 5/6) loamy sand; very weak fine granular structure; very friable; many fine and medium roots; strongly acid; gradual wavy boundary.

Bw2--23 to 53 cm; yellowish brown (10YR 5/6) loamy sand; very weak fine granular structure; very friable; common fine and medium roots; strongly acid; gradual wavy boundary.

Bw3--53 to 64 cm; light yellowish brown (10YR 6/4) sand; single grain; loose; few coarse roots; strongly acid; clear wavy boundary. (Combined thickness of the Bw horizons is 23 to 86 cm.)

C--64 to 165 cm; pale brown (10YR 6/3) and light brownish gray (10YR 6/2) sand; single grain; loose; few coarse roots; strongly acid.

TYPE LOCATION: Hartford County, Connecticut; town of South Windsor, 1100 feet northwest along Chapel Road from the intersection of Chapel Road and Ellington Road and 100 feet due south of Chapel Road. USGS Manchester, CT topographic quadrangle, Latitude 41 degrees, 48 minutes, 35 seconds N., Longitude 72 degrees, 36 minutes, 22 seconds W., NAD 1983

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 25 to 92 cm. Rock fragments, dominantly fine gravel, range from 0 through 10 percent by volume in the solum and from 0 to 15 percent in the substratum. Thin strata of gravel or thin subhorizons of coarse sand or loamy coarse sand are present in some pedons. Unless limed, reaction in the solum commonly is extremely acid to moderately acid, but the range includes slightly acid. Unless limed, reaction in the substratum commonly is very strongly acid to slightly acid, but the range includes neutral.

O horizons are present in some pedons.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. Many pedons have an Ap horizon up to 12 inches thick with value of 3 or 4 and chroma of 2 to 4. The A or Ap horizon is loamy fine sand, loamy sand, fine sand, or sand. It has weak or moderate granular structure and is very friable, friable, or loose.

Some pedons have a thin E horizon with hue 7.5YR or 10YR, value of 4 to 6, and chroma of 1 or 2.

The upper part of the Bw horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. The lower part of Bw horizon has hue of 7.5YR to 5Y, value of 4 to 7, and chroma of 3 to 6. The Bw horizon is loamy sand or loamy fine sand in the upper part and loamy fine sand, loamy sand, fine sand, or sand in the lower part. The Bw horizon has weak granular or weak subangular blocky structure, or it is massive or single grain. Consistence is very friable or loose.

Some pedons have a BC horizon similar to the lower part of the Bw horizon.

The C horizon has hue of 5YR to 5Y, value of 4 to 7, and chroma of 1 to 6. It is fine sand, sand, coarse sand, loamy fine sand, or loamy sand. The horizon is massive or single grain and consistence is very friable or loose.

COMPETING SERIES: These are the Acquango, Aldo, Bigapple, Biltmore, Boplain, Breeze, Caesar, Chute, Dabney, Hodge, Oakville, Osolo, Pahuk, Penwood, Perks, Pinegrove, Plainfield, Poquonock, Ronda, Samoa, Sardak, Sarpy, Scotah, Spessard, Suncook, Tyner, and Wapanucket series. Aquango, Aldo, Biltmore, Boplain, Chute, Dabney, Hodge, Osolo, Pahuk, Perks, Ronda, Samoa, Sardak, Spessard, and Tyner soils are from outside of LRRs L, R, and S. Acquango soils are very slightly to moderately saline within the soil profile. Aldo soils have a water table and saturation within the series control section for as much as one month per year in 6 out of 10 years. Bigapple soils formed in human transported soil material from dredging activities. Biltmore and Spessard soils are well drained. Breeze soils formed in human transported sandy soil materials intermingled with construction debris. Caesar soils contain more coarse sand. Chute, Hodge, and Sarpy soils contain free carbonates and do not have a B horizon. Dabney soils do not have a B horizon and receive more than 152 cm of precipitation annually. Oakville soils typically average 50 percent or more fine sand in the subsoil. Osolo soils have a solum thicker than 1.5 m. Penwood soils have hue of 5YR or redder in the B horizon. Pahuk, Perks, Samoa, and Suncook soils do not have a B horizon. Plainfield soils are less moist in all parts of the control section for the 120 days following the summer solstice. Poquonock soils have a densic contact with in 1 m. Ronda soils formed in alluvium from residuum sources. Sardak soils formed in alluvium and are calcareous. Tyner soils have a thicker solum. Wapanucket soils are underlain by glaciolacustrine deposits with in the series control section.

GEOGRAPHIC SETTING: Windsor soils are nearly level through very steep soils typically on glaciofluvial landforms but include late-Wisconsin-aged dunes. The steeper slopes are typically on terrace escarpments. Slope ranges from 0 to 60 percent. The soils formed in outwash or eolian deposits of poorly graded sands and loamy sands derived mainly from crystalline rocks. Mean annual temperature ranges from 7 to 12 degrees C, and the mean annual precipitation typically ranges from 965 to 1270 mm, but the range includes as low as 660 mm in some places east of Adirondack Mountains in the Champlain Valley of New York. The growing season ranges from 120 to 190 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Deerfield, Hinckley, Merrimac, Quonset, Suncook, Agawam, Hadley, Haven, Occum, Pootatuck, Scarboro, Sudbury, Walpole, Wareham, and Winooski soils on nearby landscapes. The moderately well drained Deerfield and Sudbury, the somewhat poorly drained and poorly drained Walpole and Wareham, and the very poorly drained Scarboro soils are common drainage associates. Agawam and Haven soils are coarse-loamy over sandy or sandy-skeletal or coarse-loamy terrace associates, respectively. Hadley, Occum, Pootatuck, and Winooski soils are on nearby flood plains.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Excessively drained. Surface runoff is negligible to medium. Saturated hydraulic conductivity is high or very high.

USE AND VEGETATION: Most areas are forested or in low growing brushy vegetation. Some areas are used for silage corn, hay, and pasture. Small areas, mostly irrigated, are used for shade tobacco, vegetables and nursery stock. Some areas are in community development. Common trees are white, black, and northern red oak, eastern white pine, pitch pine, gray birch, poplar, red maple, and sugar maple.

DISTRIBUTION AND EXTENT: Late Wisconsin glaciofluvial or eolian landforms in Connecticut, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont; MLRAs 101, 142, 144A, and 145. The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Connecticut Valley Area, 1899.

REMARKS: The use of the Windsor series in Maine, and in MLRAs 141, 144B, and 143 is relict to before temperature classes in soil taxoonomy. These have been removed from the SC file.

Diagnostic horizons and features recognized in this pedon include:
1. Ochric epipedon - the zone from 0 to 8 cm (Oe and A horizons).
2. Particle-size class - averages sandy in the control section from 25 to 100 cm.
3. No cambic horizon and development of color - the zone from 8 to 64 cm demonstrates development of color with no illuvial accumulation of material (Bw horizons).

ADDITIONAL DATA: Reference samples from pedons 54MA023005, 63VT011001, 63VT011002, 64NH017003, 64NH017004, 70CT003003, 70MA011003, 70VT017002, 73MA005003, 73MA005004, 91MA023006, 95NH013001, 96NH013004, 98NY045002, 98NY085002, S07VT011004.

LOCATION HINCKLEY MA+CT ME NH NJ NY RI VT

Established Series
Rev. CAW-SMF-DCP
08/2017

HINCKLEY SERIES

The Hinckley series consists of very deep, excessively drained soils formed in glaciofluvial materials. They are nearly level through very steep soils on outwash terraces, outwash plains, outwash deltas, kames, kame terraces, and eskers. Saturated hydraulic conductivity is high or very high. Slope ranges from 0 to 60 percent. Mean annual temperature is about 7 degrees C, and mean annual precipitation is about 1143 mm.

TAXONOMIC CLASS: Sandy-skeletal, mixed, mesic Typic Udorthents

TYPICAL PEDON: Hinckley loamy sand in woodland at an elevation of about 240 meters. (All colors are for moist soil.)

Oe -- 0 to 3 cm; moderately decomposed plant material derived from red pine needles and twigs. (0 to 5 cm thick.)

Ap -- 3 to 20 cm; very dark grayish brown (10YR 3/2) loamy sand; weak fine and medium granular structure; very friable; many fine and medium roots; 5 percent fine gravel; very strongly acid; abrupt smooth boundary. (3 to 25 cm thick.)

Bw1 -- 20 to 28 cm; strong brown (7.5YR 5/6) gravelly loamy sand; weak fine and medium granular structure; very friable; common fine and medium roots; 20 percent gravel; very strongly acid; clear smooth boundary.

Bw2 -- 28 to 41 cm; yellowish brown (10YR 5/4) gravelly loamy sand; weak fine and medium granular structure; very friable; common fine and medium roots; 25 percent gravel; very strongly acid; clear irregular boundary. (Combined thickness of the Bw horizon is 8 to 41 cm.)

BC -- 41 to 48 cm; yellowish brown (10YR 5/4) very gravelly sand; single grain; loose; common fine and medium roots; 40 percent gravel; strongly acid; clear smooth boundary. (0 to 13 cm thick)

C -- 48 to 165 cm; light olive brown (2.5Y 5/4) extremely gravelly sand consisting of stratified sand, gravel and cobbles; single grain; loose; common fine and medium roots in the upper 20 cm and very few below; 60 percent gravel and cobbles; moderately acid.

TYPE LOCATION: Worcester County, Massachusetts; Town of Petersham, Harvard Forest, 240 feet north of Tom Swamp Road at a point 1.15 miles east of the intersection of Athol Road and Tom Swamp Road. USGS Athol, MA topographic quadrangle, Latitude 42 degrees, 30 minutes, 41.8 seconds N., and Longitude 72 degrees, 12 minutes, 28.9 seconds W., NAD 1983.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 30 to 87 cm. Rock fragment content of the solum ranges from 5 through 50 percent gravel, 0 through 30 percent cobbles, and 0 through 3 percent stones. Rock fragment content of individual horizons of the substratum ranges from 10 through 55 percent gravel, 5 through 25 percent cobbles, and 0 through 5 percent stones. In some places gravel content throughout the soil ranges up through 75 percent. The soil ranges from extremely acid through moderately acid, except where limed.

The O horizons, where present, consist of slightly, moderately, and/or highly decomposed plant material. They have hue N or 2.5YR through 7.5YR, value of 2 or 3, and chroma of 0 through 3.

The Ap horizon has hue of 7.5YR or 10YR, value of 2 through 4, and chroma of 1 through 4. Texture of the fine-earth fraction is very fine sandy loam, fine sandy loam, sandy loam, coarse sandy loam, loamy fine sand, loamy sand, or loamy coarse sand. Structure is weak or moderate very fine through coarse granular or subangular blocky. Consistence is friable or very friable. Undisturbed areas have an A horizon that has hue of 10YR, value of 2 or 3, and chroma of 1 through 4.

Some pedons have thin E, Bhs, Bh, or Bs horizons below the A horizon.

The upper part of the Bw horizon has hue of 7.5YR or 10YR, value of 3 through 5, and chroma of 3 through 8. The lower part has hue of 7.5YR through 2.5Y, value of 3 through 6, and chroma of 3 through 8. Texture, to a depth of 25 cm from the surface, is fine sandy loam, sandy loam, coarse sandy loam, loamy fine sand, loamy sand, or loamy coarse sand in the fine-earth fraction. Below 25 cm it is loamy fine sand, loamy sand, loamy coarse sand, fine sand, sand, or coarse sand in the fine-earth fraction. Structure commonly is weak fine and/or medium granular or the horizon is structureless, but ranges through weak subangular blocky in some places. It is very friable, friable, or loose.

Some pedons have a BC horizon with characteristics similar to both the B and 2C horizons.

The C horizon has hue of 7.5YR through 5Y, value of 3 through 7, and chroma of 2 through 8. Texture is loamy fine sand, loamy sand, loamy coarse sand, fine sand, sand or coarse sand in the fine-earth fraction, and is stratified.

COMPETING SERIES: These are the Bonaparte, Manchester, Mecosta, Multorpor, Otisville, Quonset, and Rikers series. Mecosta and Multorpor soils are from outside Land Resource Region R. Bonaparte soils have carbonates within a depth of 100 cm. Manchester soils have 5YR or redder hue in the Bw and C horizons. Mecosta soils are calcareous and Multorpor soils do not have Bw horizons. Otisville soils have rock fragments dominated by sandstone, shale, and slate. Quonset soils have rock fragments dominated by phyllite, slate, and shale. Rikers soils have carboliths in the soil.

GEOGRAPHIC SETTING: Hinckley soils are nearly level through very steep soils on outwash terraces, outwash plains, outwash deltas, kames, kame terraces, and eskers. Slope is generally 0 through 8 percent on tops of the terraces, outwash plains and deltas. Slope of 8 through 60 percent or more are on the kames, eskers and margins of the outwash plains, deltas, and terraces. The soils formed in glaciofluvial sand and gravel derived principally from granite, gneiss, and schist. Mean annual temperature ranges from 7 to 13 degrees C, and mean annual precipitation ranges from 1016 to 1270 mm. Length of the growing season ranges from 140 through 240 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Agawam, Canton, Charlton, Deerfield, Essex, Gloucester, Horseneck, Mashpee, Massasoit, Merrimac, Paxton, Pompton, Riverhead, Scarboro, Sudbury, Walpole, Wareham, and Windsor soils on nearby landscapes. Horseneck, Pompton, and Riverhead soils are commonly associates in the extreme southern portions of MLRA 144A. Agawam, Merrimac, and Riverhead soils are similar to Hinckley soils, but have cambic horizons. Canton, Charlton, Essex, Gloucester, and Paxton soils formed in till. Deerfield, Horseneck, and Sudbury soils are moderately well drained and Horseneck and Sudbury soils have Cambic horizons. Pompton soils have Cambic horizons and are moderately well and somewhat poorly drained. Scarboro soils are very poorly drained. Windsor soils have less than 15 percent rock fragments. Mashpee and Massasoit soils are poorly drained with spodic horizons. Walpole and Wareham soils are poorly drained.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Excessively drained. Surface runoff is negligible through low. Saturated hydraulic conductivity is high or very high.

USE AND VEGETATION: Cleared areas are used for hay, pasture, and silage corn. In the southern Connecticut River Valley, Hinckley soils are used for growing tobacco and truck crops and in eastern Massachusetts, truck crops. Most areas are forested, brush land or used as urban land. Northern red, black, white, scarlet and scrub oak, eastern white and pitch pine, eastern hemlock, and gray birch are the common trees. Unimproved pasture and idle land support hardhack, little bluestem, bracken fern, sweet fern, and low bush blueberry.

DISTRIBUTION AND EXTENT: Connecticut, southern Maine, Massachusetts, New Hampshire, northern New Jersey, New York, Rhode Island, and Vermont. MLRA's 101, 141, 142, 144A, 145, and 149B. The series is extensive.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Oneida County, New York, 1913.

REMARKS: The use of the Hinckley series in frigid areas of Maine, and in MLRA 143 and 144B, is relict to before temperature classes. These have been removed from the SC file.

Diagnostic horizons and features recognized in this pedon are:
1. Ochric epipedon - the zone from 3 to 20 cm (Ap horizon).
2. Sandy-skeletal feature - the zone from 25 to 100 cm has a weighted average content of rock fragments of 51 percent and a particle size of the fine-earth fraction is sandy (Bw, BC, and C horizons).

ADDITIONAL DATA: Reference samples from pedons S55NH015002, S56MA011002, S56MA011003, S57MA023005, S58NH015002, S73MA009001, S73MA005002, S73MA009004, S73MA005005, S96NH013003 from Massachusetts and New Hampshire, samples by NSSL, Lincoln, NE, various dates.

LOCATION NATCHAUG NY+CT MA NJ

Established Series
DAF-SMF-JTI
03/2015

NATCHAUG SERIES

The Natchaug series consists of very deep, very poorly drained soils formed in woody and herbaceous organic materials overlying loamy deposits in depressions on lake plains, outwash plains, till plains, moraines, and flood plains. Saturated hydraulic conductivity is moderately high or high in the organic layers and moderately low to high in the loamy material. Slope ranges from 0 to 2 percent. Mean annual temperature is about 9 degrees Celsius and mean annual precipitation is about 1205 millimeters.

TAXONOMIC CLASS: Loamy, mixed, euic, mesic Terric Haplosaprists

TYPICAL PEDON: Natchaug muck - 0 percent slope in a wooded area at an elevation of about 80 meters. (Colors are for moist soil.)

Oa1--0 to 10 centimeters; very dark brown (10YR 2/2) rubbed and black (10YR 2/1) broken face muck; 15 percent fibers, 5 percent rubbed; moderate fine granular structure; friable, nonsticky, and slightly plastic; common medium roots; 20 percent mineral soil material; slightly acid; abrupt smooth boundary.

Oa2--10 to 46 centimeters; dark reddish brown (5YR 2/2) broken face muck; 30 percent fibers, 8 percent rubbed; massive; friable, moderately sticky, slightly plastic; 10 percent mineral soil material; neutral; abrupt smooth boundary. (Combined thickness of the O horizons is 40 to 130 cm.)

2Cg1--46 to 61 centimeters; dark gray (10YR 4/1) silt loam; massive; friable, slightly sticky, moderately plastic; neutral; abrupt smooth boundary.

2Cg2--61 to 152 centimeters; gray (10YR 5/1) fine sandy loam; massive; friable, nonsticky, nonplastic; neutral.

TYPE LOCATION: Rensselaer County, New York; Town of Schodack; 0.5 mile east of County Road 3, 3,000 feet north of New York Thruway, 3,700 feet west of New York Route 9; USGS Kinderhook, New York topographic quadrangle, latitude 42 degrees 29 minutes 38.53 seconds N. and longitude 73 degrees 41 minutes 20.42 seconds W., WGS 84.

RANGE IN CHARACTERISTICS: The organic material extends to a depth of 40 to 130 centimeters. Woody fragments, consisting of twigs, branches, logs, or stumps, commonly occur throughout the organic soil materials and average from 2 to 15 percent by volume in the control section. Fragments range in size from 20 to 300 millimeters in diameter, and in lieu textures include woody modifiers. The reaction of the organic material ranges from ultra acid to slightly alkaline. The reaction ranges from strongly acid to moderately alkaline in the substratum. Some pedons have free carbonates in the mineral soil material.

The surface tier has hue of 10YR to 5YR, or is neutral; value of 2 to 4, and chroma of 0 to 6. It is peat, mucky peat, or muck (fibric, hemic, or sapric materials). The surface tier is massive or has weak or medium, coarse to fine granular or subangular blocky structure.

The subsurface tier has hue of 2.5Y to 5YR, or is neutral, value of 2 to 4, and chroma of 0 to 4. It is commonly massive, but some pedons have granular, weak coarse blocky or thick platy structure. It is typically muck (sapric materials), but some pedons have thin layers of mucky peat (hemic materials).

The bottom tier, where present, has characteristics similar to the subsurface tier.

The 2C or 2Cg horizon has a hue of 5YR to 5GY, or is neutral; value of 3 to 6, and chroma of 1 to 6. It is loamy very fine sand, very fine sandy loam, sandy loam, fine sandy loam, loam, silt loam, silty clay loam, or gravelly analogues of these textures. Rock fragments range in size from gravel to stones and from 0 to 30 percent by volume.

COMPETING SERIES: These are the Klossner, Linwood, Medo, Palms, Philbon, and Shalcar series. Klossner, Linwood, Medo, Philbon, and Shalcar soils are from outside LRRs R and S. Klossner and Philbon soils have A horizons directly below the organic material. Linwood soils are moist for more than 60 cumulative days in any part of the upper 15 centimeters of the soil in a normal year. Palms soils formed primarily in herbaceous materials, lack woody fragments, and average less than 920 mm of precipitation annually. Medo soils have sandy textures in the lower part of the series control section. Shalcar soils have mean summer temperatures that average less than 18 degrees Celsius.

GEOGRAPHIC SETTING: Natchaug soils are in depressions on lake plains, outwash plains, moraines, till plains, and flood plains. These soils formed in woody and herbaceous organic materials. Slope ranges from 0 to 2 percent. Mean annual temperature is 7 to 13 degrees Celsius. The mean annual precipitation is 920 to 1800 millimeters. The frost-free period is 130 to 240 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Catden, Freetown, Leicester, Ridgebury, Timakwa, and Whitman soils. Catden and Freetown soils have organic deposits more than 130 centimeters deep. Timakwa soils have a sandy mineral substratum at depths of 40 to 130 centimeters. Poorly drained or very poorly drained mineral soils such as Ridgebury, Leicester, and Whitman occur at the margins of Natchaug soils as they grade to the uplands.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Very poorly drained. Depth to the seasonal high water table ranges from 1 foot above the surface to 30 centimeters below the surface from October to June. Surface runoff is negligible or very low. Saturated hydraulic conductivity is moderately high or high in the organic layers and moderately low to high in the loamy material. Some areas are subject to frequent, very long flooding from September through June.

USE AND VEGETATION: Most areas are used for wildlife habitat or are in woodland or clear-cut woodland. Some areas are used for pasture. Common vegetation is red maple, skunk cabbage, and sphagnum moss.

DISTRIBUTION AND EXTENT: Low-lying areas in Connecticut, Massachusetts, New Jersey, and New York; MLRAs 140, 144A, and 145. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Connecticut Statewide Update Survey, 2003. The name is from a state forest in Connecticut.

REMARKS: These soils were previously mapped in Connecticut as the Palms series.
Diagnostic horizons and features recognized in this pedon are:
1. Sapric soil materials - the zone from the surface to 46 centimeters (Oa1 and Oa2 horizons)
2. Terric feature - mineral soil material in the zone from 46 to 200 centimeters (2Cg1 and 2Cg2 horizons)
3. Particle size control section - 46 to 130 centimeters (2Cg1 and 2Cg2 horizons);
4. Histosols control section - the zone from 0 to 130 centimeters (Oa1, Oa2, 2Cg1, and 2Cg2 horizons)
5. Euic reaction class - pH of 4.5 or more in 0.01 M calcium chloride in one or more organic layers within the Histosols control section (Oa1 and Oa2 horizons)

Established Series
Rev. CAW-MFF-JTI
05/2018

DEERFIELD SERIES

The Deerfield series consists of very deep, moderately well drained soils formed in glaciofluvial deposits. They are nearly level to strongly sloping soils on terraces, deltas, and outwash plains. Slope ranges from 0 to 15 percent. Saturated hydraulic conductivity is high or very high. Mean annual temperature is about 9 degrees C. and mean annual precipitation is about 1194 mm.

TAXONOMIC CLASS: Mixed, mesic Aquic Udipsamments

TYPICAL PEDON: Deerfield loamy fine sand in a hayfield at an elevation of about 19 meters. (Colors are for moist soil.)

Ap --0 to 23 cm; very dark brown (10YR 2/2) loamy fine sand; weak fine and medium granular structure; very friable; common fine roots; moderately acid; abrupt smooth boundary. (15 to 30 cm thick)

Bw1 --23 to 43 cm; strong brown (7.5YR 5/6) loamy fine sand; weak fine and medium granular structure; very friable; common fine roots; moderately acid; clear smooth boundary.

Bw2 --43 to 64 cm; yellowish brown (10YR 5/6) loamy fine sand; weak fine granular structure; very friable; few fine faint brownish yellow (10YR 6/6), moist, masses of oxidized iron accumulation; strongly acid; clear wavy boundary. (Combined thickness of the Bw horizons is 13 to 69 cm.)

BC --64 to 84 cm; yellowish brown (10YR 5/6) fine sand; single grain structure; loose; common fine and medium distinct strong brown (7.5YR 5/8) masses of oxidized iron accumulation and common fine and medium distinct light brownish gray (10YR 6/2) iron depletions; strongly acid; clear broken boundary. (0 to 51 cm thick)

C1 --84 to 102 cm; light brownish gray (10YR 6/2) stratified sand and fine sand; single grain structure; loose; common fine prominent strong brown (7.5YR 5/8) masses of oxidized iron accumulation; strongly acid; clear wavy boundary.

C2 --102 to 152 cm; light brownish gray (10YR 6/2) stratified sand and gravelly sand; single grain structure; loose; common fine and medium prominent strong brown (7.5YR 5/8) masses of oxidized iron accumulation; 10 percent rounded fine granite and quartzite gravel; very strongly acid; individual strata contain up to 20 percent gravel.

TYPE LOCATION: Essex County, Massachusetts; Town of Andover, 2,525 feet north-northwest (345 deg) of the intersection of Laurel Lane and Old River Road, in a hayfield. USGS Lawrence, Massachusetts topographic quadrangle; Lat. 42 degrees 41 minutes 49.57 seconds N. and long. 71 degrees 12 minutes 52.52 seconds W., WGS 84.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 38 to 100 cm. Gravel, generally fine gravel, ranges from 0 to less than 15 percent in the solum and 0 to 20 percent in the substratum. Reaction ranges from extremely acid through slightly acid unless limed. Iron depletions with chroma of two or less are between depths of 38 and 100 cm from the mineral soil surface.

The O horizon, where present, has a hue of 5YR to 10YR, value of 2 to 3, and chroma of 1 to 3. It is slightly to highly decomposed plant material.

The Ap horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 to 3. It is fine sandy loam, sandy loam, loamy fine sand, loamy sand, fine sand, or sand. Undisturbed pedons commonly have an O horizon and a thin sequence of A, E, and Bs, Bhs or Bh horizons. They may also have an AB or AE horizon. The Ap or A horizon has weak or moderate very fine to medium granular structure and is friable or very friable.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6. Texture of the upper part of the Bw horizon, within a depth of 25 cm from the soil surface, has the same range as the A horizon. Below 25 cm the texture is loamy fine sand, loamy sand, fine sand, sand or coarse sand. Structure is weak, very fine to medium granular or subangular blocky, or is single grain. Moist consistence is friable, very friable, or loose.

The BC horizon has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 2 to 4. Texture range is the same as the lower part of the Bw horizon. Structure is weak, very fine to medium subangular blocky, or is single grain. Moist consistence is friable, very friable, or loose.

The C horizon has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 1 to 4. Texture is loamy fine sand, loamy sand, fine sand, sand or coarse sand. Stratified textures of these textures and gravel, coarse sand, or loamy coarse sand are present in some pedons. It is single grain or massive. Moist consistence is friable, very friable or loose.

COMPETING SERIES: These are the Algansee, Altmar, Birchwood, Brems, Brockatonorton, Elnora, Fortress, Livonia, Meckling, Morocco, Ottokee, Partridge, Succotash, Tedrow, and Zaborowsky series. The Algansee, Brems, Brockatonorton, Meckling, Morocco, Ottokee, Partridge, Tedrow, and Zaborowsky soils are from outside of region R. Algansee soils have an irregular decrease of organic matter with depth. Altmar soils have rock fragments dominated by sandstone. Birchwood soils formed in sandy sediments over glacial till. Brems and Ottokee soils have sola more than 100 cm thick, and Ottokee soils have lamellae. Elnora soils contain more fine sand in the lower part of the series control section. Fortress soils formed in anthropotransported soil material from eolian sand, outwash, ordredging activities. Livonia soils formed in glaciolacustrine parent material with neutral to moderately alkaline reaction and average less than 960 mm of annual precipitation. Meckling soils are calcareous throughout. Morocco soils have redox features within a depth of 38 cm. Partridge soils have bedrock at depths of 50 to 100 cm. Succotash soils formed in sandy eolian and/or marine overwash deposits. Tedrow and Zaborosky soils have carbonates.

GEOGRAPHIC SETTING: Deerfield soils are level to strongly sloping soils on outwash terraces, outwash deltas, and outwash plains. Slope gradients are commonly 0 to 3 percent, but range to 15 percent. The soils formed in thick deposits of sand derived mainly from granite, gneiss and quartzite, but in places containing materials from schist and sandstone. The sand is poorly graded; medium sand is generally dominant and typically contains little or no gravel. The mean annual precipitation typically ranges from 965 to 1397 mm but the range includes as low as 660 mm in some places east of Adirondack Mountains in the Champlain Valley of New York. The mean annual temperature ranges from 7 to 11 degrees C. The frost-free period ranges from 120 to 200 days.

GEOGRAPHICALLY ASSOCIATED SOILS: Deerfield soils are in a drainage sequence that includes the excessively drained Carver and Windsor soils, the somewhat poorly drained Wareham and Pipestone soils, and the very poorly drained Scarboro soils. The well drained Agawam, moderately well drained Ninigret, and poorly drained Walpole soils are terrace associates that are loamy over stratified sand and gravel. The somewhat excessively drained Merrimac and the excessively drained Hinckley and Penwood soils are on nearby glaciofluvial landforms and have sandy and gravelly substrata. The excessively drained Plymouth, somewhat excessively drained Gloucester, well drained Canton, Charlton, Cheshire, Essex and Paxton, and moderately well drained Woodbridge soils are on nearby glacial till uplands.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Moderately well drained. Runoff is negligible to low. Saturated hydraulic conductivity is high or very high.

USE AND VEGETATION: Mainly cleared and used for truck crops, tobacco, potatoes, hay, pasture and silage corn. Forested areas have pitch pine, white pine, gray birch, red maple, oaks, and sugar maple. Many areas are in urban uses.

DISTRIBUTION AND EXTENT: New Hampshire, Vermont, Maine, Massachusetts, Rhode Island, Connecticut, and New York. (MLRAs 101, 142, 144A, 144B, 145, and 149B) The soils of this series are moderately extensive.

SOIL SURVEY REGIONAL OFFICE (SSRO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Franklin County, Massachusetts, 1964.

REMARKS: Diagnostic horizons and features recognized in this pedon include:
Ochric epipedon - the zone from 0 to 23 cm (Ap horizon).
Redox depletions with chroma of 2 or less - the zone from 64 to 152 cm. (BC, Cg1, and Cg2 horizons).

ADDITIONAL DATA: Full characterization data for pedons with User Pedon IDs of S1959MA005001, S1970MA011004, S1991MA023005, S2005CT003003, and S2013NY085002. Pedons analyzed by the KSSL, Lincoln, NE. The laboratory characterization data for these pedons and similar soils is available through the National Cooperative Soil Survey Soil Characterization Database: http://ncsslabdatamart.sc.egov.usda.gov/

Established Series
Rev. DGG-MFF-DCP
01/2013

SUDBURY SERIES

The Sudbury series consists of very deep, moderately well and somewhat poorly drained soils on outwash plains. They are nearly level through strongly sloping soils in slight depressions and on terraces and foot slopes in areas of outwash or glaciofluvial deposits. Slope ranges from 0 through 15 percent. Saturated hydraulic conductivity is moderately high or high in the upper solum and high or very high in the lower solum and substratum. Mean annual temperature is about 48 degrees F. (9 degrees C.) and the mean annual precipitation is about 43 inches (1092 millimeters).

TAXONOMIC CLASS: Sandy, mixed, mesic Aquic Dystrudepts

TYPICAL PEDON: Sudbury fine sandy loam in a cultivated field at an elevation of about 92 feet (28 meters). (Colors are for moist soils unless otherwise stated.)

Ap -- 0 to 13 inches (0 to 33 centimeters); very dark grayish brown (10YR 3/2) fine sandy loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; very friable; many fine roots; 5 percent gravel; moderately acid; abrupt smooth boundary. (6 to 14 inches, 15 to 36 centimeters thick.)

Bw -- 13 to 19 inches (33 to 48 centimeters); yellowish brown (10YR 5/6) sandy loam; weak medium granular structure; very friable; common grass roots; 10 percent fine gravel; few fine and medium prominent dark reddish gray (5YR 4/2) areas of iron depletion in the lower 3 inches (8 centimeters); moderately acid; abrupt wavy boundary. (2 to 20 inches, 5 to 51 centimeters thick.)

2CB -- 19 to 26 inches(48 to 66 centimeters) ; yellowish brown (10YR 5/4) gravelly coarse sand; single grain; loose; few fine roots; yellowish red (5YR 4/8) coatings on some sand grains; 20 percent gravel; many fine prominent dark reddish brown (2.5YR 3/4) and common coarse prominent reddish yellow (5YR 6/8) masses of iron accumulations; moderately acid; abrupt wavy boundary. (0 to 10 inches, 0 to 25 centimeters thick.)

2C -- 26 to 65 inches (66 to 165 centimeters); light olive brown (2.5Y 5/4) very gravelly coarse sand; single grain; loose; many sand grains coated with strong brown (7.5YR 5/6) and some sand grains slightly cemented, and many pebbles and cobbles coated with black (5YR 2/1); few fine roots; strata of sand and gravel consisting of about 50 percent gravel and some cobbles; common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation; moderately acid.

TYPE LOCATION: Essex County, Massachusetts; town of Beverly, 0.2 miles south of the junction of Essex Street and Cole Street and 150 feet south of railroad track. USGS Salem, MA quadrangle; Latitude 42 degrees, 33 minutes, 52 seconds N., Longitude 70 degrees, 51 minutes, 38 seconds W., NAD 1983.

RANGE IN CHARACTERISTICS: Thickness of the solum and depth to stratified sand and gravel range from 18 through 36 inches (46 through 91 centimeters). Depth to redoximorphic features ranges from 12 through 24 inches (30 through 60 centimeters) and must include redoximorphic depletions with chroma of 2 or less. Rock fragment content of individual horizons of the solum ranges from 0 through 30 percent by volume. The fragments are primarily fine gravel but include some medium gravel, coarse gravel and cobbles. Rock fragment content of the C horizon ranges from 0 through 75 percent, and consists of 0 through 65 percent gravel and 0 through 25 percent cobbles and stones. The fragments are mainly granite or gneiss with less than 25 percent dark, fine-grained shale, slate, or phyllite. Reaction ranges from extremely acid through slightly acid in the solum, unless limed, and from very strongly acid through slightly acid in the substratum.

Some pedons have an O horizon.

The Ap or A horizon has hue of 7.5YR or 10YR, value of 2 through 4, and chroma of 0 through 4. It is fine sandy loam, sandy loam, or very fine sandy loam in the fine-earth fraction. Structure is granular or subangular blocky.

Some pedons have an E horizon that has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 1 or 2. The E horizon has the same texture range as the A horizon. Structure is granular or subangular blocky.

The Bw horizon has hue of 7.5YR through 2.5Y, value of 3 through 5, and chroma of 2 through 8. The upper part of the B horizon is fine sandy loam or sandy loam and the lower part ranges from sandy loam through coarse sand in the fine-earth fraction. Structure is granular or subangular blocky or the horizon is massive. The structure may be single grain in the lower part in some pedons.

The 2CB horizon, where present, has hue of 7.5YR through 2.5Y, value of 3 through 6, and chroma of 2 through 8. Texture ranges from loamy sand through coarse sand in the fine-earth fraction.
The 2C horizon has hue of 7.5YR through 5Y, value of 4 through 6, and chroma of 2 through 8. It consists of stratified sand, gravel, and cobbles and ranges from loamy fine sand through coarse sand in the fine-earth fraction.

COMPETING SERIES: There are no other series in the same family.

The Deerfield, Merrimac, Ninigret, Tisbury, and Walpole series are in related families. Deerfield soils have loamy fine sand or coarser textures below a depth of 10 inches (25 centimeters). Merrimac soils are somewhat excessively drained. Ninigret soils are coarse loamy over sandy or sandy-skeletal. Tisbury soils are silt loam or very fine sandy loam in the upper part of the B horizon. Walpole soils are poorly drained.

GEOGRAPHIC SETTING: Sudbury soils are nearly level through strongly sloping soils in slight depressions on outwash plains and on gentle foot slopes. Slope ranges from 0 through 15 percent. The soils formed in water sorted sandy and gravelly glaciofluvial materials derived mainly from granite, gneiss, and schist. Mean annual precipitation ranges from 30 through 55 inches (762 through 1397 millimeters) and mean annual temperature ranges from 45 through 50 degrees F. (7 through 10 degrees C.). Mean growing season ranges from 120 through 240 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Agawam, Deerfield, Hinckley, Merrimac, Walpole and Windsor soils on nearby landscapes. Agawam, Hinckley, Merrimac, and Windsor soils do not have redox depletions within 24 inches (60 centimeters) of the surface. In addition, the Hinckley and Windsor soils have loamy sand or coarser textures in the B horizon. Deerfield soils have loamy fine sand or coarser textures below a depth of 10 inches (25 centimeters). Walpole soils are poorly drained.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Moderately well and somewhat poorly drained. The potential for surface runoff is low to very high. The internal drainage is restricted by a seasonal high water table. Saturated hydraulic conductivity is moderately high or high in the upper solum and high or very high in the lower solum and substratum.

USE AND VEGETATION: Most areas used for growing hay, pasture, field and truck crops. Some are forested areas with mainly red maple, gray birch, eastern hemlock, larch, eastern white pine, and red, black, and scarlet oaks.

DISTRIBUTION AND EXTENT: Massachusetts, Connecticut, Rhode Island, Vermont, New Hampshire and eastern New York. MLRAs 144A, 145, and 149B. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Middlesex County, Massachusetts, 1924.

REMARKS: Diagnostic horizons and features recognized in this pedon are:
1. Ochric epipedon - the zone from the soil surface to a depth of 13 inches (33 centimeters) (Ap horizon).
2. Cambic horizon - the zone from 13 to 19 inches (33 to 48 centimeters) (Bw horizon).
3. Aquic subgroup - redox depletions with a chroma of 2 within 24 inches (60 centimeters) of the soil surface.

Established Series
Rev. WHT-SMF-MFF
03/2010

SCARBORO SERIES

The Scarboro series consists of very deep, very poorly drained soils in sandy glaciofluvial deposits on outwash plains, deltas, and terraces. They are nearly level soils in depressions. Slope ranges from 0 through 3 percent. Saturated hydraulic conductivity is high or very high. Mean annual temperature is about 49 degrees F. (9 degrees C.) and the mean annual precipitation is about 44 inches (1118 millimeters).

TAXONOMIC CLASS: Sandy, mixed, mesic Histic Humaquepts

TYPICAL PEDON: Scarboro mucky fine sandy loam woodland; in an area of Scarboro mucky fine sandy loam at an elevation of about 212 meters. (Colors are for moist soil.)

Oi-- 0 to 1 inch (0 to 3 centimeters); slightly decomposed maple leaves and other plant material

Oa-- 1 to 8 inches (3 to 20 centimeters); dark brown (10YR3/3) mucky peat; thin platy structure; friable; common fine roots; very strongly acid; abrupt wavy boundary. (Combined thickness of Oi, Oe, and Oa horizons is 8 to 13 inches (20 to 33 centimeters).)

A-- 8 to 14 inches (20 to 36 centimeters); black (N 2/0) mucky fine sandy loam; weak medium granular structure; friable; common fine roots; very strongly acid; abrupt smooth boundary. (0 to 14 inches (0 to 36 centimeters) thick.)

Cg1-- 14 to 19 inches (36 to 48 centimeters); grayish brown (2.5Y 5/2) loamy sand; massive; friable; many fine roots; very strongly acid; abrupt irregular boundary.

Cg2-- 19 to 22 inches (48 to 56 centimeters); grayish brown (2.5Y 5/2) sand; massive; friable; few fine roots; 10 percent rock fragments; common medium prominent dark brown (7.5YR 3/2) areas of iron depletion and common medium prominent yellowish red (5YR 4/6) masses of iron; very strongly acid; clear wavy boundary.

Cg3-- 22 to 65 inches (56 to 165 centimeters); grayish brown (2.5Y 5/2) gravelly sand; single grain; loose; 15 percent rock fragments; strongly acid.

TYPE LOCATION: 60 feet north of Electric Avenue near the south edge of Forest Hill Cemetery in the City of Fitchburg, Massachusetts. USGS Fitchburg, MA topographic quadrangle, Latitude 42 degrees, 34 minutes, 0.3 seconds N., and Longitude 71 degrees, 48 minutes, 33.3 seconds W., NAD 1983.

RANGE IN CHARACTERISTICS: Stones range from 0 through 5 percent by volume in the A horizon and upper part of the C horizon and are absent in the lower part of the C horizon. Cobbles range from 0 through 10 percent in the A horizon, 0 through 5 percent in the upper part of the C horizon, and are absent in the lower part of the C horizon. Gravel ranges from 0 through 10 percent by volume in the A horizon, 0 through 20 percent in the upper part of the C horizon to a depth of 30 inches (76 centimeters), and 0 through 50 percent in the C horizon below a depth of 30 inches (76 centimeters). Reaction ranges from very strongly acid through moderately acid in the A horizon and upper part of the C horizon, and from very strongly acid through neutral in the lower part of the C horizon.

The O horizon is commonly mucky peat or muck, but the range includes thin layers of peat at the surface. The O horizon is neutral or has hue 5YR through 10YR, value of 2 or 3, and chroma of 0 through 3.

The A horizon where present is neutral or has hue of 5YR through 2.5Y, value of 2 through 3, and chroma of 0 through 2. It is fine sandy loam, sandy loam, loamy fine sand, loamy sand, fine sand, sand or their mucky analogues in the fine-earth fraction. This horizon commonly is 5 through 14 inches (13 through 36 centimeters) thick, but in some places may be less than 5 inches (13 centimeters) thick or absent.

The upper part of the Cg horizon is neutral or has hue of 10YR through 5Y, value of 3 through 7, and chroma of 0 through 3. Some pedons have few or common fine through coarse redoximorphic features. Texture is fine sandy loam, sandy loam, loamy fine sand, loamy coarse sand, loamy sand, fine sand, or sand in the fine-earth fraction.

The lower part of the C horizon is neutral or has hue of 10YR through 5Y or 5GY, value of 3 through 6, and chroma of 0 through 4. Redoximorphic features range from none through many and are fine through coarse. Texture is loamy fine sand, loamy sand, fine sand, sand, loamy coarse sand, or coarse sand in the fine-earth fraction. The C horizon is structureless and loose, very friable, or friable. It is often stratified.

COMPETING SERIES: These are the Ackerman and Antung series. These soils are from outside LRR R and S. Ackerman soils are more alkaline in the organic horizons and the upper part of the C horizon. They also contain coprogenous material. Antung soils are more alkaline and effervesce in the C horizon.

GEOGRAPHIC SETTING: Scarboro soils are in level or nearly level depressions on outwash plains, deltas, and terraces. Slope is less than 3 percent. The soils formed in sandy glaciofluvial deposits. Mean annual temperature ranges from 46 through 57 degrees F. (8 through 14 degrees C.) and mean annual precipitation ranges from 38 through 55 inches (965 through 1397 millimeters).

GEOGRAPHICALLY ASSOCIATED SOILS: The excessively drained Hinckley, Windsor and Penwood soils, somewhat excessively drained Merrimac soils, moderately well drained Sudbury and Deerfield soils, poorly drained Mashpee(T) and Massasoit(T) soils, somewhat poorly and poorly drained Walpole and Wareham soils are on higher positions on associated glaciofluvial landforms. The poorly drained Rippowam soils and very poorly drained Saco soils are on nearby flood plains. The very poorly drained Rainberry soils lack a Histic epipedon and have Spodic horizons.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Very poorly drained. Saturated hydraulic conductivity is high or very high. Surface runoff is high or very high. The water table is at or near the surface for 6 to 12 months of the year, and many areas are ponded for short periods.

USE AND VEGETATION: Shrub and brush land or woodland. Common shrubs are speckled alder, smooth alder, rhoda azalea, steeplebush spirea, leatherleaf, labrador-tea, winterberry, highbush blueberry, large cranberry, black huckleberry, poison sumac, and sheep laurel. Common trees are red maple, slippery elm, Atlantic white cedar, tamarack, eastern white pine, willow, and gray birch.

DISTRIBUTION AND EXTENT: Glaciofluvial landforms in Connecticut, Massachusetts, New Hampshire, Rhode Island, eastern New York, and Vermont. MLRAs 142, 144A, 145, and 149B. Scarboro soils are extensive.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Cumberland County, Maine; 1915.

REMARKS: 1. Geographical location (latitude and longitude) determined from the published soil survey.

2. The use of the Scarboro series in Maine, and in MLRA 144B, is relict to before temperature classes. These have been removed from the SC file.

Diagnostic horizons and features recognized in this pedon are:
1. Histic epipedon - the zone from the soil surface to a depth of 8 inches (20 centimeters), (Oi and Oa horizons).
2. Thickness of organic soil materials is 8 inches (20 centimeters).

3. Aquic conditions - Histic epipedon or the zone from 19 to 22 inches (48 to 56 centimeters) has 50 percent or more 2 chroma with redox concentrations (Cg2 horizon).

Established Series
Rev. MFF-SMF-JTI
05/2016

SUTTON SERIES

The Sutton series consists of very deep, moderately well drained loamy soils formed in melt-out till. They are nearly level to strongly sloping soils on hills, low ridges, and ground moraines, typically on footslopes, lower backslopes and in slight depressions. Slope ranges from 0 to 15 percent. Saturated hydraulic conductivity is moderately high or high throughout. Mean annual temperature is about 9 degrees C and mean annual precipitation is about 1205 mm.

TAXONOMIC CLASS: Coarse-loamy, mixed, superactive, mesic Aquic Dystrudepts

TYPICAL PEDON: Sutton fine sandy loam, extremely stony - forested, with a one inch layer of undecomposed litter on surface at an elevation of about 250 meters. (Colors are for moist soil.)

Oe--0 to 2 cm; black (10YR 2/1) moderately decomposed forest plant material. (0 to 8 cm thick)

A--2 to 15 cm; very dark brown (10YR 2/2) fine sandy loam; weak medium granular structure; very friable; common fine and medium roots; 5 percent gravel; strongly acid; clear wavy boundary. (2 to 25 cm thick)

Bw1--15 to 30 cm; brown (7.5YR 4/4) fine sandy loam; weak fine and medium subangular blocky structure; friable; common fine and medium roots; 10 percent gravel and cobbles; moderately acid; gradual wavy boundary.

Bw2--30 to 61 cm; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; few medium roots; 10 percent gravel and cobbles; common fine and medium prominent light brownish gray (2.5Y 6/2) iron depletions and yellowish red (5YR 5/6) masses of iron accumulation; moderately acid; gradual wavy boundary.

Bw3--61 to 71 cm; yellowish brown (10YR 5/4) fine sandy loam; weak medium subangular blocky structure; friable; 10 percent gravel and cobbles; common medium prominent light brownish gray (2.5Y 6/2) iron depletions and reddish brown (5YR 4/4) and strong brown (7.5YR 5/6) masses of iron accumulation; moderately acid; gradual wavy boundary. (Combined thickness of the Bw horizon is 35 to 92 cm.)

C1--71 to 91 cm; brown (10YR 5/3) gravelly fine sandy loam; weak thick platy structure; firm; 15 percent gravel and cobbles; common medium distinct light brownish gray (2.5Y 6/2) iron depletions and common medium prominent strong brown (7.5YR 5/6) masses of iron concentrations; moderately acid; gradual wavy boundary. (15 to 51 cm thick)

C2--91 to 165 cm; light olive brown (2.5Y 5/4) gravelly sandy loam; massive; friable; 25 percent gravel and cobbles; moderately acid.

TYPE LOCATION: New Haven County, Connecticut; town of Prospect, 400 feet southeast along Merriman Lane from the intersection with Summit Road, and 70 feet north of Merriman Lane, in a wooded area. USGS Southington quadrangle, latitude 41 degrees 30 minutes 31 seconds N., longitude 72 degrees 58 minutes 45 seconds W., NAD 27, in a wooded area.

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 50 to 100 cm. Depth to bedrock is commonly more than 2 meters. Rock fragments range from 5 to 35 percent by volume to a depth of 100 cm and up to 50 percent below 100 cm. Except where the surface is stony, the fragments are mostly subrounded gravel and typically make up 60 percent or more of the total rock fragments. Unless limed, reaction ranges from very strongly acid to moderately acid.

The A horizon has hue of 10YR or 7.5YR, value of 2 to 4, and chroma of 1 to 3. Disturbed pedons have an Ap horizon with value of 3 or 4 and chroma of 2 to 4. The A or Ap horizon is sandy loam, fine sandy loam, or loam in the fine-earth fraction. It has weak or moderate granular structure and is friable or very friable.

Some pedons have a thin E horizon below the A horizon. It has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 3. Texture, structure, and consistence are like the A horizon.

The upper part of the Bw horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6.

The lower part of the Bw horizon has hue of 10YR to 5Y and value and chroma of 4 to 6. It has iron depletions and masses of iron accumulation above a depth of 60 cm. Fine-earth texture of the Bw horizon is sandy loam, fine sandy loam, or loam with less than 65 percent silt plus very fine sand. Structure is weak platy, granular, or subangular blocky, or the horizon is massive. Consistence is friable or very friable.

Some pedons have a thin BC horizon with value and chroma like the lower part of the Bw horizon. The BC horizon has texture, structure, and consistence similar to the Bw horizon.

The C horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 to 4. It typically has redoximorphic features in the upper part. Texture is commonly fine sandy loam or sandy loam, but ranges to very fine sandy loam in the fine-earth fraction. Some pedons have pockets or thin lenses of silt loam, loamy sand, or sand. The horizon is massive or it has weak plates. Consistence is commonly very friable or friable but the range includes firm in some pedons.

COMPETING SERIES: There are currently no other series in the same family.

The Chautauqua, Pittstown, Pompton, Rainbow, Wapping, Wilbraham, and Woodbridge series are in related families.
Rainbow soils have a dense substratum. Wilbraham soils have low chroma iron depletions throughout the B horizon and have a dense substratum. Chautauqua and Wapping soils have more than 65 percent silt plus very fine sand in the B horizon. Pittstown and Woodbridge soils have a dense substratum. Pompton soils have a stratified sandy and gravelly substratum within a depth of 100 centimeters.

GEOGRAPHIC SETTING: Sutton soils are nearly level to strongly sloping soils typically on footslopes and lower backslopes or in slightly depressed areas on hills on glaciated uplands. Slope ranges from 0 to 15 percent. The soils formed in acid melt-out till derived mainly from granite, gneiss, and/or schist. Mean annual air temperature ranges from 7 to 13 degrees C, and mean annual precipitation ranges from 910 to 1800 mm. The frost-free period ranges from 140 to 240 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Acton, Charlton, Rainbow, Wapping, and Woodbridge soils and the Broadbrook, Brookfield, Canton, Chatfield, Essex, Gloucester, Hollis, Leicester, Montauk, Narragansett, Paxton, Ridgebury, Scituate, and Whitman soils on nearby landscapes. The well drained Charlton and the poorly drained Leicester soils are associated in a drainage sequence. Broadbrook, Essex, Montauk, and Paxton soils are well drained and have a dense substratum. Brookfield, Canton, Gloucester, and Narragansett soils are well drained and do not have redoximorphic features. Chatfield and Hollis soils have bedrock within a depth of 25 to 50 and 50 to 100 cm respectively. Ridgebury and Whitman soils are poorly drained and very poorly drained, respectively and have a dense substratum. Scituate soils are moderately well drained and have a dense substratum.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Moderately well drained. Surface runoff is slow to medium. Saturated hydraulic conductivity ranges from moderately high or high throughout.

USE AND VEGETATION: Cleared areas are used for cultivated crops, hay, or pasture. Scattered areas are used for community development. Some areas are wooded. Common trees are red oak, white oak, black oak, hickory, ash, red maple, gray birch, hemlock, and white pine.

DISTRIBUTION AND EXTENT: Late Wisconsin age glaciated areas in Connecticut, Massachusetts, New Hampshire, New York, and Rhode Island; MLRAs 142, 144A, and 145. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Worcester County, Massachusetts, 1922.

REMARKS: Diagnostic horizons and features recognized in this pedon are:
1. Ochric epipedon - the zone from 0 to 15 cm (Oe and A horizons).
2. Cambic horizon - the zone from 15 to 71 cm (Bw horizons).
3. Redox depletions with chroma 2 or less - zone from 30 to 91 cm (Bw2, Bw3, and C1 horizons).
4. Particle-size class - averages coarse-loamy in the control section from 27 to 102 cm.

ADDITIONAL DATA: Full characterization data for the pedon with User Pedon ID S1999NY005003. Pedon analyzed by the KSSL, Lincoln, NE. The laboratory characterization data for this pedon and similar soils is available through the National Cooperative Soil Survey Soil Characterization Database: http://ncsslabdatamart.sc.egov.usda.gov/

Established Series
Rev. MFF-SMF-JTI
04/2015

PAXTON SERIES

The Paxton series consists of well drained loamy soils formed in lodgment till. The soils are very deep to bedrock and moderately deep to a densic contact. They are nearly level to steep soils on hills, drumlins, till plains, and ground moraines. Slope ranges from 0 to 45 percent. Saturated hydraulic conductivity is moderately high or high in the surface layer and subsoil and low or moderately low in the substratum. Mean annual temperature is about 10 degrees C., and mean annual precipitation is about 1194 mm.

TAXONOMIC CLASS: Coarse-loamy, mixed, active, mesic Oxyaquic Dystrudepts

TYPICAL PEDON: Paxton fine sandy loam - in a brushy field at an elevation of about 850 feet. (Colors are for moist soil unless otherwise noted.)

Ap -- 0 to 20 cm; dark brown (10YR 3/3) fine sandy loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine roots; 5 percent gravel; strongly acid; abrupt smooth boundary. (13 to 28 cm thick)

Bw1 -- 20 to 38 cm; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; 5 percent gravel; few earthworm casts; strongly acid; gradual wavy boundary.

Bw2 -- 38 to 66 cm; olive brown (2.5Y 4/4) fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; 10 percent gravel; strongly acid; clear wavy boundary. (Combined thickness of the Bw horizon is 38 to 94 cm thick.)

Cd -- 66 to 165 cm; olive (5Y 5/3) gravelly fine sandy loam; medium plate-like divisions; massive; very firm, brittle; 25 percent gravel; many dark coatings on plates; strongly acid.

TYPE LOCATION: New Haven County, Connecticut; town of Prospect, 0.4 mile east of Straitsville Road and 0.5 mile north of the Bethany - Prospect town line; USGS Mount Carmel, CT topographic quadrangle; Latitude 41 degrees, 28 minutes, 34 33.79 seconds N., Longitude 72 degrees, 59 minutes, 16 119.19 seconds W., WGS 84

RANGE IN CHARACTERISTICS: Thickness of the mineral solum and depth to the densic contact ranges from 50 to 100 cm. Depth to bedrock is commonly more than 1.5 meters. Rock fragments range from 5 through 35 percent by volume in the mineral soil. Except where the surface is stony, the fragments are mostly subrounded gravel and typically make up 60 percent or more of the total rock fragments. Unless limed, reaction ranges from very strongly acid to slightly acid in the mineral soil.

The O horizon, where present, has hue of 5YR to 10YR or it is neutral, value of 2 or 3 and chroma of 0 to 2. It is mainly composed of slightly, moderately, or highly decomposed plant material.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 to 4. Dry value is 6 or more. The structure is commonly granular but the range includes subangular blocky in some pedons. Undisturbed pedons have a thin A horizon with value of 2 or 3 and chroma of 1 or 2. The Ap or A horizon is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

Some pedons have a thin E horizon below the A horizon. It has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 3.

The upper part of the Bw horizon has hue of 7.5YR or 2.5Y, value of 4 to 6, and chroma of 4 to 8. The lower part of the Bw horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6. Some pedons have few faint redoximorphic features just above the Cd horizon. The Bw horizon is loam, fine sandy loam, or sandy loam with less than 65 percent silt plus very fine sand. It has granular or subangular blocky structure Consistence is friable or very friable.

Some pedons have a BC horizon up to 20 cm thick.

Some pedons have an E or E' horizon up to 8 cm thick below the B horizon. It has hue of 10YR to 5Y, value of 5 or 6, and chroma of 2 or 3. Typically, it is coarser textured than the overlying horizon.

The Cd has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 to 4. In some pedons there are a few faint or distinct areas of iron depletion or masses of iron accumulation in the upper part. Texture is loam, fine sandy loam, sandy loam, or coarse sandy loam in the fine-earth fraction. A few thin lenses of loamy sand are in some pedons. The structure is geogenetically derived, appearing in the form of medium to very thick plates, or it is massive. Consistence is firm or very firm. Some pedons have a friable C horizon above the Cd horizon.

COMPETING SERIES: These are Amostown, Bernardston, Broadbrook, Horseneck, Nantucket, Scituate, and Wethersfield series. Amostown soils are underlain by stratified very fine sand or silt within a depth of 100 cm. Bernardston and Broadbrook soils have a solum with more than 65 percent silt plus very fine sand. Horseneck soils lack a densic contact. Nantucket soils have a lithologic discontinuity. Scituate soils have sandy substrata. Wethersfield soils have 5YR or redder hue in the B and C horizons.

GEOGRAPHIC SETTING: Paxton soils are nearly level to steep and are on till plains, ground moraines, hills, and drumlins. Slope commonly is 0 to 35 percent, but range from 0 to 45 percent in some pedons. The soils formed in acid lodgment till derived mostly from schist, gneiss, and granite. Mean annual temperature ranges from 7 to 11 degrees C., mean annual precipitation ranges from 940 to 1245 mm, and the growing season ranges from 115 to 180 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Bernardston, Broadbrook, and Scituate soils and the Canton, Charlton, Chatfield, Georgia, Hollis, Leicester, Montauk, Narragansett, Pittstown, Ridgebury, Stockbridge, Sutton, Wapping, Whitman, and Woodbridge soils on nearby landscapes. The moderately well drained Woodbridge, poorly drained Ridgebury, and the very poorly drained Whitman soils are associated in a drainage sequence. Canton soils have a friable loamy sand substratum. Well drained Stockbridge and moderately well drained Georgia soils have higher base status. Hollis soils have bedrock within a depth of 25 to 50 cm. Leicester soils are poorly drained and do not have a dense substratum. Montauk soils have sandy substrata. Narragansett soils have a lithologic discontinuity within a depth of 100 cm and a solum high in silt and very fine sand. Sutton and Wapping soils are moderately well drained and do not have a dense substratum.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Well drained. Water may perch on the densic contact for brief periods in late fall through early spring. Surface runoff is negligible to high. Saturated hydraulic conductivity is moderately high or high in the mineral solum and low or moderately low in the substratum.

USE AND VEGETATION: Many areas are cleared and used for cultivated crops, hay, or pasture. Scattered areas are used for community development. Some areas are wooded. Common trees are red, white, and black oak, hickory, sugar maple, red maple, gray and black birch, eastern white pine, and eastern hemlock.

DISTRIBUTION AND EXTENT: Glaciated uplands in Connecticut, Massachusetts, New Hampshire, eastern

New York, Rhode Island, and Vermont. MLRAs 144A and 145. The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Worcester County, Massachusetts, 1922.

REMARKS: Paxton is the state soil of Massachusetts.

Prior revisions included changes to the range in characteristics as well as general updating to metric units. Cation exchange activity class placement was determined from a review of limited lab data and similar or associated soils. Paxton soils were previously classified as Typic Dystrochrepts, and before that as Typic Fragiochrepts.

The Paxton series was previously used in some surveys in Maine. Maine determined from soil temperature studies that the mesic soil temperature regime would no longer be used. Maine is re-evaluating the soil temperature regimes in southern Maine as of the date of this revision.

Diagnostic horizons and features recognized in this pedon include:
1. Ochric epipedon - the zone from 0 to 20 cm (Ap horizon).
2. Cambic horizon - the zone from 20 to 66 cm (Bw horizons).
3. Densic material - the zone from 66 to 165 cm (Cd horizon).
4. Oxyaquic subgroup - based on saturation in one or more layers within 100 cm of the mineral surface, for one month or more per year, in 6 out of 10 years.
5) Particle-size control section - the zone from 20 to 66 cm (Bw horizons).

ADDITIONAL DATA: Full characterization data for pedons with User Pedon IDs of S1955MA027002, S1955NH015001, S1973MA005001, S1973MA005006, S1975CT013001, S1996NH013001, S1999NY061001. Pedons analyzed by the NSSL, Lincoln, NE. Laboratory characterization data for these pedons and similar soils is available through the National Cooperative Soil Survey Soil Characterization Database: http://ncsslabdatamart.sc.egov.usda.gov/

LOCATION CHATFIELD NH+CT MA NJ NY

Established Series
Rev. LWK-ERS-JTI
04/2017

CHATFIELD SERIES

The Chatfield series consists of well drained soils formed in loamy melt-out till. They are moderately deep to bedrock. They are nearly level to very steep soils on bedrock-controlled hills and ridges. Slope ranges from 0 to 70 percent. Crystalline bedrock is at depths of 50 to 100 cm. Saturated hydraulic conductivity is moderately high or high in the mineral soil. Mean annual temperature is about 9 degrees C, and mean annual precipitation is about 1205 mm.

TAXONOMIC CLASS: Coarse-loamy, mixed, superactive, mesic Typic Dystrudepts

TYPICAL PEDON: Chatfield fine sandy loam, on a 13 percent slope in a wooded area. (Colors are for moist soil unless otherwise noted).

Oi -- 0 to 3 cm, slightly decomposed leaf, needle, and twig litter; extremely acid, pH 4.2. (0 to 15 cm thick.)

A -- 3 to 5 cm, very dark gray (10YR 3/1) fine sandy loam, gray (10YR 5/1), dry; weak fine subangular blocky structure; friable; many fine and medium roots throughout; 5 percent mixed gravel and cobbles; very strongly acid, pH 4.5; abrupt smooth boundary. (1 to 25 cm thick.)

Bw1-- 5 to 33 cm, strong brown (7.5YR 5/6) gravelly fine sandy loam; weak fine subangular blocky structure; friable; common fine roots throughout and common medium roots throughout; 15 percent mixed gravel and cobbles; very strongly acid, pH 4.5; abrupt wavy boundary.

Bw2 -- 33 to 76 cm, strong brown (7.5YR 5/6) gravelly fine sandy loam; moderate medium subangular blocky structure; friable; few fine roots throughout; 20 percent mixed rock fragments; very strongly acid, pH 4.5; abrupt irregular boundary. (Combined thickness of the Bw horizons is 10 to 80 cm.)

2R -- 76 cm; fractured slightly-weathered schist bedrock.

TYPE LOCATION: Merrimack County, New Hampshire; Town of Epsom, 450 feet north-northwest from point 3,550 feet southwest along Old Mountain Road from intersection of Mountain Road and Tarlton Road. USGS Gossville, NH topographic quadrangle; Latitude 43 degrees, 11 minutes, 55.79 seconds N. and Longitude 71 degrees, 19 minutes, 22.31 seconds W., WGS 1984.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 40 to 97 cm. Depth to bedrock ranges from 50 to 100 cm from the mineral soil surface. Rock fragments range from 5 to 50 percent by volume in the A horizon and from 5 to 35 percent in the B and C horizons. Rock fragments are typically gravel or channers, but include cobbles, stones, boulders and flagstones, particularly just above the bedrock.

The O horizon has hue of 5YR to 2.5Y, value of 2 or 3, and chroma of 0 to 2. It is slightly, intermediately, and/or highly decomposed plant material. Reaction ranges from extremely acid to moderately acid.

The A, or Ap horizon where present, has hue of 7.5YR to 2.5Y, value of 2 to 4, and chroma of 1 to 4. Dry value is 6 or higher. Texture is sandy loam, fine sandy loam, very fine sandy loam, loam, or silt loam in the fine-earth fraction. Structure is granular. Consistence is friable or very friable. Reaction ranges from extremely acid to moderately acid, unless limed.

The AB or BA horizon, where present, has hue of 7.5YR to 2.5Y, value of 3 or 4, and chroma of 2 to 4. Texture is similar to the A horizon.

The Bw horizon commonly has hue of 10YR or 2.5Y, and includes 7.5YR when a high ratio of ammonium oxalate extractable iron to dithionite-citrate extractable iron (greater than 0.15) exists, value of 3 to 6, and chroma of 4 to 6. Texture is similar to the A horizon. The Bw horizon has subangular blocky or granular structure and is friable or very friable. Reaction ranges from very strongly acid to moderately acid.

Some pedons have a BC horizon with color and texture similar to the C horizon.

The C horizon, where present, has hue of 7.5YR to 5Y, value of 4 or 5, and chroma of 2 to 4, and the 7.5YR hue is limited to horizons having a high ratio of ammonium oxalate extractable iron to dithionite-citrate extractable iron (> 0.15). Texture is sandy loam, fine sandy loam, very fine sandy loam, loam, or silt loam in the fine-earth fraction and may have lenses or pockets of loamy sand. It is massive and may have plate-like divisions. It is friable or firm. Reaction ranges from very strongly through moderately acid.

The 2R horizon is dominantly schist, granite, or gneiss bedrock. In places it is massive, but it dominantly has vertical and horizontal fractures in the upper 30 to 76 cm.

COMPETING SERIES: These are the Chadakoin, Charlton, Maplecrest, Riverhead, Stinger, and Valois series. Chadakoin, Maplecrest, and Valois soils formed in till derived primary from sedimentary rock parent materials and are greater than 100 cm to bedrock. Charlton soils formed in similar parent material to that of Chatfield but are greater than 150 cm to bedrock. Riverhead soils formed in glacial outwash deposits and are greater than 100 cm to bedrock. Stinger soils are not from Region R and have a paralithic contact.

GEOGRAPHIC SETTING: Chatfield soils are nearly level through very steep, and are on bedrock-controlled glaciated upland landscapes. The soils formed in a moderately thick mantle of melt-out till overlying granite, gneiss, or schist bedrock. Slope ranges from 0 to 70 percent. Mean annual precipitation ranges from 660 to 1270 mm, mean annual temperature ranges from 7 to 13 degrees C, and the frost free season ranges from 130 to 180 days. Elevation ranges from 0 to 305 meters above sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Brimfield, Brookfield, Cardigan, Charlton, Hollis, Narragansett, Nipmuck, and Paxton soils and their wetter associates on nearby landscapes where the soil mantle is deeper than 100 cm. Brimfield, Brookfield and Nipmuck soils formed in sulfur bearing parent materials and have a ratio of ammonium oxalate extractable iron to dithionite-citrate extractable iron less than 0.15 and have pedogenic iron contents greater than 1 percent throughout the pedon. Brookfield, Charlton, Narragansett, and Paxton soils are very deep soils. Cardigan soils are moderately deep soils that formed in till derived from phyllite, slate, shale, and schist. Hollis soils are shallow to bedrock and are on nearby ridge crests and areas adjacent to rock outcrops.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Well drained. Potential for surface runoff ranges from low to high. Saturated hydraulic conductivity is moderately high or high in the mineral soil.

USE AND VEGETATION: Most areas of Chatfield soils are in woodland. Major tree species include white and northern red oaks, sugar maple, beech, eastern hemlock, eastern white pine, eastern red cedar, and shagbark hickory. Some small cleared areas are used for pasture, are idle, or are sites for residential and recreational development.

DISTRIBUTION AND EXTENT: Connecticut, eastern New York, Massachusetts, New Jersey, and New Hampshire. MLRAs 142, 143, 144A and 145. The soils are of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Orange County, New York, 1940.

REMARKS: Diagnostic horizons and features recognized in this pedon are:
Ochric epipedon - the zone from 0 to 5 cm (Oi and A horizons).
Cambic horizon - the zone from 5 to 76 cm (Bw1 and Bw2 horizons).
Lithic contact - bedrock at 76 cm (2R horizon).
Particle-size control section - the zone from 28 to 76 cm (part of the Bw1 horizon and all of the Bw2 horizon).
Lithologic discontinuity - at a depth of 76 cm.

ADDITIONAL DATA: M.S. Thesis work by Shawn McVey, University of Connecticut, 2006. Full characterization data for pedons with User Pedon IDs of S1955NH015003, S1982CT007005, S1982CT007005, S1982NY061001, S1995NH013003, S1995NJ037003, S1998NY005001, S1999NY005004, S2000NY005002, S2000NY005004, S2000NY005008, S2000NY119002, S2000NY119003, S2002CT005007, and S2002CT005008. Pedons analyzed by the NSSL, Lincoln, NE. The laboratory characterization data for these pedons and similar soils is available through the National Cooperative Soil Survey Soil Characterization Database: http://ncsslabdatamart.sc.egov.usda.gov/

Established Series
Rev. MFF-SMF-SJM-DCP
05/2016

HOLLIS SERIES

The Hollis series consists of well drained and somewhat excessively drained soils formed in a thin mantle of till. They are shallow to bedrock. They are nearly level to very steep upland soils on bedrock-controlled hills and ridges. Slope ranges from 0 through 60 percent. Saturated hydraulic conductivity is moderately high or high. Depth to hard bedrock ranges from 25 to 50 cm. Mean annual temperature is about 9 degrees C, and mean annual precipitation is about 1205 mm.

TAXONOMIC CLASS: Loamy, mixed, superactive, mesic Lithic Dystrudepts

TYPICAL PEDON: Hollis gravelly fine sandy loam, 3 to 15 percent slopes, forested. (Colors are for moist soil.)

Oi--0 to 3 cm; slightly decomposed plant material.

Oa--3 to 5 cm; black (10YR 2/1) highly decomposed plant material; moderate fine granular structure; very friable; many fine and very fine roots; abrupt smooth boundary. (Combined thickness of the O horizons is 0 to 10 cm.)

A--5 to 18 cm; very dark grayish brown (10YR 3/2) gravelly fine sandy loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; very friable; common fine, very fine, medium, and coarse roots; 10 percent gravel, 5 percent channers; very strongly acid; clear smooth boundary. (3 to 15 cm thick)

Bw1--18 to 25 cm; dark yellowish brown (10YR 4/4) gravelly fine sandy loam; moderate medium subangular blocky structure; friable; few very fine and fine roots, common medium roots; 10 percent gravel, 10 percent channers; strongly acid; clear wavy boundary.

Bw2--25 to 41 cm; yellowish brown (10YR 5/6) gravelly fine sandy loam; moderate medium and coarse subangular blocky structure; friable; few fine and very fine roots, common medium roots; 10 percent gravel, 5 percent channers; strongly acid; abrupt smooth boundary. (Combined thickness of the Bw horizons is 18 to 48 cm.)

2R--41 cm; schist bedrock.

TYPE LOCATION: Middlesex County, Connecticut, town of East Hampton, 1000 feet due west of Connecticut Route 196 and 3200 feet due north of Connecticut Route 151; USGS Moodus, CT topographic quadrangle, Latitude 41 degrees 31, minutes 28, seconds N., Longitude 72 degrees, 29 minutes, 48 seconds W., NAD 27.

RANGE IN CHARACTERISTICS: Thickness of the solum and depth to bedrock range from 25 to 50 cm. Rock fragments commonly range from 5 through 35 percent by volume, but some pedons have less than 5 percent rock fragments. The fragments are mostly subrounded gravel, except where the surface is stony. The soil has 20 percent or more silt in the particle-size control section. Unless limed, reaction ranges from extremely acid through moderately acid in the organic horizons and very strongly acid through moderately acid in the mineral horizons.

The O horizon, where present, ranges from slightly decomposed to highly decomposed plant material.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 to 3. It is sandy loam, fine sandy loam, or loam in the fine-earth fraction. Consistence is friable or very friable.

Some pedons have a BA horizon with colors similar to the A horizon and other properties similar to the Bw horizon.

The Bw horizon commonly has hue of 10YR or 2.5Y, and includes 7.5YR when a high ratio of ammonium oxalate extractable iron to dithionite-citrate extractable iron (greater than 0.15) exists, value of 4 or 5, and chroma of 4 through 8. It is sandy loam, fine sandy loam, or loam in the fine-earth fraction. The Bw horizon has granular or subangular blocky structure. Consistence is friable or very friable.

Some pedons have a thin BC or C horizon with color like the Bw horizon, except it includes hue of 5Y. Texture, structure, and consistence are similar to the Bw horizon.

Some pedons have a thin 2Cr horizon that is typically weathered schist and moderately cemented.

COMPETING SERIES: This is the Holyoke series. Holyoke soils formed in a thin mantle of till derived mainly from basalt and red sandstone, conglomerate, and shale, and typically overly basalt, red sandstone, conglomerate, or shale bedrock.

The Cleveland, Kearsarge, and Brimfield series are in closely related families. Cleveland soils have less than 20 percent silt in the particle-size control section and lack a 2R horizon. Kearsarge soils lack a 2R horizon and have rock fragments of phyllite, slate, or schist. Brimfield soils formed in parent materials derived from sulfur bearing schist and have a ratio of ammonium oxalate extractable iron to dithionite-citrate extractable iron of less than 0.15. They have pedogenic iron contents of greater than 1 percent throughout the pedon.

GEOGRAPHIC SETTING: Hollis soils are nearly level to very steep soils on bedrock controlled hills, modified by glacial processes. Slope ranges from 0 to 60 percent. The soils formed in a thin mantle of till derived from local bedrock of schist, granite, and gneiss. Mean annual temperature ranges from 7 to 13 degrees C and mean annual precipitation ranges from 910 to 1295 mm, but the range includes as low as 660 mm in some places east of Adirondack Mountains in the Champlain Valley of New York. The growing season ranges from 115 through 185 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Brimfield, Acton, Broadbrook, Brookfield, Canton, Charlton, Chatfield, Essex, Gloucester, Hibernia, Leicester, Montauk, Narragansett, Paxton, Rainbow, Ridgebury, Rockaway, Scituate, Sutton, Wapping, Whitman, and Woodbridge soils on nearby landscapes. All are very deep upland soils formed in till except for the Brimfield and Chatfield soils. Acton, Rainbow, Rockaway, Scituate, Sutton, Wapping, and Woodbridge soils are moderately well drained. The Broadbrook, Brookfield, Canton, Charlton, Essex, Montauk, Narragansett, and Paxton soils are well drained. Chatfield soils have bedrock within a depth of 50 to 100 cm. Gloucester soils are somewhat excessively drained. Hibernia, Leicester, and Ridgebury soils are somewhat poorly drained or poorly drained soils in drainageways or low lying areas.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Well drained and somewhat excessively drained. Surface runoff is negligible to very high. Saturated hydraulic conductivity is moderately high or high.

USE AND VEGETATION: Mostly forested. Small areas with few rock outcrops are cleared of stones and used for cultivated crops, but most cleared areas are in hay or pasture. Scattered areas are used for community development. Common trees are northern red, white, black, and chestnut oak, hickory, eastern white pine, eastern hemlock, and gray and black birch.

DISTRIBUTION AND EXTENT: Glaciated uplands in Connecticut, Massachusetts, New Jersey, New Hampshire, and eastern New York. MLRAs 101, 142, 144A, and 145. The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Nashua Area, New Hampshire, 1909.

REMARKS: Diagnostic horizons and features recognized in this pedon include:
1. Ochric epipedon - the zone from 0 to 18 cm (O and A horizons).
2. Cambic horizon - the zone from 18 to 41 cm (Bw1 and Bw2 horizons).
3. Lithic contact - hard bedrock at 41 cm (2R horizon).
4. Particle-size control section - the zone from 30 to 41 cm.
5. Loamy (coarse-loamy) particle-size class - the control section from 30 to 41 cm averages less than 35 percent clay in fine-earth fraction and the soil is in a Lithic subgroup.
6. Lithologic discontinuity - till with rock fragments from mixed sources overlying single kind of hard bedrock at 41 cm.

ADDITIONAL DATA: M.S. Thesis work by Shawn McVey, University of Connecticut, 2006. Full characterization data for sample no.1999CT005001, 2000CT007004, S2002CT005001, S2002CT005004, S2002CT005005, S2002CT005006, S1998NY061001, S2000NY119001. Partial characterization data for sample no. S99NY061003 and S99NY061003A-3D. Analyzed by the NSSL, Lincoln, NE.

Established Series
Rev. MFF-JTI-DHZ
05/2016

WOODBRIDGE SERIES

The Woodbridge series consists of moderately well drained loamy soils formed in lodgment till. They are very deep to bedrock and moderately deep to a densic contact. They are nearly level to moderately steep soils on hills, drumlins, till plains, and ground moraines. Slope ranges from 0 to 25 percent. Saturated hydraulic conductivity ranges from moderately high to high in the surface layer and subsoil and low or moderately low in the dense substratum. Mean annual temperature is about 9 degrees C., and mean annual precipitation is about 1168 mm.

TAXONOMIC CLASS: Coarse-loamy, mixed, active, mesic Aquic Dystrudepts

TYPICAL PEDON: Woodbridge fine sandy loam - grass field, at an elevation of about 177 meters. (Colors are for moist soil unless otherwise noted.)

Ap--0 to 18 cm; very dark grayish brown (10YR 3/2) fine sandy loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many fine and medium roots; few very dark brown (10YR 2/2) earthworm casts; 5 percent gravel; moderately acid; abrupt wavy boundary. (10 to 30 cm thick.)

Bw1--18 to 46 cm; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; few very dark brown (10YR 2/2) earthworm casts; 10 percent gravel; moderately acid; gradual wavy boundary.

Bw2--46 to 66 cm; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; few very dark brown (10YR 2/2) earthworm casts; 10 percent gravel; few medium prominent strong brown (7.5YR 5/6) masses of iron accumulation and light brownish gray (10YR 6/2) areas of iron depletion; moderately acid; gradual wavy boundary.

Bw3--66 to 76 cm; light olive brown (2.5Y 5/4) fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; 10 percent gravel; common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation and light brownish gray (10YR 6/2) areas of iron depletion; moderately acid; clear wavy boundary. (Combined thickness of the Bw horizons is 31 to 94 cm.)

Cd1--76 to 109 cm; light olive brown (2.5Y 5/4) gravelly fine sandy loam; weak thick plates of geogenic origin; very firm, brittle; 20 percent gravel; many medium prominent strong brown (7.5YR 5/8) masses of iron accumulation and light brownish gray (10YR 6/2) areas of iron depletion; moderately acid; gradual wavy boundary.

Cd2--109 to 165 cm; light olive brown (2.5Y 5/4) gravelly fine sandy loam; weak thick plates of geogenic origin; very firm, brittle; few fine prominent very dark brown (10YR 2/2) coatings on plates; 25 percent gravel; common fine prominent strong brown (7.5YR 5/8) masses of iron accumulation; moderately acid.

TYPE LOCATION: Tolland County, Connecticut; town of Mansfield, 0.75 mile south of the intersection of Connecticut Routes 275 and 195, and 0.25 mile east on the University of Connecticut Agronomy Farm, 800 feet north of the greenhouses near the corner of a brushy field. USGS Spring Hill, CT topographic quadrangle, Latitude 41 degrees, 47 minutes, 53.43 seconds N., Longitude 72 degrees, 13 minutes, 48.69 seconds W., WGS

1984.

RANGE IN CHARACTERISTICS: The thickness of the solum and depth to densic materials is 50 to 100 cm. Depth to bedrock is commonly more than 2 meters. Rock fragments commonly range from 0 to 35 percent. Except where the surface is stony, the fragments are mostly subrounded gravel and typically make up 60 percent or more of the total rock fragments. Unless limed, reaction ranges from very strongly acid to slightly acid.

Some pedons have an O horizon.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. Dry value is 6 or more. Undisturbed pedons have a thin A horizon commonly with hue of 7.5YR or 10YR but the range includes 2.5Y, value of 2 or 3 and chroma of 1 or 2. The Ap or A horizon is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

Some pedons have a thin E horizon below the A horizon. It has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 3.

The upper part of the Bw horizon has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 3 to 8. The lower part of the Bw horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6. Iron depletions are within 60 cm. The Bw horizon is loam, fine sandy loam, or sandy loam with less than 65 percent silt plus very fine sand.

Some pedons have a thin BC horizon.

Some pedons have an E or E' horizon up to 8 cm thick below the B horizon. It has hue of 10YR to 5Y, value of 5 or 6, chroma of 2 or 3, and has redoximorphic features. Typically, it is coarser-textured than the overlying horizon.

Some pedons have a C horizon above the Cd horizon.

The Cd horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 4. It commonly has redoximorphic features. Texture is loam, fine sandy loam, sandy loam, or coarse sandy loam in the fine-earth fraction. The structure is not pedogenetically derived, and appears in the form of medium to very thick plates, or it is massive. Consistence is firm or very firm.

COMPETING SERIES: These are the Chautauqua, North Meadow, Pittstown, Pompton, Rainbow, Sutton, Wapping, and Wilbraham series. Chautauqua, Pompton, Sutton, and Wapping soils do not have a dense substratum. North Meadow soils have a cap of human transported material 25 to 100 cm thick. Pittstown and Rainbow soils have more than 65 percent silt plus very fine sand in the solum. Wilbraham soils are poorly drained and developed from red parent materials (originating from reddish sandstone, shale, and conglomerate with some basalt).

GEOGRAPHIC SETTING: Woodbridge soils are nearly level to moderately steep and are on hills, drumlins, till plains, and ground moraines. Slope commonly is less than 8 percent, but the range includes 0 to 25 percent. The soils formed in acid till derived mostly from schist, gneiss, and granite. Mean annual temperature ranges from 7 to 13 degrees C and mean annual precipitation ranges from 940 to 1250 mm, and the growing season ranges from 115 to 180 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Rainbow, Sutton, and Wapping soils and the Bernardston, Broadbrook, Canton, Charlton, Chatfield, Georgia, Hollis, Leicester, Montauk, Paxton, Ridgebury, Scituate, and Whitman soils on nearby landscapes. The well drained Paxton, somewhat poorly and poorly drained Ridgebury, and the very poorly drained Whitman soils are associated in a drainage sequence. Bernardston and Broadbrook soils are well drained and are finer textured. Canton and Charlton soils are well drained and do not have a dense substratum. Chatfield and Hollis soils have bedrock within depths of 50 to 100 and 25 to 50 cm, respectively. Georgia soils are calcareous within 200 cm. Leicester soils are poorly drained and do not have a dense substratum. Montauk soils are well drained and are coarser textured. Scituate soils have a loamy sand substratum.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Moderately well drained. The potential for surface runoff is moderate to very high. Saturated hydraulic conductivity is moderately high or high in the solum and low or moderately low in the dense substratum.

USE AND VEGETATION: Many areas are cleared and used for cultivated crops, hay, or pasture. Scattered areas are used for community development. Some areas are wooded. Common trees are red, white, and black oak, hickory, white ash, sugar maple, red maple, eastern hemlock, and eastern white pine.

DISTRIBUTION AND EXTENT: Glaciated uplands of Connecticut, Massachusetts, New Hampshire, eastern New York, and Rhode Island. MLRAs 144A, 145, and 149B. The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Essex County, Massachusetts, 1925.

REMARKS: Woodbridge soils were previously used in Maine. Soil temperature studies in Maine have resulted in the use of the frigid soil temperature regime for soils in areas formerly identified as mesic.

Diagnostic horizons and features recognized in this pedon include:
1. Ochric epipedon - the zone from 0 to 18 cm (Ap horizon).
2. Cambic horizon - the zone from 18 to 76 cm (Bw horizons).
3. Aquic feature - low chroma areas of iron depletion within 60 cm (Bw2 horizon).
4. Densic materials - the zone from 76 to 165 cm (Cd1 and Cd2 horizons).
5) Particle-size control section - the zone from 18 to 76 cm (Bw horizons).

ADDITIONAL DATA: Full characterization data for pedons with User Pedon IDs of S2000CT013003, S1956NH017002, S1956NH017003, S1958CT013004, S1958MA015002, S1978NH011002, and S1991MA023007. Pedons analyzed by the NSSL, Lincoln, NE. The laboratory characterization data for these pedons and similar soils is available through the National Cooperative Soil Survey Soil Characterization Database: http://ncsslabdatamart.sc.egov.usda.gov/

Established Series
Rev. DAS-DCP-MCT-DHZ
05/2016

CANTON SERIES

The Canton series consists of very deep, well drained soils formed in a loamy mantle underlain by sandy till. They are on nearly level to very steep moraines, hills, and ridges. Slope ranges from 0 to 45 percent. Saturated hydraulic conductivity is moderately high or high in the solum and high or very high in the substratum. The mean annual temperature is about 9 degrees C and the annual precipitation is about 1205 mm.

TAXONOMIC CLASS: Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Typic Dystrudepts

TYPICAL PEDON: Canton fine sandy loam on a west-facing, convex, 8 percent slope in an extremely stony forested area at an elevation of about 210 meters. (Colors are for moist soil unless otherwise noted.)

Oi-- 0 to 5 cm; slightly decomposed plant material; (0 to 13 cm thick.)

A-- 5 to 13 cm; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; friable; common fine roots; 5 percent gravel; very strongly acid (pH 4.6); abrupt smooth boundary. (3 to 10 cm thick.)

Bw1-- 13 to 30 cm; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; 5 percent gravel; very strongly acid (pH 4.6); clear smooth boundary.

Bw2-- 30 to 41 cm; yellowish brown (10YR 5/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; 5 percent gravel; strongly acid (pH 5.1); clear smooth boundary.

Bw3-- 41 to 56 cm; yellowish brown (10YR 5/4) gravelly fine sandy loam; weak medium subangular blocky; friable; common fine and medium roots; 15 percent gravel; strongly acid (pH 5.1); abrupt smooth boundary. (Combined thickness of the Bw horizons is 43 to 84 cm.)

2C-- 56 to 170 cm; grayish brown (2.5Y 5/2) gravelly loamy sand; massive; friable; 25 percent gravel; moderately acid (pH 5.6).

TYPE LOCATION: Worcester County, Massachusetts; Town of Douglas; 150 feet south on Wallum Lake Road from the junction of Cedar and South West Main Streets, and 165 feet southwest of Wallum Lake Road. USGS Oxford, MA quadrangle; Latitude 42 degrees, 2 minutes, 43.2 seconds N., and Longitude 71 degrees, 45 minutes, 44.8 seconds W., NAD 83.

RANGE IN CHARACTERISTICS: Solum thickness is commonly 46 to 91 cm, but ranges to 36 cm. It corresponds closely to the depth to the sandy till. Rock fragment content consists of 0 to 20 percent gravel and 0 to 5 percent cobbles in the solum. Stones and boulders are 0 to 15 percent of the surface and solum. Gravel content is 10 to 30 percent, cobbles 5 to 10 percent, and stones 0 to 10 percent in the substratum. Rock fragments are dominantly granite, gneiss, and quartzite. The soil ranges from extremely acid to moderately acid.

The O horizons, where present, consist of slightly, moderately, and/or highly decomposed organic material.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 to 3. Texture is sandy loam, fine sandy loam, loam, or very fine sandy loam in the fine-earth fraction. Some pedons have an Ap horizon with properties similar to the A horizon. It is up to 20 cm thick.

Some pedons have a thin E or AE horizon that has hue of 7.5YR or 10YR, value of 3 to 5 and chroma of 1 or 2 with similar textures to the A horizon. It is up to 8cm thick.

The upper Bw horizons commonly have hue of 10YR, and includes 7.5YR when a high ratio of ammonium oxalate extractable iron to dithionite-citrate extractable iron (greater than 0.15) exists, value of 4 or 5, and chroma of 4 to 8. The lower Bw horizons have hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 4 to 8. Texture of the fine-earth fraction of the Bw horizons is commonly fine sandy loam and less commonly sandy loam, loam, and very fine sandy loam. Structure of the Bw horizons is granular or subangular blocky.

Some pedons have a Bs, Bh, or BC horizon with texture similar to the Bw horizons.

The 2C horizon typically has hue of 2.5Y or 5Y, value of 5 to 7, and chroma of 2 or 3. In some pedons hue is 10YR with chroma of 4 to 6. The texture of the fine-earth fraction is loamy fine sand or coarser. It is single grain or massive. Consistence is friable, very friable or loose. Thin lenses or small pockets of firm or very firm finer textured material are common below 91 cm.

COMPETING SERIES: There are no other soils currently in the same family.

The Agawam, Barnstable, Branford, Brookfield, Charlton, Haven, and Narragansett series are in closely related families. The Agawam, Branford, and Haven soils have stratified sand or sand and gravel in the series control section. In addition, the Branford soils have hues redder than 7.5YR throughout the B horizon. Barnstable soils formed in till over outwash and have less than 30 percent fine sand in the lower part of the Bw horizon. Brookfield soils formed in sulfur bearing parent materials and have a ratio of ammonium oxalate extractable iron to dithionite-citrate extractable iron less than 0.15 and have pedogenic iron contents greater than 1 percent throughout the pedon. Charlton soils lack a lithologic discontinuity of abrupt change in sand distribution. Narragansett soils have more than 55 percent silt and very fine sand in the solum.

GEOGRAPHIC SETTING: Canton soils are on moraines and glaciated upland hills and ridges. Slope ranges from 0 to 45 percent. The soils formed in an acid coarse loamy supraglacial melt out till over loose sandy till of Wisconsin age derived from gneiss, granite and schist along with some fine-grained sandstone in some pedons. The loamy mantle in some pedons is influenced or derived from eolian sources. The climate is humid temperate. The mean annual air temperature is 7 to 11 degrees C, and the mean annual precipitation ranges from 1016 to 1295 mm.

GEOGRAPHICALLY ASSOCIATED SOILS: The Newfields series is the moderately well drained member of the same toposequence. The Agawam, Haven, Merrimac, and Warwick soils are on nearby glacial outwash kames and plains. The Barnstable, Brookfield, Charlton, Cheshire, Dutchess, Gloucester, Hollis, Montauk, Narragansett, and Paxton soils are on nearby glaciated uplands. Brookfield, Charlton, Cheshire, Dutchess, Gloucester, Hollis, Montauk, and Paxton soils do not have a contrasting particle size in the control section.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Well drained. Runoff is negligible to medium. Internal drainage is medium. Saturated hydraulic conductivity is moderately high or high in the solum and high or very high in the substratum.

USE AND VEGETATION: Mostly forested. Some areas have been cleared of surface stones and are used for crops and pasture. Native vegetation is forest composed of eastern white pine, northern red, white, and black oaks, hickory, red maple, sugar maple, gray birch, yellow birch, beech, eastern hemlock, and white ash.

DISTRIBUTION AND EXTENT: Glaciated uplands in Connecticut, Massachusetts, New Hampshire, eastern New York, and Rhode Island, also in the Massachusetts Coastal Islands; MLRAs 144A, 145, and 149B. The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Herkimer County, New York, 1969.

REMARKS:

Diagnostic horizons and features recognized in this pedon are:
1) Ochric epipedon - the zone from 0 to 13 cm (Oi and A horizons).
2) Cambic horizon - the zone from 13 to 56 cm (Bw1, Bw2, and Bw3 horizons).
3) Contrasting particle size - the coarse-loamy material contains less than 50 percent fine sand or coarser, and the transition zone between the two parts of the particle-size control section is less than 12 cm thick. (Coarse-loamy over sandy or sandy skeletal).
4) Lithologic discontinuity - abrupt change in sand distribution at 56 cm (2C horizon).
6) Particle-size control section - the zone from 30 to 105 cm (Bw1, Bw2, Bw3, and 2C horizons).

ADDITIONAL DATA: M.S. Thesis work by Shawn McVey, University of Connecticut, 2006. Full characterization data for sample no. S1982CT007001, S1999CT013001, S1999CT013004, S2000CT007003, S2004CT011003, and pedons of similar soils is available through the National Cooperative Soil Survey Soil Characterization Database: http://ncsslabdatamart.sc.egov.usda.gov/

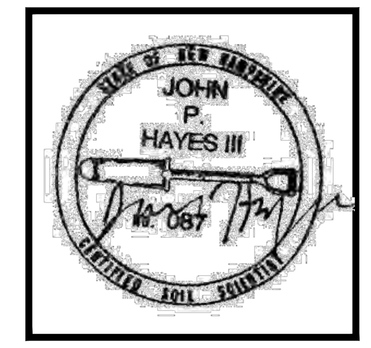
SITE SPECIFIC SOILS LEGEND

SYMBOL	SLOPES	SOIL TAXONOMIC NAME	HYDROLOGIC SOIL GROUP
12	B,C,D,E	HINCKLEY	A
26	B,D	WINDSOR	A
29	B,C,D,E	WOODBRIDGE	C
40	B,C	CHATFIELD HOLLIS COMPLEX	C/D
43	B,C,D,E	CANTON (VERY STONY)	B
67	B,C,D,E	PAXTON (VERY STONY)	C
68	B,C	SUTTON	B
115	A	SCARBORO	D
118	B,C,D,E	SUDBURY	B
313	B,C,D,E	DEERFIELD	B
400	A,B,C,D	UDORTHENTS (SANDY OR GRAVELLY)	A
496	A	NATCHAUG VARIANT	D
500	B	UDORTHENTS (LOAMY)	C
547	B	WALPOLE (VERY STONY)	C
900	A	ENDOQUENTS (SANDY OR GRAVELLY)	C

SLOPE: A = 0–3% B = 3–8% C = 8–15% D = 15–25% E = 25–50% F = 50%+

DENOMINATOR: /VP = VERY POORLY DRAINED /P = POORLY DRAINED /SWP = SOMEWHAT POORLY DRAINED /MW = MODERATELY WELL DRAINED

JOHN P. HAYES, CWS



JOHN P. HAYES, CSS

WETLAND NOTE:

WETLANDS WERE DELINEATED BY JOHN P. HAYES, CWS, IN THE SUMMER OF 2021 USING THE FOLLOWING CRITERIA:

1. USACE. 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. 2012. VICKSBURG, MS.

2. USACE. CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. ENVIRONMENTAL LABORATORY. 1987. VICKSBURG, MS.

3. UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE. 2018. FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 8.2. L.M. VASILAS, G.W. HURT, AND J.F. BERKOWITZ (EDS.). USDA, NRCS, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.

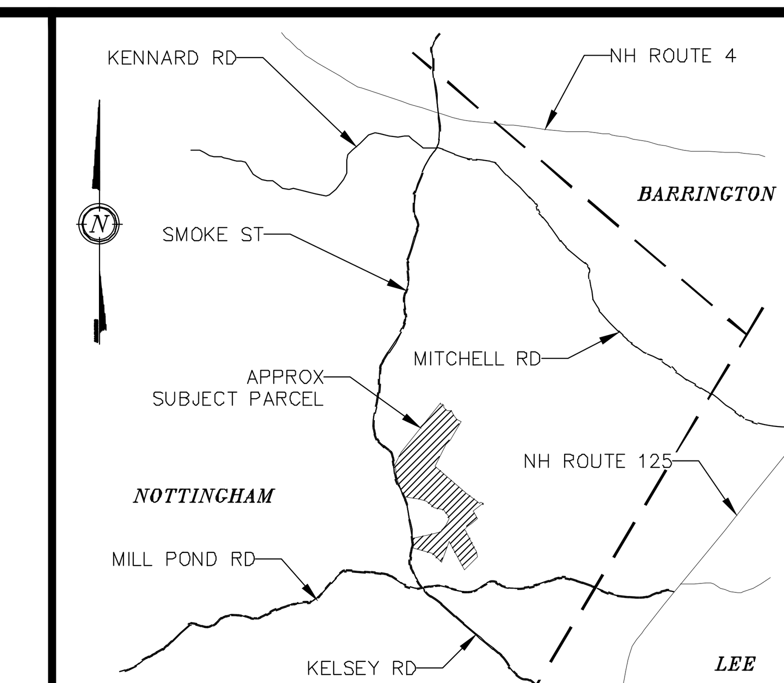
4. NEW ENGLAND HYDRIC SOIL TECHNICAL COMMITTEE. FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 4. NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION. 2019. LOWELL, MA.

5. U.S. ARMY CORPS OF ENGINEERS 2019. NATIONAL WETLAND PLANT LIST, VERSION 3.3. HTTP://WETLAND-PLANTS.USACE.ARMY.MIL/

6. A VERNAL POOL STUDY WAS CONDUCTED IN THE SPRING MONTHS OF 2022. NO VERNAL POOLS WERE FOUND.

LEGEND:

- IRON BOUND~FND~
- DRILL HOLE ~FND~
- IRON PIPE ~FND~
- TREE W/ BARBED WIRE
- TEST PIT
- MATCH POINT
- STONE WALL
- WETLAND LINE
- MATCH LINE
- SOIL LINE
- LIMIT OF SITE SPECIFIC SOIL SURVEY
- 313B SOIL SERIES
- R.C.R.D. ROCKINGHAM COUNTY REGISTRY OF DEEDS
- TYP. TYPICAL
- FND FOUND



LOCATION PLAN
NOTTINGHAM, NH
NOT TO SCALE

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

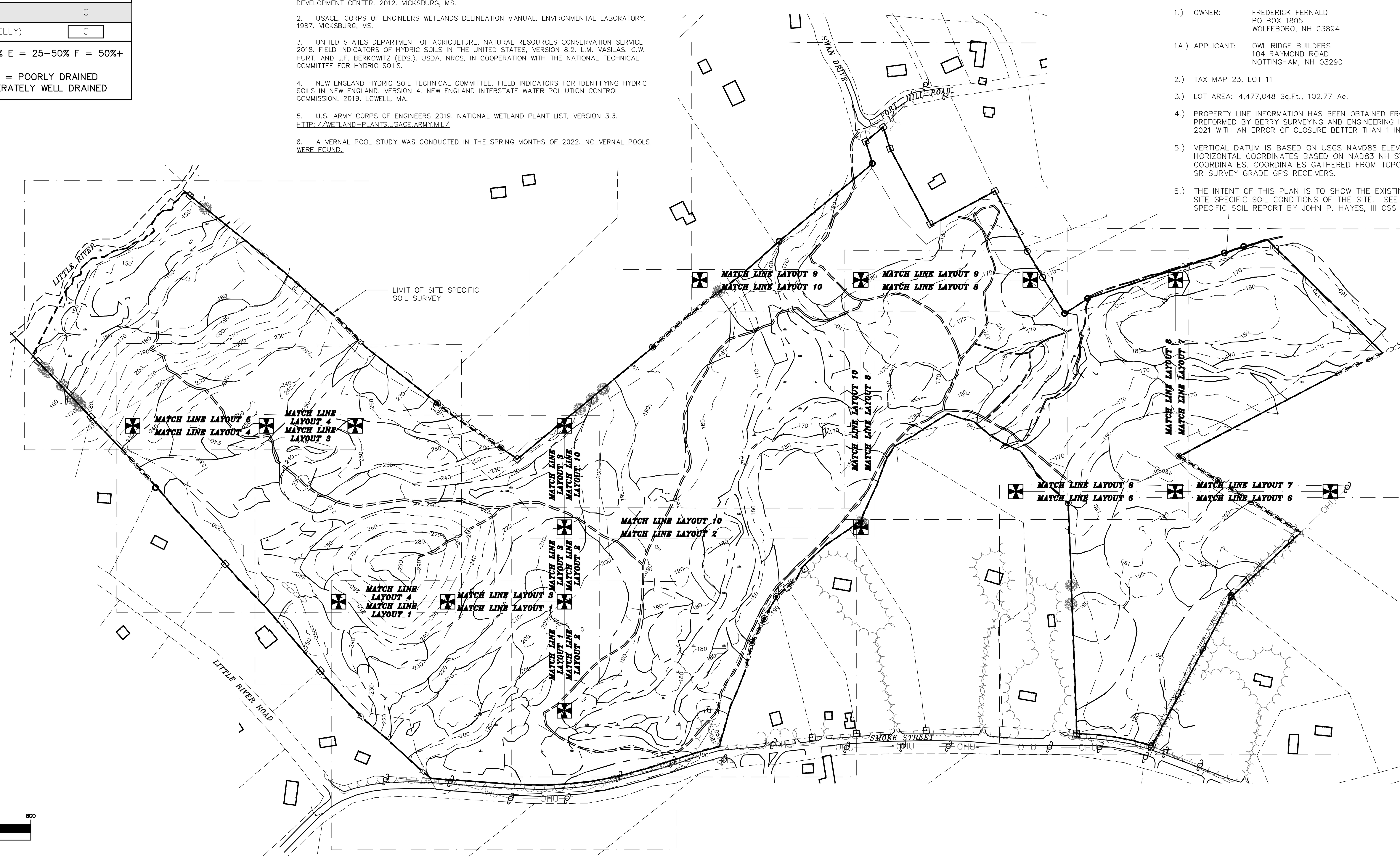
2.) TAX MAP 23, LOT 11

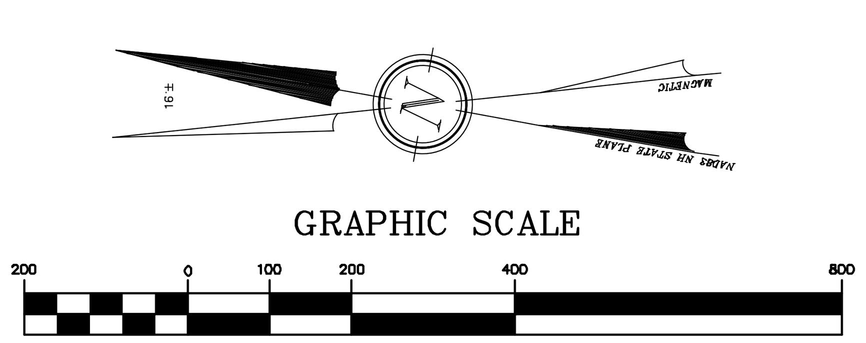
3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) PROPERTY LINE INFORMATION HAS BEEN OBTAINED FROM A SURVEY PREFORMED BY BERRY SURVEYING AND ENGINEERING IN 2020 & 2021 WITH AN ERROR OF CLOSURE BETTER THAN 1 IN 10,000.

5.) VERTICAL DATUM IS BASED ON USGS NAVD88 ELEVATIONS. HORIZONTAL COORDINATES BASED ON NAD83 NH STATE PLANE COORDINATES. COORDINATES GATHERED FROM TOPCON HIPER SR SURVEY GRADE GPS RECEIVERS.

6.) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING ANALYZED SITE SPECIFIC SOIL CONDITIONS OF THE SITE. SEE SITE SPECIFIC SOIL REPORT BY JOHN P. HAYES, III CSS #87





REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

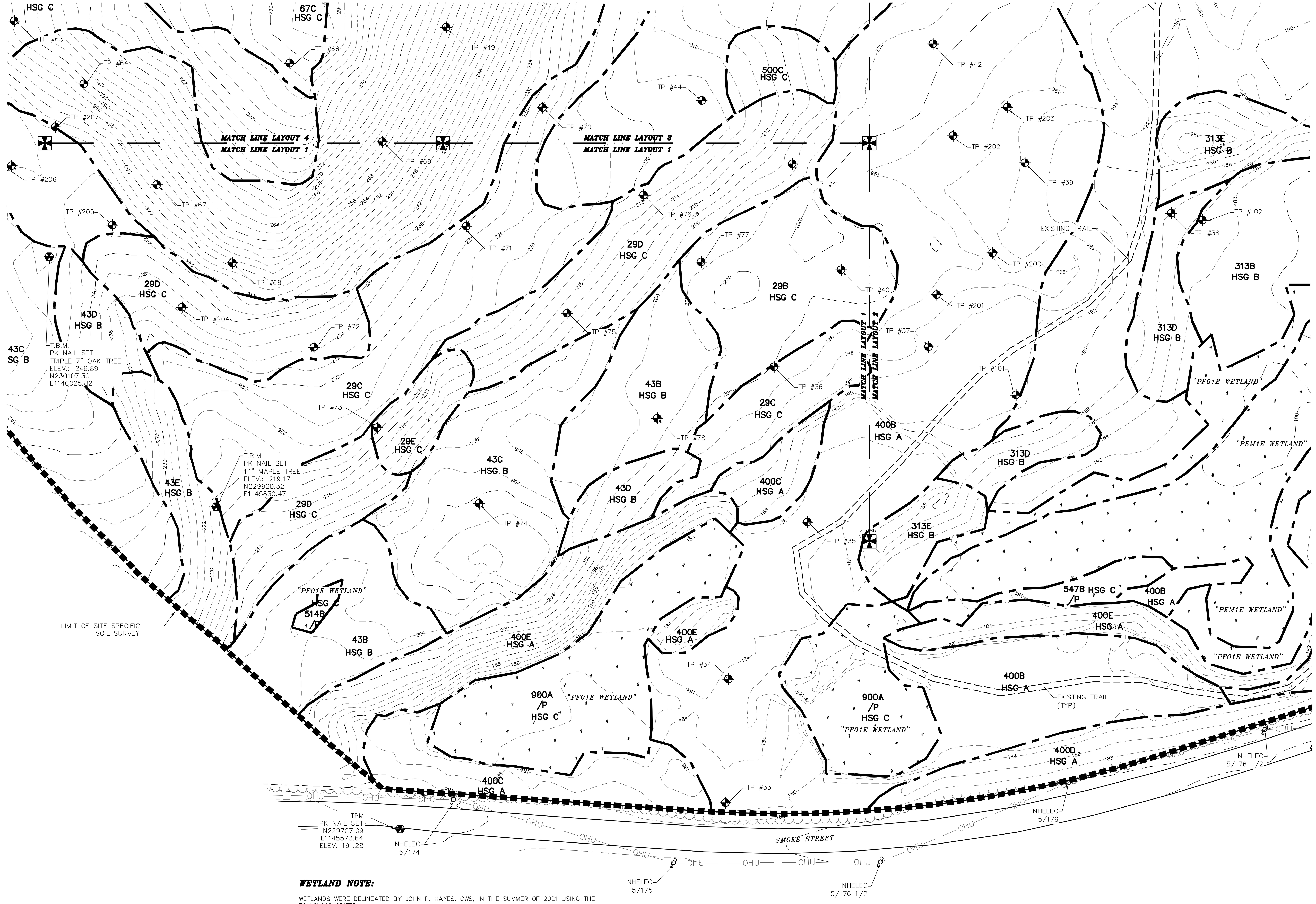
SITE SPECIFIC SOIL MAP OVERVIEW
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

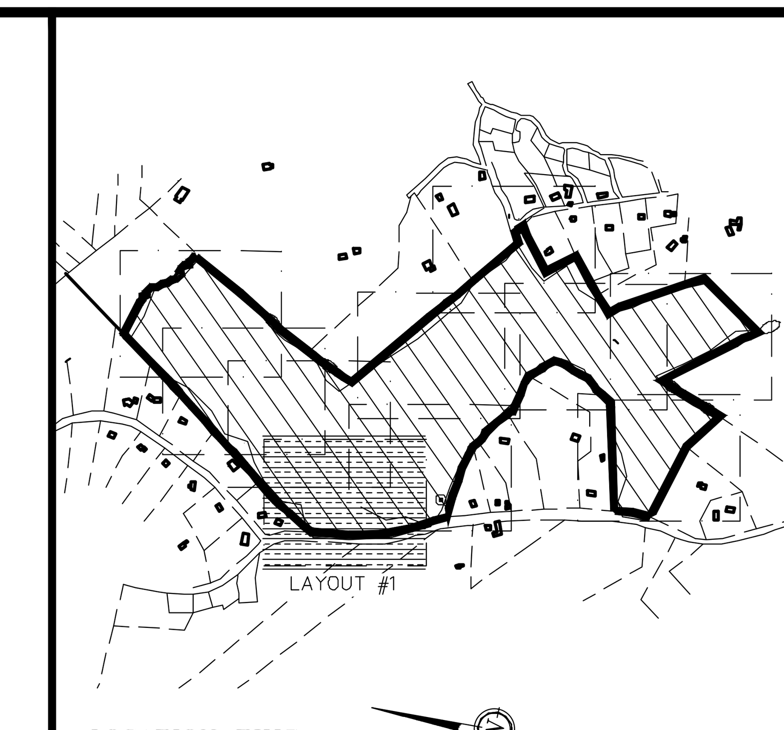
BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 200 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065

STATE OF NEW HAMPSHIRE KENNETH A. BERRY No. 805 LICENSED LAND SURVEYOR
SIGNATURE

NOT FOR CONSTRUCTION





LOCATION THIS SHEET ~ L1 ~

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) PROPERTY LINE INFORMATION HAS BEEN OBTAINED FROM A SURVEY PREFORMED BY BERRY SURVEYING AND ENGINEERING IN 2020 & 2021 WITH AN ERROR OF CLOSURE BETTER THAN 1 IN 10,000.

5.) VERTICAL DATUM IS BASED ON USGS NAVD88 ELEVATIONS. HORIZONTAL COORDINATES BASED ON NAD83 NH STATE PLANE COORDINATES. COORDINATES GATHERED FROM TOPCON HIPER SR SURVEY GRADE GPS RECEIVERS.

6.) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING ANALYZED SITE SPECIFIC SOIL CONDITIONS OF THE SITE.

7.) SEE OVERVIEW SITE SPECIFIC SOILS MAP FOR SOILS LEGEND, SHEET #19.

LEGEND:

IRON BOUND~FND~
DRILL HOLE ~FND~
IRON PIPE ~FND~
TREE W/ BARBED WIRE
TEST PIT
MATCH POINT
STONE WALL
WETLAND LINE
MATCH LINE
SOIL LINE
LIMIT OF SITE SPECIFIC SOIL SURVEY
313B SOIL SERIES
R.C.R.D. ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND

WETLAND NOTE:

WETLANDS WERE DELINEATED BY JOHN P. HAYES, CWS, IN THE SUMMER OF 2021 USING THE FOLLOWING CRITERIA:

1. USACE. 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. 2012. VICKSBURG, MS.

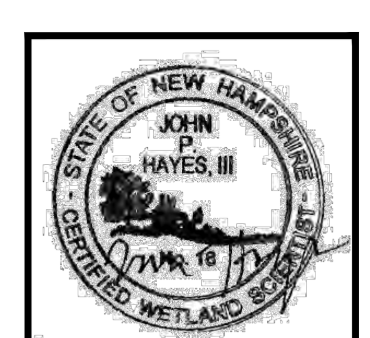
2. USACE. CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. ENVIRONMENTAL LABORATORY. 1987. VICKSBURG, MS.

3. UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE. 2018. FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 8.2. L.M. VASILAS, G.W. HURT, AND J.F. BERKOWITZ (EDS.). USDA, NRCS, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.

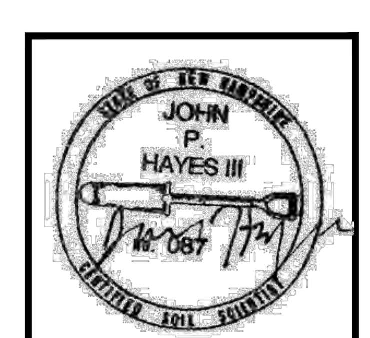
4. NEW ENGLAND HYDRIC SOIL TECHNICAL COMMITTEE. FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 4. NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION. 2019. LOWELL, MA.

5. U.S. ARMY CORPS OF ENGINEERS 2019. NATIONAL WETLAND PLANT LIST, VERSION 3.3. HTTP://WETLAND-PLANTS.USACE.ARMY.MIL/

6. A VERNAL POOL STUDY WAS CONDUCTED IN THE SPRING MONTHS OF 2022. NO VERNAL POOLS WERE FOUND.



JOHN P. HAYES, CWS



JOHN P. HAYES, CSS

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

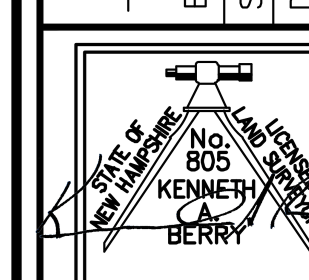
SITE SPECIFIC SOILS MAP ~ LAYOUT 1 ~

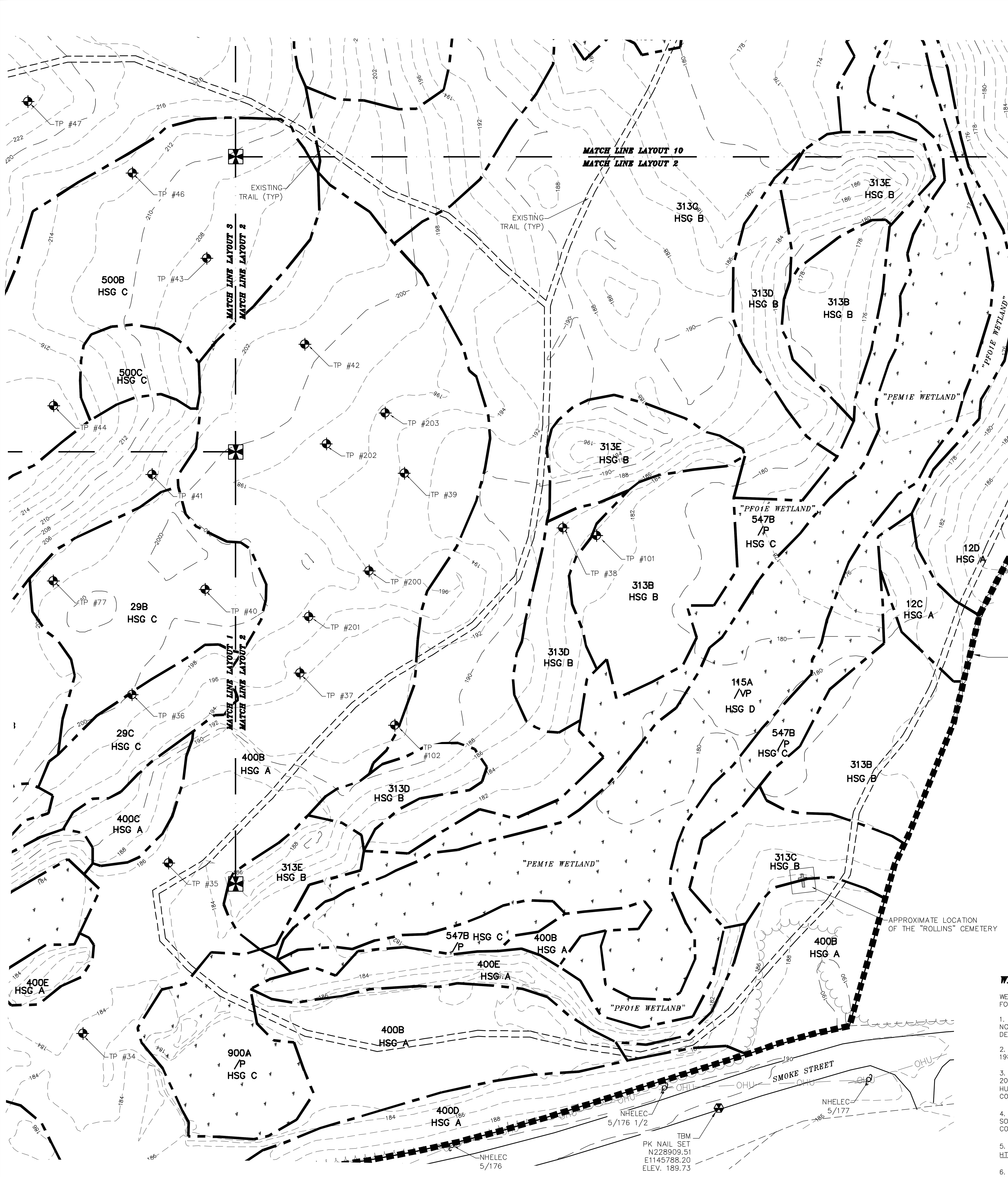
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

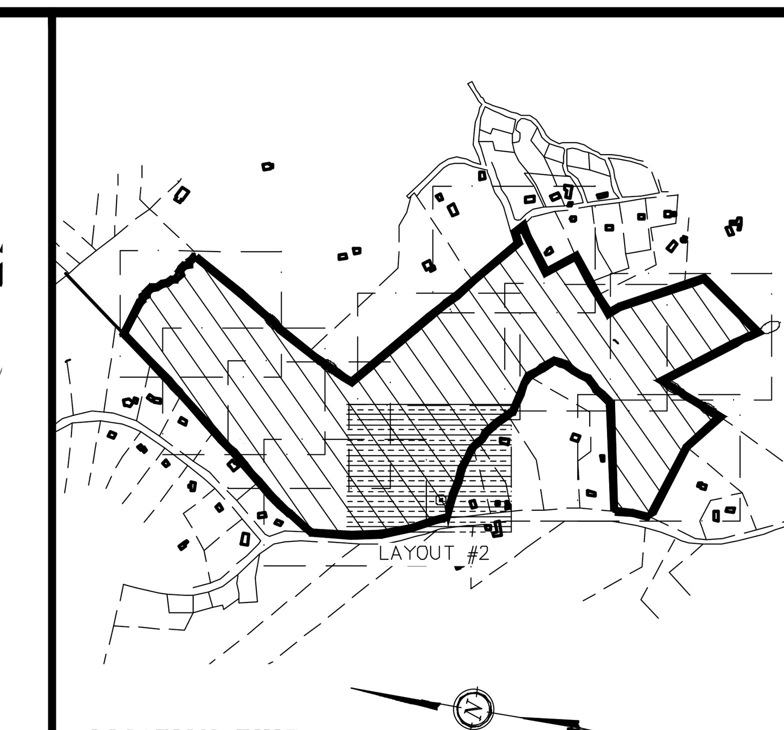
REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065







LOCATION THIS SHEET ~ L2 ~

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) PROPERTY LINE INFORMATION HAS BEEN OBTAINED FROM A SURVEY PREFORMED BY BERRY SURVEYING AND ENGINEERING IN 2020 & 2021 WITH AN ERROR OF CLOSURE BETTER THAN 1 IN 10,000.

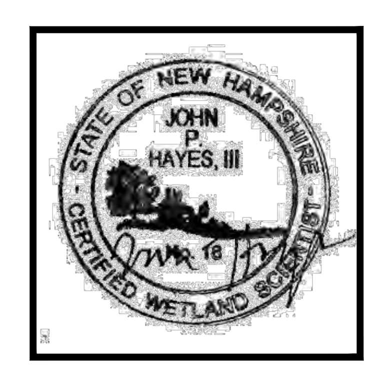
5.) VERTICAL DATUM IS BASED ON USGS NAVD88 ELEVATIONS. HORIZONTAL COORDINATES BASED ON NAD83 NH STATE PLANE COORDINATES. COORDINATES GATHERED FROM TOPCON HIPER SR SURVEY GRADE GPS RECEIVERS.

6.) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING ANALYZED SITE SPECIFIC SOIL CONDITIONS OF THE SITE.

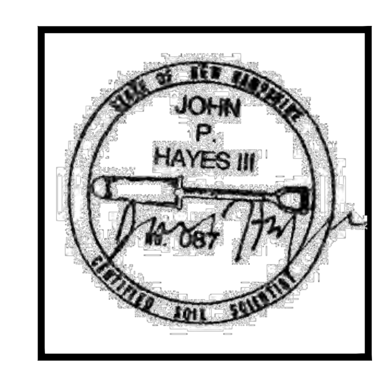
7.) SEE OVERVIEW SITE SPECIFIC SOILS MAP FOR SOILS LEGEND, SHEET #15.

LEGEND:

	IRON BOUND~FND~
	DRILL HOLE ~FND~
	IRON PIPE ~FND~
	TREE W/ BARBED WIRE
	TEST PIT
	MATCH POINT
	STONE WALL
	WETLAND LINE
	MATCH LINE
	SOIL LINE
	LIMIT OF SITE SPECIFIC SOIL SURVEY
313B	SOIL SERIES
R.C.R.D.	ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP.	TYPICAL
FND	FOUND



JOHN P. HAYES, CWS



JOHN P. HAYES, CSS

WETLAND NOTE:

WETLANDS WERE DELINEATED BY JOHN P. HAYES, CWS, IN THE SUMMER OF 2021 USING THE FOLLOWING CRITERIA:

1. USACE. 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. 2012. VICKSBURG, MS.

2. USACE. CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. ENVIRONMENTAL LABORATORY. 1987. VICKSBURG, MS.

3. UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE. 2018. FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 8.2. L.M. VASILAS, G.W. HURT, AND J.F. BERKOWITZ (EDS.). USDA, NRCS, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.

4. NEW ENGLAND HYDRIC SOIL TECHNICAL COMMITTEE. FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 4. NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION. 2019. LOWELL, MA.

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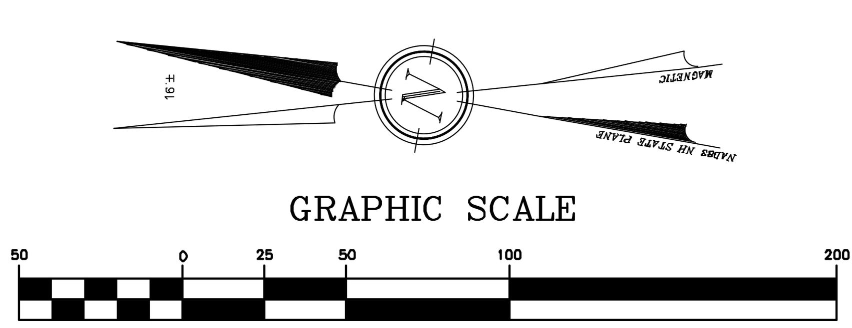


GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

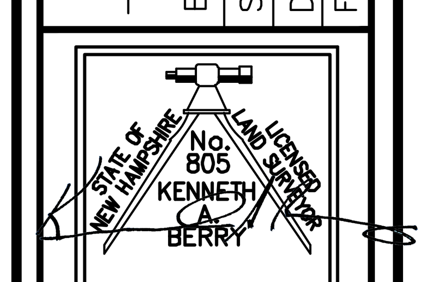
REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SITE SPECIFIC SOILS MAP ~ LAYOUT 2 ~

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

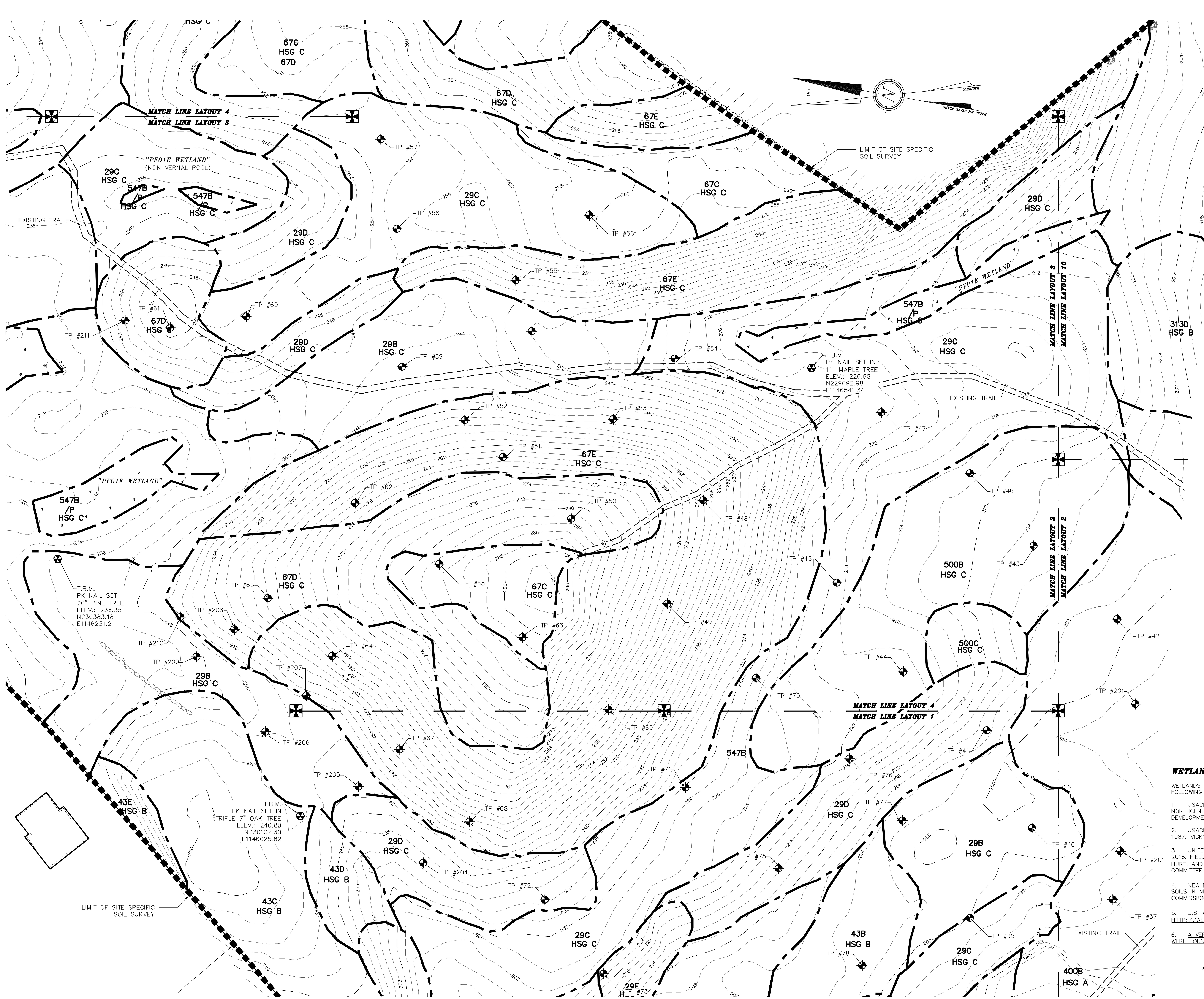
BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

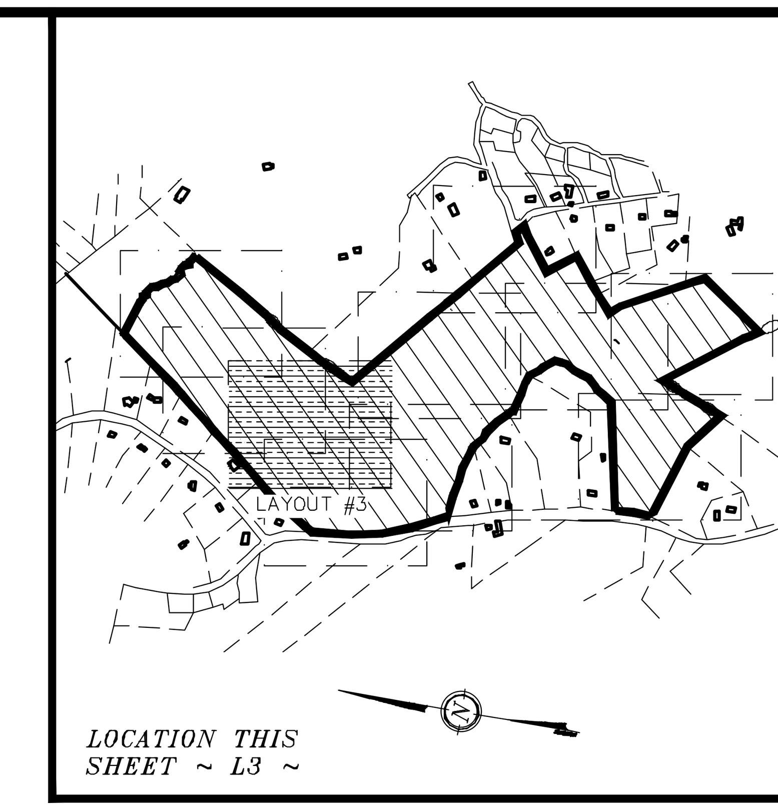
SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065



SHEET 21 OF 88

NOT FOR CONSTRUCTION





LOCATION THIS SHEET ~ L3 ~

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) PROPERTY LINE INFORMATION HAS BEEN OBTAINED FROM A SURVEY PREFORMED BY BERRY SURVEYING AND ENGINEERING IN 2020 & 2021 WITH AN ERROR OF CLOSURE BETTER THAN 1 IN 10,000.

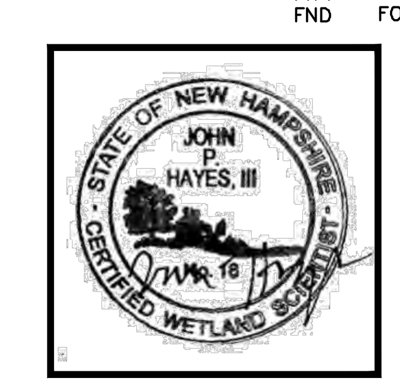
5.) VERTICAL DATUM IS BASED ON USGS NAVD88 ELEVATIONS. HORIZONTAL COORDINATES BASED ON NAD83 NH STATE PLANE COORDINATES. COORDINATES GATHERED FROM TOPCON HIPER SR SURVEY GRADE GPS RECEIVERS.

6.) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING ANALYZED SITE SPECIFIC SOIL CONDITIONS OF THE SITE.

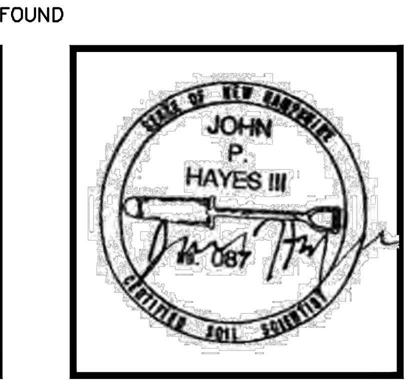
7.) SEE OVERVIEW SITE SPECIFIC SOILS MAP FOR SOILS LEGEND, SHEET #19.

LEGEND:

IRON BOUND~FND~
DRILL HOLE ~FND~
IRON PIPE ~FND~
TREE W/ BARBED WIRE
TEST PIT
MATCH POINT
STONE WALL
WETLAND LINE
MATCH LINE
SOIL LINE
LIMIT OF SITE SPECIFIC SOIL SURVEY
313B SOIL SERIES
R.C.R.D. ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND



JOHN P. HAYES, CWS



JOHN P. HAYES, CSS

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GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REVISION	DATE	DESCRIPTION
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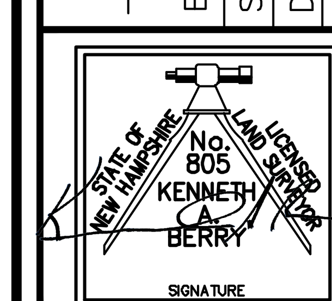
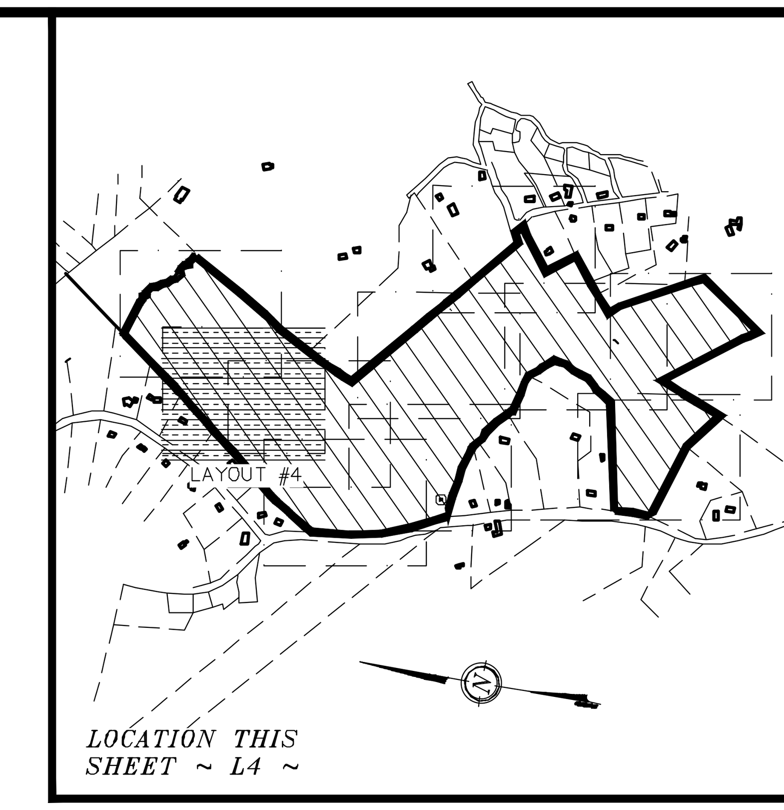
SITE SPECIFIC SOILS MAP ~ LAYOUT 3 ~
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065





NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

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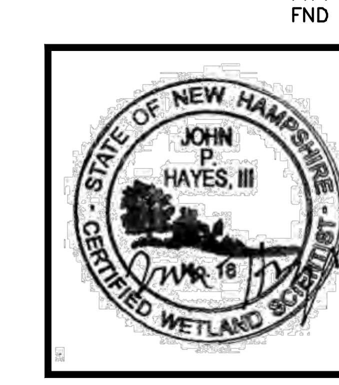
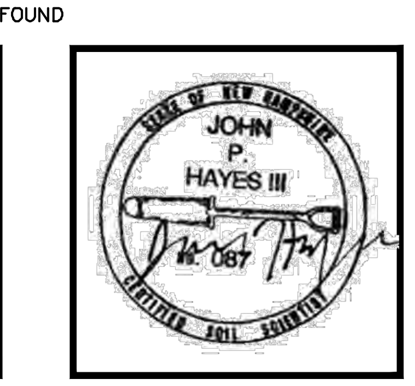
7.) SEE OVERVIEW SITE SPECIFIC SOILS MAP FOR SOILS LEGEND, SHEET #19.

LEGEND:

IRON BOUND~FND~
DRILL HOLE ~FND~
IRON PIPE ~FND~
TREE W/ BARBED WIRE
TEST PIT
MATCH POINT
STONE WALL
WETLAND LINE
MATCH LINE
SOIL LINE
LIMIT OF SITE SPECIFIC SOIL SURVEY
313B SOIL SERIES
R.C.R.D. ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND



JOHN P. HAYES, CWS



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GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
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REVISION	DATE	DESCRIPTION
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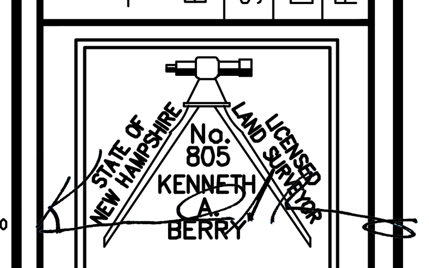
SITE SPECIFIC SOILS MAP ~ LAYOUT 4 ~
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

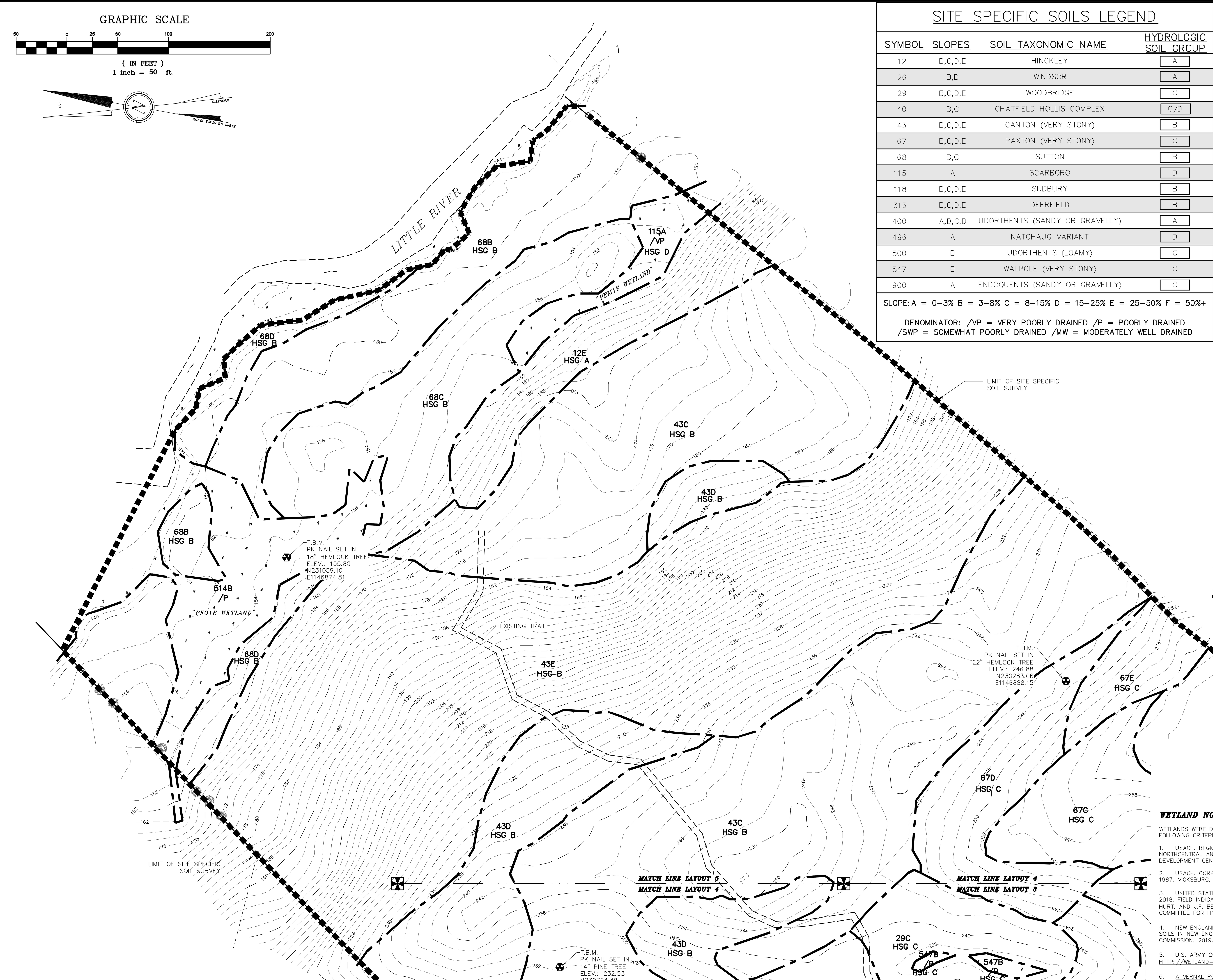
SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065



NOT FOR CONSTRUCTION

GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.



SITE SPECIFIC SOILS LEGEND

SYMBOL	SLOPES	SOIL TAXONOMIC NAME	HYDROLOGIC SOIL GROUP
12	B,C,D,E	HINCKLEY	A
26	B,D	WINDSOR	A
29	B,C,D,E	WOODBRIDGE	C
40	B,C	CHATFIELD HOLLIS COMPLEX	C/D
43	B,C,D,E	CANTON (VERY STONY)	B
67	B,C,D,E	PAXTON (VERY STONY)	C
68	B,C	SUTTON	B
115	A	SCARBORO	D
118	B,C,D,E	SUDBURY	B
313	B,C,D,E	DEERFIELD	B
400	A,B,C,D	UDORTHENTS (SANDY OR GRAVELLY)	A
496	A	NATCHAUG VARIANT	D
500	B	UDORTHENTS (LOAMY)	C
547	B	WALPOLE (VERY STONY)	C
900	A	ENDOQUENTS (SANDY OR GRAVELLY)	C

SLOPE: A = 0–3% B = 3–8% C = 8–15% D = 15–25% E = 25–50% F = 50%+

DENOMINATOR: /VP = VERY POORLY DRAINED /P = POORLY DRAINED
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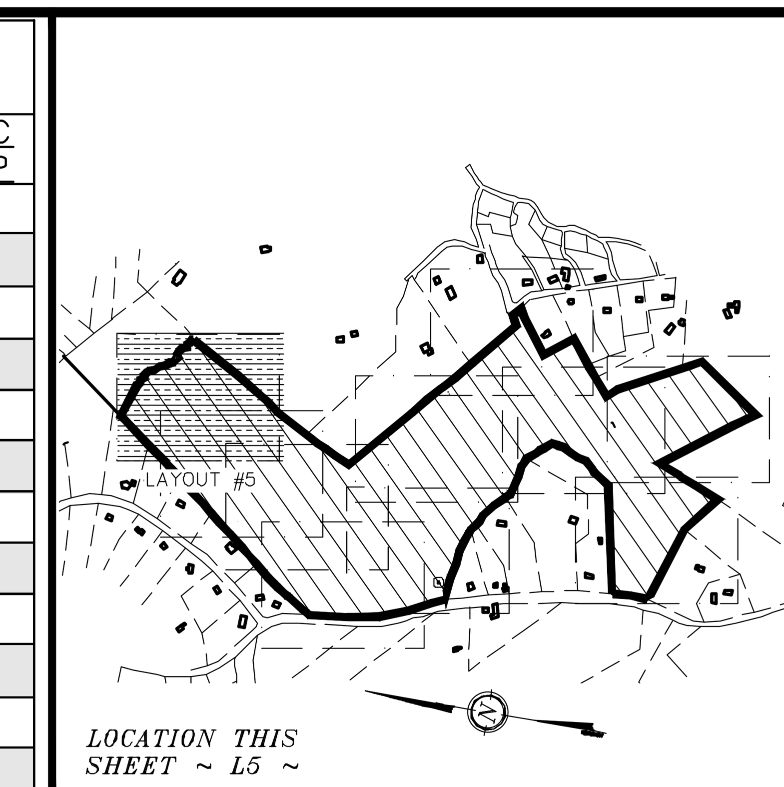

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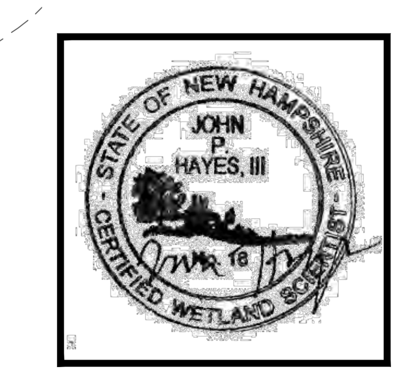
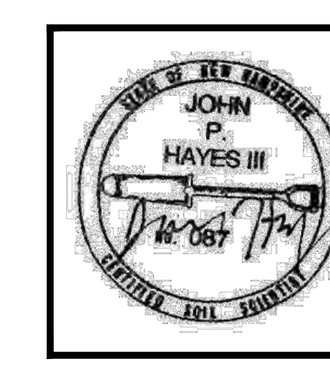
LEGEND:

IRON BOUND~FND~
DRILL HOLE ~FND~
IRON PIPE ~FND~
TREE W/ BARBED WIRE
TEST PIT
MATCH POINT
STONE WALL
WETLAND LINE
MATCH LINE
SOIL LINE
LIMIT OF SITE SPECIFIC SOIL SURVEY
313B SOIL SERIES
R.C.R.D. ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND



JOHN P. HAYES, CWS



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REVISION	DATE	DESCRIPTION
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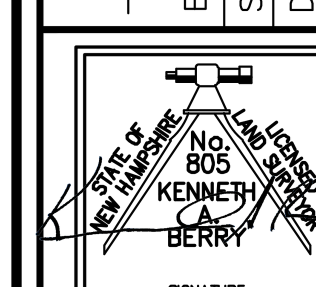
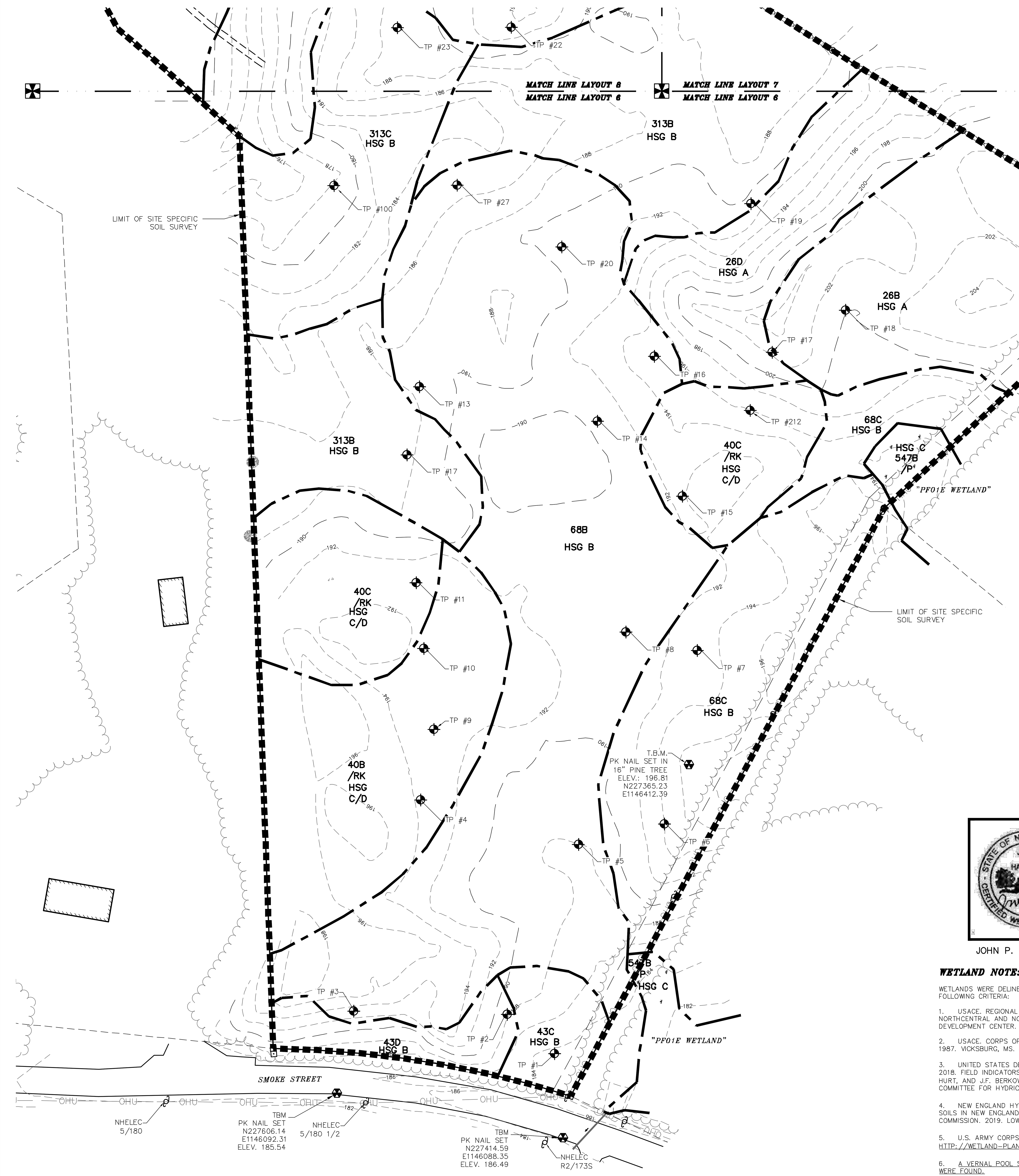
SITE SPECIFIC SOILS MAP ~ LAYOUT 5 ~

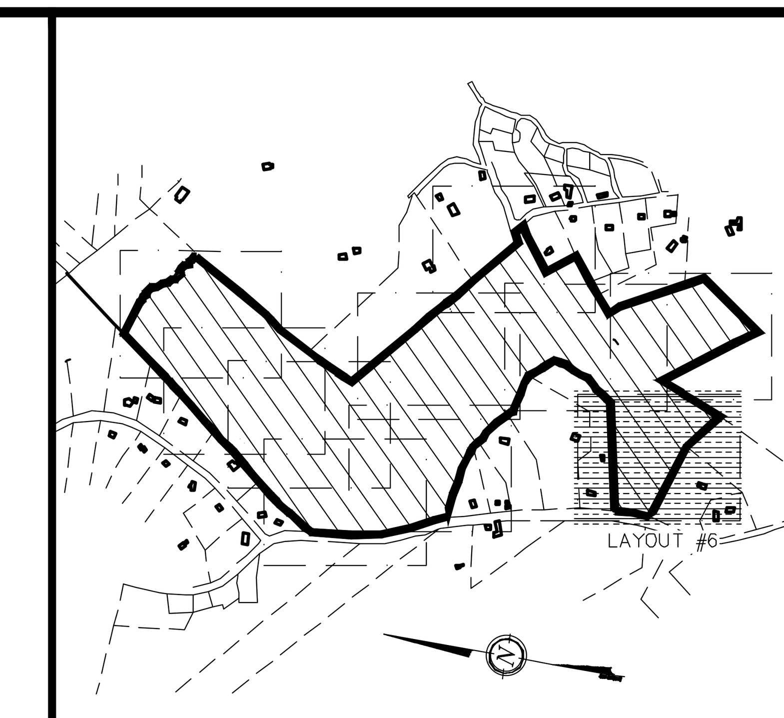
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065







LOCATION THIS SHEET ~ L6 ~

SITE SPECIFIC SOILS LEGEND

SYMBOL	SLOPES	SOIL TAXONOMIC NAME	HYDROLOGIC SOIL GROUP
12	B,C,D,E	HINCKLEY	A
26	B,D	WINDSOR	A
29	B,C,D,E	WOODBRIDGE	C
40	B,C	CHATFIELD HOLLIS COMPLEX	C/D
43	B,C,D,E	CANTON (VERY STONY)	B
67	B,C,D,E	PAXTON (VERY STONY)	C
68	B,C	SUTTON	B
115	A	SCARBORO	D
118	B,C,D,E	SUDBURY	B
313	B,C,D,E	DEERFIELD	B
400	A,B,C,D	UDORTHENTS (SANDY OR GRAVELLY)	A
496	A	NATCHAUG VARIANT	D
500	B	UDORTHENTS (LOAMY)	C
547	B	WALPOLE (VERY STONY)	C
900	A	ENDOQUENTS (SANDY OR GRAVELLY)	C

SLOPE: A = 0–3% B = 3–8% C = 8–15% D = 15–25% E = 25–50% F = 50%+

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WOLFEBORO, NH 03894

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104 RAYMOND ROAD
NOTTINGHAM, NH 03290

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TEST PIT
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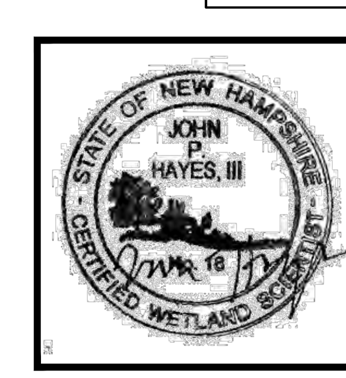
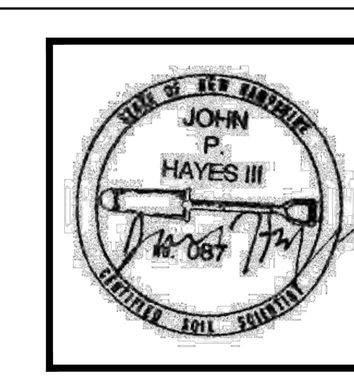
FND FOUND



JOHN P. HAYES, CWS



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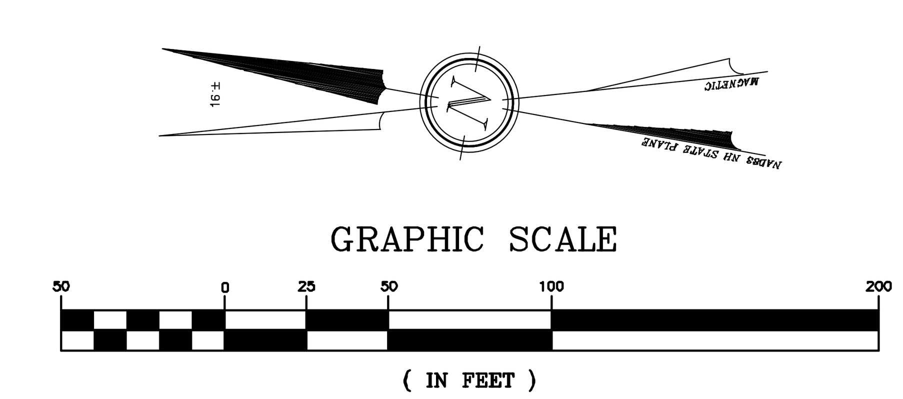

REVISION	DATE	DESCRIPTION
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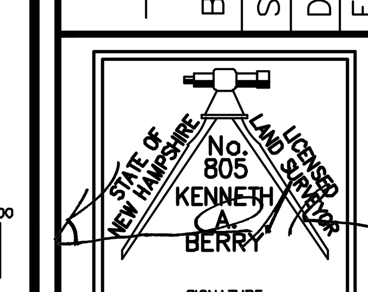
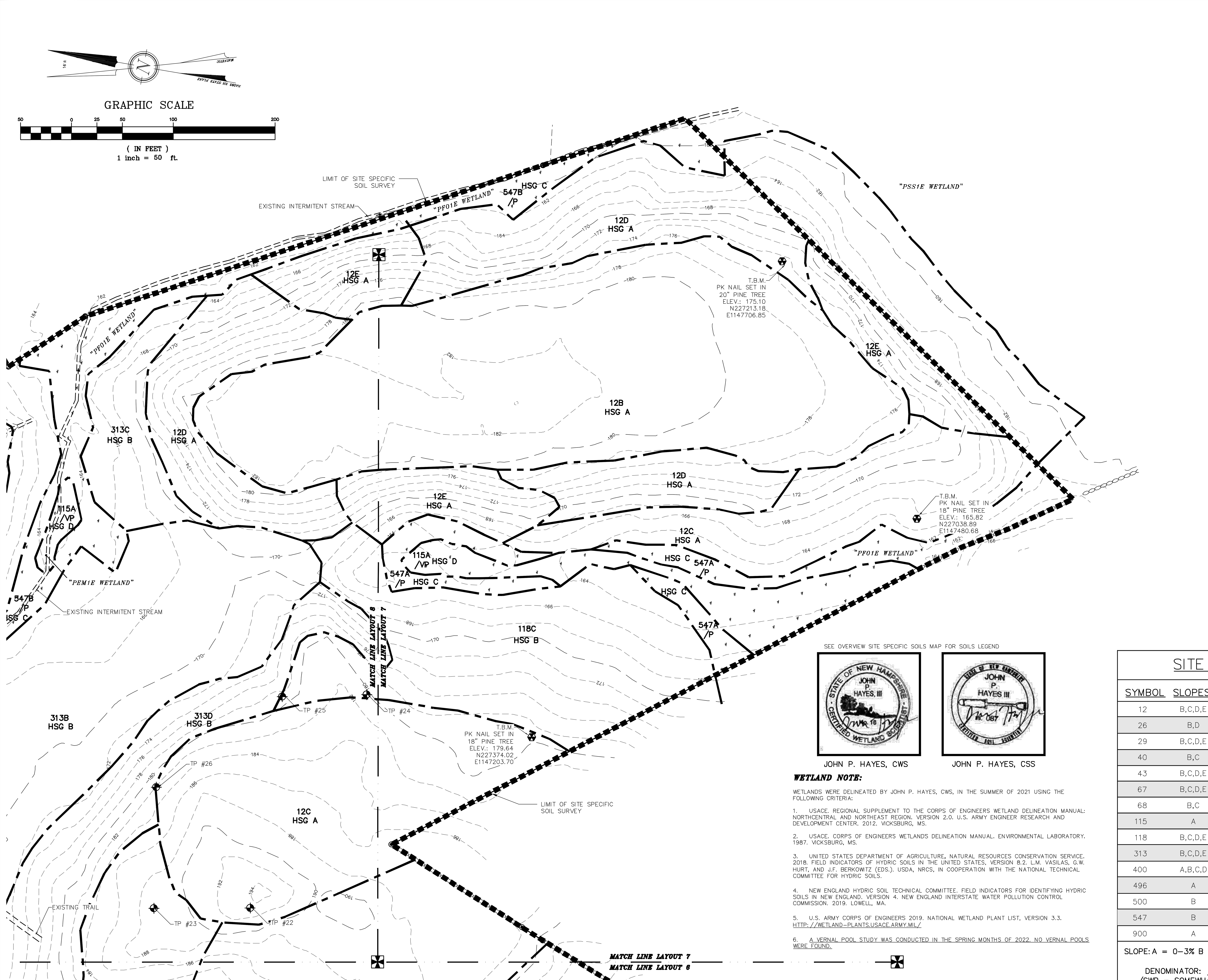
SITE SPECIFIC SOILS MAP ~ LAYOUT 6 ~

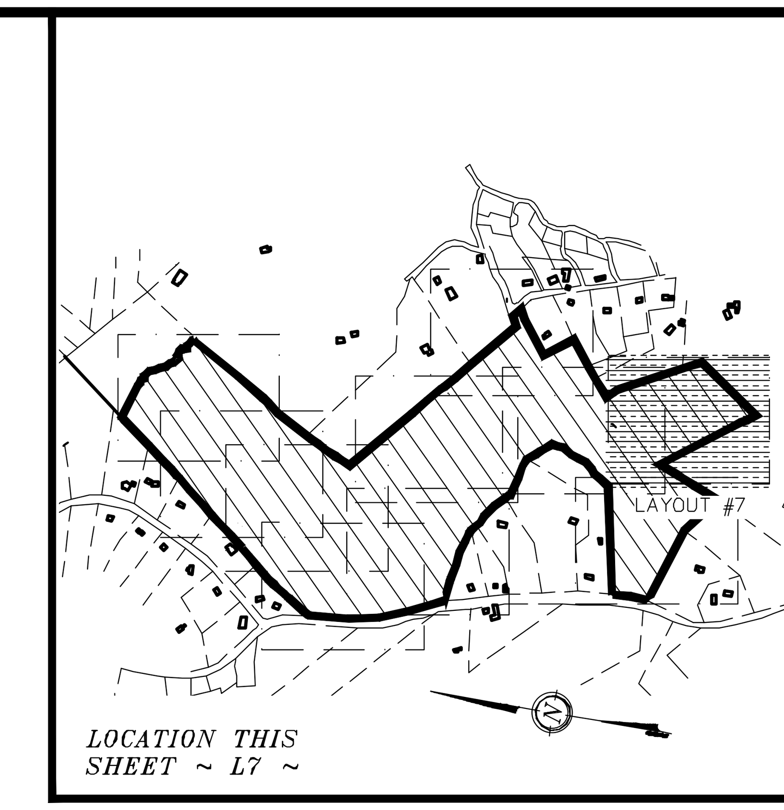
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 – 065







NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) PROPERTY LINE INFORMATION HAS BEEN OBTAINED FROM A SURVEY PREFORMED BY BERRY SURVEYING AND ENGINEERING IN 2020 & 2021 WITH AN ERROR OF CLOSURE BETTER THAN 1 IN 10,000.

5.) VERTICAL DATUM IS BASED ON USGS NAVD88 ELEVATIONS. HORIZONTAL COORDINATES BASED ON NAD83 NH STATE PLANE COORDINATES. COORDINATES GATHERED FROM TOPCON HIPER SR SURVEY GRADE GPS RECEIVERS.

6.) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING ANALYZED SITE SPECIFIC SOIL CONDITIONS OF THE SITE.

7.) SEE OVERVIEW SITE SPECIFIC SOILS MAP FOR SOILS LEGEND, SHEET #19.

LEGEND:

IRON BOUND~FND~
DRILL HOLE ~FND~
IRON PIPE ~FND~
TREE W/ BARBED WIRE
TEST PIT
MATCH POINT
STONE WALL
WETLAND LINE
MATCH LINE
SOIL LINE
LIMIT OF SITE SPECIFIC SOIL SURVEY
313B SOIL SERIES
R.C.R.D. ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND

SEE OVERVIEW SITE SPECIFIC SOILS MAP FOR SOILS LEGEND

JOHN P. HAYES, CWS

JOHN P. HAYES, CSS

WETLAND NOTE:

WETLANDS WERE DELINEATED BY JOHN P. HAYES, CWS, IN THE SUMMER OF 2021 USING THE FOLLOWING CRITERIA:

1. USACE. 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. 2012. VICKSBURG, MS.

2. USACE. CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. ENVIRONMENTAL LABORATORY. 1987. VICKSBURG, MS.

3. UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE. 2018. FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 8.2. L.M. VASILAS, G.W. HURT, AND J.F. BERKOWITZ (EDS.). USDA, NRCS, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.

4. NEW ENGLAND HYDRIC SOIL TECHNICAL COMMITTEE. FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 4. NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION. 2019. LOWELL, MA.

5. U.S. ARMY CORPS OF ENGINEERS 2019. NATIONAL WETLAND PLANT LIST, VERSION 3.3. HTTP://WETLAND-PLANTS.USACE.ARMY.MIL/

6. A VERNAL POOL STUDY WAS CONDUCTED IN THE SPRING MONTHS OF 2022. NO VERNAL POOLS WERE FOUND.

SITE SPECIFIC SOILS LEGEND

SYMBOL	SLOPES	SOIL TAXONOMIC NAME	HYDROLOGIC SOIL GROUP
12	B,C,D,E	HINCKLEY	A
26	B,D	WINDSOR	A
29	B,C,D,E	WOODBRIDGE	C
40	B,C	CHATFIELD HOLLIS COMPLEX	C/D
43	B,C,D,E	CANTON (VERY STONY)	B
67	B,C,D,E	PAXTON (VERY STONY)	C
68	B,C	SUTTON	B
115	A	SCARBORO	D
118	B,C,D,E	SUDBURY	B
313	B,C,D,E	DEERFIELD	B
400	A,B,C,D	UDORTHENTS (SANDY OR GRAVELLY)	A
496	A	NATCHAUG VARIANT	D
500	B	UDORTHENTS (LOAMY)	C
547	B	WALPOLE (VERY STONY)	C
900	A	ENDOQUENTS (SANDY OR GRAVELLY)	C

SLOPE: A = 0-3% B = 3-8% C = 8-15% D = 15-25% E = 25-50% F = 50%+

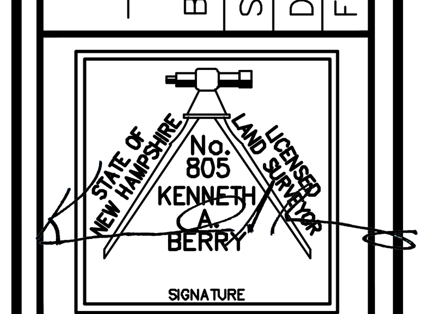
DENOMINATOR: /VP = VERY POORLY DRAINED /P = POORLY DRAINED
/SWP = SOMEWHAT POORLY DRAINED /MW = MODERATELY WELL DRAINED

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

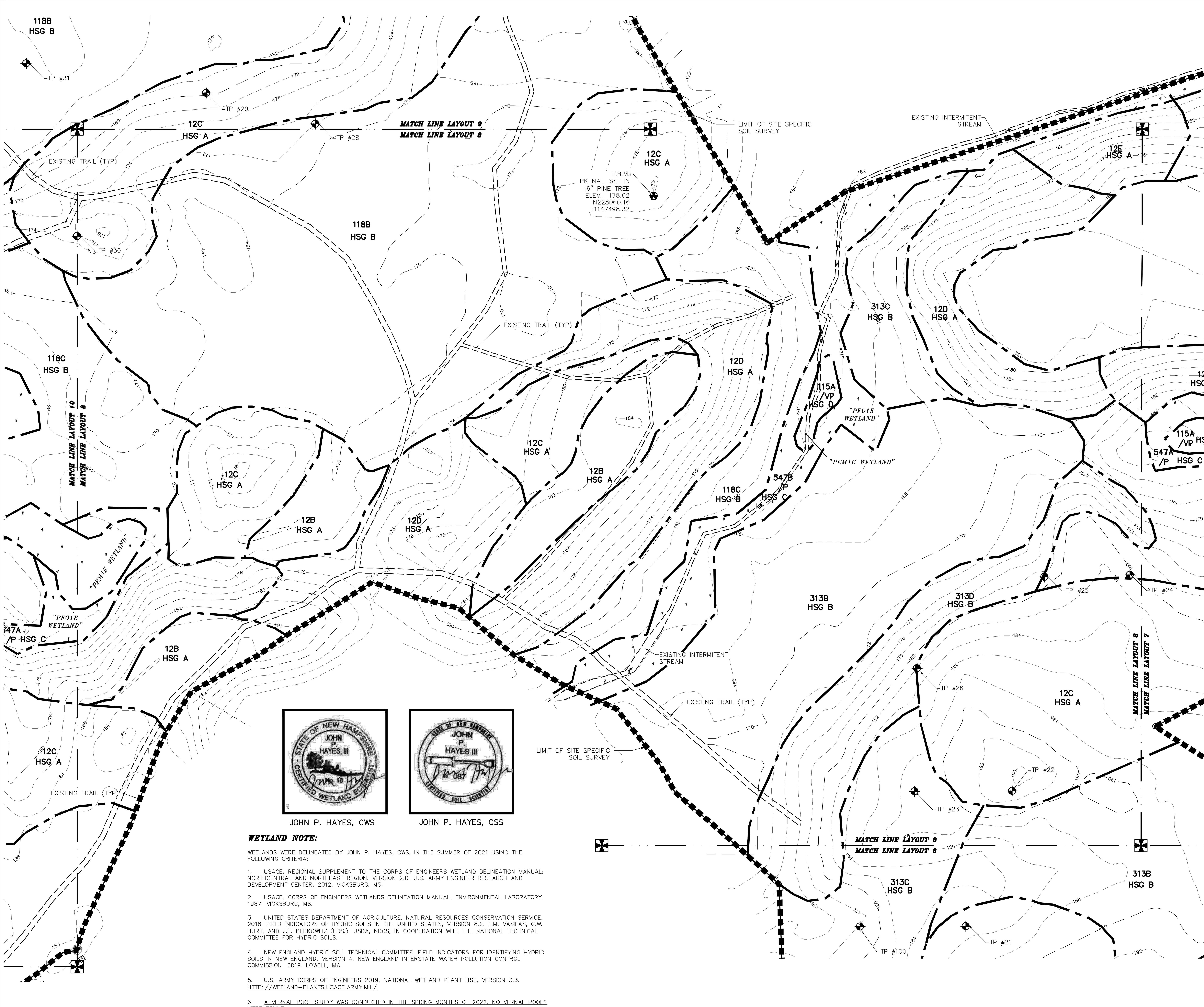
SITE SPECIFIC SOILS MAP ~ LAYOUT 7 ~
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065



NOT FOR CONSTRUCTION



WETLAND NOTE:

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2. USACE. CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. ENVIRONMENTAL LABORATORY. 1987. VICKSBURG, MS.

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4. NEW ENGLAND HYDRIC SOIL TECHNICAL COMMITTEE. FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 4. NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION. 2019. LOWELL, MA.

5. U.S. ARMY CORPS OF ENGINEERS 2019. NATIONAL WETLAND PLANT LIST, VERSION 3.3. HTTP://WETLAND-PLANTS.USACE.ARMY.MIL/

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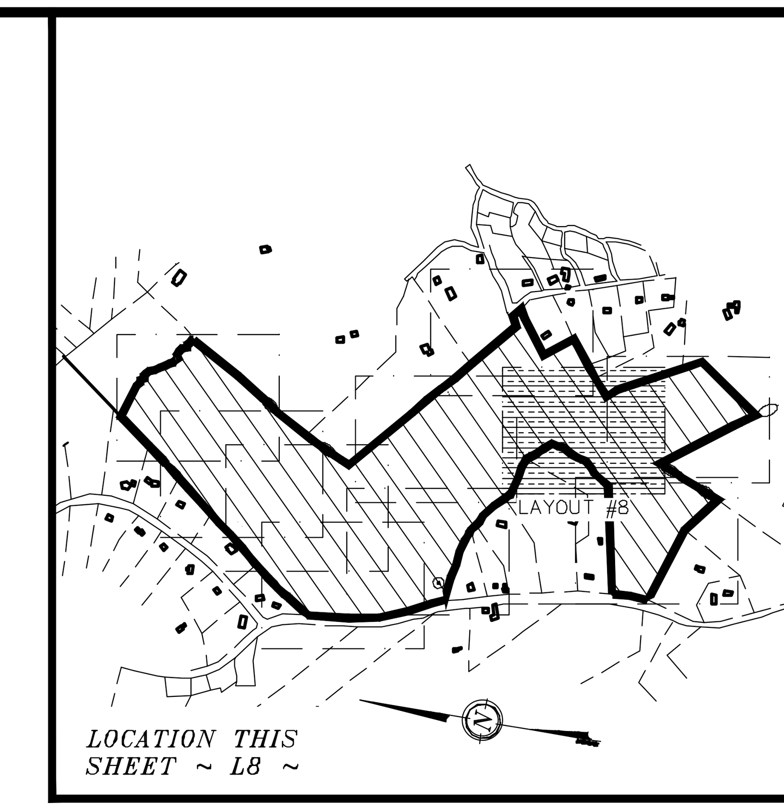


LOCATION THIS SHEET ~ L8 ~

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) PROPERTY LINE INFORMATION HAS BEEN OBTAINED FROM A SURVEY PREFORMED BY BERRY SURVEYING AND ENGINEERING IN 2020 & 2021 WITH AN ERROR OF CLOSURE BETTER THAN 1 IN 10,000.

5.) VERTICAL DATUM IS BASED ON USGS NAVD88 ELEVATIONS. HORIZONTAL COORDINATES BASED ON NAD83 NH STATE PLANE COORDINATES. COORDINATES GATHERED FROM TOPCON HIPER SR SURVEY GRADE GPS RECEIVERS.

6.) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING ANALYZED SITE SPECIFIC SOIL CONDITIONS OF THE SITE.

7.) SEE OVERVIEW SITE SPECIFIC SOILS MAP FOR SOILS LEGEND, SHEET #19.

LEGEND:

IRON BOUND~FND~
DRILL HOLE ~FND~
IRON PIPE ~FND~
TREE W/ BARBED WIRE
TEST PIT
MATCH POINT
STONE WALL
WETLAND LINE
MATCH LINE
SOIL LINE
LIMIT OF SITE SPECIFIC SOIL SURVEY
313B SOIL SERIES
R.C.R.D. ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

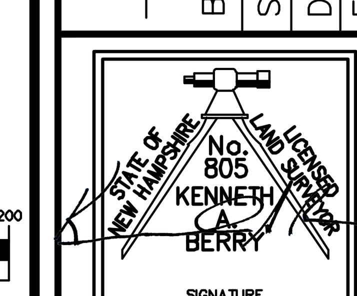
REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SITE SPECIFIC SOILS MAP ~ LAYOUT 8 ~

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065



NOT FOR CONSTRUCTION

JOHN P. HAYES, CWS

JOHN P. HAYES, CSS

WETLAND NOTE:

WETLANDS WERE DELINEATED BY JOHN P. HAYES, CWS, IN THE SUMMER OF 2021 USING THE FOLLOWING CRITERIA:

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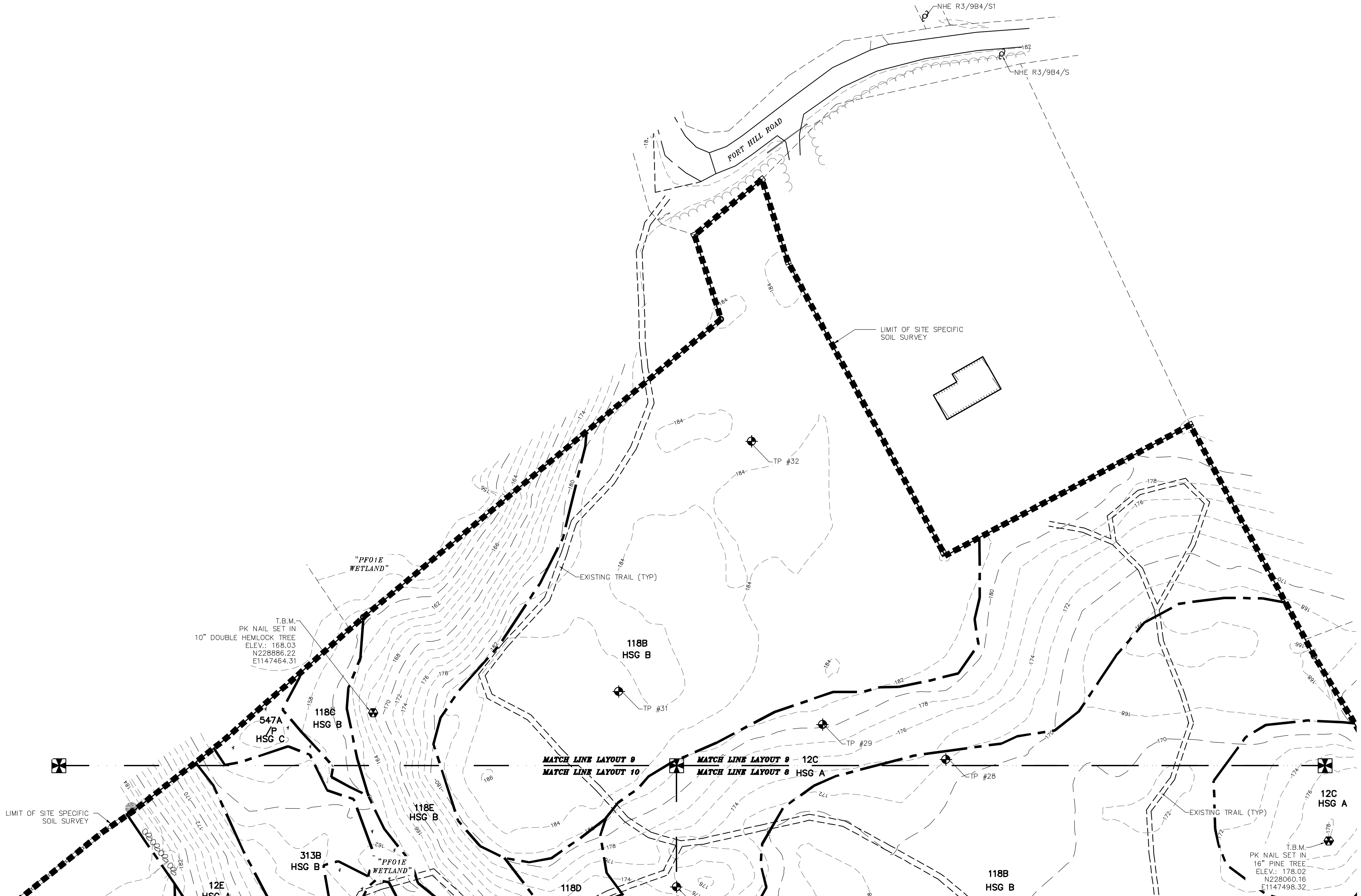
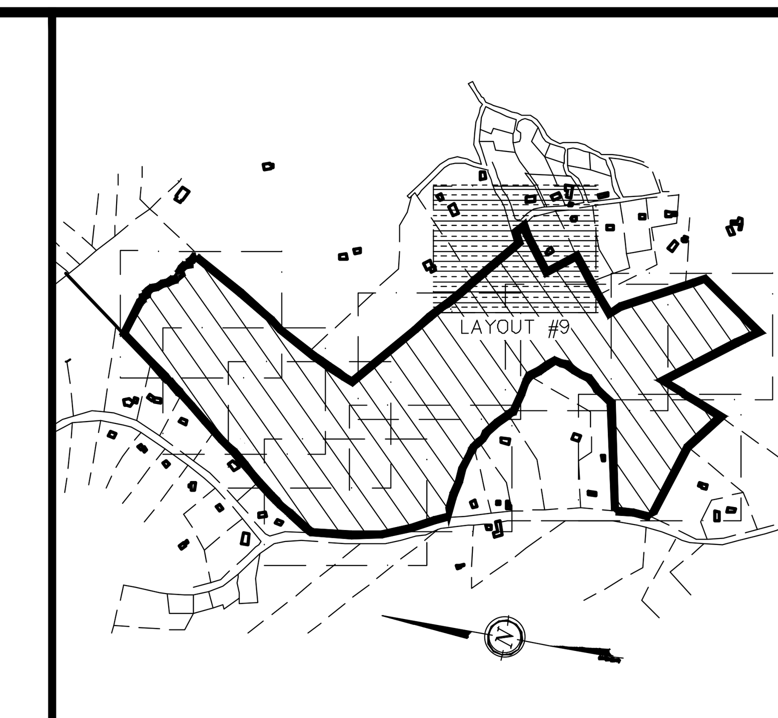
5. U.S. ARMY CORPS OF ENGINEERS 2019. NATIONAL WETLAND PLANT LIST, VERSION 3.3. HTTP://WETLAND-PLANTS.USACE.ARMY.MIL/

6. A VERNAL POOL STUDY WAS CONDUCTED IN THE SPRING MONTHS OF 2022. NO VERNAL POOLS WERE FOUND.





LOCATION THIS SHEET ~ L9 ~

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) PROPERTY LINE INFORMATION HAS BEEN OBTAINED FROM A SURVEY PREFORMED BY BERRY SURVEYING AND ENGINEERING IN 2020 & 2021 WITH AN ERROR OF CLOSURE BETTER THAN 1 IN 10,000.

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7.) SEE OVERVIEW SITE SPECIFIC SOILS MAP FOR SOILS LEGEND, SHEET #19.

LEGEND:

IRON BOUND~FND~
DRILL HOLE ~FND~
IRON PIPE ~FND~
TREE W/ BARBED WIRE
TEST PIT
MATCH POINT
STONE WALL
WETLAND LINE
MATCH LINE
SOIL LINE
LIMIT OF SITE SPECIFIC SOIL SURVEY
313B SOIL SERIES
R.C.R.D. ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND

GRAPHIC SCALE

0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SITE SPECIFIC SOILS MAP ~ LAYOUT 9 ~
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065

STATE OF NEW HAMPSHIRE No. 805 KENNETH A. BERRY LICENSED LAND SURVEYOR
SIGNATURE

GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

WETLAND NOTE:

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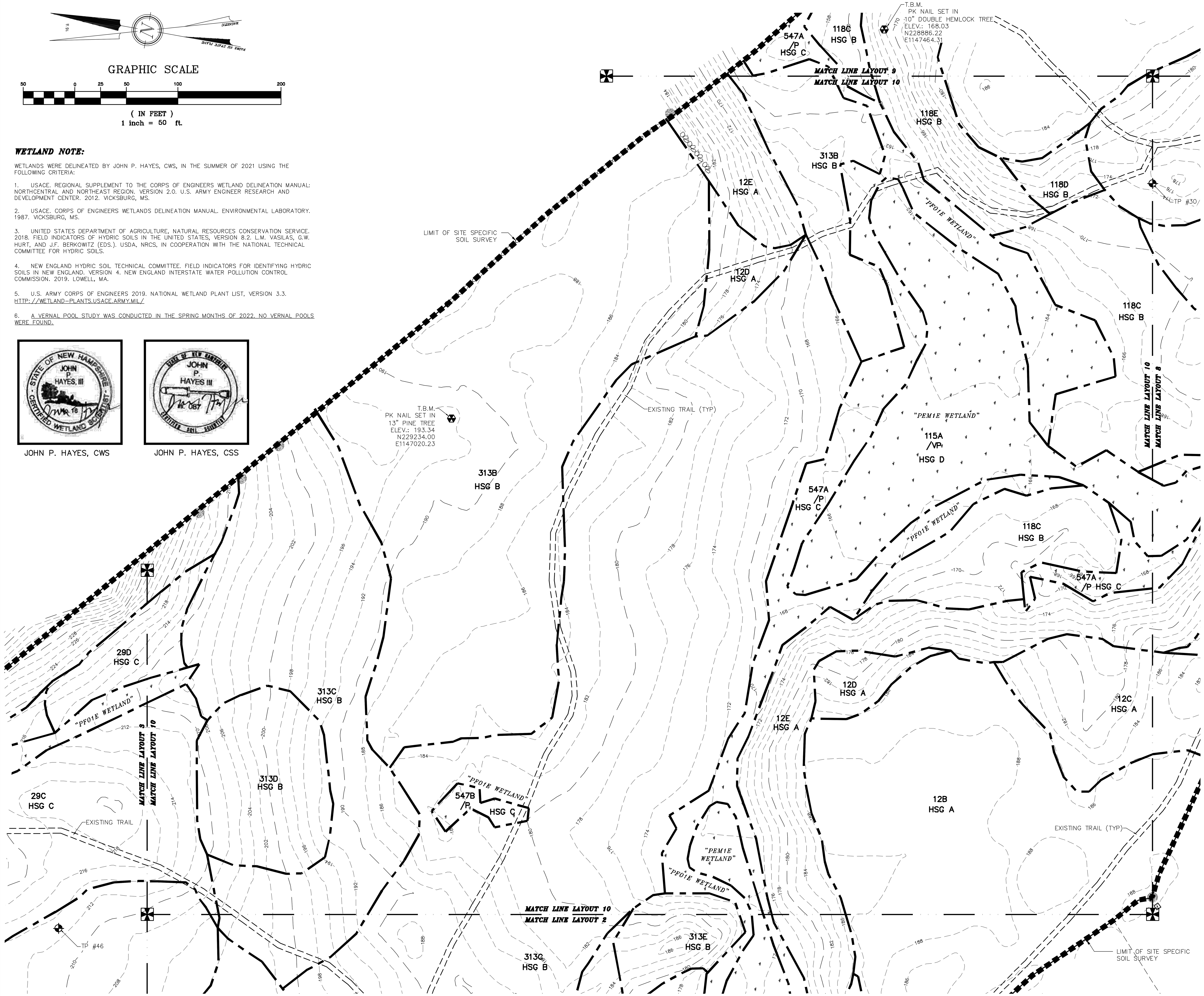
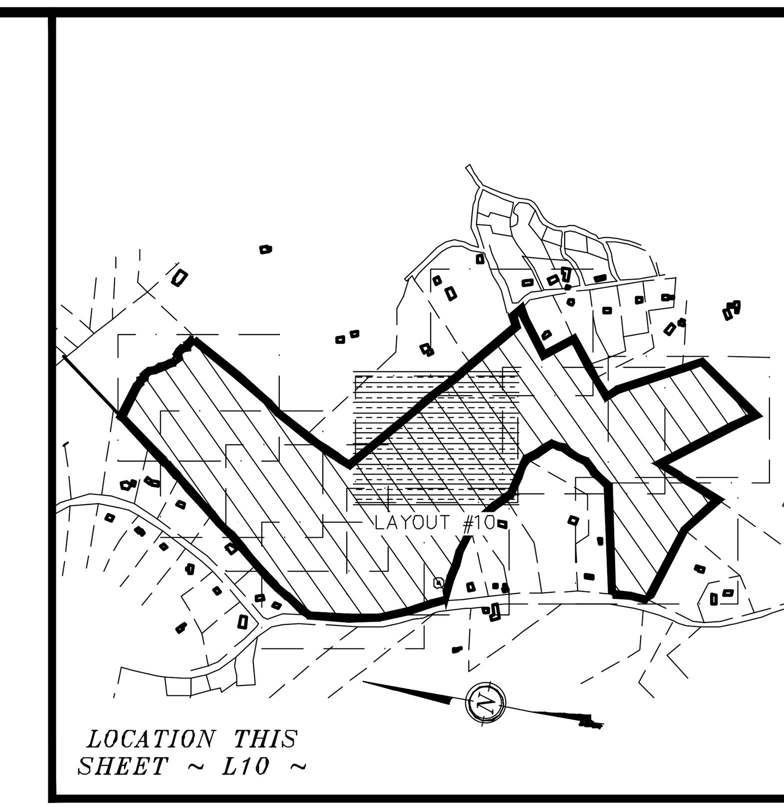
STATE OF NEW HAMPSHIRE JOHN P. HAYES, III CERTIFIED WETLAND SCIENTIST

JOHN P. HAYES, CWS

STATE OF NEW HAMPSHIRE JOHN P. HAYES III CERTIFIED SOIL SCIENTIST

JOHN P. HAYES, CSS





LOCATION THIS SHEET ~ L10 ~

NOTES:

1.) OWNER: FREDERICK FERNALD
PO BOX 1805
WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

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7.) SEE OVERVIEW SITE SPECIFIC SOILS MAP FOR SOILS LEGEND, SHEET #19.

LEGEND:

IRON BOUND~FND~
DRILL HOLE ~FND~
IRON PIPE ~FND~
TREE W/ BARBED WIRE
TEST PIT
MATCH POINT
STONE WALL
WETLAND LINE
MATCH LINE
SOIL LINE
LIMIT OF SITE SPECIFIC SOIL SURVEY
313B SOIL SERIES
R.C.R.D. ROCKINGHAM COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SITE SPECIFIC SOILS MAP ~ LAYOUT 10 ~
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065

STATE OF NEW HAMPSHIRE No. 805 KENNETH A. BERRY LICENSED LAND SURVEYOR
SIGNATURE

NOT FOR CONSTRUCTION

TEST PIT DATA:

TEST PIT #1
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-14 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
14-26 10YR 5/4 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
26-40 2.5Y 5/4 LIGHT OLIVE BROWN, GRAVELLY FINE SANDY LOAM, GRANULAR, FRIABLE
40-75 2.5Y 5/2 GRAYISH BROWN, GRAVELLY LOAMY SAND WITH REDOX. FEAT. PRESENT, MASSIVE, FRIABLE
E.S.H.W.T. @ 40"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 60"
TERMINATED @ 75"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #2
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-14 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
14-28 10YR 5/4 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
28-40 2.5Y 5/4 LIGHT OLIVE BROWN, GRAVELLY FINE SANDY LOAM, GRANULAR, FRIABLE
40-72 2.5Y 5/2 GRAYISH BROWN, GRAVELLY LOAMY SAND WITH REDOX. FEAT. PRESENT, MASSIVE, FRIABLE
E.S.H.W.T. @ 40"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 72"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #3
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-22 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
22-36 2.5Y 6/4 LIGHT YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
36-76 2.5Y 6/3 LIGHT YELLOWISH BROWN, GRAVELLY LOAMY SAND WITH REDOX. FEAT. PRESENT, MASSIVE, FRIABLE
E.S.H.W.T. @ 36"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 60"
TERMINATED @ 76"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #4
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-18 7.5YR 5/6 STRONG BROWN, GRAVELLY FINE SANDY LOAM, GRANULAR, FRIABLE
18-30 10YR 5/4 YELLOWISH BROWN, GRAVELLY FINE SANDY LOAM, BLOCKY, FRIABLE
E.S.H.W.T. @ N/A
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 30"
REFUSAL @ 30" (DOES NOT PASS)
P = 20 MIN./IN.

TEST PIT #5
0-8 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
8-24 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-36 10YR 5/4 YELLOWISH BROWN, FINE SANDY LOAM, BLOCKY, FRIABLE
36-50 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 36"
RESTRICTIVE LAYER @ 36"
GROUND WATER @ 36"
TERMINATED @ 50"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #6
0-8 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
8-26 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
26-36 10YR 5/4 YELLOWISH BROWN, FINE SANDY LOAM, BLOCKY, FRIABLE
36-50 5Y 5/3 OLIVE, GRNVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 36"
RESTRICTIVE LAYER @ 36"
GROUND WATER @ 38"
TERMINATED @ 50"
REFUSAL @ 50"
P = 6 MIN./IN.

TEST PIT #7
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-38 10YR 5/4 YELLOWISH BROWN, FINE SANDY LOAM, BLOCKY, FRIABLE
38-58 5Y 5/3 OLIVE, GRNVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ 38"
GROUND WATER @ 42"
TERMINATED @ 58"
REFUSAL @ 58"
P = 5 MIN./IN.

TEST PIT #8 & 8A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-26 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
26-38 2.5Y 5/4 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
38-54 5Y 5/3 OLIVE, GRNVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 26"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 38"
TERMINATED @ 54"
REFUSAL @ 54"
P = 14 MIN./IN.

TEST PIT #9 & 9A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-22 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
22-34 2.5Y 5/4 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
34-50 5Y 5/3 OLIVE, GRNVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 34"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 40"
TERMINATED @ 50"
REFUSAL @ 50"
P = 6 MIN./IN.

TEST PIT #10
E.S.H.W.T. @ N/A
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 18"
REFUSAL @ 18" (DOES NOT PASS)

TEST PIT #11
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-28 7.5YR 5/6 STRONG BROWN, GRAVELLY FINE SANDY LOAM, GRANULAR, FRIABLE
28-36 10YR 5/4 YELLOWISH BROWN, GRAVELLY FINE SANDY LOAM, BLOCKY, FRIABLE
E.S.H.W.T. @ N/A
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 36"
REFUSAL @ 36" (DOES NOT PASS)

TEST PIT #12
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-18 10YR 5/6 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
18-24 10YR 5/4 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
24-70 2.5Y 6/2 LIGHT BROWNISH GRAY, GRAVELLY LOAMY SAND WITH REDOX. FEAT. PRESENT, MASSIVE, FRIABLE
E.S.H.W.T. @ 24"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 30"
TERMINATED @ 70"
REFUSAL @ N/A
P =12 MIN./IN.

TEST PIT DATA:

TEST PIT #13
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-26 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
26-36 10YR 5/4 YELLOWISH BROWN, FINE SANDY LOAM, BLOCKY, FRIABLE
36-68 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 36"
RESTRICTIVE LAYER @ 36"
GROUND WATER @ 60"
TERMINATED @ 68"
REFUSAL @ 68"
P = 6 MIN./IN.

TEST PIT #14
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-18 10YR 5/6 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
18-28 10YR 5/4 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
28- 62 2.5Y 6/2 LIGHT BROWNISH GRAY, SAND WITH REDOX. FEAT. PRESENT, GRANULAR, FRIABLE
E.S.H.W.T. @ 28"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 36"
TERMINATED @ 62"
REFUSAL @ 62"
P = 8 MIN./IN.

TEST PIT #15
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-18 7.5YR 5/6 STRONG BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
18-28 10YR 5/4 YELLOWISH BROWN, GRAVELLY FINE SANDY LOAM, BLOCKY, FRIABLE
E.S.H.W.T. @ N/A
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 28"
REFUSAL @ 28" (DOES NOT PASS)

TEST PIT #16
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-20 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
20-32 10YR 5/4 YELLOWISH BROWN, FINE SANDY LOAM, BLOCKY, FRIABLE
32- 50 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 32"
RESTRICTIVE LAYER @ 32"
GROUND WATER @ N/A
TERMINATED @ 50"
REFUSAL @ 50"
P = 8 MIN./IN.

TEST PIT #17
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
16-28 10YR 5/4 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
28-38 2.5Y 5/4 YELLOWISH BROWN, GRAVELLY FINE SANDY LOAM, GRANULAR, FRIABLE
38-50 2.5Y 5/3 LIGHT OLIVE BROWN, GRAVELLY LOAMY SAND WITH REDOX. FEAT. PRESENT, MASSIVE, FRIABLE
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 50"
REFUSAL @ 50"
P = 6 MIN./IN.

TEST PIT #18
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 7.SYR 5/6 STRONG BROWN, LOAMY SAND, GRANULAR, FRIABLE
24-36 10YR 5/4 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
36-48 2.SY 5/4 LIGHT OLIVE BROWN, SAND, GRANULAR, FRIABLE
48-70 2.5Y 6/3 LIGHT YELLOWISH BROWN, STRATIFIED SAND AND VERY FINE SAND WITH REDOX. FEAT. PRESENT SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 48"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 70"
REFUSAL @ 70"
P = 4 MIN./IN.

TEST PIT #19
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 7.5YR 5/6 STRONG BROWN, LOAMY SAND, GRANULAR, FRIABLE
16-24 10YR 5/4 YELLOWISH BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
24-36 2.5Y 5/4 LIGHT OLIVE BROWN, GRAVELLY SAND, GRANULAR, FRIABLE
36-74 2.5Y 5/3 LIGHT OLIVE BROWN, GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 36"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 44"
TERMINATED @ 74"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #20
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-20 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
20-32 10YR 5/4 YELLOWISH BROWN, FINE SANDY LOAM, BLOCKY, FRIABLE
32- 74 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 32"
RESTRICTIVE LAYER @ 32"
GROUND WATER @ N/A
TERMINATED @ 74"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #21
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-20 7.5YR 4/6 STRONG BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
20-36 10YR 5/4 YELLOWISH BROWN, FINE SANDY LOAM, BLOCKY, FRIABLE
36-44 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 36"
RESTRICTIVE LAYER @ 36"
GROUND WATER @ 36"
TERMINATED @ 44"
REFUSAL @ 44" (DOES NOT PASS)
P = 12 MIN./IN.

TEST PIT #22
0-5 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
5-14 10YR 5/6 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
14-28 10YR 5/4 YELLOWISH BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
28-38 2.5Y 5/4 LIGHT OLIVE BROWN, GRAVELLY SAND, GRANULAR, FRIABLE
38-72 2.5Y 5/3 LIGHT OLIVE BROWN, GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 72"
REFUSAL @ N/A
P = 8 MIN./IN.

TEST PIT #23
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 7.5YR 5/6 STRONG BROWN, LOAMY SAND, GRANULAR, FRIABLE
16-26 10YR 5/4 YELLOWISH BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
26-38 2.5Y 5/4 LIGHT OLIVE BROWN, GRAVELLY SAND, GRANULAR, FRIABLE
38-70 2.5Y 5/3 LIGHT OLIVE BROWN, STRATIFIED SAND AND GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 44"
TERMINATED @ 70"
REFUSAL @ 70"
P = 8 MIN./IN.

TEST PIT DATA:

TEST PIT #24
0-5 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
5-18 7.5YR 5/6 STRONG BROWN, LOAMY SAND, GRANULAR, FRIABLE
18-28 10YR 5/4 YELLOWISH BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
28-38 2.5Y 5/4 LIGHT OLIVE BROWN, GRAVELLY SAND, GRANULAR, FRIABLE
38-76 2.5Y 5/3 LIGHT OLIVE BROWN, STRATIFIED SAND AND GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 76"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #25
0-5 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
5-16 10YR 5/6 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
16-26 10YR 5/4 YELLOWISH BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
26-32 2.5Y 5/4 LIGHT OLIVE BROWN, GRAVELLY SAND, GRANULAR, FRIABLE
32-72 2.5Y 6/3 LIGHT YELLOWISH BROWN, GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 32"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 44"
TERMINATED @ 72"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #25A
0-5 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
5-18 10YR 5/6 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
18-26 10YR 5/4 YELLOWISH BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
26-34 2.5Y 5/4 LIGHT OLIVE BROWN, GRAVELLY SAND, GRANULAR, FRIABLE
34-74 2.5Y 6/3 LIGHT YELLOWISH BROWN, GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 32"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 44"
TERMINATED @ 74"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #26
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 7.5YR 5/6 STRONG BROWN, LOAMY SAND, GRANULAR, FRIABLE
16-28 10YR 5/4 YELLOWISH BROWN, GRAVELLY SAND, GRANULAR, FRIABLE
28-38 2.5Y 6/4 LIGHT YELLOWISH BROWN, GRAVELLY COARSE SAND, SINGLE GRAIN, LOOSE
38-70 2.5Y 5/3 LIGHT OLIVE BROWN, GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 70"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #26A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-18 7.5YR 5/6 STRONG BROWN, LOAMY SAND, GRANULAR, FRIABLE
18-30 10YR 5/4 YELLOWISH BROWN, GRAVELLY SAND, GRANULAR, FRIABLE
30-38 2.5Y 6/4 LIGHT YELLOWISH BROWN, GRAVELLY COARSE SAND, SINGLE GRAIN, LOOSE
38-72 2.5Y 5/3 LIGHT OLIVE BROWN, GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 72"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #27
N/A

TEST PIT #28
0-10 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
10-26 7.5YR 5/6 STRONG BROWN, LOAMY SAND, GRANULAR, FRIABLE
26-36 10YR 5/4 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
36-42 2.5Y 5/4 LIGHT OLIVE BROWN, SAND, GRANULAR, FRIABLE
42-74 2.5Y 6/3 LIGHT YELLOWISH BROWN, STRATIFIED SAND AND VERY FINE SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 42"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 74"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #29
0-8 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
8-22 7.5YR 5/6 STRONG BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
22-36 10YR 5/4 YELLOWISH BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
36-54 2.5Y 5/4 LIGHT OLIVE BROWN, GRAVELLY SAND, GRANULAR, FRIABLE
54-70 2.5Y 5/3 LIGHT OLIVE BROWN, GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 54"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 70"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #30
0-8 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
8-22 7.5YR 5/6 STRONG BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
22-36 10YR 5/4 YELLOWISH BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
36-54 2.5Y 5/4 LIGHT OLIVE BROWN, GRAVELLY SAND, GRANULAR, FRIABLE
54-72 2.5Y 5/3 LIGHT OLIVE BROWN, GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 54"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 72"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #30A
0-8 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
8-20 7.5YR 5/6 STRONG BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
20-34 10YR 5/4 YELLOWISH BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
34-54 2.5Y 5/4 LIGHT OLIVE BROWN, GRAVELLY SAND, GRANULAR, FRIABLE
54-70 2.5Y 5/3 LIGHT OLIVE BROWN, GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 54"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 70"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #31
0-8 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
8-16 7.5YR 5/6 STRONG BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
16-24 10YR 5/4 YELLOWISH BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
24-36 2.5Y 5/4 LIGHT OLIVE BROWN, GRAVELLY SAND, GRANULAR, FRIABLE
36-44 2.5Y 5/3 LIGHT OLIVE BROWN, GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
44-74 2.5Y 6/3 LIGHT YELLOWISH BROWN, SAND WITH REDOX. FEAT. PRESENT, GRANULAR, FRIABLE
E.S.H.W.T. @ 36"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 74"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT DATA:

TEST PIT #32
0-8 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
8-18 7.5YR 5/6 STRONG BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
18-24 10YR 5/4 YELLOWISH BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
24-36 2.5Y 5/4 LIGHT OLIVE BROWN, GRAVELLY SAND, GRANULAR, FRIABLE
36-52 2.5Y 5/3 LIGHT OLIVE BROWN, GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
52-74 2.5Y 6/3 LIGHT YELLOWISH BROWN, SAND WITH REDOX. FEAT. PRESENT, GRANULAR, FRIABLE
E.S.H.W.T. @ 36"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 74"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #33
0-3 10YR 3/1 VERY DARK GRAY, SANDY LOAM, GRANULAR, FRIABLE
3-18 10YR 5/4 YELLOWISH BROWN, GRAVELLY SAND, GRANULAR, FRIABLE
18-68 2.5Y 5/3 LIGHT OLIVE BROWN, GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 18" (DOES NOT PASS)
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 24"
TERMINATED @ 68"
REFUSAL @ N/A
P = 20 MIN./IN.

TEST PIT #34
0-3 10YR 3/2 VERY DARK GRAYISH BROWN, SANDY LOAM, GRANULAR, FRIABLE
3-16 10YR 5/4 YELLOWISH BROWN, GRAVELLY SAND, SINGLE GRAIN, LOOSE
16-21 2.5Y 5/4 LIGHT OLIVE BROWN, VERY GRAVELLY SAND, SINGLE GRAIN, LOOSE
21-76 2.5Y 5/3 LIGHT OLIVE BROWN, VERY GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 21" (DOES NOT PASS)
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 28"
TERMINATED @ 76"
REFUSAL @ N/A
P = 20 MIN./IN.

TEST PIT #35
0-3 10YR 3/1 VERY DARK GRAY, SANDY LOAM, GRANULAR, FRIABLE
3-16 10YR 5/4 YELLOWISH BROWN, GRAVELLY SAND, GRANULAR, FRIABLE
16-48 2.5Y 6/3 LIGHT YELLOWISH BROWN, COARSE SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
48-72 2.5Y 5/3 LIGHT OLIVE BROWN, VERY GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 16" (DOES NOT PASS)
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 28"
TERMINATED @ 72"
REFUSAL @ N/A
P = 20 MIN./IN.

TEST PIT #36
0-5 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
5-26 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
26-48 10YR 5/4 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
E.S.H.W.T. @ N/A
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 48"
REFUSAL @ 38-48"
P = 20 MIN./IN.

TEST PIT #37 & 37A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
6-12 7.5YR 5/6 STRONG BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
12-32 10YR 5/6 YELLOWISH BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
32-42 10YR 5/4 YELLOWISH BROWN, COARSE SAND, SINGLE GRAIN, LOOSE
42-82 2.5Y 5/3 LIGHT OLIVE BROWN, VERY GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 42"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 82"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #38
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
6-22 10YR 5/6 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
22-34 10YR 5/4 YELLOWISH BROWN, SAND, GRANULAR, FRIABLE
34-72 2.5Y 5/3 LIGHT OLIVE BROWN, STRATIFIED SAND AND VERY FINE SAND WITH REDOX. FEAT. PRESENT, GRANULAR, FRIABLE
E.S.H.W.T. @ 34"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 40"
TERMINATED @ 72"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #38A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
6-20 10YR 5/6 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
20-34 10YR 5/4 YELLOWISH BROWN, SAND, GRANULAR, FRIABLE
34-70 2.5Y 5/3 LIGHT OLIVE BROWN, STRATIFIED SAND AND VERY FINE SAND WITH REDOX. FEAT. PRESENT, GRANULAR, FRIABLE
E.S.H.W.T. @ 34"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 40"
TERMINATED @ 70"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #39
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
6-18 10YR 5/4 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
18-26 10YR 5/4 YELLOWISH BROWN, SAND, GRANULAR, FRIABLE
26-44 10YR 6/2 LIGHT BROWNISH GRAY, SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
44-72 2.5Y 5/3 LIGHT OLIVE BROWN, VERY GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 26"
RESTRICTIVE LAYER @ 44"
GROUND WATER @ 36"
TERMINATED @ 72"
REFUSAL @ N/A
P = 12 MIN./IN.

TEST PIT #39A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
6-16 10YR 5/4 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
16-26 10YR 5/4 YELLOWISH BROWN, SAND, GRANULAR, FRIABLE
22-44 10YR 6/2 LIGHT BROWNISH GRAY, SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
44-70 2.5Y 5/3 LIGHT OLIVE BROWN, VERY GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 26"
RESTRICTIVE LAYER @ 44"
GROUND WATER @ 36"
TERMINATED @ 70"
REFUSAL @ N/A
P = 12 MIN./IN.

TEST PIT #40
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-22 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
22-28 10YR 5/4 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
28-38 10YR 5/4 YELLOWISH BROWN, GRAVELLY FINE SANDY LOAM, MASSIVE, FRIABLE
38-78 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ 38"
GROUND WATER @ 58"
TERMINATED @ 78"
REFUSAL @ N/A
P = 6 MIN./IN.

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SITE SPECIFIC SOILS MAP ~TEST PITS 1~
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

STATE OF NEW HAMPSHIRE
JOHN P. HAYES III
No. 087
CERTIFIED SOIL SCIENTIST

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863
SCALE : N/A
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
LICENSED PROFESSIONAL ENGINEER

TEST PIT DATA:

TEST PIT #41 & 41A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
6-18 10YR 4/4 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
18-28 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
28-64 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 28"
RESTRICTIVE LAYER @ 28"
GROUND WATER @ 48"
TERMINATED @ 64"
REFUSAL @ N/A
P = 8 MIN./IN.

TEST PIT #42
0-3 10YR 2/2 VERY DARK BROWN, SANDY LOAM, GRANULAR, FRIABLE
3-12 10YR 5/4 YELLOWISH BROWN, GRAVELLY LOAMY SAND, SINGLE GRAIN, LOOSE
12-18 2.5Y 5/4 LIGHT OLIVE BROWN, VERY GRAVELLY SAND, SINGLE GRAIN, LOOSE
18-50 2.5Y 5/3 LIGHT OLIVE BROWN, VERY GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 18" (DOES NOT PASS)
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 28"
TERMINATED @ 50"
REFUSAL @ N/A
P = 16 MIN./IN.

TEST PIT #42A
0-3 10YR 2/2 VERY DARK BROWN, SANDY LOAM, GRANULAR, FRIABLE
3-10 10YR 5/4 YELLOWISH BROWN, GRAVELLY LOAMY SAND, SINGLE GRAIN, LOOSE
10-18 2.5Y 5/4 LIGHT OLIVE BROWN, VERY GRAVELLY SAND, SINGLE GRAIN, LOOSE
18-50 2.5Y 5/3 LIGHT OLIVE BROWN, VERY GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 18" (DOES NOT PASS)
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 28"
TERMINATED @ 50"
REFUSAL @ N/A
P = 16 MIN./IN.

TEST PIT #43
0-3 10YR 2/2 VERY DARK BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
3-16 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
16-24 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-75 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 24"
RESTRICTIVE LAYER @ 24"
GROUND WATER @ 26"
TERMINATED @ 75"
REFUSAL @ N/A
P = 12 MIN./IN.

TEST PIT #43A
0-3 10YR 2/2 VERY DARK BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
3-14 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
14-24 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-72 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 24"
RESTRICTIVE LAYER @ 24"
GROUND WATER @ 26"
TERMINATED @ 72"
REFUSAL @ N/A
P = 12 MIN./IN.

TEST PIT #44
0-3 10YR 2/2 VERY DARK BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
3-16 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABFE
16-24 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
24-76 SY 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 24"
RESTRICTIVE LAYER @ 24"
GROUND WATER @ N/A
TERMINATED @ 76"
REFUSAL @ N/A
P = 12 MIN./IN.

TEST PIT #45
0-3 10YR 2/2 VERY DARK BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
3-16 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
16-24 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
24-75 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 24"
RESTRICTIVE LAYER @ 24"
GROUND WATER @ 40"
TERMINATED @ 75"
REFUSAL @ N/A
P = 12 MIN./IN.

TEST PIT #46
0-3 10YR 2/2 VERY DARK BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
3-14 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
14-20 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
20-64 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 24"
RESTRICTIVE LAYER @ 24"
GROUND WATER @ N/A
TERMINATED @ 64"
REFUSAL @ N/A
P = 12 MIN./IN.

TEST PIT #46A
0-3 10YR 2/2 VERY DARK BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
3-14 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
14-24 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-64 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 24"
RESTRICTIVE LAYER @ 24"
GROUND WATER @ N/A
TERMINATED @ 64"
REFUSAL @ N/A
P = 12 MIN./IN.

TEST PIT #47
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
22-34 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
34-80 2.5Y 5/2 GRAYISH BROWN, GRAVELLY LOAMY SAND WITH REDOX. FEAT. PRESENT, MASSIVE, FRIABLE
E.S.H.W.T. @ 34"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 56"
TERMINATED @ 80"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #47A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-18 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
18-30 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
30-78 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 30"
RESTRICTIVE LAYER @ 30"
GROUND WATER @ 34"
TERMINATED @ 78"
REFUSAL @ N/A
P = 8 MIN./IN.

TEST PIT DATA:

TEST PIT #48
0-3 10YR 2/2 VERY DARK BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
3-18 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
18-28 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
28-64 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 28"
RESTRICTIVE LAYER @ 28"
GROUND WATER @ 46"
TERMINATED @ 64"
REFUSAL @ N/A
P = 10 MIN./IN.

TEST PIT #48A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-40 2.SY 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
40-80 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 40"
RESTRICTIVE LAYER @ 40"
GROUND WATER @ N/A
TERMINATED @ 80"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #49
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-22 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
22-38 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
38-78 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ 38"
GROUND WATER @ N/A
TERMINATED @ 78"
REFUSAL @ 78"
P = 6 MIN./IN.

TEST PIT #50
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-22 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
22-38 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
38-78 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ 38"
GROUND WATER @ N/A
TERMINATED @ 78"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #51
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-40 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
40-88 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 40"
RESTRICTIVE LAYER @ 40"
GROUND WATER @ N/A
TERMINATED @ 88"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #52
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-40 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
40-88 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 40"
RESTRICTIVE LAYER @ 40"
GROUND WATER @ N/A
TERMINATED @ 88"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #53
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-40 2.SY 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
40-80 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 40"
RESTRICTIVE LAYER @ 40"
GROUND WATER @ N/A
TERMINATED @ 80"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #54
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-18 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
18-30 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
30-78 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 30"
RESTRICTIVE LAYER @ 30"
GROUND WATER @ 34"
TERMINATED @ 78"
REFUSAL @ N/A
P = 8 MIN./IN.

TEST PIT #55 & 55A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-38 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
38-80 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ 38"
GROUND WATER @ 53"
TERMINATED @ 80"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #56
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-38 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
38-80 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ 38"
GROUND WATER @ N/A
TERMINATED @ 78"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #56A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-22 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
22-38 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
38-80 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ 38"
GROUND WATER @ N/A
TERMINATED @ 78"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT DATA:

TEST PIT #57
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-18 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
18-36 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
36-72 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 36"
RESTRICTIVE LAYER @ 36"
GROUND WATER @ N/A
TERMINATED @ 72"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #57A
0-8 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
8-20 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
20-36 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
36-74 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 36"
RESTRICTIVE LAYER @ 36"
GROUND WATER @ N/A
TERMINATED @ 74"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #58
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-18 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
18-36 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
36-72 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 36"
RESTRICTIVE LAYER @ 36"
GROUND WATER @ N/A
TERMINATED @ 72"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #59
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
16-36 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
36-80 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 36"
RESTRICTIVE LAYER @ 36"
GROUND WATER @ N/A
TERMINATED @ 80"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #60
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 10YR 4/4 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
16-32 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
32-70 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 32"
RESTRICTIVE LAYER @ 32"
GROUND WATER @ N/A
TERMINATED @ 70"
REFUSAL @ N/A
P = 8 MIN./IN.

TEST PIT #61
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-38 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
38-70 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ 38"
GROUND WATER @ 53"
TERMINATED @ 70"
REFUSAL @ N/A
P = 8 MIN./IN.

TEST PIT #62
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-38 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
38-70 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 42"
RESTRICTIVE LAYER @ 42"
GROUND WATER @ N/A
TERMINATED @ 78"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #63
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 10YR 4/4 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
16-28 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
28-68 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX, FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 28"
RESTRICTIVE LAYER @ 28"
GROUND WATER @ N/A
TERMINATED @ 68"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #63A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-38 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
38-70 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 42"
RESTRICTIVE LAYER @ 42"
GROUND WATER @ N/A
TERMINATED @ 78"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #64
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 10YR 4/4 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
16-36 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
36-70 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 32"
RESTRICTIVE LAYER @ 32"
GROUND WATER @ N/A
TERMINATED @ 70"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #64A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-38 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
38-70 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 42"
RESTRICTIVE LAYER @ 42"
GROUND WATER @ N/A
TERMINATED @ 78"
REFUSAL @ N/A
P = 2 MIN./IN.

TEST PIT DATA:

TEST PIT #65
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
16-36 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
36-78 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 36"
RESTRICTIVE LAYER @ 36"
GROUND WATER @ N/A
TERMINATED @ 78"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #66
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-38 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
38-72 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ 38"
GROUND WATER @ N/A
TERMINATED @ 72"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #67
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
16-36 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
36-72 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ 38"
GROUND WATER @ N/A
TERMINATED @ 80"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #67A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-38 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
38-84 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ 38"
GROUND WATER @ N/A
TERMINATED @ 84"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #68
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-38 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
38-80 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ 38"
GROUND WATER @ N/A
TERMINATED @ 80"
REFUSAL @ N/A
P = 4 MIN./IN.

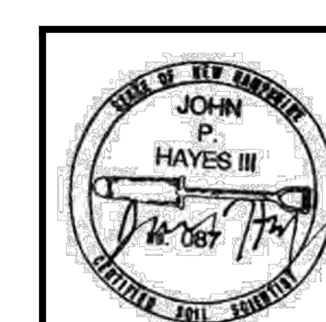
TEST PIT #68A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-38 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
38-84 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ 38"
GROUND WATER @ N/A
TERMINATED @ 84"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #69
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-38 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
38-84 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 38"
RESTRICTIVE LAYER @ 38"
GROUND WATER @ N/A
TERMINATED @ 84"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #70
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-14 10YR 4/4 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
14-32 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
32-80 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FILM
E.S.H.W.T. @ 32"
RESTRICTIVE LAYER @ 32"
GROUND WATER @ 46"
TERMINATED @ 80"
REFUSAL @ N/A
P = 8 MIN./IN.

TEST PIT #71
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-40 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
40-78 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 40"
RESTRICTIVE LAYER @ 40"
GROUND WATER @ N/A
TERMINATED @ 78"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #72
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-14 10YR 4/4 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
14-26 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
26-72 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 26"
RESTRICTIVE LAYER @ 26"
GROUND WATER @ N/A
TERMINATED @ 72"
REFUSAL @ N/A
P = 10 MIN./IN.

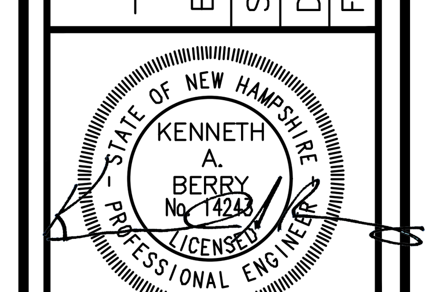


REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

SITE SPECIFIC SOILS MAP ~TEST PITS 2~
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : N/A
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065



NOT FOR CONSTRUCTION

TEST PIT DATA:

TEST PIT #72A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-12 10YR 4/4 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
12-26 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
26-74 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 26"
RESTRICTIVE LAYER @ 26"
GROUND WATER @ N/A
TERMINATED @ 74"
REFUSAL @ N/A
P = 12 MIN./IN.

TEST PIT #73
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-14 10YR 4/4 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
14-28 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
28-64 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 28"
RESTRICTIVE LAYER @ 28"
GROUND WATER @ N/A
TERMINATED @ 64"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #73A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 10YR 4/4 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
16-32 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
32-80 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 32"
RESTRICTIVE LAYER @ 32"
GROUND WATER @ 46"
TERMINATED @ 80"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #74
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-48 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
48-80 2.5Y 5/2 GRAYISH BROWN, GRAVELLY SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FRIABLE
E.S.H.W.T. @ 48"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 80"
REFUSAL @ N/A
P = 2 MIN./IN.

TEST PIT #74A
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-24 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-48 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
48-80 2.5Y 5/2 GRAYISH BROWN, GRAVELLY SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FRIABLE
E.S.H.W.T. @ 48"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 80"
REFUSAL @ N/A
P = 2 MIN./IN.

TEST PIT #75
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 10YR 4/4 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
16-32 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
32-80 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 32"
RESTRICTIVE LAYER @ 32"
GROUND WATER @ 46"
TERMINATED @ 80"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #76
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 10YR 4/4 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
16-32 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
32-78 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIrM
E.S.H.W.T. @ 32"
RESTRICTIVE LAYER @ 32"
GROUND WATER @ 58"
TERMINATED @ 78"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #77
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-14 10YR 4/4 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
14-30 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
30-80 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 30"
RESTRICTIVE LAYER @ 30"
GROUND WATER @ 44"
TERMINATED @ 80"
REFUSAL @ N/A
P = 8 MIN./IN.

TEST PIT #78
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-20 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
20-40 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
40- 76 2.5Y 5/2 GRAYISH BROWN, GRAVELLY LOAMY SAND WITH REDOX. FEAT. PRESENT, MASSIVE, FRIABLE
E.S.H.W.T. @ 40"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 48"
TERMINATED @ 76"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #100
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-20 7.5YR 4/6 STRONG BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
20-36 10YR 5/4 YELLOWISH BROWN, FINE SANDY LOAM, BLOCKY, FRIABLE
36-44 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 24"
RESTRICTIVE LAYER @ 36"
GROUND WATER @ 36"
TERMINATED @ 44"
REFUSAL @ 44"
P = 12 MIN./IN.

TEST PIT #101
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
6-12 7.5YR 5/6 STRONG BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
12-32 10YR 5/6 YELLOWISH BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
32-42 10YR 5/4 YELLOWISH BROWN, COARSE SAND, SINGLE GRAIN, LOOSE
42-82 2.5Y 5/3 LIGHT OLIVE BROWN, VERY GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 42"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 82"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT DATA:

TEST PIT #102
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
6-22 10YR 5/6 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
22-34 10YR 5/4 YELLOWISH BROWN, SAND, GRANULAR, FRIABLE
34-72 2.5Y 5/3 LIGHT OLIVE BROWN, STRATIFIED SAND AND VERY FINE SAND WITH REDOX. FEAT. PRESENT, GRANULAR, FRIABLE
E.S.H.W.T. @ 34"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 40"
TERMINATED @ 72"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #103
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-18 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
18-30 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, MASSIVE, FRIABLE
30-78 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 30"
RESTRICTIVE LAYER @ 30"
GROUND WATER @ 34"
TERMINATED @ 78"
REFUSAL @ N/A
P = 8 MIN./IN.

TEST PIT #200
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
6-16 10YR 5/4 YELLOWISH BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
16-24 2.5Y 5/4 LIGHT OLIVE BROWN, GRAVELLY SAND, GRANULAR, FRIABLE
24-62 2.5Y 5/3 LIGHT OLIVE BROWN, GRAVELLY SAND WITH REDOX. FEAT. PRESENT, SINGLE GRAIN, LOOSE
E.S.H.W.T. @ 24"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 38"
TERMINATED @ 62"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #201
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
6-14 7.5YR 5/6 STRONG BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
14-24 10YR 5/6 YELLOWISH BROWN, GRAVELLY LOAMY SAND, GRANULAR, FRIABLE
24-34 10YR 5/4 YELLOWISH BROWN, GRAVELLY SAND, SINGLE GRAIN, LOOSE
34-64 2.5Y 5/3 LIGHT OLIVE BROWN, VERY GRAVELLY SAND WITH REDOX. FEAT. PRESENT, GRANULAR, FRIABLE
E.S.H.W.T. @ 34"
RESTRICTIVE LAYER @ N/A
GROUND WATER @ N/A
TERMINATED @ 64"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #202
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 10YR 4/4 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
16-24 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-60 2.5Y 5/3 LIGHT OLIVE BROWN, FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 24"
RESTRICTIVE LAYER @ 24"
GROUND WATER @ 32"
TERMINATED @ 60"
REFUSAL @ N/A
P = 12 MIN./IN.

TEST PIT #203
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-18 10YR 4/4 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
18-32 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
32-64 2.5Y 5/3 LIGHT OLIVE BROWN, FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 32"
RESTRICTIVE LAYER @ 32"
GROUND WATER @ 42"
TERMINATED @ 64"
REFUSAL @ N/A
P = 12 MIN./IN.

TEST PIT #204
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
16-28 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
28-64 5Y 5/3 OLIVE, FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 28"
RESTRICTIVE LAYER @ 28"
GROUND WATER @ N/A
TERMINATED @ 64"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #205
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-20 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
20-32 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
32-64 5Y 5/3 OLIVE, FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 32"
RESTRICTIVE LAYER @ 32"
GROUND WATER @ N/A
TERMINATED @ 64"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #206
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-18 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
18-28 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
28-62 5Y 5/3 OLIVE, FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 28"
RESTRICTIVE LAYER @ 28"
GROUND WATER @ 50"
TERMINATED @ 62"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #207
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
16-30 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
30-64 5Y 5/3 OLIVE, FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 30"
RESTRICTIVE LAYER @ 30"
GROUND WATER @ N/A
TERMINATED @ 64"
REFUSAL @ N/A
P = 4 MIN./IN.

TEST PIT #208
0-8 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
8-20 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
20-30 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
30-65 5Y 5/3 OLIVE, FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 30"
RESTRICTIVE LAYER @ 30"
GROUND WATER @ N/A
TERMINATED @ 65"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT DATA:

TEST PIT #209
0-8 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
8-14 10YR 4/4 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
14-20 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
20-60 5Y 5/3 OLIVE, FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 20" (DOES NOT PASS)
RESTRICTIVE LAYER @ 20"
GROUND WATER @ N/A
TERMINATED @ 60"
REFUSAL @ N/A
P = 8 MIN./IN.

TEST PIT #210
0-8 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
8-16 10YR 4/4 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
16-24 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24-60 5Y 5/3 OLIVE, FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 24"
RESTRICTIVE LAYER @ 24"
GROUND WATER @ N/A
TERMINATED @ 60"
REFUSAL @ N/A
P = 6 MIN./IN.

TEST PIT #211
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-22 10YR 4/6 DARK YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
22-34 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
34-60 5Y 5/3 OLIVE, FINE SANDY LOAM WITH REDOX. FEAT. PRESENT, MASSIVE, FIRM
E.S.H.W.T. @ 34"
RESTRICTIVE LAYER @ 34"
GROUND WATER @ N/A
TERMINATED @ 60"
REFUSAL @ N/A
P = 8 MIN./IN.

TEST PIT #212
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6-16 10YR 5/6 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
16-26 10YR 5/4 YELLOWISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
26-34 2.5Y 5/4 LIGHT OLIVE BROWN, GRAVELLY FINE SANDY LOAM, GRANULAR, FRIABLE
34-60 5Y 5/3 OLIVE, GRAVELLY LOAMY SAND WITH REDOX. FEAT. PRESENT, MASSIVE, FRIABLE
E.S.H.W.T. @ 34"
RESTRICTIVE LAYER @ 34"
GROUND WATER @ N/A
TERMINATED @ 60"
REFUSAL @ N/A
P = 6 MIN./IN.

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

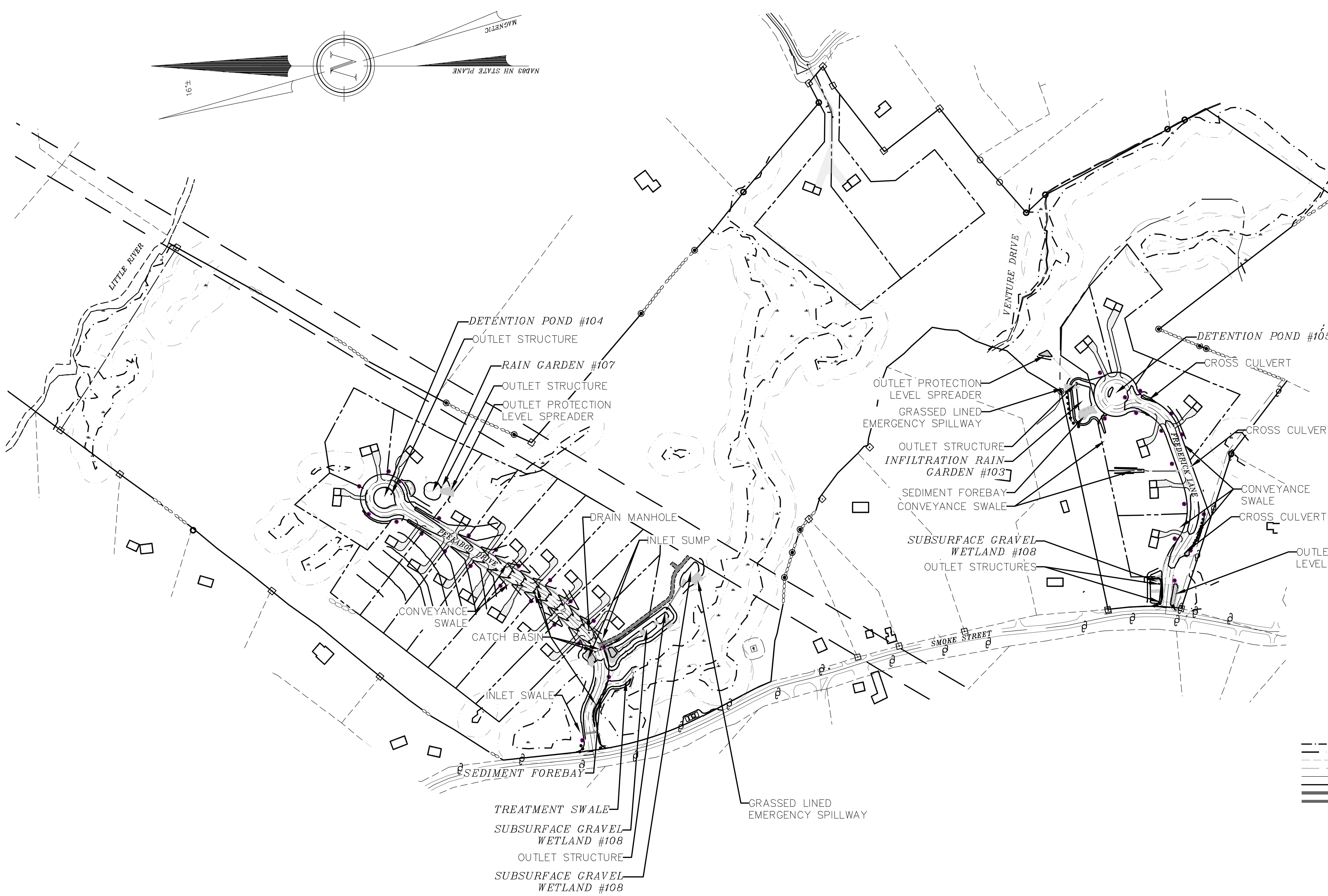
SITE SPECIFIC SOILS MAP ~TEST PITS 3~
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

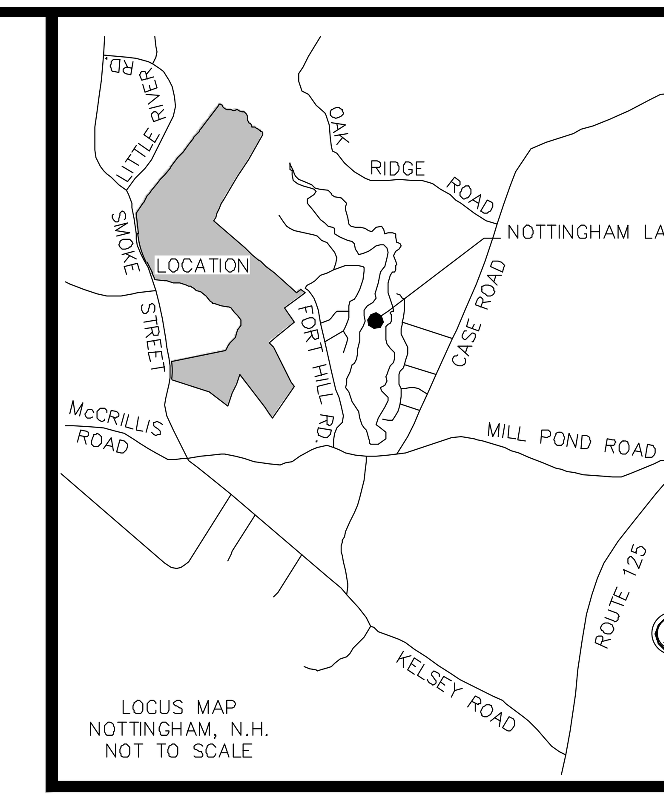
BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : N/A
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065

JOHN P. HAYES III

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





NOTES:

1.) OWNER: FREDERICK FERNALD, PO BOX 1805, WOLFEBORO, NH 03894

1A.) APPLICANT: OWL RIDGE BUILDERS, 104 RAYMOND ROAD, NOTTINGHAM, NH 03290

2.) TAX MAP 23, LOT 11

3.) LOT AREA: 4,477,048 Sq.Ft., 102.77 Ac.

4.) R.C.R.D. BOOK 2819, PAGE 786

5.) THE INTENT OF THIS PLAN IS TO SHOW AN OVERVIEW OF THE GRADING AND DRAINAGE INFRASTRUCTURE FOR THE SUPPORT OPERATION OF THE MULTI PHASE OPEN SPACE SUBDIVISION.

6.) THIS PLAN IS NORMALLY PRINTED AT HALF SCALE, 11 X 17, AND THE TRUE SCALE IS TWICE THE PUBLISHED SCALE. IT IS ALSO INTENDED TO BE AN ATTACHMENT TO THE STORMWATER SYSTEM OPERATIONS: INSPECTION AND MAINTENANCE MANUAL

LEGEND:

- PROPOSED DRAIN MANHOLE W/ STRUCTURE
- PROPOSED CATCH BASIN W/ STRUCTURE
- PROPOSED STORMWATER BMP OUTLET STRUCTURE
- POORLY DRAINED JURISDICTIONAL WETLAND
- 50' WETLAND BUFFER
- CONTOUR MINOR, EXISTING
- CONTOUR MAJOR, EXISTING
- CONTOUR MINOR, PROPOSED
- CONTOUR MAJOR, PROPOSED
- EXISTING DRAINAGE LINE
- PROPOSED DRAINAGE LINE
- RIP RAP
- STORMWATER BEST MANAGEMENT PRACTICE (BMP)
- BERM

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

INSPECTION & MAINTENANCE PLAN
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 200 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10745
LICENSED
PROFESSIONAL ENGINEER

NOT FOR CONSTRUCTION

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

Prepared for:

Owl Ridge Builders
104 Raymond Road
Nottingham, NH 03290

Land of:

Frederick Fernald
PO Box 1805
Wolfeboro, NH 03894

LOCATION

Smoke Street
Nottingham, NH 03290

Tax Map 23, Lot 11

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

Prepared by:

Berry Surveying & Engineering
335 Second Crown Point Road
Barrington, NH 03825

File Number
DB2020-065

February 15, 2023
Revised: December 11, 2023

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Introduction

The Best Management Practices (BMP) described in this manual are specified in more detail within the plan set giving design details and specifications. The New Hampshire Stormwater Manual, Volume 2, Post-Construction Best Management Practices Selection & Design (December 2008, NHDES) and US EPA NPDES CGP 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/) See also, additional references for the University of New Hampshire Stormwater Center regarding maintenance of the Subsurface Gravel Wetlands.
https://www.unh.edu/unhsc/design-and-maintenance-subsurface-gravel-wetlands
https://www.unh.edu/unhsc/sites/default/files/media/unhsc_gravel_wetland_spec_6-2016.pdf

The BMP's are covered below in the general order in which the storm water flows. Each BMP has a design intent, description and maintenance consideration listed. A Check List table is provided after the narrative to summarize the maintenance responsibilities and schedule. A Log Form is also provided for the owners use.

For details regarding the design of the Storm Water System see also Drainage Analysis & Sediment and Erosion Control Plan also published by Berry Surveying & Engineering originally dated February 15, 2023, as revised. See also plan set completed for Owl Ridge Builders, LLC. originally dated February 15, 2023, as revised.

Owl Ridge Builders, LLC, Owner and Managing Member Joe Fernald, is responsible for the periodic inspection and required maintenance, , who is responsible for the Stormwater System Operation, Inspection, and Maintenance defined and described herein. 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 and parking lots, 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 properly inspect and maintain the system. (Reduced copies attached.) The Owner and Managing Member, Joe Fernald, as the Operator, is responsible to ensure that any subsequent owner, tenant, or subcontractor have 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 Nottingham, Planning Department, with the Annual Report.

The applicant of Tax Map 23, Lot 11, Owl Ridge Builders, is proposing to develop the property on Smoke Street. The site is currently wooded vacant land. The proposal for development includes 25 single family houses on 2 cul-de-sac roads consisting of a total of 2,740 feet of roadway. The proposal is supported by multiple practices including subsurface gravel wetlands, rain gardens, detention ponds, and infiltration ponds.

The following drainage features will all require periodic inspections and maintenance based on this manual in addition to deep sump catch basins throughout:

Conveyance Swales, cross culverts, and roadside ditches

Treatment Swale

Detention Ponds (P-104, P105) w/ Outlet Structure

Sediment Forebays

Subsurface Gravel Wetland P-102 and P-108 w/ Outlet structures, and emergency spillway.

Rain Garden with Infiltration (P-103) w/ Outlet Structured and Emergency Spillway

Rain Garden (P-107) w/ Underdrain, Outlet Structure and Emergency Spillway

Infiltration Pond w/ Emergency Spillway

Outlet Protection and Level Spreader

Conveyance Swales, Cross Culverts, & Roadside Ditches

Project Intent: The swales are individually designed in the drainage analysis and specified on the design plans. Temporary check dams will be installed as specified and removed upon completion of the project. Conveyance swales will be lined with rolled erosion control blanket (R.E.C.B.) as specified on the E&SC Plan. Roadside ditches and cross culverts will be installed according to the Grading & Drainage Plan and Profile Plans to properly route the surface water runoff.

Description: Conveyance swales are stabilized channels designed to convey 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 channels may provide incidental water quality benefits, but are not specifically designed to provide treatment. Conveyance swales are not considered a Treatment or Pretreatment Practice under the AoT regulations, unless they are also designed to meet the requirements of an acceptable Treatment/Pretreatment Practice as described elsewhere in this Chapter. See New Hampshire Stormwater Manual (SWM) Volume 2, 4-6.3 Conveyance Practices, Conveyance Swale, page 166. A conveyance swale will be designed so that there is the capacity to convey the 50-year 24-hour storm event.

Maintenance Considerations: Grassed channels should be inspected periodically (at least annually) for sediment accumulation, erosion, and condition of surface lining (vegetation or riprap). Repairs, including stone or vegetation replacement, should be made based on this inspection. Remove sediment and debris annually, or more frequently as warranted by inspection. Mow vegetated channels based on frequency specified by design. Mowing at least once per year is required to control establishment of woody vegetation. It is recommended to cut grass no shorter than 4 inches. Any damage to the vegetation will be repaired and woody vegetation and invasive vegetation will be removed. Any damage to the channel due to erosion will be repaired and R.E.C.B. reinstalled. Roadside swales and cross culverts will be cleared of excess woody brush and sedimentation to allow proper drainage.

Treatment Swale

Description: Treatment swales are designed to promote sedimentation by providing a minimum hydraulic residence time within the channel under design flow conditions (Water Quality Flow). This BMP may also provide some infiltration, vegetative filtration, and vegetative uptake. Conventional grass channels and ditches are primarily designed for conveyance. Treatment swales, in contrast, are designed for hydraulic residence time and shallow depths under water quality flow conditions. As a result, treatment swales provide higher pollutant removal efficiencies. Pollutants are removed through sedimentation, adsorption, biological uptake, and microbial breakdown. Treatment swales also differ from practices such as underdrained swales (for example, "dry swales" and "bioretention swales"), which are essentially filtration practices, and "wet swales," which are similar in function to pocket ponds. See SWM Volume 2, 4-3.5, Treatment Practices, Treatment Swales, page 123.

Maintenance Considerations: Inspect annually for erosion, sediment accumulation, vegetation loss, and presence of invasive species. Perform periodic mowing; frequency depends on location and type of grass. Do not cut shorter than Water Quality Flow depth (maximum 4-inches). Remove debris and accumulated sediment, based on inspection. Repair eroded areas, remove invasive species and dead vegetation, and reseed with applicable grass mix as warranted by inspection.

Sediment Forebay

Design Intent: A Sediment Forebay is designed to pre-treat surface water runoff from the paved surfaces and compact gravel surfaces. The two Subsurface Gravel Wetlands and single Infiltration Pond will be preceded by a Sediment Forebay.

Description: A sediment forebay is an impoundment, basin, or other storage structure designed to dissipate the energy of incoming runoff and allow for initial settling of coarse sediments. Forebays are used for pretreatment of runoff prior to discharge into the primary water quality treatment BMP. In some cases, forebays may be constructed as separate structures but often, they are integrated into the design of larger stormwater management structures. See SWM Volume 2, 4-4.1 Pre-treatment Practices, Sediment Forebay, page 140.

Maintenance Considerations: Forebays help reduce the sediment load to downstream BMPs, and will therefore require more frequent cleaning. Inspect at least annually; Conduct periodic mowing of embankments (generally two times per year) to control growth of woody vegetation on embankments; Remove debris from outlet structures at least once annually; Remove and dispose of accumulated sediment based on inspection; Install and maintain a staff gauge or other measuring device, to indicate depth of sediment accumulation and level at which clean-out is required.
reaches half the height of the check dam. Erosion or other damage to the basin will be repaired and revegetated. (See Outlet Protection below.)

Subsurface Gravel Wetland

Design Intent: There are two Subsurface Gravel Wetlands (P-101 and P-102) designed to manage and treat surface water runoff from the site. Runoff is routed to the BMP's through conveyance swales.

Description: The gravel wetland system consists of one or more flow-through constructed wetland cells, preceded by a forebay. The cells are filled with a gravel media, supporting an organic substrate that is planted with wetland vegetation. During low-flow storm events, the system is designed to promote subsurface horizontal flow through the gravel media, allowing contact with the root zone of the wetland vegetation. The gravel and planting media support a community of soil microorganisms. Water quality treatment occurs through microbial, chemical, and physical processes within this media. Treatment may also be enhanced by vegetative uptake. To accommodate higher flows, the system is designed to permit inundation of the wetland surface, and the system would function similar to other constructed wetland systems. Overflow from the wetland is provided by an outlet structure designed for this "extended detention" condition. Following such an event, remaining water on the surface of the wetland would infiltrate into the gravel media, and flow horizontally through the media as in the low flow condition. The outlet of the wetland system is designed to keep the media submerged, to provide the hydrology to support the wetland plant community. The gravel media consists of either crushed rock or processed gravel. An organic soil layer is placed on top of this material, and the wetland plants are rooted in the media where they can directly take up pollutants. The system can be designed to integrate some stormwater storage, and also to provide infiltration. With these features, the practice would not only remove pollutants, but also contribute to the attenuation of peak rates through temporary storage and reduction in runoff volume.

During smaller rain events, the surface water runoff is intended to pass from the forebay, into the gravel media through perforated pipes and structures where it passes through an anaerobic environment where the Water Quality Volume will have 24-72 hours of contact time. The forebay is required to contain 10% of the WQV and each of the two cells must contain 45% of the WQV. During larger storm events, the system works as a detention pond. See SWM Volume 2, 4-3.2d, Treatment Practices, Gravel Wetland, page 78.

Maintenance Considerations: Monitoring and replanting, as warranted, of wetland vegetation. Removal of debris from inlet and outlet structures. Inspection and removal of sediment accumulation in the gravel bed. Depending on sediment accumulation, bed may require periodic replacement and replanting. Inspection and repair of containment structure (if applicable), inlet and outlet structures, and appurtenances. Debris will need to be removed from the inlet and outlet structures as well as any buildup of sediment.

The surface of the ponded area is intended to have wetland plants which may require periodic replanting, depending on the sediment loading. The outlet configuration of the anaerobic subsurface gravel consists of a small discharge orifice that is located in a threaded cap within Outlet Structure A. This goose-neck feature is designed to be disassembled to allow cleaning. This structure has a drain manhole frame and cover requiring tools to open for inspection and maintenance. Outlet Structure B is a multi-stage discharge device consisting of a concrete structure with a top and variable outlet orifices, all protected by trash racks. Sediment buildup in the forebay must be removed to maintain the minimum required volume. Trash racks will be cleaned and orifices inspected. See also 9 and 10 of the attached UNHSC Subsurface Gravel Wetland Design Specifications 2009, and / or UNHSC Subsurface Gravel Wetland Design Specifications 2016 with Maintenance Guidelines and Checklist. See also Design and Maintenance of Subsurface Gravel Wetlands, (for NHDOT) by UNHSC. (Check List, Page 24 & 25, Attached). All 2:1 side slopes within the BMP will be maintained via weedwhacker.

Bio-Retention System (Rain-Garden)

Description: A bioretention system (sometimes referred to as a “rain garden”) is a type of filtration BMP designed to collect and filter moderate amounts of stormwater runoff using conditioned planting soil beds, gravel beds and vegetation within shallow depressions. The bioretention system may be designed with an underdrain, to collect treated water and convey it to discharge, or it may be designed to infiltrate the treated water directly to the subsoil. Bioretention cells are capable of reducing sediment, nutrients, oil and grease, and trace metals. Bioretention systems should be sited in close proximity to the origin of the stormwater runoff to be treated. The major difference between bioretention systems and other filtration systems is 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 shrubs and perennials whose roots assist with pollutant uptake. The use of vegetation allows these systems to blend in with other landscaping features. See SWM Volume 2, 4-3.4c, Treatment Practices, Bio-Retention System, page 110.

Construction Considerations: After the stone and bio-media has been installed, Filtrexx Silt Soxx or approved equal, will be installed at the toe of slope intersection between the berm and bio-media and will remain until the slopes of the berm are stable.

Maintenance Considerations: 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. Pretreatment 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 filter media. 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. All 2:1 side slopes within the BMP will be maintained via weedwhacker.

In-Ground Infiltration Basin

Description: Infiltration basins are impoundments designed to temporarily store runoff, allowing all or a portion of the water to infiltrate into the ground. An infiltration basin is designed to completely drain between storm events. An infiltration basin is specifically designed to retain and infiltrate the entire Water Quality Volume. Some infiltration basins may infiltrate additional volumes during larger storm events, but many will be designed to release stormwater exceeding the water quality volume from the larger storms. In a properly sited and designed infiltration basin, water quality treatment is provided by runoff pollutants binding to soil particles beneath the basin as water percolates into the subsurface. Biological and chemical processes occurring in the soil also contribute to the breakdown of pollutants. Infiltrated water is used by plants to support growth or it is recharged to the underlying groundwater. As with all impoundment BMPs, surface infiltration basins should be designed with an outlet structure to pass peak flows during a range of storm events, as well as with an emergency spillway to pass peak flows around the embankment during extreme storm events that exceed the combined infiltration capacity and outlet structure capacity of the facility. See SWM Volume 2, 4-3.3b, Treatment Practices, In-Ground Infiltration Basin, page 88.

Maintenance Considerations: Removal of debris from inlet and outlet structures. Removal of accumulated sediment. Inspection and repair of outlet structures and appurtenances. Inspection of infiltration components 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. Inspection of pretreatment measures at least twice annually, and removal of accumulated sediment as warranted by inspection, but no less than once annually. Periodic mowing of embankments. Removal of woody vegetation from embankments. Inspection and repair of embankments and spillways. If an infiltration 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 infiltration function, including but not limited to removal of accumulated sediments or reconstruction of the infiltration trench. All 2:1 side slopes within the BMP will be maintained via weedwhacker.

Rain-Garden with Infiltration (Bio-Retention System)

Design Intent: A Rain Garden with Infiltration (P-103) is designed and located to intercept surface water runoff from compacted gravel surfaces discharging from roadside swales and conveyance swales.

Description: A bioretention system (sometimes referred to as a "rain garden") is a type of filtration BMP designed to collect and filter moderate amounts of stormwater runoff using conditioned planting soil beds, gravel beds and vegetation within shallow depressions. The bioretention system may be designed with an underdrain, to collect treated water and convey it to discharge, or it may be designed to infiltrate the treated water directly to the subsoil. (In this case it is designed to infiltrate.) Bioretention cells are capable of reducing sediment, nutrients, oil and grease, and trace metals. Bioretention systems should be sited in close proximity to the origin of the stormwater runoff to be treated. The major difference between bioretention systems and other filtration systems is 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 shrubs and perennials whose roots assist with pollutant uptake. The use of vegetation allows these systems to blend in with other landscaping features. See SWM Volume 2, 4-3.4c, Treatment Practices, Bio-Retention System, page 110.

Construction Considerations: After the stone and bio-media has been installed, Filtrexx Silt Soxx, or approved equal, will be installed at the toe of slope, at the intersection between the berm and bio-media. This will remain until the slopes of the berm are stable. This specification is intended to protect the bio-media.

Maintenance Considerations: 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. Pretreatment 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 filter media. 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. All 2:1 side slopes within the BMP will be maintained via weedwhacker.

Outlet Protection, Emergency Spillways & Level Spreaders

Design Intent: Each of the Subsurface Gravel Wetlands and the Infiltration Pond, will be installed with a rip rap emergency spillway, outlet pipes will be protected by outlet protection, and BMP discharge will be converted to sheet flow by level spreaders.

Outlet Protection

Description: Outlet protection is typically provided at stormwater discharge conduits from structural best management practices 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 runoff into an in-ground stormwater management practice (e.g., pond or swale) to prevent scour where flow enters the BMP. See SWM Volume 2, 4-6.6 Conveyance Practices, Outlet Protection, page 172.

Maintenance Considerations: Inspect the outlet protection annually for damage and deterioration. Repair damages immediately.

Stone Berm Level Spreader

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 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 phosphorous, nitrogen, metals and hydrocarbons will settle out of the runoff through settlement, filtration, infiltration, absorption, decomposition and volatilization. See SWM Volume 2, 4-6.6 Conveyance Practices, Stone Berm Level Spreader, page 162.

Maintenance Considerations: 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% of spreader channel depth. Mow as required by landscaping design. At a minimum, mow annually to control woody vegetation within the spreader. 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 re-grading.

Emergency Spillway

Description: A rip rap trapezoidal open water outlet to a Best Management Practice pond or basin. The elevation of the spillway is normally set six-inches below the top of the embankment or berm set so that the 25-year 24-hour storm event does not overtop the embankment. The rip rap stone size will be designed to prevent erosion of the spillway and the depth of the rip rap will be the same as that of outlet protection.

Maintenance Considerations: The spillway will be inspected to ensure that the rip rap has not been relocated by runoff, that it is clear of vegetation, and clear of all trash and gross solids.

Street Sweeping

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. See SWM Volume 2, 4-2, Source Control BMPS, Street Sweeping, page 52.

Maintenance Considerations: Inspect and maintain street sweeping equipment in accordance with manufacturer's recommendations.

Control of Invasive Species

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.

Snow Removal & Winter Maintenance

Description: Drainage and stormwater systems need to be maintained during the winter months so that surface water runoff from a rain storm does not become a impounding and icing problem. Sand and salt should be used at the rate that prevents sedimentation problems or excess salt deposited but yet enough to allow for protection for pedestrians and vehicles.

Maintenance Considerations: The edge of pavement where surface water sheet flow is designed to leave the paved area, the edge of pavement and shoulder need to be plowed to allow runoff to leave the pavement. Snow is to piled in designated areas and removed from the site when the on-site storage locations have been exceeded. At the end of the winter season, sediment is to be swept from the paved surfaces and removed from the drainage system. (Sumps if provided, sediment forebays, swale lines.) NHDES offers training (Green SnowPro Certification) for contractors and owners.
https://www.des.nh.gov/land/roads/road-salt-reduction/green-snowpro-certification
Please find attached NHDES Green SnoPro Utilization Chart which is required to be used.

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 <u>Stormwater System Operation: Inspection & Maintenance Manual,</u> 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 Nottingham, Department of Public Works, Engineering 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 includes 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, SIT
Principal - President
Design Engineer

STORMWATER SYSTEM OPERATIONS: INSPECTION & MAINTENANCE MANUAL

Inspection & Maintenance Manual Checklist

Owl Ridge Builders, LLC
104 Raymond Road, Nottingham, NH 03290
Smoke Street, Nottingham, Tax Map 23, Lot 11

☑	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.
		Drainage Pipes / Outlet Structures	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
		Outlet Structure	2 times per year	Check for sediment accumulation & clogging.	Any accumulated Sediment or debris.
		Subsurface Gravel Wetland / Infiltration Pond	2 times per year	Check for sediment and debris accumulation buildup.	Remove sediment & debris when required. Remove Invasive Species
		Rain Garden with Infiltration / Rain Garden	Annually	Drain completely with 72 hours	Evaluate the surface of the Infiltration Pond for sedimentation and clogging. Remove clogging and restore the pond surface to original conditions.
		Subsurface Gravel Wetland	See Attached NHDOT Checklist	See Attached NHDOT Checklist	See Attached NHDOT Checklist
		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

		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 Nottingham Planning Dept. and kept on file by the owner.	Report to be submitted on or before December 15th each year.

See also attached, UNHSC Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device.

Inspection Check List: Page 3

The following drainage features will all require periodic inspections and maintenance based on this manual in addition to deep sump catch basins throughout:

Conveyance Swales, cross culverts, and roadside ditches

Treatment Swale

Detention Ponds (P-104, P105) w/ Outlet Structure

Sediment Forebays

Subsurface Gravel Wetland P-102 and P-108 w/ Outlet structures, and emergency spillway.

Rain Garden with Infiltration (P-103) w/ Outlet Structured and Emergency Spillway

Rain Garden (P-107) w/ Underdrain, Outlet Structure and Emergency Spillway

Infiltration Pond w/ Emergency Spillway

Outlet Protection and Level Spreader

Reference is also made to the UNHSC / NHDOT Design and Maintenance of Subsurface Gravel Wetlands, (attached) which includes specific Inspection and Maintenance Guidance in Attachment B, Page 23.

Snow Removal and Winter Maintenance

Inspection Notes: (Add pages as required.)

STORMWATER SYSTEM OPERATIONS: INSPECTION & MAINTENANCE MANUAL

Inspection & Maintenance Manual Log Form

Owl Ridge Builders, LLC
104 Raymond Road, Nottingham, NH 03290
Smoke Street, Nottingham, Tax Map 23, Lot 11

BMP / System	Date Inspected	Inspector	Cleaning/Repair (List Items & Comments)	Repair Date	Performed By:

See also attached Checklist for Inspection of Gravel Wetland

STORMWATER SYSTEM OPERATIONS: INSPECTION & MAINTENANCE MANUAL

Deicing Log Form

Owl Ridge Builders, LLC
104 Raymond Road, Nottingham, NH 03290
Smoke Street, Nottingham, Tax Map 23, Lot 11

Date	Amount Applied	Performed By:	Date	Amount Applied	Performed By:

STORMWATER SYSTEM OPERATION & MAINTENANCE PLAN CERTIFICATION

Owner	Responsibility
Name: Owl Ridge Builders, LLC Joe Fernald Address: 104 Raymond Road Nottingham, NH 03290 Telephone: 1-207-337-4320 E-mail: owlridgebuilders@gmail.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.

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:

Infiltration Feasibility Report

Prepared for:

Owl Ridge Builders
104 Raymond Road
Nottingham, NH 03290

Land of:

Frederick Fernald
PO Box 1805
Wolfeboro, NH 03894

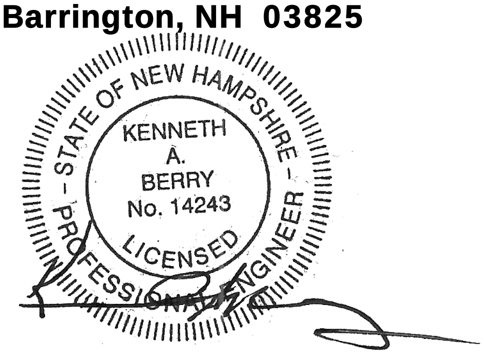
LOCATION

Smoke Street
Nottingham, NH 03290

Tax Map 23, Lot 11

Prepared by:

Berry Surveying & Engineering
335 Second Crown Point Road
Barrington, NH 03825



File Number
DB2020-066

February 15, 2023
Rev: December 11, 2023

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1.0 Location of Practice:

The project proposes infiltration for ground water recharge as well as channel flow protection purposes via Rain Garden with Infiltration #103 and Infiltration Pond #106.

Rain Garden with Infiltration #103 (Pond 103P) – This Rain Garden is in the southern portion of the property adjacent to Lot 12-4, Tax Map 23. This land area is currently forested and has a slope of 7% generally to the north.

Infiltration Pond #106 (Pond 106P) is centrally located on the norther portion of the property.

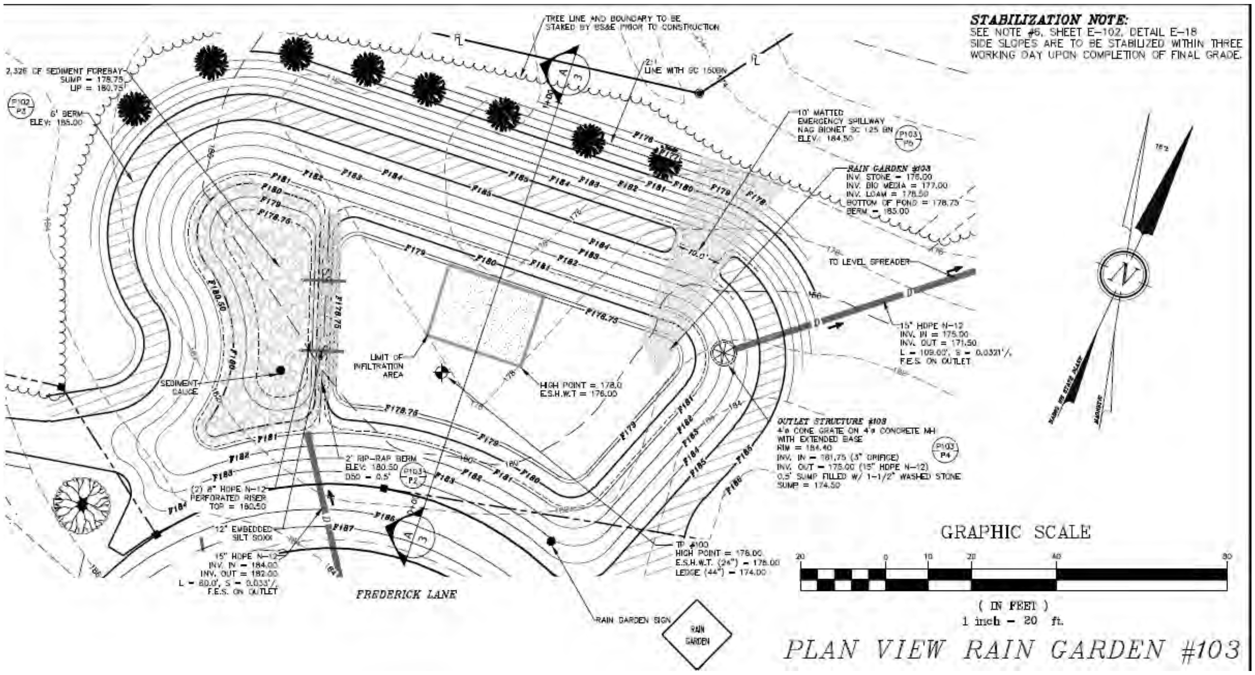
2.0 Existing Topography at the Location of the Practice

Rain Garden with Infiltration #103 (Pond 103P) – This land area is currently forested and has a slope of 7% generally to the north.

Infiltration Pond #106 (Pond 106P) – This land area is currently forested and has of slope of 9% generally to the south.

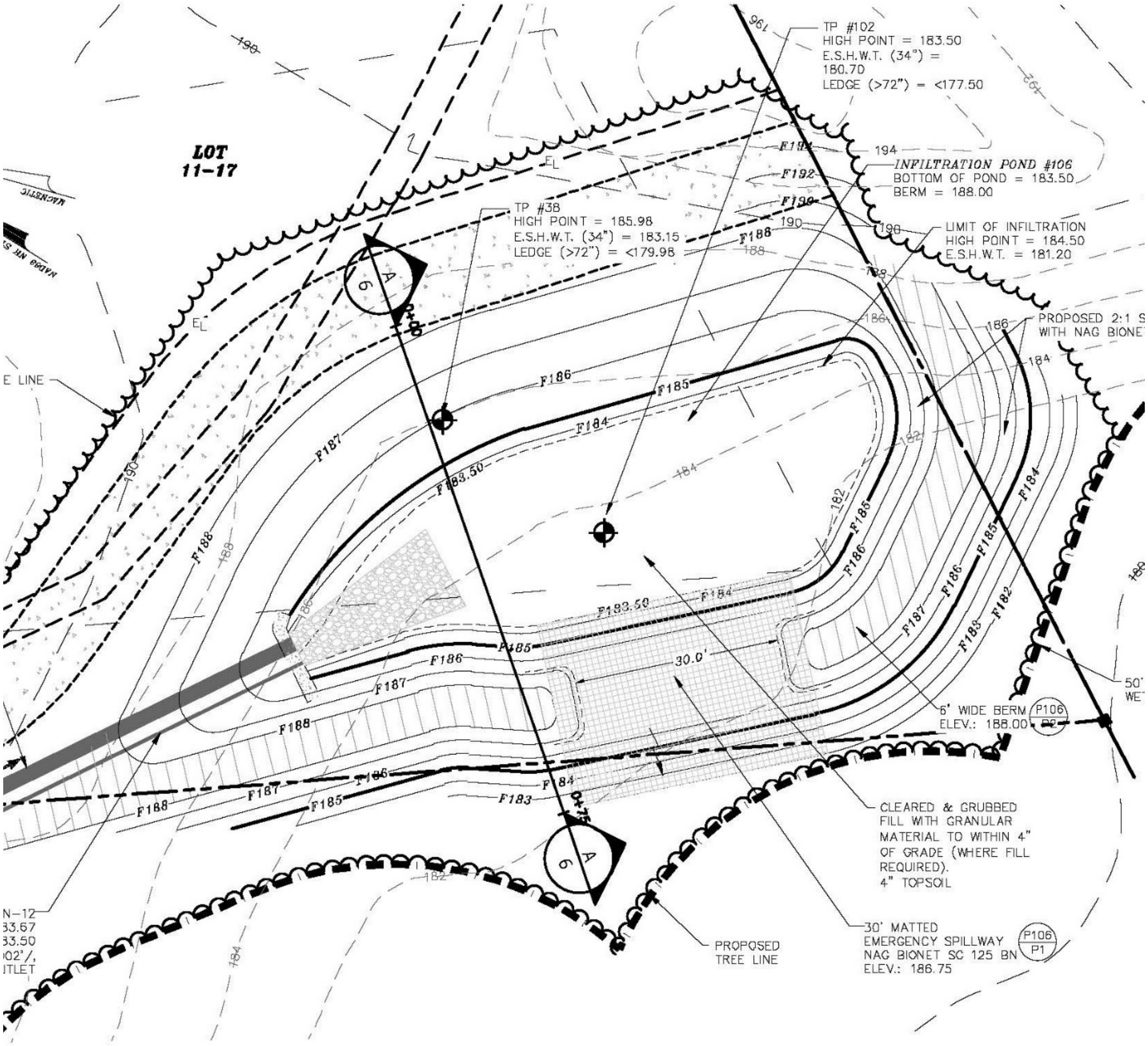
3.0 Test Pit Locations

Rain Garden with Infiltration #103 (Pond 103P) – The practice has a surface area of 2,695 SF and infiltration area of 400 SF. The practice is located over test pit #100. See test pit profiles below. See test pit locations on Sheet P-103, Proposed Rain Garden (with Infiltration) #103 Detail Plan. The test holes were completed in March 2022, (See Site Specific Soil Map Report by John P Hayes III). The soil in the vicinity of this practice is Deerfield (313C), considered to be HSG B soil where the most restrictive published Ksat is 6 inches per hour. This practice was designed using 3 in. / hr.



Rain Garden with Infiltration #103 (Pond 103P) – (Reference Sheet P-103)

Infiltration Pond #106 (Pond 106P) – The practice has a surface area of 1,844 SF. The practice is located over test pit #102. See test pit profiles below. See test pit locations on Sheet P-106, Proposed Infiltration Pond #106 Detail Plan.



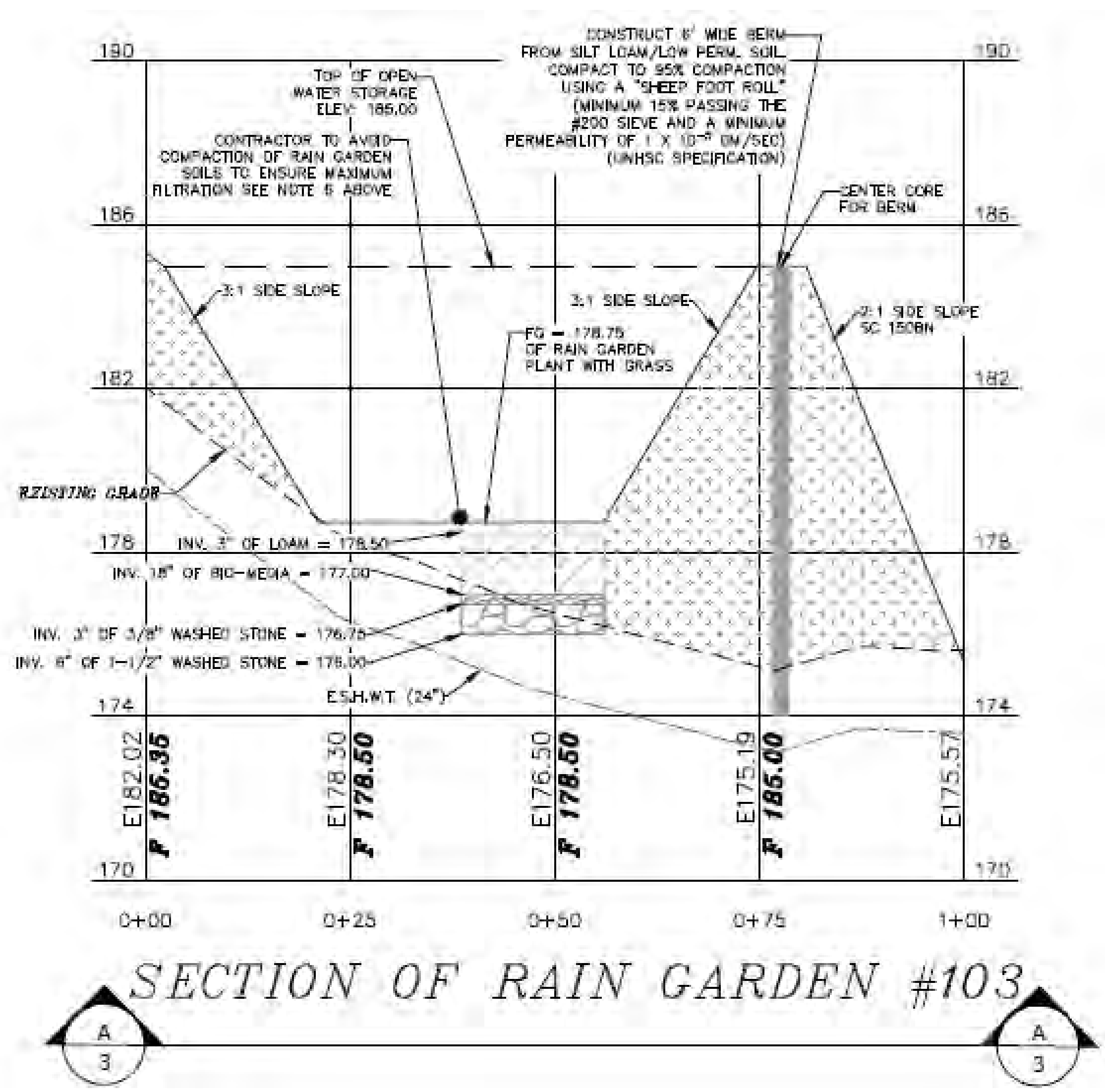
PLAN VIEW INFILTRATION POND #106

4.0 Seasonal High Water Table (SHWT) and Bedrock Elevations

TP#100:	Existing Surface Elevation of TP =	178.00’
	SHWT 24-Inches	176.00’
	Bedrock 44-Inches	174.00’
	Ground Water = N/A	
	Deepest Elevation of TP =	174.00’

Rain Garden w/ Infiltration #103 (Pond 103P): Inv. Biomedia = 177.00’

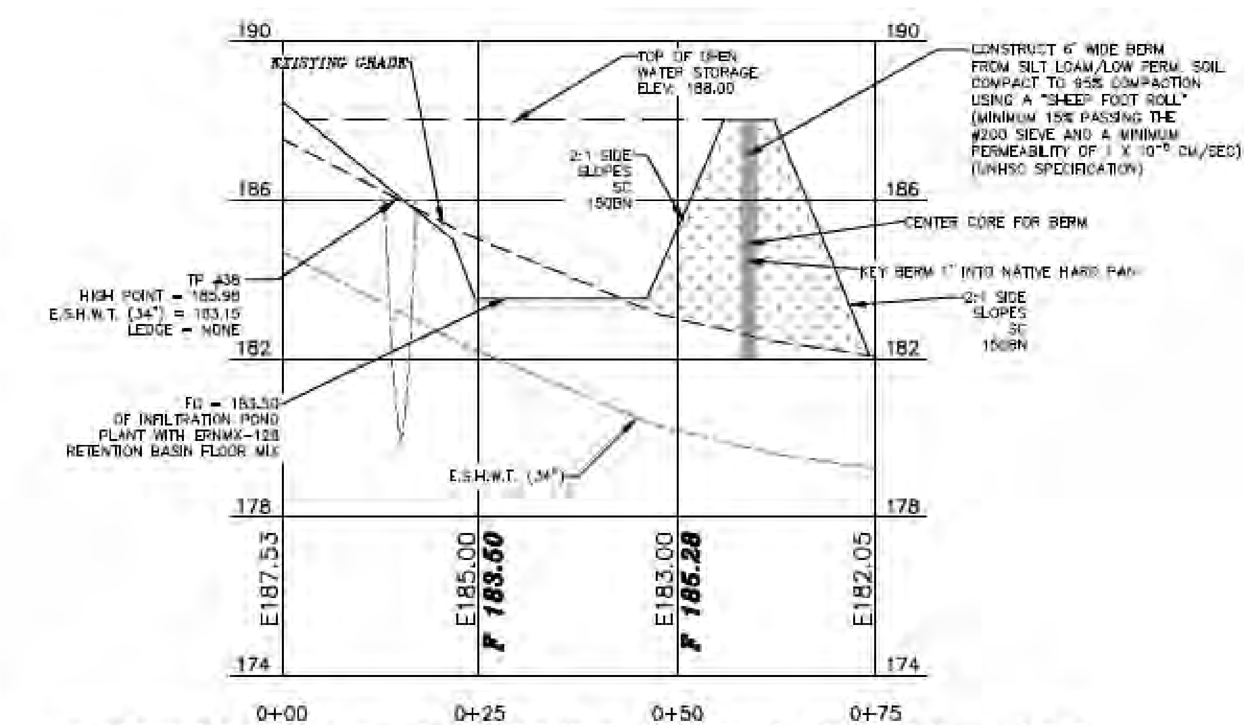
See cross sections below.



TP#102:	Existing Surface Elevation of TP =	183.50’
	SHWT 34-Inches	180.70’
	Bedrock >72-Inches	<177.50’
	Ground Water = N/A	
	Deepest Elevation of TP =	177.50’

Infiltration Pond #106 (Pond 106P): Inv. Pond = 183.50’

See cross sections below.



SECTION OF INFILTRATION POND #106

A
6

A
6

5.0 Profile descriptions

The following test pit data was collected, see profile below.

TEST PIT #100
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
6-20 7.5YR 4/6 STRONG BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
20-36 10YR 5/4 YELLOWISH BROWN, FINE SANDY LOAM, BLOCKY, FRIABLE
36-44 5Y 5/3 OLIVE, GRAVELLY FINE SANDY LOAM, WITH REDOX. FEATUR. PRESENT, MASSIVE, FIRM

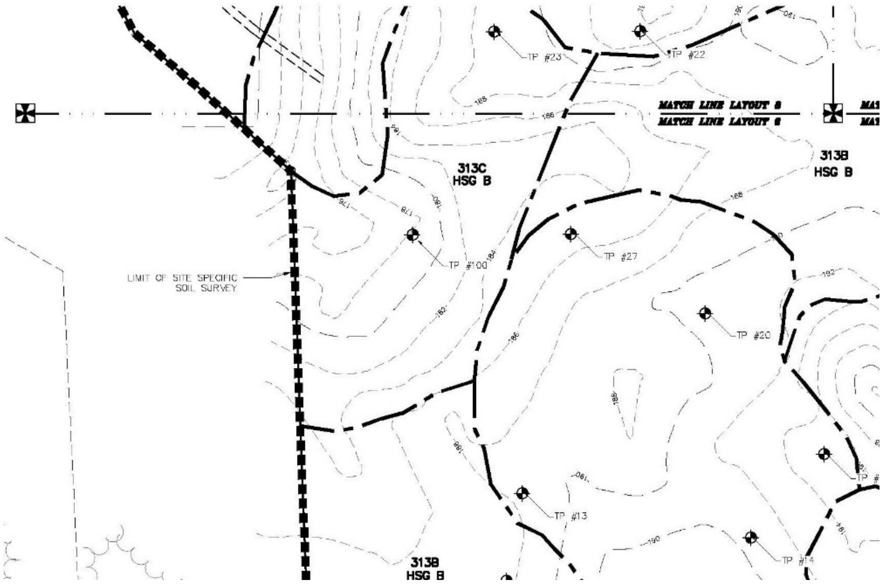
E.S.H.W.T. @ 24 INCHES
RESTRICTIVE LAYER @ 36 INCHES
GROUND WATER @ 36 INCHES
TERMINATED @ 44 INCHES
REFUSAL @ 44 INCHES

TEST PIT #102
0-6 10YR 3/2 VERY DARK GRAYISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
6-22 10YR 5/6 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
22-34 10YR 5/4 YELLOWISH BROWN, SAND, GRANULAR, FRIABLE
34-72 2.5Y 5/3 LIGHT OLIVE BROWN, STRATIFIED SAND AND VERY FINE SANDY LOAM, WITH REDOX. FEATUR. PRESENT, GRANULAR, FRIABLE

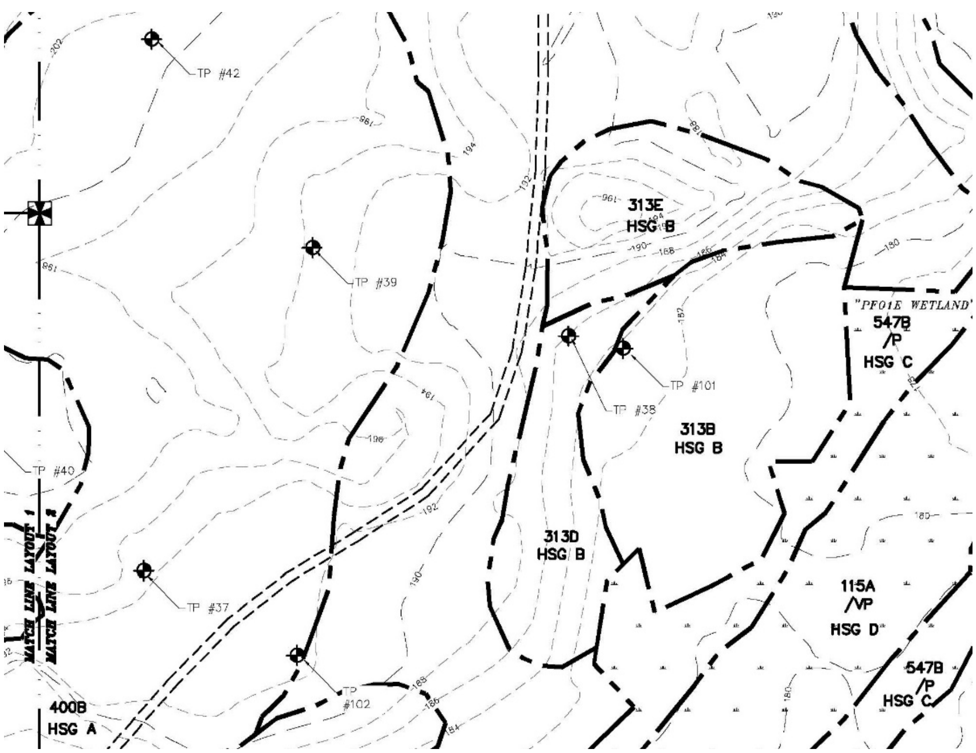
E.S.H.W.T. @ 34 INCHES
RESTRICTIVE LAYER @ N/A
GROUND WATER @ 40 INCHES
TERMINATED @ 72 INCHES
REFUSAL @ N/A

6.0 Soil Plan in the Area of the Constructed Practice

Rain Garden with Infiltration #103 (Pond 103P) is located over Deerfield See Test Pit #100.



Infiltration Pond#106 (Pond 106P) is located over Deerfield See Test Pit #102



Rain Garden with Infiltration #103 (Pond 103P)

7.0 Summary of Infiltration Rate

Rain Garden with Infiltration #103 and #106 are located over Deerfield (313), considered to be HSG B, soil area as mapped by Site Specific Soil Survey by John P. Hayes III, CSS, with a documented Ksat of 6 inches per hour. The design exfiltration rate for the rain garden is 3 inches per hour.

Amoozemeter testing was not conducted on site and the alternate method of using the USDA / NRCS published values was employed. Reference is made to K Sat Values for New Hampshire Soils (Including Hydrologic and DES Soil Lot Sizing Groups, sponsored by the Society of Soil Scientists of Norther New England, Publication #5 dated September 2009.

Respectfully submitted:

BERRY SURVEYING & ENGINEERING

Christopher R. Berry, SIT	Kenneth A. Berry, PE, LLS
Principal, President	CPSWQ, CPESC, CESSWI
Senior Design Engineer	Principal, VP – Technical Operations

2020/2022	NHRIV600030703-04	DUDLEY BROOK - UNNAMED BROOK	RAYMOND, DEERFIELD, NOTTINGHAM	4.340	MILES	Aquatic Life Integrity	Oxygen, Dissolved	5-P				Non-ORW
2020/2022	NHRIV600030703-04	DUDLEY BROOK - UNNAMED BROOK	RAYMOND, DEERFIELD, NOTTINGHAM	4.340	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030703-05	LAMPREY RIVER	RAYMOND	2.647	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030703-07-02	LAMPREY RIVER - CARROLL LAKE BEACH	RAYMOND	0.020	MILES	Primary Contact Recreation	Escherichia coli	4A-P	9/21/2010	NEW HAMPSHIRE STATEWIDE BACTERIA	39276	Non-ORW
2020/2022	NHRIV600030703-09	LAMPREY RIVER	RAYMOND	2.295	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030703-10	LAMPREY RIVER	RAYMOND	0.558	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030703-11	LAMPREY RIVER	EPPING, RAYMOND	3.270	MILES	Aquatic Life Integrity	Aluminum	5-M				Non-ORW
2020/2022	NHRIV600030703-11	LAMPREY RIVER	EPPING, RAYMOND	3.270	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030703-14	PAWTUCKAWAY RIVER - UNNAMED BROOK	NOTTINGHAM, EPPING, RAYMOND	6.751	MILES	Aquatic Life Integrity	Dissolved oxygen saturation	5-P				Non-ORW
2020/2022	NHRIV600030703-14	PAWTUCKAWAY RIVER - UNNAMED BROOK	NOTTINGHAM, EPPING, RAYMOND	6.751	MILES	Aquatic Life Integrity	Oxygen, Dissolved	5-P				Non-ORW
2020/2022	NHRIV600030703-14	PAWTUCKAWAY RIVER - UNNAMED BROOK	NOTTINGHAM, EPPING, RAYMOND	6.751	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030703-15	LAMPREY RIVER	EPPING	4.692	MILES	Aquatic Life Integrity	Dissolved oxygen saturation	5-M				Non-ORW
2020/2022	NHRIV600030703-15	LAMPREY RIVER	EPPING	4.692	MILES	Aquatic Life Integrity	Oxygen, Dissolved	5-P				Non-ORW
2020/2022	NHRIV600030703-15	LAMPREY RIVER	EPPING	4.692	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030703-15	LAMPREY RIVER	EPPING	4.692	MILES	Primary Contact Recreation	Escherichia coli	4A-P	9/21/2010	NEW HAMPSHIRE STATEWIDE BACTERIA	39272	Non-ORW
2020/2022	NHRIV600030703-17	UNNAMED BROOK - TO LAMPREY RIVER	EPPING	3.280	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030703-18	LAMPREY RIVER	EPPING	3.247	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030703-18	LAMPREY RIVER	EPPING	3.247	MILES	Primary Contact Recreation	Escherichia coli	4A-M	9/21/2010	NEW HAMPSHIRE STATEWIDE BACTERIA	39272	Non-ORW
2020/2022	NHRIV600030703-20	RUM BROOK	EPPING	4.791	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030704-02	BACK CREEK - UNNAMED BROOK	DEERFIELD	6.449	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030704-04	BACK CREEK - UNNAMED BROOK	DEERFIELD, NOTTINGHAM	8.064	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030704-06	ROUND POND BROOK	NOTTINGHAM	3.701	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030704-07	MOUNTAIN BROOK - UNNAMED BROOKS	NOTTINGHAM, DEERFIELD	6.199	MILES	Aquatic Life Integrity	Dissolved oxygen saturation	5-M				Non-ORW
2020/2022	NHRIV600030704-07	MOUNTAIN BROOK - UNNAMED BROOKS	NOTTINGHAM, DEERFIELD	6.199	MILES	Aquatic Life Integrity	Oxygen, Dissolved	5-P				Non-ORW
2020/2022	NHRIV600030704-07	MOUNTAIN BROOK - UNNAMED BROOKS	NOTTINGHAM, DEERFIELD	6.199	MILES	Aquatic Life Integrity	pH	5-P				Non-ORW
2020/2022	NHRIV600030704-08	UNNAMED BROOK - TO PAWTUCKAWAY POND	NOTTINGHAM	1.706	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030704-10	MOUNTAIN BROOK - BETWEEN MOUNTAIN POND AND PAWTACKAWAY LAKE	NOTTINGHAM	0.179	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030704-13	FUNDY BROOK	NOTTINGHAM	0.422	MILES	Aquatic Life Integrity	pH	5-P				Non-ORW
2020/2022	NHRIV600030704-14	WHITE GROVE BROOK - TO PAWTUCKAWAY POND	NOTTINGHAM	0.179	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030705-13	NORTH RIVER	NOTTINGHAM	8.109	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030706-02	NORTH RIVER	NOTTINGHAM, EPPING, LEE	8.000	MILES	Aquatic Life Integrity	Dissolved oxygen saturation	5-M				Non-ORW
2020/2022	NHRIV600030706-02	NORTH RIVER	NOTTINGHAM, EPPING, LEE	8.000	MILES	Aquatic Life Integrity	Oxygen, Dissolved	5-M				Non-ORW
2020/2022	NHRIV600030706-02	NORTH RIVER	NOTTINGHAM, EPPING, LEE	8.000	MILES	Aquatic Life Integrity	pH	5-P				Non-ORW
2020/2022	NHRIV600030706-02	NORTH RIVER	NOTTINGHAM, EPPING, LEE	8.000	MILES	Primary Contact Recreation	Escherichia coli	4A-P	9/21/2010	NEW HAMPSHIRE STATEWIDE BACTERIA	39273	Non-ORW
2020/2022	NHRIV600030707-01	PERKINS BROOK - THRU ROUND POND TO MENDUMS POND	BARRINGTON, NOTTINGHAM	0.158	MILES	Aquatic Life Integrity	pH	5-P				Non-ORW
2020/2022	NHRIV600030707-02	HOWE BROOK	BARRINGTON	0.153	MILES	Aquatic Life Integrity	Dissolved oxygen saturation	5-M				Non-ORW
2020/2022	NHRIV600030707-02	HOWE BROOK	BARRINGTON	0.153	MILES	Aquatic Life Integrity	Oxygen, Dissolved	5-M				Non-ORW
2020/2022	NHRIV600030707-02	HOWE BROOK	BARRINGTON	0.153	MILES	Aquatic Life Integrity	pH	5-P				Non-ORW
2020/2022	NHRIV600030707-03	LITTLE RIVER	NOTTINGHAM, BARRINGTON	10.315	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030707-07	LITTLE RIVER	LEE, NOTTINGHAM	7.225	MILES	Aquatic Life Integrity	Aluminum	5-M				Non-ORW
2020/2022	NHRIV600030707-07	LITTLE RIVER	LEE, NOTTINGHAM	7.225	MILES	Aquatic Life Integrity	Lead	5-M				Non-ORW
2020/2022	NHRIV600030707-07	LITTLE RIVER	LEE, NOTTINGHAM	7.225	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030707-07	LITTLE RIVER	LEE, NOTTINGHAM	7.225	MILES	Primary Contact Recreation	Escherichia coli	4A-M	9/21/2010	NEW HAMPSHIRE STATEWIDE BACTERIA	39273	Non-ORW
2020/2022	NHRIV600030707-13	MCDANIAL BROOK - TO MENDUMS POND	BARRINGTON	2.606	MILES	Aquatic Life Integrity	pH	5-P				Non-ORW
2020/2022	NHRIV600030708-01	PISCASSIC RIVER	FREMONT	4.960	MILES							ORW
2020/2022	NHRIV600030708-02	PISCASSIC RIVER - UNNAMED BROOK	EPPING, BRENTWOOD, EXETER, FREMONT, NEWFIELDS	10.024	MILES							ORW
2020/2022	NHRIV600030708-07	PISCASSIC RIVER	NEWMARKET, NEWFIELDS	7.385	MILES	Aquatic Life Integrity	Dissolved oxygen saturation	5-P				Non-ORW
2020/2022	NHRIV600030708-07	PISCASSIC RIVER	NEWMARKET, NEWFIELDS	7.385	MILES	Aquatic Life Integrity	Oxygen, Dissolved	5-P				Non-ORW
2020/2022	NHRIV600030708-07	PISCASSIC RIVER	NEWMARKET, NEWFIELDS	7.385	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030708-11	FRESH RIVER - BEECH HILL BROOK - UNNAMED BROOK	EXETER, EPPING, NEWFIELDS	3.542	MILES							Review OneStop GIS
2020/2022	NHRIV600030708-13	UNNAMED BROOK	FREMONT	0.225	MILES							ORW
2020/2022	NHRIV600030708-14	BROWN BROOK - TO PISCASSIC RIVER	FREMONT, BRENTWOOD, EPPING	9.088	MILES	Aquatic Life Integrity	Dissolved oxygen saturation	5-M				ORW
2020/2022	NHRIV600030708-14	BROWN BROOK - TO PISCASSIC RIVER	FREMONT, BRENTWOOD, EPPING	9.088	MILES	Aquatic Life Integrity	Oxygen, Dissolved	5-P				ORW
2020/2022	NHRIV600030708-14	BROWN BROOK - TO PISCASSIC RIVER	FREMONT, BRENTWOOD, EPPING	9.088	MILES	Aquatic Life Integrity	pH	5-M				ORW
2020/2022	NHRIV600030708-16	UNNAMED BROOK	EPPING	0.070	MILES							ORW
2020/2022	NHRIV600030709-01	LAMPREY RIVER	EPPING	3.479	MILES	Aquatic Life Integrity	Oxygen, Dissolved	3-ND	1/30/2001	LAMPREY RIVER	9801	Non-ORW
2020/2022	NHRIV600030709-07	LAMPREY RIVER	LEE, EPPING	6.354	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030709-07	LAMPREY RIVER	LEE, EPPING	6.354	MILES	Primary Contact Recreation	Escherichia coli	4A-M	9/21/2010	NEW HAMPSHIRE STATEWIDE BACTERIA	39273	Non-ORW
2020/2022	NHRIV600030709-08	LAMPREY RIVER	LEE	1.674	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030709-09	LAMPREY RIVER	DURHAM	1.164	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030709-13	MOONLIGHT BROOK	NEWMARKET	0.778	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030801-01	FORDWAY BROOK	RAYMOND, CANDIA, CHESTER	3.401	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030801-05	FORDWAY BROOK - UNNAMED BROOK	RAYMOND, CHESTER	14.294	MILES	Aquatic Life Integrity	Benthic-Macroinvertebrate Bioassessments (Streams)	5-P				Non-ORW
2020/2022	NHRIV600030801-05	FORDWAY BROOK - UNNAMED BROOK	RAYMOND, CHESTER	14.294	MILES	Aquatic Life Integrity	Dissolved oxygen saturation	5-M				Non-ORW
2020/2022	NHRIV600030801-05	FORDWAY BROOK - UNNAMED BROOK	RAYMOND, CHESTER	14.294	MILES	Aquatic Life Integrity	Oxygen, Dissolved	5-P				Non-ORW
2020/2022	NHRIV600030801-05	FORDWAY BROOK - UNNAMED BROOK	RAYMOND, CHESTER	14.294	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030802-03	EXETER RIVER	SANDOWN, CHESTER	3.866	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030802-03	EXETER RIVER	SANDOWN, CHESTER	3.866	MILES	Primary Contact Recreation	Escherichia coli	4A-P	9/21/2010	NEW HAMPSHIRE STATEWIDE BACTERIA	39272	Non-ORW
2020/2022	NHRIV600030802-10	TOWLE BROOK - TO PANDOLPIN DAM	CHESTER, SANDOWN	7.407	MILES	Primary Contact Recreation	Escherichia coli	4A-P	9/21/2010	NEW HAMPSHIRE STATEWIDE BACTERIA	39273	Non-ORW
2020/2022	NHRIV600030802-16	UNNAMED BROOK - TO SOUTHWEST INLET OF PHILLIPS POND	HAMPSTEAD, SANDOWN	3.801	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030803-01	EXETER RIVER	RAYMOND, FREMONT	2.445	MILES	Aquatic Life Integrity	Benthic-Macroinvertebrate Bioassessments (Streams)	5-P				Non-ORW
2020/2022	NHRIV600030803-01	EXETER RIVER	RAYMOND, FREMONT	2.445	MILES	Aquatic Life Integrity	Habitat Assessment (Streams)	4C-P				Non-ORW
2020/2022	NHRIV600030803-01	EXETER RIVER	RAYMOND, FREMONT	2.445	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030803-01	EXETER RIVER	RAYMOND, FREMONT	2.445	MILES	Primary Contact Recreation	Escherichia coli	4A-M	9/21/2010	NEW HAMPSHIRE STATEWIDE BACTERIA	39273	Non-ORW
2020/2022	NHRIV600030803-05	EXETER RIVER	BRENTWOOD	5.000	MILES	Aquatic Life Integrity	Benthic-Macroinvertebrate Bioassessments (Streams)	5-M				Non-ORW
2020/2022	NHRIV600030803-05	EXETER RIVER	BRENTWOOD	5.000	MILES	Aquatic Life Integrity	Dissolved oxygen saturation	5-P				Non-ORW
2020/2022	NHRIV600030803-05	EXETER RIVER	BRENTWOOD	5.000	MILES	Aquatic Life Integrity	pH	5-M				Non-ORW
2020/2022	NHRIV600030803-05	EXETER RIVER	BRENTWOOD	5.000	MILES	Primary Contact Recreation	Escherichia coli	5-M				Non-ORW
2020/2022	NHRIV600030803-07	LITTLE RIVER - UNNAMED BROOK	KINGSTON, BRENTWOOD	3.985	MILES	Aquatic Life Integrity	Benthic-Macroinvertebrate Bioassessments (Streams)	5-M				Non-ORW
2020/2022	NHRIV600030804-06	DUDLEY BROOK - UNNAMED BROOK	BRENTWOOD, EXETER, FREMONT	13.218	MILES	Aquatic Life Integrity	Benthic-Macroinvertebrate Bioassessments (Streams)	5-P				Non-ORW
2020/2022	NHRIV600030804-06	DUDLEY BROOK - UNNAMED BROOK	BRENTWOOD, EXETER, FREMONT	13.218	MILES	Aquatic Life Integrity	Dissolved oxygen saturation	5-P				Non-ORW
2020/2022	NHRIV600030804-06	DUDLEY BROOK - UNNAMED BROOK	BRENTWOOD, EXETER, FREMONT	13.218	MILES	Aquatic Life Integrity	Oxygen, Dissolved	5-P				Non-ORW

Welcome to New Hampshire's Watershed Report Cards built from the DRAFT 2020, 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 2020 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.

			Severe Not Supporting, Severe	**Poor** Not Supporting, Marginal	**Likely Bad** Insufficient Information – Potentially Not Supporting	**No Data** No Data	**Likely Good** Insufficient Information – Potentially Full Supporting	**Marginal** Full Support, Marginal	**Good** Full Support, Good
CATEGORY		**Description**							
Category 2		Meets standards						2-M or 2-OBS	2-G
Category 3		Insufficient Information			3-PNS	3-ND	3-PAS		
Category 4		Does not Meet Standards;							
	4A	TMDL* Completed	4A-P	4A-M or 4A-T					
	4B	Other enforceable measure will correct the issue.	4B-P	4B-M or 4B-T					
	4C	Non-pollutant (i.e. exotic weeds)	4C-P	4C-M					
Category 5		TMDL* Needed	5-P	5-M or 5-T					

* TMDL stands for Total Maximum Daily Load studies

Watershed 305(b) Assessment Summary Report:

Assessment Cycle: Draft 2020

HUC 12: 010600030707

HUC 12 Name: Little River

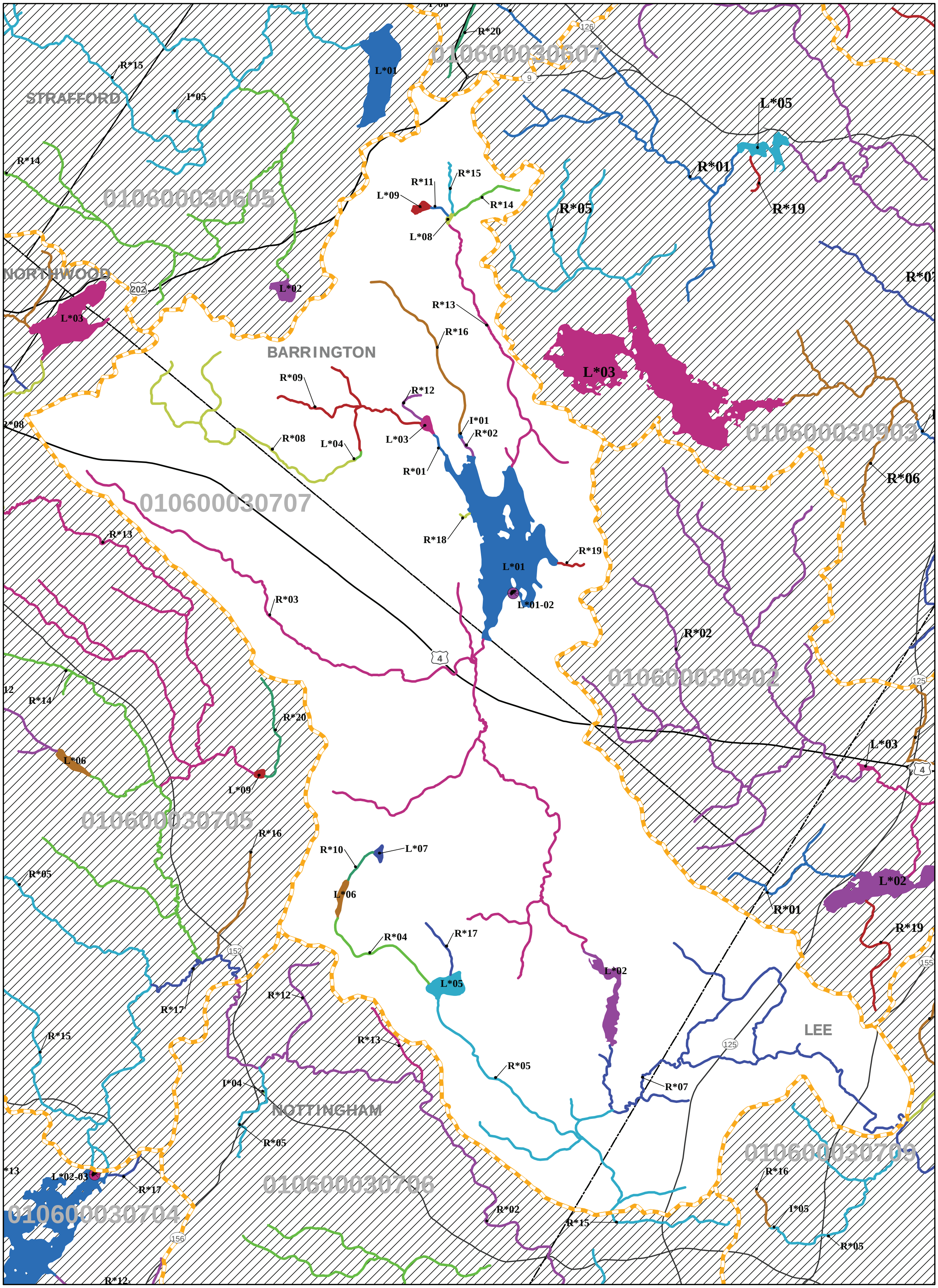
(Locator map on next page only applies to this HUC12)

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
NHIMP600030707-01	I*01	Trib To Mendums Pond		4A-M	3-ND	3-ND
NHLAK600030707-01	L*01	Mendums Pond	5-P	4A-M	3-PAS	3-ND
NHLAK600030707-01-02	L*01-02	Mendums Pond - Unh Rec Area	3-ND	4A-M	3-ND	3-ND
NHLAK600030707-02	L*02	Nottingham Lake	3-ND	4A-M	3-ND	3-ND
NHLAK600030707-03	L*03	Round Pond	3-ND	4A-M	3-ND	3-ND
NHLAK600030707-04	L*04	Unnamed Pond	3-ND	4A-M	3-ND	3-ND
NHLAK600030707-05	L*05	Cedar Waters	3-ND	4A-M	3-ND	3-ND
NHLAK600030707-06	L*06	Langley Pond	3-ND	4A-M	3-ND	3-ND
NHLAK600030707-07	L*07	Cyrus Pond	3-ND	4A-M	3-ND	3-ND
NHLAK600030707-08	L*08	Round Ponds	3-ND	4A-M	3-ND	3-ND
NHLAK600030707-09	L*09	Unnamed Pond	3-ND	4A-M	3-ND	3-ND
NHRIV600030707-01	R*01	Perkins Brook - Thru Round Pond To Mendums Pond	5-P	4A-M	3-ND	3-ND

NHRIV600030707-02	R*02	Howe Brook	5-P	4A-M	3-ND	3-ND
NHRIV600030707-03	R*03	Little River	5-M	4A-M	3-ND	3-ND
NHRIV600030707-04	R*04	Unnamed Brook - Thru Cyrus & Langley Ponds To Cedar Waters	3-ND	4A-M	3-ND	3-ND
NHRIV600030707-05	R*05	Pea Porridge Brook	3-PAS	4A-M	3-ND	3-ND
NHRIV600030707-07	R*07	Little River	5-M	4A-M	4A-M	3-ND
NHRIV600030707-08	R*08	Unnamed Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030707-09	R*09	Unnamed Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030707-10	R*10	Unnamed Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030707-11	R*11	Unnamed Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030707-12	R*12	Unnamed Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030707-13	R*13	Mcdanial Brook - To Mendums Pond	5-P	4A-M	3-ND	3-ND
NHRIV600030707-14	R*14	Unnamed Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030707-15	R*15	Unnamed Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030707-16	R*16	Unnamed Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030707-17	R*17	Unnamed Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030707-18	R*18	Wood Road Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030707-19	R*19	Powerline Brook	3-ND	4A-M	3-ND	3-ND

AUIDs For HUC12: 010600030707 - Little River



HUC12 Boundaries
Town Boundaries
Major Roads
Interstate Highway
US Highway
State Highway

Assessment Unit Coloring
AUs Ending with:
0 =
1 =
2 =
3 =
4 =
5 =
6 =
7 =
8 =
9 =

N
W E
S

Abbrv. Label HUC 12
L * 03 010 700060201
AUID = NH L AK700060201-03

Assessment Unit IDs are derived from the HUC12 they reside within. The labels have been shortened on this map for presentation purposes.
Example: the Label "L*03" in HUC12 = 010700060201 represents AUID = "NHLAK700060201-03"
In rare cases where an AUID extends beyond the boundary of a single HUC12, additional portions of the end of the HUC 12 number have also been replaced.

0 0.4 0.8 1.2 1.6 Miles

Scale:1:42,900

S:\WD-Watershed\WQ_Planning\305b_303d\2020\Report_Cards\HUC12_maps

Assessment Unit ID: NHLAK600030707-02
Assessment Unit Name: Nottingham Lake
Town(s) Primary Town is Listed First: Nottingham

Size: 34.6670 ACRES
Assessment Unit Category: 3-ND
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	3-ND	Chlorophyll-a	N	N/A	NLV	3-ND	
		Dissolved oxygen saturation	N			3-ND	
		Oxygen, Dissolved	N			3-ND	
		pH	N			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.

Assessment Unit ID: NHRIV600030707-03
Assessment Unit Name: Little River
Town(s) Primary Town is Listed First: Barrington, Nottingham

Size: 10.3150 MILES
Assessment Unit Category: 5-M
Beach: N

Draft 2020, 305(b)/303(d) - All Reviewed Parameters by Assessment Unit

Designated Use Description	Desig. Use Category	Parameter Name	Parameter Threatened (Y/N)	Last Sample	Last Exceed	Parameter Category	TMDL Priority
Aquatic Life Integrity	5-M	Benthic-Macroinvertebrate Bioassessments (Streams)	N			3-ND	
		CHLORIDE	N	2019	N/A	3-PAS	
		DISSOLVED OXYGEN SATURATION	N	2019	N/A	2-G	
		Fishes Bioassessments (Streams)	N			3-ND	
		OXYGEN, DISSOLVED	N	2019	2016	3-PNS	
		PH	N	2019	2019	5-M	LOW
		PHOSPHORUS (TOTAL)		2007	NLV	3-ND	
		TURBIDITY	N	2019	N/A	3-PAS	
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.

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.

SWPPP Cut Sheet:

Filtrexx® Inlet Protection

Sediment & Perimeter Control Technology

PURPOSE & DESCRIPTION

Filtrexx® Inlet protection is a three-dimensional tubular sediment control and storm water runoff filtration device typically used for storm drain **inlet protection** of sediment and soluble pollutants (such as phosphorus and petroleum hydrocarbons) on and around construction activities.

APPLICATION

Drain inlets are located in areas that receive runoff from surrounding lands, often exposed and disturbed soils, and are located at a low point, or in a sump. Inlet protection used around drain inlets (or *Drain* Inlet protection) should completely enclose the circumference of the drain and where possible should not be placed on a grade or slope. Inlet protection used around drain inlets should never be the only form of site sediment control and should be accompanied by erosion control/slope stabilization practices, such as Slope protection or rolled erosion control blankets (RECB). Inlet protection should never be placed where they divert runoff flow from the drain inlet, or on top of the inlet, which can cause flooding. Under high runoff and sediment loading conditions placement of 1-2 in (25-50 mm) diameter rock (AASHTO #2) may be placed around the outer circumference of the Inlet protection up to ½ the height of the Inlet protection. This will slow runoff velocity as it contacts the Inlet protection and will reduce sediment build-up and clogging of the Inlet protection.

Curb inlets are generally located on paved surfaces and are designed to rapidly drain storm runoff from roadways to prevent flooding that poses a hazard to vehicular traffic. Inlet protection devices should be placed in a manner which intercepts runoff prior to entering the inlet, but does not block or divert runoff from the inlet. To prevent diversion of runoff, Inlet protection used around curbs (or *Curb* Inlet protection) should be used in low points, or sumps, and minor slopes or grades. Inlet protection should never be placed in or on the curb inlet drain, or placed in a manner than obstructs vehicular traffic. Inlet protection height should be at least 1 in (25 mm) lower than top of curb inlet to allow for overflow into the drain and not over the curb. Maximum sediment removal efficiency occurs when minor ponding exists behind Inlet protection but should never lead to flooding.

Curb sediment containment systems are used to reduce the sediment and pollutant load flowing to a curb inlet. They are generally placed on paved surfaces perpendicular to runoff flow and should be lower than the height of the curb. Curb sediment containment systems should never cause flooding or placed where they are a hazard to vehicular traffic. Inlet protection used for curb sediment containment (or *Curb Sediment Containment* Inlet protection) can be placed on a grade but should never be placed directly upslope from curb inlet where it may inadvertently divert runoff from entering curb inlet.

INSTALLATION

1. Inlet protection used for inlet protection to reduce sediment and soluble pollutants entering storm drains shall meet Filtrexx® FilterSoxx™ Material Specifications and use Certified Filtrexx® FilterMedia™.
2. Contractor is required to be a Filtrexx® Certified™ Installer as determined by Filtrexx® International, LLC (440-926-2607 or visit web site at Filtrexx.com). Certification shall be considered current if appropriate identification is shown during time of bid or at time of application (current list of installers can be found at www.filtrexx.com). Look for the Filtrexx® Certified™ Installer Seal.

3. Filtrexx® Inlet protection shall be placed at locations indicated on plans as directed by the Engineer. Inlet protection should be installed in a pattern that allows complete protection of the inlet area.
4. Installation of curb Inlet protection will ensure a minimal overlap of at least 1 ft (300mm) on either side of the opening being protected. The Inlet protection will be anchored to the soil behind the curb using staples, stakes or other devices capable of holding the Inlet protection in place.
5. Standard Inlet protection for curb inlet protection and curb sediment containment will use 8 in (200mm) diameter Inlet protection, and drain inlets on soil will use 12 in (300mm) or 18 in (450mm) diameter Inlet protection. In severe flow situations, larger Inlet protection may be specified by the Engineer. During curb installation, Inlet protection shall be compacted to be slightly shorter than curb height.
6. If Inlet protection becomes clogged with debris and sediment, they shall be maintained so as to assure proper drainage and water flow into the storm drain. In severe storm events, overflow of the Inlet protection may be acceptable in order to keep the area from flooding.
7. Curb and drain Inlet protection shall be positioned so as to provide a permeable physical barrier to the drain itself, allowing sediment to collect on the outside of the Inlet protection.
8. For drains and inlets that have only curb cuts, without street grates, a spacer is required in order to keep the Inlet protection away from the drain opening. This spacer should be a hog wire screen bent to overlap the grate opening and keep the sock from falling into the opening. Use at least one spacer for every 4 ft (1.2m) of curb drain opening. The wire grid also prevents other floatable waste from passing over the Inlet protection.
9. Stakes shall be installed through the middle of the drain Inlet protection on 5 ft (1.5m) centers, using 2 in (50mm) x 2 in (50mm) x 3 ft (1m) wood stakes.
10. Staking depth for sand and silt loam soils shall be 12 in (300mm), and 8 in (200mm) for clay soils.

INSPECTION AND MAINTENANCE

Routine inspection should be conducted within 24 hrs of a runoff event or as designated by the regulating authority. Inlet protection should be regularly inspected to make sure they maintain their shape and are producing adequate hydraulic flow-through. If ponding becomes excessive, additional Inlet protection may be required or sediment removal may be necessary. Inlet protection shall be inspected until contributing drainage area has been permanently stabilized and construction activity has ceased

1. The Contractor shall maintain the Inlet protection in a functional condition at all times and it shall be routinely inspected.
2. If the Inlet protection has been damaged, it shall be repaired, or replaced if beyond repair.
3. The Contractor shall remove sediment at the base of the upslope side of the Inlet protection when accumulation has reached 1/2 of the effective height of the Inlet protection, or as directed by the Engineer. Alternatively, for drain Inlet protection a new Soxx™ may be placed on top of the original increasing the sediment storage capacity without soil disturbance.
4. Inlet protection shall be maintained until disturbed area above or around the device has been permanently stabilized and construction activity has ceased.
5. Regular maintenance includes lifting the Inlet protection and cleaning around and under them as sediment collects.
6. The FilterMedia™ will be removed from paved areas or dispersed on site soil or behind curb once disturbed area has been permanently stabilized, construction activity has ceased, or as determined by the Engineer.

Table 2.4 Spacing for Curb Sediment Containment Systems.

Grade (%)	Spacing (ft)	Spacing (mm)
0.5	100	30
1.0	50	15
2.0	25	8
3.0	16	5
4.0	13	4
5.0	10	3

Source: Fifield, 2001.

Figure 2.1. Engineering Design Drawing for Curb and Drain Inlet Protection

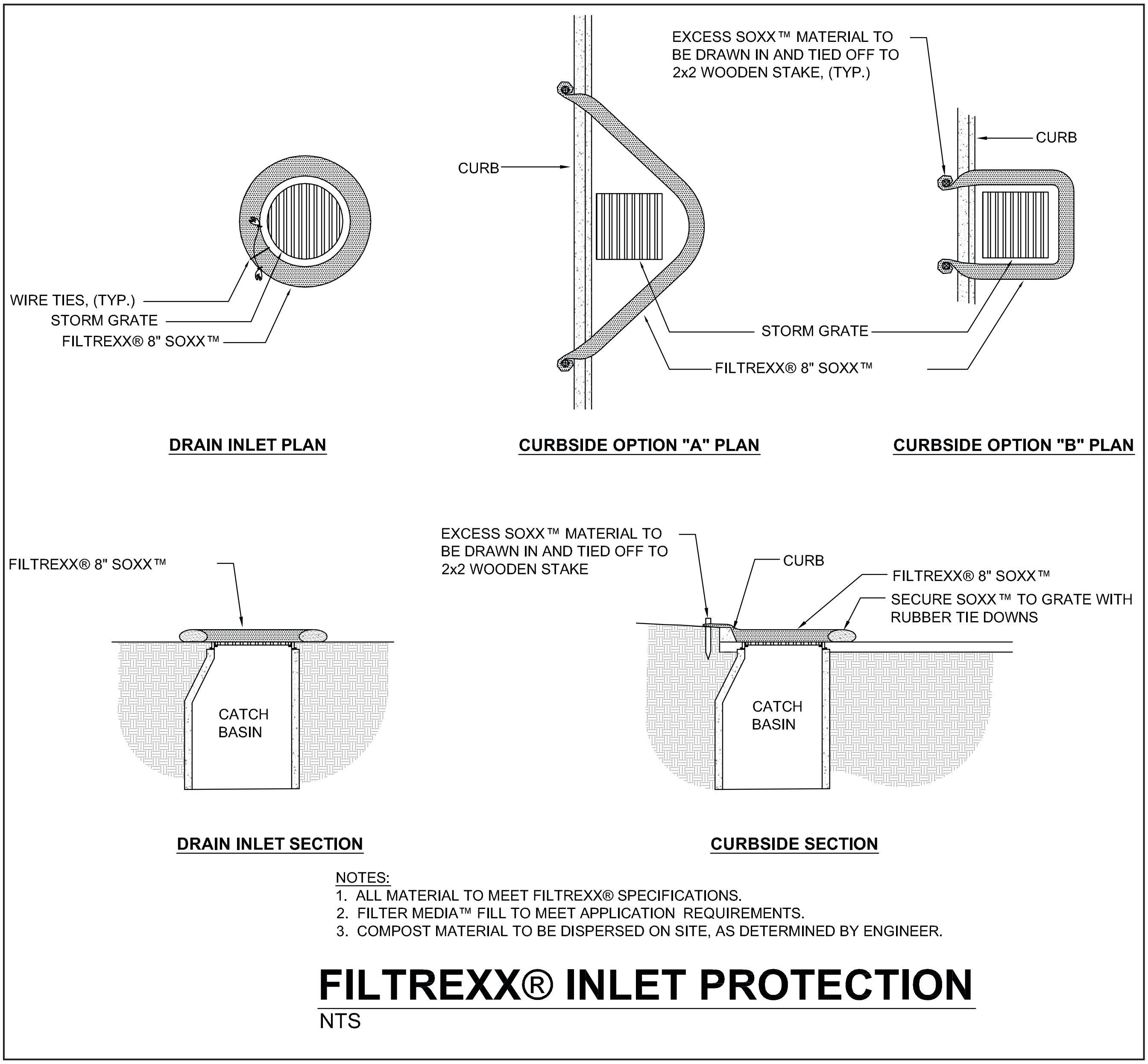
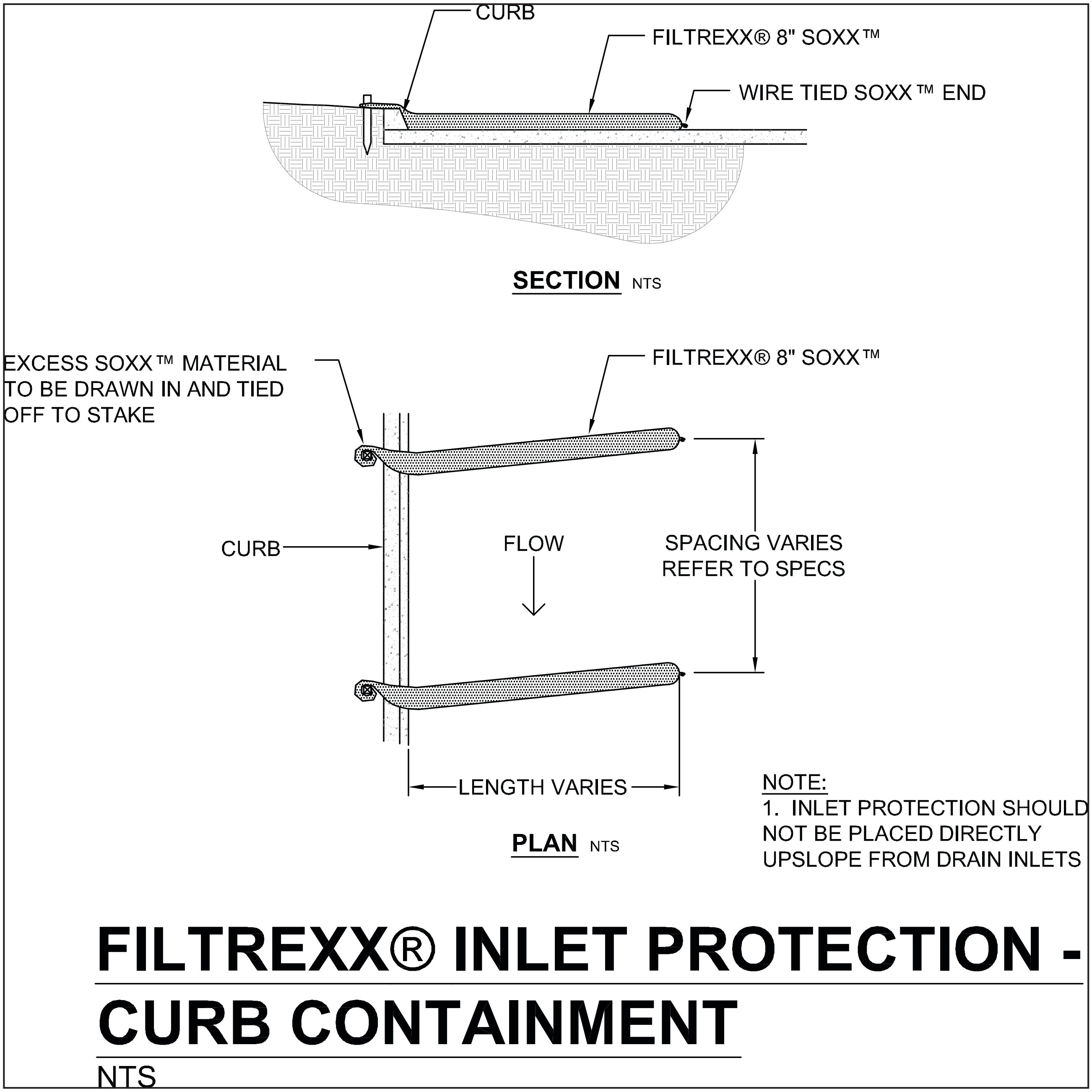


Figure 2.2. Engineering Design Drawing for Curb Sediment Containment Inlet Protection



filtrexx®
LAND IMPROVEMENT SYSTEMS

SWPPP Cut Sheet:

Filtrexx® Sediment Control

Sediment & Perimeter Control Technology

PURPOSE & DESCRIPTION

Filtrexx® Sediment control is a three-dimensional tubular sediment control and storm water runoff filtration device typically used for **perimeter control** of sediment and other soluble pollutants (such as phosphorus and petroleum hydrocarbons), on and around construction activities.

APPLICATION

Filtrexx® Sediment control is to be installed down slope of any disturbed area requiring erosion and sediment control and filtration of soluble pollutants from runoff. Sediment control is effective when installed perpendicular to sheet or low concentrated flow. Acceptable applications include:

- Site perimeters
- Above and below disturbed areas subject to sheet runoff, interrill and rill erosion
- Above and below exposed and erodable slopes
- Around area drains or inlets located in a 'sump'
- On compacted soils where trenching of silt fence is difficult or impossible
- Around sensitive trees where trenching of silt fence is not beneficial for tree survival or may unnecessarily disturb established vegetation.
- On frozen ground where trenching of silt fence is impossible.
- On paved surfaces where trenching of silt fence is impossible.

INSTALLATION

1. Sediment control used for perimeter control of sediment and soluble pollutants in storm runoff shall meet Filtrexx® Soxx™ Material Specifications and use Certified Filtrexx® FilterMedia™.
2. Contractor is required to be Filtrexx® Certified™, or use pre-filled Filtrexx® Sediment control products manufactured by a Filtrexx® Certified Manufacturer™ as determined by Filtrexx® International, LLC (440-926-2607 or visit www.filtrexx.com). Certification shall be considered current if appropriate identification is shown during time of bid or at time of application. Look for the Filtrexx® Certified™ Seal.
3. Sediment control will be placed at locations indicated on plans as directed by the Engineer.
4. Sediment control should be installed parallel to the base of the slope or other disturbed area. In extreme conditions (i.e., 2:1 slopes), a second Sediment control shall be constructed at the top of the slope.
5. Effective Soxx™ height in the field should be as follows: 8" Diameter Sediment control = 6.5" high, 12" Diameter Sediment control = 9.5" high, 18" Diameter SiltSoxx™ = 14.5" high, 24" Diameter Sediment control = 19" high.
6. Stakes shall be installed through the middle of the Sediment control on 10 ft (3m) centers, using 2 in (50mm) by 2 in (50mm) by 3 ft (1m) hard wood stakes. In the event staking is not possible, i.e., when Sediment control is used on pavement, heavy concrete blocks shall be used behind the Sediment control to help stabilize during rainfall/runoff events.
7. Staking depth for sand and silt loam soils shall be 12 in (300mm), and 8 in (200mm) for clay soils.
8. Loose compost may be backfilled along the upslope side of the Sediment control, filling the seam between the soil surface and the device, improving filtration and sediment retention.
9. If the Sediment control is to be left as a permanent filter or part of the natural landscape, it may be seeded at time of installation for

establishment of permanent vegetation. The Engineer will specify seed requirements.

10. Filtrexx® Sediment control is not to be used in perennial, ephemeral, or intermittent streams.

See design drawing schematic for correct Filtrexx® Sediment control installation (Figure 1.1).

INSPECTION AND MAINTENANCE

Routine inspection should be conducted within 24 hrs of a runoff event or as designated by the regulating authority. Sediment control should be regularly inspected to make sure they maintain their shape and are producing adequate hydraulic flow-through. If ponding becomes excessive, additional Sediment control may be required to reduce effective slope length or sediment removal may be necessary. Sediment control shall be inspected until area above has been permanently stabilized and construction activity has ceased

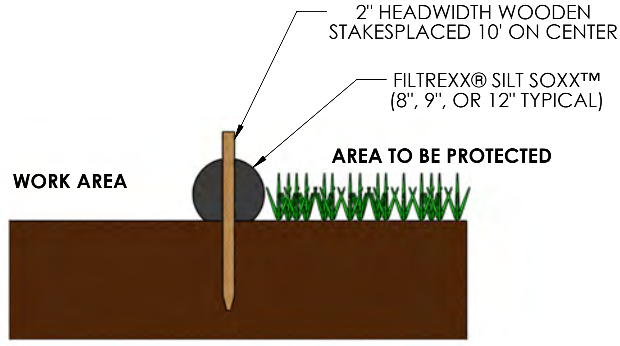
1. The Contractor shall maintain the Sediment control in a functional condition at all times and it shall be routinely inspected.
2. If the Sediment control has been damaged, it shall be repaired, or replaced if beyond repair.
3. The Contractor shall remove sediment at the base of the upslope side of the Sediment control when accumulation has reached 1/2 of the effective height of the Sediment control, or as directed by the Engineer. Alternatively, a new Sediment control can be placed on top of and slightly behind the original one creating more sediment storage capacity without soil disturbance.
4. Sediment control shall be maintained until disturbed area above the device has been permanently stabilized and construction activity has ceased.
5. The FilterMedia™ will be dispersed on site once disturbed area has been permanently stabilized, construction activity has ceased, or as determined by the Engineer.
6. For long-term sediment and pollution control applications, Sediment control can be seeded at the time of installation to create a vegetative filtering system for prolonged and increased filtration of sediment and soluble pollutants (contained vegetative filter strip). The appropriate seed mix shall be determined by the Engineer.

Slope Percent	Maximum Slope Length Above Sediment Control in Feet (meters)*				
	8 in (200 mm) Sediment control	12 in (300 mm) Sediment control	18 in (450 mm) Sediment control	24 in (600mm) Sediment control	32 in (800mm) Sediment control
	6.5 in (160 mm)**	9.5 in (240 mm) **	14.5 in (360 mm) **	19 in (480 mm) **	26 in (650 mm) **
2 (or less)	600 (180)	750 (225)	1000 (300)	1300 (400)	1650 (500)
5	400 (120)	500 (150)	550 (165)	650 (200)	750 (225)
10	200 (60)	250 (75)	300 (90)	400 (120)	500 (150)
15	140 (40)	170 (50)	200 (60)	325 (100)	450 (140)
20	100 (30)	125 (38)	140 (42)	260 (80)	400 (120)
25	80 (24)	100 (30)	110 (33)	200 (60)	275 (85)
30	60 (18)	75 (23)	90 (27)	130 (40)	200 (60)
35	60 (18)	75 (23)	80 (24)	115 (35)	150 (45)
40	60 (18)	75 (23)	80 (24)	100 (30)	125 (38)
45	40 (12)	50 (15)	60 (18)	80 (24)	100 (30)
50	40 (12)	50 (15)	55 (17)	65 (20)	75 (23)

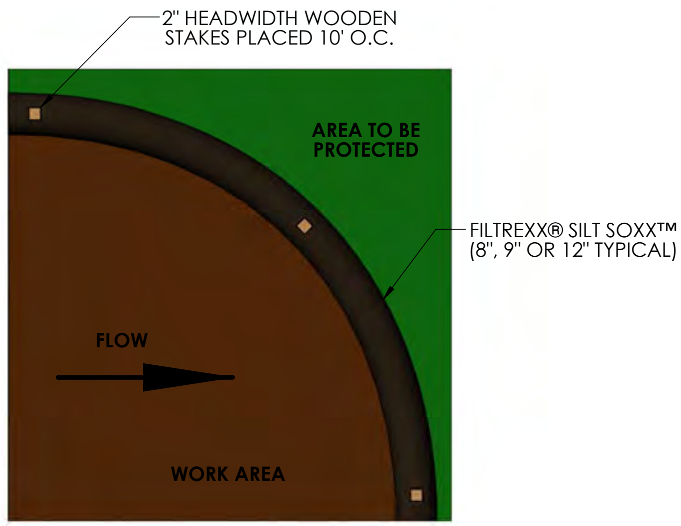
* Based on a failure point of 36 in (0.9 m) super silt fence (wire reinforced) at 1000 ft (303 m) of slope, watershed width equivalent to receiving length of sediment control device, 1 in/ 24 hr (25 mm/24 hr) rain event.

** Effective height of Sediment control after installation and with constant head from runoff as determined by Ohio State University.

FILTREXX® SILT SOXX™

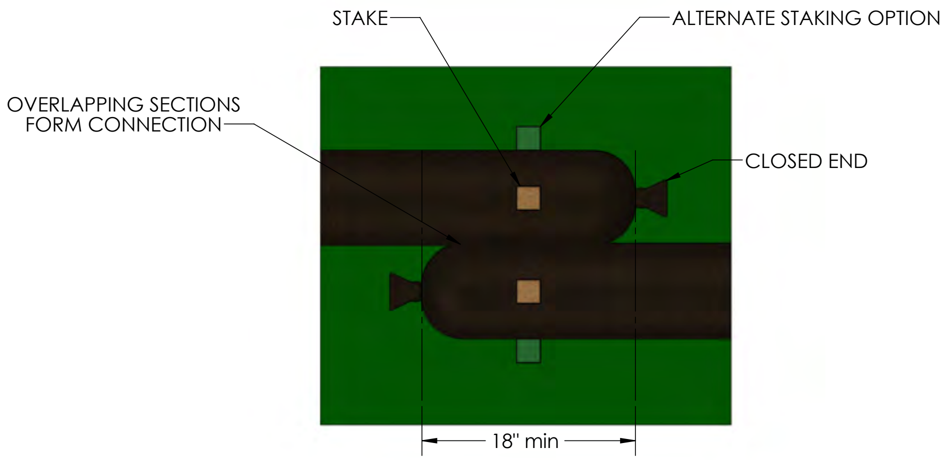


SECTION VIEW

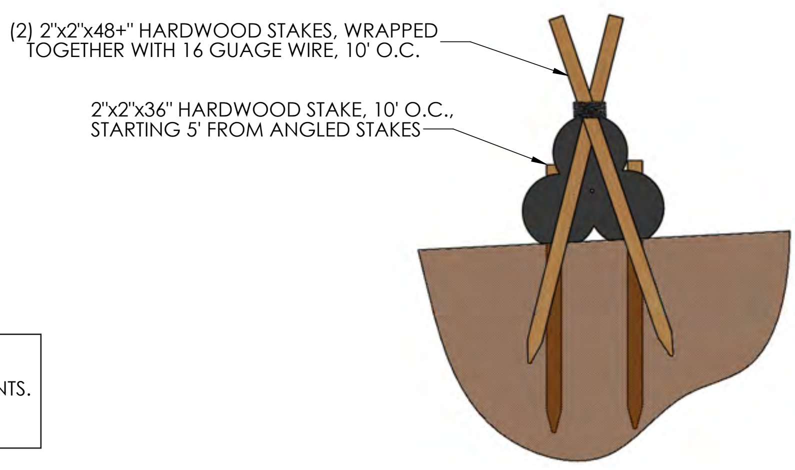


TOP VIEW

COMPOST SOCK CONNECTION/ATTACHMENT DETAIL



FILTREXX® PYRAMID STAKING DETAIL



NOTES:
1. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
2. SILT SOXX™ FILL TO MEET APPLICATION REQUIREMENTS.
3. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER.

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.

Design and Maintenance of Subsurface Gravel Wetlands

February 4, 2015

The University of New Hampshire Stormwater Center conducted a design and maintenance review of subsurface gravel wetland systems for the New Hampshire Department of Transportation. The UNHSC utilized various NHDOT site and construction plans, construction photo documentation, cost and material specification sheets, and the NHDOT subsurface gravel wetland (SGW) design specification dated December 20, 2013. The UNHSC also conducted inspections of subsurface gravel wetland systems that were designed and installed by the NHDOT or its contractors in order to determine maintenance needs. The UNHSC prepared this report as a resource for SGW designers and installers to assist in the design, cost and material specification, and maintenance requirements to ensure a properly functioning SGW system.

Table of Contents

1.0 Introduction

The UNHSC appreciates the opportunity to provide Design and Maintenance Review services for the New Hampshire Department of Transportation. We have completed our review and site visits of NHDOT SGW installations and offer the following summary.

Information Reviewed:

- Various Site Plans prepared by NHDOT and various assisting engineering firms
- Construction Management photos provided by NHDOT
- Costs and material specifications compiled by NHDOT
- NHDOT Subsurface Gravel Wetland Design, dated December 20, 2013

2.0 Background

The subsurface gravel wetland (SGW) stormwater management system has been around for almost 20 years. It approximates the look and function of a natural wetland, effectively removing sediments and other pollutants commonly found in runoff while enhancing the visual appeal of the landscape by adding buffers or greenscape to urban areas. The SGW specification used by NHDOT represents the original specification developed by the University of New Hampshire Stormwater Center (UNHSC) and documented in the UNHSC SGW Design Specifications published in June of 2009. These specifications reflect findings from five years of study of the SGW originally designed and evaluated at UNHSC. The SGW is a horizontal-flow filtration system and should not be confused with stormwater wetlands that function more like ponds. Instead, the SGW includes a dense root mat in a wetland soil that forms a cover over crushed stone. The subsurface crushed stone is the primary flow path for stormwater and is an anaerobic microbe-rich environment for improving water quality. Like other filtration systems, it demonstrates a tremendous capacity to reduce runoff peak flows and improve water quality.

3.0 Implementation

Subsurface gravel wetlands can be used in many regions, with the exception of those that are too arid to support a wetland system. SGW systems have demonstrated exceptional stormwater quality treatment, in particular for nutrients, for a range of land uses including linear transportation environments. It should be noted that as implementation has progressed and coupled with an additional five years of research at the UNHSC, additional findings and design modifications have arisen. The initial design of the UNHSC SGW was to handle runoff from a commuter parking area, best represented by a high density commercial use. In such applications SGW systems are space intensive; however for linear transportation environments some flexibility is expected. Recommendations and comments provided herein reflect additional learning and research findings gathered since the original publication of the UNHSC 2009 SGW specification.

1.) The purpose of the NHDOT underdrain systems is to intercept and provide drainage for seasonal high ground water levels where deemed to be within 0.5' of the wetland soil surface elevation. The rationale is not well defined and requires justification. For systems that are installed within proximity to seasonal high groundwater (SHGW) it is unclear how the benefits of the flushing basins justify overall costs (average cost savings: $1,069 per system). The SGW low flow orifice not only controls the stormwater flow through the system, by this hydraulic control will also ultimately control SHGW elevation in the vicinity of the SGW in the same manner. An SGW may have a portion of the system built below the SHGW. The original SGW at the UNHSC site in Durham, NH is a case in point. A caution is noted in that groundwater flows should not be significant compared to the stormwater flows. Significant groundwater inflows could prevent the formation of the anaerobic zone in the crushed stone.

2.) Overall system sizing for NHDOT systems appears to be based on the UNHSC 2009 SGW drainage design guidance with respect to overall length to width (L:W) ratio. In some locations L:W ratio dominates design orientation. UNHSC researchers recommend that this design criterion not be considered the most critical design element. The critical design element with respect to configuration is to size the system to treat the desired design rainfall depth from the contributing drainage area (1" Water Quality Volume). Linear systems are fine (higher L:W), provided the minimum WQV: Internal Storage Reservoir (ISR) capacity ratio is 4:1 or 25% (WQV:ISR) and the minimum flow path in the crushed stone in each cell is 15 feet.

3.) Most inspected forebays appear to function as wet basins rather than the more desirable dry basin. Dry forebays promote aerobic transformations of nitrogen which is an important first step prior to the anaerobic zone. It is recommended that if forebays cannot be economically installed to operate dry then concrete inlet structures such as off-line deep sump catch basins be used for pre-treatment as opposed to a forebay structure. A deep sump catch basin or other precast inlet structure may also be easier to maintain. A very important function of any SGW forebay is that it be aerobic in order to convert most forms of nitrogen to nitrate or nitrite.

4.) Most forebay outlets lack low flow conveyance which causes them to function as wet basins as opposed to dry basins. It is important that regardless of the configuration of the pretreatment structure that the SGW system forebay contain an outlet with an invert at the same level as the wetland surface to eliminate ponding behind the forebay berm such that obligate wetland plant colonization (cattails) and the potential for anaerobic conditions do not occur. Other options are to design the forebays to convey low flows that draw the fore bay water level down between storm events.

5.) Hydraulic inlets (leaching chambers) appear to be oversized. There are many hydraulic inlet design configurations that may be able to replace existing designs with better function and maintenance capacity and diminished costs. NHDOT SGW systems observed in this study, small and large, seem to use similar hydraulic inlet configurations with the same number of structures regardless of watershed area size or design treatment volume. UNHSC research indicates the hydraulic inlet configuration can be flexible provided it has a greater hydraulic capacity/efficiency than the primary outlet orifice control. Recent experience in UNHSC designs have used slotted hydraulic inlet pipes as a backup inlet with a primary inlet composed of woven geotextile laid on the subsurface pea stone and covered in 6"-8" diameter stone around the outfall of the inlet pipe (see figures 1 and 2). This configuration protects the stone filter in the subsurface of the wetland system while also providing a more accessible and maintainable surface hydraulic inlet feature that will inevitably be easier and less costly to construct.

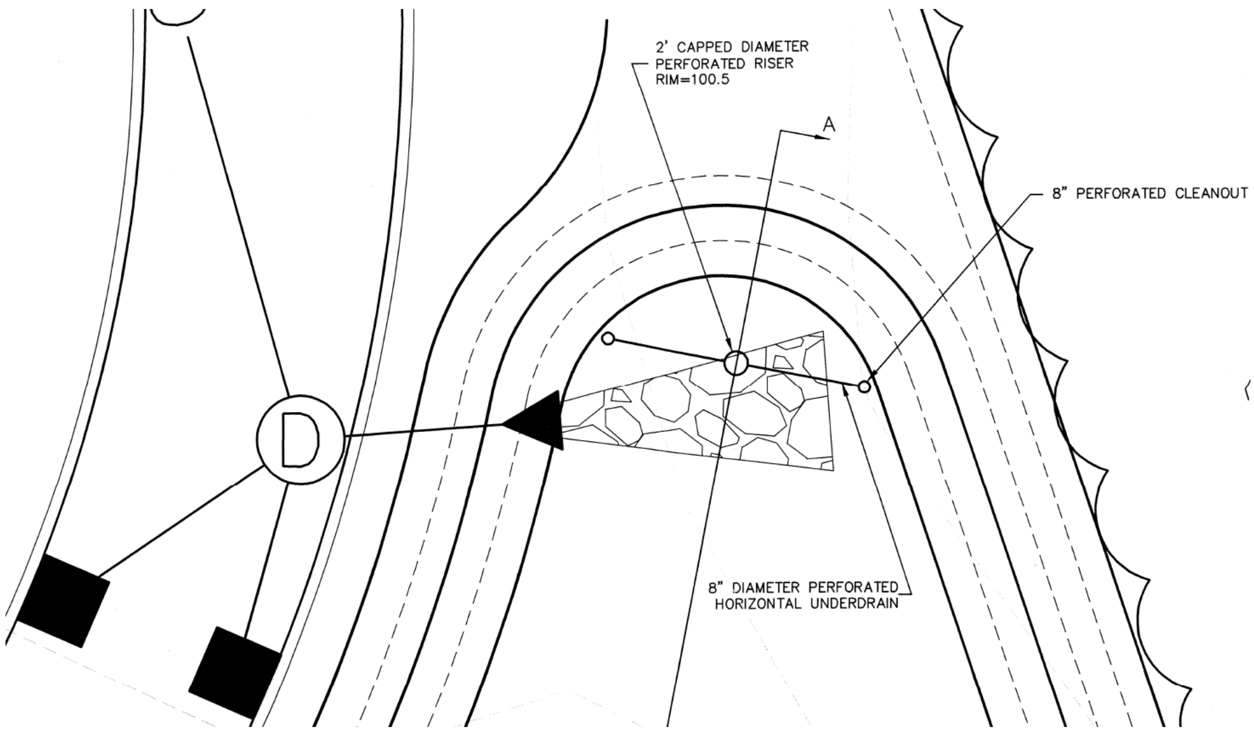


Figure 1: Typical plan view of multi-inlet configuration of a SGW system

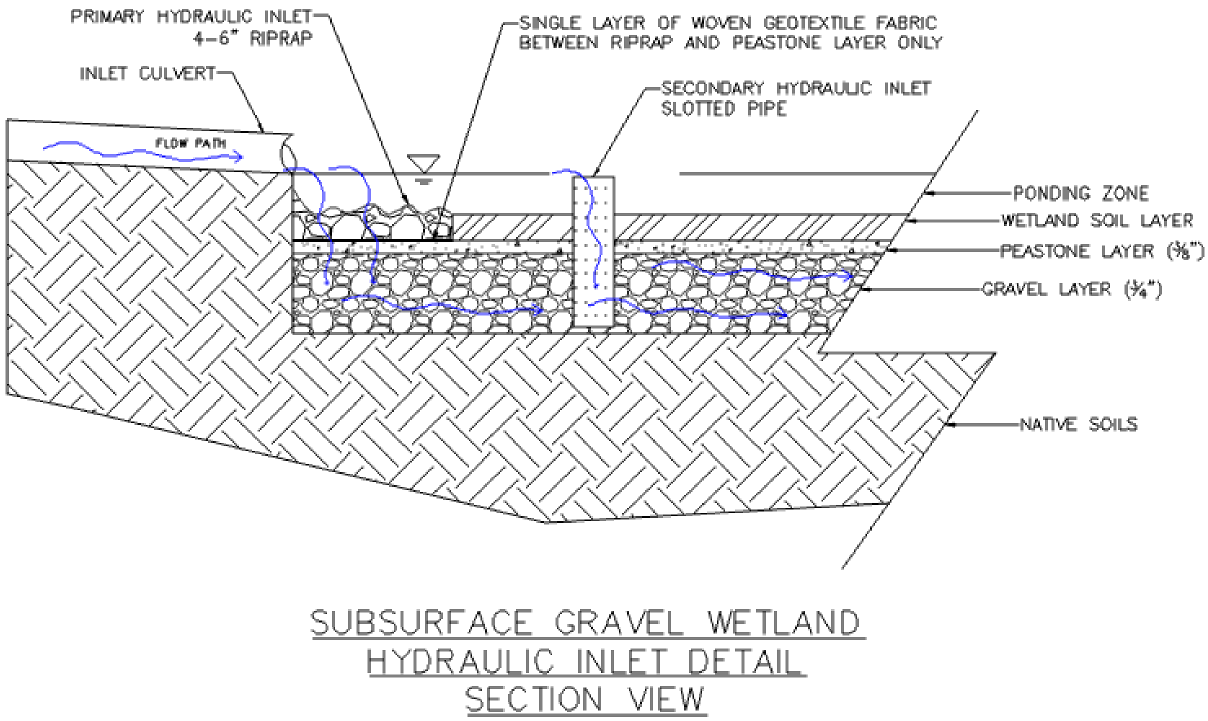


Figure 2: Typical profile view of multi-inlet configuration of a SGW system.

6.) Cleanout structures (leaching chambers) need not be as large since their primary function is for emergency access to the subsurface header pipe that directs flow either to the second wetland chamber or the outlet structure. Cleanout structures can be capped or be installed at the wetland surface grade with a manhole cover to ensure that the cleanouts are accessible, water tight, and does not short circuit system hydraulics.

7.) Some of the outlet control structures have slotted inlets (4” high by 12” wide) to allow for drainage of high flows. These slots need to be protected by covering them with 6-8” stone or some type of trash screen. This will prevent trash, leaves, or other debris from clogging the outlet orifice.

4.0 Costs

For this project NHDOT produced itemized costs associated with the bid prices for the materials and installation of thirteen SGW systems. In meetings with NHDOT personnel several items were determined to be irrelevant to this project and were thus eliminated from the spreadsheet. These items are itemized in the list below:

- 206.1 (Common Structure Excavation) and 206.2 (Rock Structure Excavation) were determined to be unique and not standard items and eliminated

- 209.1 (Granular Backfill) was determined to reflect typical stabilization for bedding material and were eliminated
- 593.331 (Geotextile, Stabilization, Class 3, Non-woven) was determined to be no longer used, and was replaced with Item 585.7 (Stone Fill, Class G) and thus eliminated
- 593.411 (Geotextile, Permeability Control, Class 1, Non-woven), 593.421 (Geotextile, Permeability Control, Class 2, Non-woven), 593.431 (Geotextile, Permeability Control, Class 3, Non-woven) were determined to be erosion control items and were eliminated
- 603.83206 (6” Plastic Pipe, Smooth Interior), 605.906 (6” Pipe Underdrain, Contractors’ Option) were determined to be irrelevant to the SGW construction costs and were thus eliminated.

To compare costs, all original capital construction costs were converted to 2014 dollars using consumer price index inflation rates (USDOL, 2014). Average SGW materials and installation costs from the range of assessed projects (see attachment A for the raw costs) was $32,462 per impervious acre treated ($0.75/sf) with a maximum cost of $68,893 per impervious acre treated ($1.47/sf) and a minimum cost of $12,210 per impervious acre treated ($0.28/sf). As a comparison, for the SGW studied at the UNH field facility, costs were calculated at $28,079 per impervious acre treated ($0.64/sf). Cost details are illustrated in Table 1.

Table 1: Comparison of unit costs from all reviewed NHDOT SGW materials cost data and reference information documented by UNHSC. Note all costs are in 2014 dollars

Total Price Statistics	Contributing Impervious Area (A)	Construction Cost per Impervious Area ($/A)	Construction Cost per Impervious Area ($/sf)	UNHSC Costs ($/A)	UNHSC Costs ($/sf)
Minimum	1.90	$ 12,210	$ 0.28	-	-
Average	4.56	$ 32,462	$ 0.75	$28,079	$ 0.64
Maximum	8.40	$ 63,893	$ 1.47	-	-

Results of the cost assessment indicate room for potential savings with respect to design. In light of the detailed recommendations outlined in the Implementation section of this report, cost adjustments and justifications include:

Eliminate items 605.79 and 605.82251-24 (perimeter dewatering controls) for use if SHGW is within 0.5’ of SGW surface. There is no data or clear rationale for any threat from SHGW in SGW systems. SHGW levels are often intermittent and would ultimately be controlled by the outlet orifice which is typically 0.5 to 0.67’ below SGW surface. Therefore this item is redundant and further justification is necessary to validate the additional expense. Cost savings is estimated at 3.3% or $1,069 per system.

Reduce the number of item numbers 604.921 and 604.922 (alt: 604.193, 604.393, and 604.912) leaching chambers. Hydraulic inlet controls could be reduced if not eliminated in the future as linear routing through the system is adapted in future designs. Other hydraulic inlet controls such as suggested in the Implementation section of this report may be less expensive and offer greater maintainability. There is no clear rationale for these structures at the end of each wetland cell as their only function is to provide access to the perforated header pipe in the subsurface as a potential clean out. At the end of the wetland cell these can simply be solid risers capped at the wetland surface. At the upstream end of each wetland cell, hydraulic inlets should be reduced to two if not eliminated and replaced with alternative inlet structures. Hydraulic inlet capacity need only exceed that of the outlet orifice. Cost savings is estimated at 10% or $3,201 per system.

Items 647.1 (Humus) and 647.29 (Wetland Humus) incurred high variability with respect to cost and in some systems had some of the largest percent costs (>12%) than any additional line items. There is no specification for the wetland humus in the NHDOT SGW design guidelines dated December 20, 2013 and the wetland soil specification in the UNHSC 2009 guidance is weak without sufficient detail to allow for accurate and cost effective bidding. Subsequent to this report UNHSC has worked to develop a particle size distribution for use in specifying wetland humus in future SGW systems. The proposed PSD for wetland humus is provided in Table 2 and reflects a poorly drained soil with a d50 of 0.15 mm and is a clay or silt loam in the soil textural triangle. We feel that this will allow for more cost effective bidding of appropriate soil types with the potential to even employ appropriate onsite excavated materials into select humus mixes thereby further reducing costs. We believe with these additional specifications it is not unrealistic to assume a future price of $15/CY, which represents the 25% quartile cost of the original line item. Cost savings is estimated at 0.5% or $164 per system.

Table 2: Particle size distribution and testing tolerances for wetland humus for the subsurface gravel wetland system

US Standard Sieve Size in/mm	Percent Passing	Percent Passing Testing Tolerances
0.5/12.5	100	± 10.0
#10/2.00	90 - 75	± 5.0
#100/0.15	40-50	± 5.0
#200/0.75	25-50	± 5.0

Relative cost savings are summarized in table 3.

Table 3: Comparison of unit costs from all reviewed SGW materials cost data with projected cost savings from recommended itemized design modifications. Note all costs are amortized to reflect 2014 dollars.

Total Price Statistics	Contributing Impervious Area (A)	Construction Cost per Impervious Area ($/A)	Construction Cost per Impervious Area ($/sf)	UNHSC Costs ($/A)	UNHSC Costs ($/sf)
Minimum	1.90	$ 7,895	$ 0.18	-	-
Average	4.56	$ 27,320	$ 0.63	$28,079	$0.64
Maximum	8.40	$ 53,780	$ 1.23	-	-

5.0 Maintenance

Inspection and maintenance is a critical component of the long term function and effectiveness of any stormwater control measure. Overall the UNHSC inspections of the facilities proved that the SGW systems were largely functioning properly and were well designed and constructed. The UNHSC has produced operation and maintenance guidelines as well as an inspection checklist which have been provided in attachment A of this report. Inspection is critical to assess as built functionality in addition to identifying unique maintenance tasks that may be less general in nature and more site specific. Overall the inspections conducted and provided as an attachment to this report (attachment B) indicates that routine biannual inspection (annual as a minimum) should be initiated at these facilities as a standard of practice. Post construction inspections are critical just after newly constructed SGW system is placed online. While some long-term maintenance items are due to system aging and processing of polluted runoff, some operation issues are a result of construction and installation practices not fully aligned with design specifications. These items are often quickly identifiable. In our assessment of eight NHDOT SGW systems two main issues were identified associated with installation or construction. First numerous pre-treatment forebays in observed systems held ponding water. This impacts the overall chemical function and processing of dissolved inorganic nitrogen species as these ponded forebay areas often turn into anaerobic areas of obligate wetland plants. Second on one particular system (NHDOT # 14633F BMP 19) three to five inches of standing water was observed within the entire system. The final water elevation was being controlled by an outlet pipe invert that was installed above the overall wetland soil elevation. This has resulted in sparse vegetation and likely was not part of the original design.

Beyond construction and installation issues the primary maintenance need identified through these inspections is simple maintenance of the established wetland vegetation. Numerous facilities are in need of this type of maintenance which involves cutting the existing plants down to the base and removing it from the system to prevent breakdown and rerelease of nitrogen.

Attachment A: Raw Item Costs

SUBSURFACE GRAVEL WETLANDS (13933C/ DB 920)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	16,603	$4.75	$78,864.25
Item 203.6 - Embankment-in-Place (CY)	245	$8.95	$2,192.75
Item 203. 52 - Impervious Material (CY)	500	$14.00	$7,000.00
Item 585.3- Stone Fill, Class C (CY)	83	$18.00	$1,494.00
Item 585.5 - Stone Fill, Class E (CY)	900	$18.00	$16,200.00
Item 585.7 - Stone Fill, Class G (CY)	120	$24.00	$2,880.00
Item 593.411 - Geotextile, Perm. Control, Cl. 1, Non-woven (SY)	215	$2.10	$451.50
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	283	$33.00	$9,339.00
Item 604.91X - Outlet Control Structure (U)	2	$5,800.00	$11,600.00
Item 604.193 - Special Catch Basin (3' Dia) (U)	8	$3,300.00	$26,400.00
Item 604.393 - Specia Drain Manhole 3'x 3' (U)	3	$2,600.00	$7,800.00
Item 605.508 - 8" Perf. Corr. Poly. Pipe Underdrain (LF)	592	$22.00	$13,024.00
Item 605.79 - Underdrain Flushing Basins (EA)	10	$660.00	$6,600.00
Item 605.906 - 6" Pipe Underdrain (Contractor's Option)	506	$16.00	$8,096.00
Item 646.3 - Turf Establishment w/ Mulch & Tackifiers (A)	0.48	$1,650.00	$792.00
Item 647.1 - Humus (CY)	1,900	$15.00	$28,500.00
Item 647.29 - Wetland Humus (CY)	330	$15.00	$4,950.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$225.00	$225.00
Total			**$226,408.50**

P. Salo 12/2/2013

SUBSURFACE GRAVEL WETLANDS (13455A/ GW)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	5,776	$9.75	$56,316.00
Item 203.2 - Rock Excavation (CY)	2,241	$29.00	$64,989.00
Item 203.6 - Embankment-in-Place (CY)	317	$6.25	$1,981.25
Item 203. 53 - Low Permeability Fill (CY)	255	$8.80	$2,244.00
Item 520.1 - Concrete Class A (CY)	6	$375.00	$2,250.00
Item 585.3- Stone Fill, Class C (CY)	131	$34.50	$4,519.50
Item 585.5 - Stone Fill, Class E (CY)	370	$31.00	$11,470.00
Item 585.7 - Stone Fill, Class G (CY)	62	$34.25	$2,123.50
Item 593.421 - Geotextile, Perm. Control, Cl. 2, Non-woven (SY)	502	$2.00	$1,004.00
Item 603.80012 - 12" Plastic Pipe (LF)	31	$40.00	$1,240.00
Item 604.91X - Outlet Control Structure (U)	1	$4,850.00	$4,850.00
Item 604.921 - Leaching Chamber, Type 1 (U)	6	$1,700.00	$10,200.00
Item 604.922 - Leaching Chamber, Type 2 (U)	5	$1,850.00	$9,250.00
Item 605.506 - 6" Perf. Corr. Poly. Pipe Underdrain (LF)	204	$19.50	$3,978.00
Item 647.1 - Humus (CY)	244	$14.00	$3,416.00
Item 647.29 - Wetland Humus (CY)	123	$16.00	$1,968.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$250.00	$250.00
Total			**$182,049.25**

P. Salo 12/2/2013

SUBSURFACE GRAVEL WETLANDS (10620L/ GW)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203. 52 - Impervious Material (CY)	1,919	$18.05	$34,637.95
Item 585.2 - Stone Fill, Class B (CY)	56	$19.15	$1,072.40
Item 585.3- Stone Fill, Class C (CY)	278	$40.25	$11,189.50
Item 585.5 - Stone Fill, Class E (CY)	46	$45.90	$2,111.40
Item 593.431 - Geotextile, Perm. Control, Cl. 3, Non-woven (SY)	200	$6.00	$1,200.00
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	50	$32.15	$1,607.50
Item 604.91X - Outlet Control Structure (U)	1	$2,045.00	$2,045.00
Item 604.921 - Leaching Chamber, Type 1 (U)	4	$3,080.00	$12,320.00
Item 604.922 - Leaching Chamber, Type 2 (U)	4	$2,950.00	$11,800.00
Item 605.512 - 12" Perf. Corr. Poly. Pipe Underdrain (LF)	187	$15.75	$2,945.25
Item 647.29 - Wetland Humus (CY)	93	$35.00	$3,255.00
Total			**$84,184.00**

There was no earthwork specifcally attributable to the gravel wetland. It is essentially constructed on top of the existing ground between the Rte. 16 NB slope work and the Exit 15 on ramp slope work.

SUBSURFACE GRAVEL WETLANDS (10418G/ GW)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	5,978	$8.00	$47,824.00
Item 203.6 - Embankment-in-Place (CY)	8	$5.00	$40.00
Item 203. 52 - Impervious Material (CY)	1,415	$18.00	$25,470.00
Item 206.1 - Common Structure Excavation (CY)	1,225	$16.00	$19,600.00
Item 585.3- Stone Fill, Class C (CY)	21	$30.00	$630.00
Item 585.5 - Stone Fill, Class E (CY)	1,141	$30.00	$34,230.00
Item 593.331 - Geotextile, Stabilization, Cl. 3, Non-woven (SY)	1,711	$3.00	$5,133.00
Item 603.83206 - 6" Plastic Pipe (Smooth Interior) (LF)	55	$24.00	$1,320.00
Item 604.91X - Outlet Control Structure (U)	1	$2,400.00	$2,400.00
Item 604.921 - Leaching Chamber, Type 1 (U)	4	$3,000.00	$12,000.00
Item 604.922 - Leaching Chamber, Type 2 (U)	2	$3,000.00	$6,000.00
Item 605.906 - 6" Pipe Underdrain (Contractors Option) (LF)	602	$16.00	$9,632.00
Item 605.79 - Underdrain Flushing Basins (EA)	8	$600.00	$4,800.00
Item 647.29 - Wetland Humus (CY)	380	$25.00	$9,500.00
Total			**$178,579.00**

SUBSURFACE GRAVEL WETLANDS (11238L/ BMP 1590)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	3,933	$4.00	$15,732.00
Item 203.6 - Embankment-in-Place (CY)	184	$2.00	$368.00
Item 203. 52 - Impervious Material (CY)	1,530	$15.00	$22,950.00
Item 206.2- Rock Structure Excavation (CY)	27	$30.00	$810.00
Item 520.1 - Concrete Class A (CY)	5	$500.00	$2,700.00
Item 585.3- Stone Fill, Class C (CY)	90	$30.00	$2,700.00
Item 585.5 - Stone Fill, Class E (CY)	182	$28.00	$5,096.00
Item 585.7 - Stone Fill, Class G (CY)	30	$40.00	$1,200.00
Item 593.411 - Geotextile, Perm. Control, Cl. 1, Non-woven (SY)	192	$2.25	$432.00
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	20	$32.00	$640.00
Item 604.91X - Outlet Control Structure (U)	1	$3,000.00	$3,000.00
Item 604.921 - Leaching Chamber, Type 1 (U)	6	$1,250.00	$7,500.00
Item 604.922 - Leaching Chamber, Type 2 (U)	5	$1,250.00	$6,250.00
Item 605.512 - 12" Perf. Corr. Poly. Pipe Underdrain (LF)	125	$25.00	$3,125.00
Item 646.31 - Turf Establishment w/ Mulch & Tackifiers (SY)	1,482	$0.35	$518.70
Item 647.1 - Humus (CY)	78	$20.00	$1,560.00
Item 647.29 - Wetland Humus (CY)	103	$35.00	$3,605.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$500.00	$500.00
Total			**$78,686.70**

SUBSURFACE GRAVEL WETLANDS (11238L/ BMP 922)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	3,822	$4.00	$15,288.00
Item 203.6 - Embankment-in-Place (CY)	467	$2.00	$934.00
Item 206.1 - Common Structure Excavation (CY)	5	$30.00	$150.00
Item 520.1 - Concrete Class A (CY)	4	$500.00	$2,000.00
Item 585.3- Stone Fill, Class C (CY)	22	$30.00	$660.00
Item 585.5 - Stone Fill, Class E (CY)	420	$28.00	$11,760.00
Item 585.7 - Stone Fill, Class G (CY)	69	$40.00	$2,760.00
Item 593.411 - Geotextile, Perm. Control, Cl. 1, Non-woven (SY)	96	$2.25	$216.00
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	41	$32.00	$1,312.00
Item 604.91X - Outlet Control Structure (U)	1	$3,000.00	$3,000.00
Item 604.921 - Leaching Chamber, Type 1 (U)	6	$1,250.00	$7,500.00
Item 604.922 - Leaching Chamber, Type 2 (U)	6	$1,250.00	$7,500.00
Item 605.512 - 12" Perf. Corr. Poly. Pipe Underdrain (LF)	306	$25.00	$7,650.00
Item 605.79 - Underdrain Flushing Basins (EA)	2	$500.00	$1,000.00
Item 605.82251 - 24" Agg. Und. Type 2 w/ 6" Perf. Corr. PE Pipe (LF)	565	$25.00	$14,125.00
Item 646.31 - Turf Establishment w/ Mulch & Tackifiers (SY)	3,262	$0.35	$1,141.70
Item 647.1 - Humus (CY)	89	$20.00	$1,780.00
Item 647.29 - Wetland Humus (CY)	304	$35.00	$10,640.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$500.00	$500.00
Total			**$89,916.70**

SUBSURFACE GRAVEL WETLANDS (14633F/ BMP 19)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	2,396	$4.00	$9,584.00
Item 203.6 - Embankment-in-Place (CY)	468	$3.15	$1,474.20
Item 203. 52 - Impervious Material (CY)	582	$15.00	$8,730.00
Item 520.1 - Concrete Class A (CY)	10	$180.00	$1,800.00
Item 585.3- Stone Fill, Class C (CY)	108	$26.00	$2,808.00
Item 585.5 - Stone Fill, Class E (CY)	267	$25.00	$6,675.00
Item 585.7 - Stone Fill, Class G (CY)	44	$35.00	$1,540.00
Item 593.431 - Geotextile, Perm. Control, Cl. 3, Non-woven (SY)	281	$3.00	$843.00
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	50	$21.00	$1,050.00
Item 604.91X - Outlet Control Structure (U)	1	$4,000.00	$4,000.00
Item 604.921 - Leaching Chamber, Type 1 (U)	6	$980.00	$5,880.00
Item 604.922 - Leaching Chamber, Type 2 (U)	5	$960.00	$4,800.00
Item 605.506 - 6" Perf. Corr. Poly. Pipe Underdrain (LF)	192	$15.00	$2,880.00
Item 605.79 - Underdrain Flushing Basins (EA)	2	$300.00	$600.00
Item 605.82251 - 24" Agg. Und. Type 2 w/ 6" Perf. Corr. PE Pipe (LF)	429	$20.00	$8,580.00
Item 647.1 - Humus (CY)	233	$20.00	$4,660.00
Item 647.29 - Wetland Humus (CY)	292	$12.50	$3,650.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$110.00	$110.00
Total			**$69,664.20**

SUBSURFACE GRAVEL WETLANDS (14633E/ BMP 17)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	7,638	$3.75	$28,642.50
Item 203.2 - Rock Excavation (CY)	1,923	$10.75	$20,672.25
Item 203.6 - Embankment-in-Place (CY)	4,211	$4.90	$20,633.90
Item 203. 52 - Impervious Material (CY)	1,746	$12.00	$20,952.00
Item 520.1 - Concrete Class A (CY)	23	$525.00	$12,075.00
Item 585.3- Stone Fill, Class C (CY)	194	$25.00	$4,850.00
Item 585.5 - Stone Fill, Class E (CY)	317	$30.00	$9,510.00
Item 585.7 - Stone Fill, Class G (CY)	52	$40.00	$2,080.00
Item 593.431 - Geotextile, Perm. Control, Cl. 3, Non-woven (SY)	580	$2.00	$1,160.00
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	38	$24.00	$912.00
Item 604.91X - Outlet Control Structure (U)	1	$2,900.00	$2,900.00
Item 604.921 - Leaching Chamber, Type 1 (U)	6	$1,115.00	$6,690.00
Item 604.922 - Leaching Chamber, Type 2 (U)	5	$1,070.00	$5,350.00
Item 605.506 - 6" Perf. Corr. Poly. Pipe Underdrain (LF)	369	$10.50	$3,874.50
Item 605.79 - Underdrain Flushing Basins (EA)	6	$240.00	$1,440.00
Item 605.82251 - 24" Agg. Und. Type 2 w/ 6" Perf. Corr. PE Pipe (LF)	718	$21.00	$15,078.00
Item 647.29 - Wetland Humus (CY)	289	$20.00	$5,780.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$500.00	$500.00
Total			**$163,100.15**

SUBSURFACE GRAVEL WETLANDS (14633F/ BMP 16)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	3,498	$4.00	$13,992.00
Item 203.2 - Rock Excavation (CY)	3,532	$9.00	$31,788.00
Item 203.6 - Embankment-in-Place (CY)	25	$3.15	$78.75
Item 203. 52 - Impervious Material (CY)	3,435	$15.00	$51,525.00
Item 206.2- Rock Structure Excavation (CY)	39	$17.00	$663.00
Item 209.1 - Granular Backfill (CY)	7	$28.00	$196.00
Item 520.1 - Concrete Class A (CY)	7	$180.00	$1,260.00
Item 585.2 - Stone Fill, Class B (CY)	202	$20.00	$4,040.00
Item 585.3- Stone Fill, Class C (CY)	106	$26.00	$2,756.00
Item 585.5 - Stone Fill, Class E (CY)	667	$25.00	$16,675.00
Item 585.7 - Stone Fill, Class G (CY)	111	$35.00	$3,885.00
Item 593.411 - Geotextile, Perm. Control, Cl. 1, Non-woven (SY)	222	$3.00	$666.00
Item 593.431 - Geotextile, Perm. Control, Cl. 3, Non-woven (SY)	273	$3.00	$819.00
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	72	$21.00	$1,512.00
Item 604.91X - Outlet Control Structure (U)	2	$4,000.00	$8,000.00
Item 604.921 - Leaching Chamber, Type 1 (U)	6	$980.00	$5,880.00
Item 604.922 - Leaching Chamber, Type 2 (U)	5	$960.00	$4,800.00
Item 605.506 - 6" Perf. Corr. Poly. Pipe Underdrain (LF)	360	$15.00	$5,400.00
Item 605.79 - Underdrain Flushing Basins (EA)	6	$300.00	$1,800.00
Item 605.82251 - 24" Agg. Und. Type 2 w/ 6" Perf. Corr. PE Pipe (LF)	1,016	$20.00	$20,320.00
Item 647.1 - Humus (CY)	434	$20.00	$8,680.00
Item 647.29 - Wetland Humus (CY)	314	$12.50	$3,925.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$110.00	$110.00
Total			**$188,770.75**

SUBSURFACE GRAVEL WETLANDS (14633E/ BMP 14)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	4,570	$3.75	$17,137.50
Item 203.2 - Rock Excavation (CY)	572	$10.75	$6,149.00
Item 203.6 - Embankment-in-Place (CY)	23	$4.90	$112.70
Item 203. 52 - Impervious Material (CY)	1,049	$12.00	$12,588.00
Item 520.1 - Concrete Class A (CY)	16	$525.00	$8,400.00
Item 585.3- Stone Fill, Class C (CY)	183	$25.00	$4,575.00
Item 585.5 - Stone Fill, Class E (CY)	210	$30.00	$6,300.00
Item 585.7 - Stone Fill, Class G (CY)	35	$40.00	$1,400.00
Item 593.431 - Geotextile, Perm. Control, Cl. 3, Non-woven (SY)	550	$2.00	$1,100.00
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	34	$24.00	$816.00
Item 604.91X - Outlet Control Structure (U)	1	$2,900.00	$2,900.00
Item 604.921 - Leaching Chamber, Type 1 (U)	6	$1,115.00	$6,690.00
Item 604.922 - Leaching Chamber, Type 2 (U)	5	$1,070.00	$5,350.00
Item 605.506 - 6" Perf. Corr. Poly. Pipe Underdrain (LF)	296	$10.50	$3,108.00
Item 605.79 - Underdrain Flushing Basins (EA)	2	$240.00	$480.00
Item 605.82251 - 24" Agg. Und. Type 2 w/ 6" Perf. Corr. PE Pipe (LF)	256	$21.00	$5,376.00
Item 647.29 - Wetland Humus (CY)	106	$20.00	$2,120.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$500.00	$500.00
Total			**$85,102.20**

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SUBSURFACE GRAVEL WETLANDS (14633F/ BMP 13)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	8,865	$4.00	$35,460.00
Item 203.2 - Rock Excavation (CY)	1,679	$9.00	$15,111.00
Item 203.6 - Embankment-in-Place (CY)	568	$3.15	$1,789.20
Item 203. 52 - Impervious Material (CY)	4,102	$15.00	$61,530.00
Item 206.2- Rock Structure Excavation (CY)	64	$17.00	$1,088.00
Item 209.1 - Granular Backfill (CY)	9	$28.00	$252.00
Item 520.1 - Concrete Class A (CY)	8	$180.00	$1,440.00
Item 585.3- Stone Fill, Class C (CY)	159	$26.00	$4,134.00
Item 585.5 - Stone Fill, Class E (CY)	922	$25.00	$23,050.00
Item 585.7 - Stone Fill, Class G (CY)	165	$35.00	$5,775.00
Item 593.431 - Geotextile, Perm. Control, Cl. 3, Non-woven (SY)	447	$3.00	$1,341.00
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	72	$21.00	$1,512.00
Item 604.91X - Outlet Control Structure (U)	2	$4,000.00	$8,000.00
Item 604.921 - Leaching Chamber, Type 1 (U)	6	$980.00	$5,880.00
Item 604.922 - Leaching Chamber, Type 2 (U)	5	$960.00	$4,800.00
Item 605.506 - 6" Perf. Corr. Poly. Pipe Underdrain (LF)	384	$15.00	$5,760.00
Item 605.79 - Underdrain Flushing Basins (EA)	5	$300.00	$1,500.00
Item 605.82251 - 24" Agg. Und. Type 2 w/ 6" Perf. Corr. PE Pipe (LF)	994	$20.00	$19,880.00
Item 647.1 - Humus (CY)	640	$20.00	$12,800.00
Item 647.29 - Wetland Humus (CY)	467	$12.50	$5,837.50
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$110.00	$110.00
Total			**$217,049.70**

SUBSURFACE GRAVEL WETLANDS (13742B/ GW #2)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	2,172	$5.00	$10,860.00
Item 203.6 - Embankment-in-Place (CY)	51	$5.00	$255.00
Item 203. 52 - Impervious Material (CY)	462	$14.00	$6,468.00
Item 585.3- Stone Fill, Class C (CY)	93	$27.00	$2,511.00
Item 585.5 - Stone Fill, Class E (CY)	82	$34.00	$2,788.00
Item 585.7 - Stone Fill, Class G (CY)	14	$51.00	$714.00
Item 593.421 - Geotextile, Perm. Control, Cl. 2, Non-woven (SY)	314	$2.50	$785.00
Item 603.80012 - 12" Plastic Pipe (LF)	36	$27.00	$972.00
Item 604.91X - Outlet Control Structure (U)	1	$4,000.00	$4,000.00
Item 604.921 - Leaching Chamber Type 1 (U)	6	$1,350.00	$8,100.00
Item 604.912 - Leaching Chamber Type 2 (U)	5	$1,350.00	$6,750.00
Item 605.506 - 6" Perf. Corr. Poly. Pipe Underdrain (LF)	109	$15.50	$1,689.50
Item 646.3 - Turf Establishment w/ Mulch & Tackifiers (A)	0.50	$1,775.00	$887.50
Item 647.29 - Wetland Humus (CY)	256	$19.00	$4,864.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$170.00	$170.00
Total			**$51,814.00**

SUBSURFACE GRAVEL WETLANDS (13742B/ GW #1)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	1,150	$5.00	$5,750.00
Item 203.6 - Embankment-in-Place (CY)	831	$5.00	$4,155.00
Item 203. 52 - Impervious Material (CY)	924	$14.00	$12,936.00
Item 585.3- Stone Fill, Class C (CY)	98	$27.00	$2,646.00
Item 585.5 - Stone Fill, Class E (CY)	178	$34.00	$6,052.00
Item 585.7 - Stone Fill, Class G (CY)	30	$51.00	$1,530.00
Item 593.421 - Geotextile, Perm. Control, Cl. 2, Non-woven (SY)	333	$2.50	$832.50
Item 603.80012 - 12" Plastic Pipe (LF)	28	$27.00	$756.00
Item 604.91X - Outlet Control Structure (U)	1	$4,000.00	$4,000.00
Item 604.921 - Leaching Chamber Type 1 (U)	6	$1,350.00	$8,100.00
Item 604.912 - Leaching Chamber Type 2 (U)	5	$1,350.00	$6,750.00
Item 605.506 - 6" Perf. Corr. Poly. Pipe Underdrain (LF)	188	$15.50	$2,914.00
Item 646.3 - Turf Establishment w/ Mulch & Tackifiers (A)	0.40	$1,775.00	$710.00
Item 647.1 - Humus (CY)	330	$18.00	$5,940.00
Item 647.29 - Wetland Humus (CY)	60	$19.00	$1,140.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$170.00	$170.00
Total			**$64,381.50**

Attachment B: Subsurface Gravel Wetland Inspection and Maintenance Guidance

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

Regular inspection and maintenance is critical to the effective operation of Gravel Wetland systems. It is the responsibility of the owner to maintain the Gravel Wetland in accordance with the minimum design standards. This page provides guidance on maintenance activities that are typically required for these systems, along with the suggested frequency for each activity. Individual systems may have more, or less, frequent maintenance needs, depending on a variety of factors including the occurrence of large storm events, overly wet or dry (I.E., drought), regional hydrologic conditions, and any changes or redevelopment in the upstream land use.

ACTIVITIES

Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system and vegetation care is important to system productivity and health. A gravel wetland is a subsurface horizontal filtration system and does not rely upon the surface soils for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of inlet standpipes. It is important to ensure these inlets are performing properly.

1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	
POST-CONSTRUCTION ACTIVITY	**FREQUENCY**
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: Inspector:
Date: Time: Site Conditions:
Date Since Last Rain Event:

Inspection Items	Satisfactory (S) or Unsatisfactory (U)		Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)			
Plants are stable, roots not exposed	S	U	
Vegetation is established and thriving	S	U	
No evidence of holes in the wetland soil causing short-circuiting	S	U	
No evidence of erosion at inlet and outlet structures	S	U	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)			
1. Standing Water			
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	S	U	
2. Short Circuiting & Erosion			
No evidence of animal burrows or other holes	S	U	
No evidence of erosion	S	U	
3. Drought Conditions (As needed)			
Water plants as needed	S	U	
Dead or dying plants	S	U	
4. Sedimentation Chamber or Forebay Inlet Inspection			
No evidence of sediment accumulation, trash, and debris.	S	U	
Good condition, no need for repair	S	U	
5. Vegetation Coverage			
50 % coverage established throughout system by first year	S	U	
Robust coverage by year 2 or later	S	U	
6. Inlet and Outlet Controls			
Flow is unobstructed in openings (grates, orifices, etc)	S	U	
Structures are operational with no evidence of deterioration	S	U	
7. Vegetation removal (once every 3 years)			
Prune dead, diseased, or decaying plants	S	U	

Corrective Action Needed	Due Date
1.	
2.	
3.	

Attachment C: Results of Subsurface Gravel Wetland Inspections

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

Regular inspection and maintenance is critical to the effective operation of Gravel Wetland systems. It is the responsibility of the owner to maintain the Gravel Wetland in accordance with the minimum design standards. This page provides guidance on maintenance activities that are typically required for these systems, along with the suggested frequency for each activity. Individual systems may have more, or less, frequent maintenance needs, depending on a variety of factors including the occurrence of large storm events, overly wet or dry (I.E., drought), regional hydrologic conditions, and any changes or redevelopment in the upstream land use.

ACTIVITIES

Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system and vegetation care is important to system productivity and health. A gravel wetland is a subsurface horizontal filtration system and does not rely upon the surface soils for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of inlet standpipes. It is important to ensure these inlets are performing properly.

1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	
POST-CONSTRUCTION ACTIVITY	**FREQUENCY**
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: I93 NB & SB Exit 5 Area DOT#: 14633F BMP 19 Inspector: Tim Puls
Date: 7/18/14 Time: 1:00PM Site Conditions: Poor
Date of Last Rain Event: 7/16/14

Inspection Items	Satisfactory (S) or Unsatisfactory (U)	Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)		
Plants are stable, roots not exposed	S U	Constructed 2013-2014
Vegetation is established and thriving	S U	
No evidence of holes in the wetland soil causing short-circuiting	S U	
No evidence of erosion at inlet and outlet structures	S U	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)		
1. Standing Water		
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	S U	Standing water in fore bay & both cells, approx. 3-5”
2. Short Circuiting & Erosion		
No evidence of animal burrows or other holes	S U	
No evidence of erosion	S U	
3. Drought Conditions (As needed)		Too much water. Plants are thin in areas where water has been pooling.
Water plants as needed	S U	
Dead or dying plants	S U	
4. Sedimentation Chamber or Forebay Inlet Inspection		
No evidence of sediment accumulation, trash, and debris.	S U	
Good condition, no need for repair	S U	
5. Vegetation Coverage		NA
50 % coverage established throughout system by first year	S U	
Robust coverage by year 2 or later	S U	
6. Inlet and Outlet Controls:		
Flow is unobstructed in openings (grates, orifices, etc)	S U	
Structures are operational with no evidence of deterioration	S U	
7. Vegetation removal (once every 3 years)		NA
Prune dead, diseased, or decaying plants	S U	

Corrective Action Needed	Due Date
1. Outlet pipe invert is above the wetland soil elevation which keeps the system flooded. Could bring the soil up another 6-8”.	ASAP
COMMENT: Area of system is smaller than other BMPs but has the same number of structures.	

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

Regular inspection and maintenance is critical to the effective operation of Gravel Wetland systems. It is the responsibility of the owner to maintain the Gravel Wetland in accordance with the minimum design standards. This page provides guidance on maintenance activities that are typically required for these systems, along with the suggested frequency for each activity. Individual systems may have more, or less, frequent maintenance needs, depending on a variety of factors including the occurrence of large storm events, overly wet or dry (I.E., drought), regional hydrologic conditions, and any changes or redevelopment in the upstream land use.

ACTIVITIES

Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system and vegetation care is important to system productivity and health. A gravel wetland is a subsurface horizontal filtration system and does not rely upon the surface soils for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of inlet standpipes. It is important to ensure these inlets are performing properly.

1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	
POST-CONSTRUCTION ACTIVITY	**FREQUENCY**
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: I93 NB, East side DOT#: 14633F BMP 18 Inspector: Tim Puls
Date: 7/18/14 Time: 1:45PM Site Conditions: Fair, Draining
Date of Last Rain Event: 7/16/14

Inspection Items	Satisfactory (S) or Unsatisfactory (U)	Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)		
Plants are stable, roots not exposed	S U	Constructed 2013-2014
Vegetation is established and thriving	S U	
No evidence of holes in the wetland soil causing short-circuiting	S U	
No evidence of erosion at inlet and outlet structures	S U	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)		
1. Standing Water		
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	S U	Standing water in fore bay & both cells, approx. 3-5”
2. Short Circuiting & Erosion		
No evidence of animal burrows or other holes	S U	
No evidence of erosion	S U	
3. Drought Conditions (As needed)		Too much water. Plants are thin in areas where water has been pooling.
Water plants as needed	S U	
Dead or dying plants	S U	
4. Sedimentation Chamber or Forebay Inlet Inspection		
No evidence of sediment accumulation, trash, and debris.	S U	
Good condition, no need for repair	S U	
5. Vegetation Coverage		
50 % coverage established throughout system by first year	S U	NA
Robust coverage by year 2 or later	S U	
6. Inlet and Outlet Controls:		A piece of trash was blocking outlet orifice. Blockage cleared and system began to drain.
Flow is unobstructed in openings (grates, orifices, etc)	S U	
Structures are operational with no evidence of deterioration	S U	
7. Vegetation removal (once every 3 years)		NA
Prune dead, diseased, or decaying plants	S U	

Corrective Action Needed	Due Date
1. Outlet control structure has slotted inlets (4” x 12”) that are unprotected. Bring rip rap up over the inlet slots to keep trash out of structure.	ASAP
COMMENT: Area of system is smaller than other BMPs but has the same number of structures.	

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

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ACTIVITIES

Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system and vegetation care is important to system productivity and health. A gravel wetland is a subsurface horizontal filtration system and does not rely upon the surface soils for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of inlet standpipes. It is important to ensure these inlets are performing properly.

1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	

POST-CONSTRUCTION ACTIVITY	FREQUENCY
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: I93 Exit 5 NB Off Ramp Area DOT#: 14633F　　Inspector: Tim Puls

Date: 7/18/14　　Time: 12:30AM　　Site Conditions: Very Good

Date of Last Rain Event: 7/16/14　　Two systems – BMP 13, BMP 16

Inspection Items	Satisfactory (S) or Unsatisfactory (U)		Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)			
Plants are stable, roots not exposed	S	U	New systems – BMP 13 approx. 1.5 years old and BMP 16 is approx. 6 months. GC is Severino Construction
Vegetation is established and thriving	S	U	
No evidence of holes in the wetland soil causing short-circuiting	S	U	
No evidence of erosion at inlet and outlet structures	S	U	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)			
1. Standing Water			
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	S	U	None
2. Short Circuiting & Erosion			
No evidence of animal burrows or other holes	S	U	
No evidence of erosion	S	U	
3. Drought Conditions (As needed)			
Water plants as needed	S	U	
Dead or dying plants	S	U	
4. Sedimentation Chamber or Forebay Inlet Inspection			
No evidence of sediment accumulation, trash, and debris.	S	U	
Good condition, no need for repair	S	U	
5. Vegetation Coverage			
50 % coverage established throughout system by first year	S	U	
Robust coverage by year 2 or later	S	U	
6. Inlet and Outlet Controls:			
Flow is unobstructed in openings (grates, orifices, etc)	S	U	
Structures are operational with no evidence of deterioration	S	U	
7. Vegetation removal (once every 3 years)			
Prune dead, diseased, or decaying plants	S	U	

Corrective Action Needed	Due Date
COMMENT: Both BMPs drain to a central 48" line. Could reduce number of hydraulic inlets and cleanout structures.	

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

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ACTIVITIES

Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system and vegetation care is important to system productivity and health. A gravel wetland is a subsurface horizontal filtration system and does not rely upon the surface soils for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of inlet standpipes. It is important to ensure these inlets are performing properly.

1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	

POST-CONSTRUCTION ACTIVITY	FREQUENCY
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: I93 Exit 5 NB On Ramp DOT#: 14633E BMP 17 — Inspector: Tim Puls
Date: 7/18/14 — Time: 1:30PM — Site Conditions: Good
Date of Last Rain Event: 7/16/14

Inspection Items	Satisfactory (S) or Unsatisfactory (U)		Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)			
Plants are stable, roots not exposed	S	U	NA System constructed in 2008-2009
Vegetation is established and thriving	S	U	
No evidence of holes in the wetland soil causing short-circuiting	S	U	
No evidence of erosion at inlet and outlet structures	S	U	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)			
1. Standing Water			
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	S	U	Fore bay has pooled water. Full of cattails.
2. Short Circuiting & Erosion			
No evidence of animal burrows or other holes	S	U	
No evidence of erosion	S	U	
3. Drought Conditions (As needed)			
Water plants as needed	S	U	
Dead or dying plants	S	U	
4. Sedimentation Chamber or Forebay Inlet Inspection			
No evidence of sediment accumulation, trash, and debris.	S	U	
Good condition, no need for repair	S	U	
5. Vegetation Coverage			
50 % coverage established throughout system by first year	S	U	
Robust coverage by year 2 or later	S	U	
6. Inlet and Outlet Controls:			
Flow is unobstructed in openings (grates, orifices, etc)	S	U	
Structures are operational with no evidence of deterioration	S	U	
7. Vegetation removal (once every 3 years)			No maintenance has been done to date.
Prune dead, diseased, or decaying plants	S	U	

Corrective Action Needed	Due Date
1. Cut vegetation down to base and remove from system.	ASAP
COMMENT: Area of system is larger than other BMPs but has the same number of structures. 6 hydraulic inlets, 5 leach basins, 1 outlet	

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

Regular inspection and maintenance is critical to the effective operation of Gravel Wetland systems. It is the responsibility of the owner to maintain the Gravel Wetland in accordance with the minimum design standards. This page provides guidance on maintenance activities that are typically required for these systems, along with the suggested frequency for each activity. Individual systems may have more, or less, frequent maintenance needs, depending on a variety of factors including the occurrence of large storm events, overly wet or dry (I.E., drought), regional hydrologic conditions, and any changes or redevelopment in the upstream land use.

ACTIVITIES

Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system and vegetation care is important to system productivity and health. A gravel wetland is a subsurface horizontal filtration system and does not rely upon the surface soils for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of inlet standpipes. It is important to ensure these inlets are performing properly.

1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	

POST-CONSTRUCTION ACTIVITY	FREQUENCY
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: I93 Exit 5 SB On Ramp DOT#: 14633E BMP 14 Inspector: Tim Puls
Date: 7/18/14 Time: 1:20PM Site Conditions: Good
Date of Last Rain Event: 7/16/14

Inspection Items	Satisfactory (S) or Unsatisfactory (U)		Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)			
Plants are stable, roots not exposed	S	U	NA System constructed in 2008-2009
Vegetation is established and thriving	S	U	
No evidence of holes in the wetland soil causing short-circuiting	S	U	
No evidence of erosion at inlet and outlet structures	S	U	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)			
1. Standing Water			
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	S	U	Fore bay is dry
2. Short Circuiting & Erosion			
No evidence of animal burrows or other holes	S	U	
No evidence of erosion	S	U	
3. Drought Conditions (As needed)			
Water plants as needed	S	U	
Dead or dying plants	S	U	
4. Sedimentation Chamber or Forebay Inlet Inspection			
No evidence of sediment accumulation, trash, and debris.	S	U	
Good condition, no need for repair	S	U	
5. Vegetation Coverage			
50 % coverage established throughout system by first year	S	U	
Robust coverage by year 2 or later	S	U	
6. Inlet and Outlet Controls:			
Flow is unobstructed in openings (grates, orifices, etc)	S	U	
Structures are operational with no evidence of deterioration	S	U	
7. Vegetation removal (once every 3 years)			No maintenance has been done to date.
Prune dead, diseased, or decaying plants	S	U	

Corrective Action Needed	Due Date
1. Cut vegetation down to base and remove from system.	ASAP
COMMENT: Area of system is smaller than other BMPs but has the same number of structures. 6 hydraulic inlets, 5 leach basins, 1 outlet	

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

Regular inspection and maintenance is critical to the effective operation of Gravel Wetland systems. It is the responsibility of the owner to maintain the Gravel Wetland in accordance with the minimum design standards. This page provides guidance on maintenance activities that are typically required for these systems, along with the suggested frequency for each activity. Individual systems may have more, or less, frequent maintenance needs, depending on a variety of factors including the occurrence of large storm events, overly wet or dry (I.E., drought), regional hydrologic conditions, and any changes or redevelopment in the upstream land use.

ACTIVITIES

Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system and vegetation care is important to system productivity and health. A gravel wetland is a subsurface horizontal filtration system and does not rely upon the surface soils for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of inlet standpipes. It is important to ensure these inlets are performing properly.

1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	

POST-CONSTRUCTION ACTIVITY	FREQUENCY
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: I93 Exit 1 NB Off Ramp DOT#: 13933C Inspector: Tim Puls
Date: 7/18/14 Time: 11:00AM Site Conditions: Very Good
Date of Last Rain Event: 7/16/14

Inspection Items	Satisfactory (S) or Unsatisfactory (U)		Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)			
Plants are stable, roots not exposed	S	U	NA – This system was constructed in 2007
Vegetation is established and thriving	S	U	
No evidence of holes in the wetland soil causing short-circuiting	S	U	
No evidence of erosion at inlet and outlet structures	S	U	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)			
1. Standing Water			
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	S	U	None
2. Short Circuiting & Erosion			
No evidence of animal burrows or other holes	S	U	
No evidence of erosion	S	U	
3. Drought Conditions (As needed)			
Water plants as needed	S	U	
Dead or dying plants	S	U	
4. Sedimentation Chamber or Forebay Inlet Inspection			Some trash has accumulated
No evidence of sediment accumulation, trash, and debris.	S	U	
Good condition, no need for repair	S	U	
5. Vegetation Coverage			Plants are in good condition. Treatment cells are densely vegetated.
50 % coverage established throughout system by first year	S	U	
Robust coverage by year 2 or later	S	U	
6. Inlet and Outlet Controls:			Concrete outlet structure 8' x 10'
Flow is unobstructed in openings (grates, orifices, etc)	S	U	
Structures are operational with no evidence of deterioration	S	U	
7. Vegetation removal (once every 3 years)			No maintenance has been done to date.
Prune dead, diseased, or decaying plants	S	U	

Corrective Action Needed	Due Date
1. Maintain vegetation = cut down to base of plant and remove vegetation from system	
COMMENT: This is an extremely large system. RRoseen advised them to replace "E Stone" with 3/8" pea stone during construction.	

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

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ACTIVITIES

Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system and vegetation care is important to system productivity and health. A gravel wetland is a subsurface horizontal filtration system and does not rely upon the surface soils for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of inlet standpipes. It is important to ensure these inlets are performing properly.

1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	

POST-CONSTRUCTION ACTIVITY	FREQUENCY
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: Rt. 16 NB Exit 5 | Inspector: Jamie Houle, Tim Puls
Date: 6/20/14 | Time: 10:00AM | Site Conditions: Good
Date of Last Rain Event: 6/13/14 (0.75")

Inspection Items	Satisfactory (S) or Unsatisfactory (U)		Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)			
Plants are stable, roots not exposed	S	U	NA System constructed in 2010-2011
Vegetation is established and thriving	S	U	
No evidence of holes in the wetland soil causing short-circuiting	S	U	
No evidence of erosion at inlet and outlet structures	S	U	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)			
1. Standing Water			
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	S	U	Fore bay has pooled water. Some cattails.
2. Short Circuiting & Erosion			
No evidence of animal burrows or other holes	S	U	
No evidence of erosion	S	U	
3. Drought Conditions (As needed)			
Water plants as needed	S	U	
Dead or dying plants	S	U	
4. Sedimentation Chamber or Forebay Inlet Inspection			Wet fore bay w/ evidence of anaerobic conditions, i.e. standing water, cattails, and algae.
No evidence of sediment accumulation, trash, and debris.	S	U	
Good condition, no need for repair	S	U	
5. Vegetation Coverage			
50 % coverage established throughout system by first year	S	U	
Robust coverage by year 2 or later	S	U	
6. Inlet and Outlet Controls:			Inlet is obstructed due to high elevation of fore bay control. Need low flow outlet from fore bay.
Flow is unobstructed in openings (grates, orifices, etc)	S	U	
Structures are operational with no evidence of deterioration	S	U	
7. Vegetation removal (once every 3 years)			
Prune dead, diseased, or decaying plants	S	U	

Corrective Action Needed	Due Date
1. Fore bay needs to be drained. 2.2ft of standing water.	ASAP
COMMENT:	

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

Regular inspection and maintenance is critical to the effective operation of Gravel Wetland systems. It is the responsibility of the owner to maintain the Gravel Wetland in accordance with the minimum design standards. This page provides guidance on maintenance activities that are typically required for these systems, along with the suggested frequency for each activity. Individual systems may have more, or less, frequent maintenance needs, depending on a variety of factors including the occurrence of large storm events, overly wet or dry (I.E., drought), regional hydrologic conditions, and any changes or redevelopment in the upstream land use.

ACTIVITIES

Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system and vegetation care is important to system productivity and health. A gravel wetland is a subsurface horizontal filtration system and does not rely upon the surface soils for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of inlet standpipes. It is important to ensure these inlets are performing properly.

1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	
POST-CONSTRUCTION ACTIVITY	**FREQUENCY**
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: I93 Exit 2 Park & Ride. DOT#: 10418G — Inspector: Tim Puls

Date: 7/18/14 — Time: 10:30AM — Site Conditions: Very Good

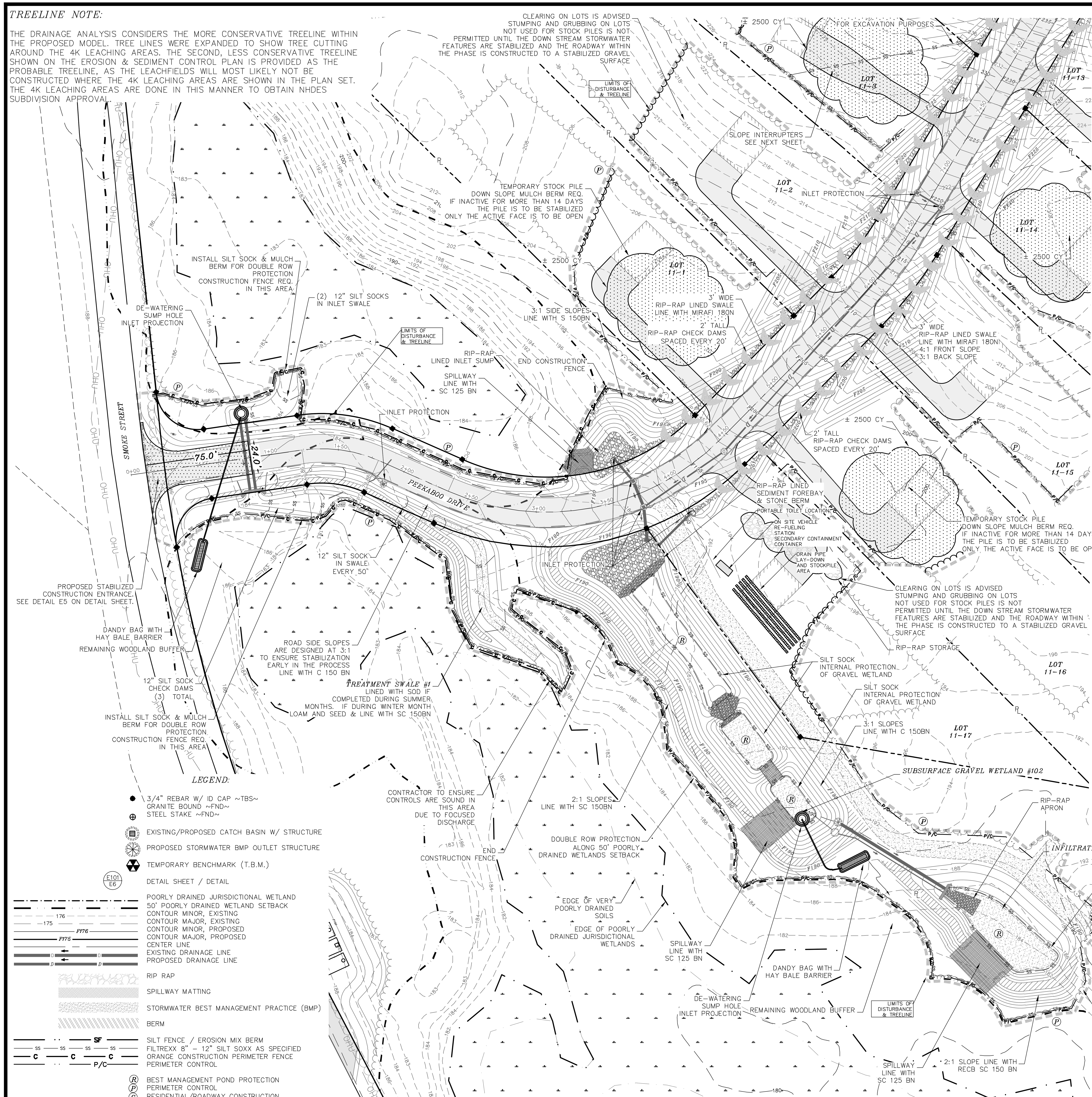
Date of Last Rain Event: 7/16/14

Inspection Items	Satisfactory (S) or Unsatisfactory (U)	Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)		
Plants are stable, roots not exposed	S U	NA – This system was constructed in 2007
Vegetation is established and thriving	S U	
No evidence of holes in the wetland soil causing short-circuiting	S U	
No evidence of erosion at inlet and outlet structures	S U	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)		
1. Standing Water		
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	S U	Plunge pools around the 3 inlet locations
2. Short Circuiting & Erosion		
No evidence of animal burrows or other holes	S U	
No evidence of erosion	S U	
3. Drought Conditions (As needed)		
Water plants as needed	S U	
Dead or dying plants	S U	
4. Sedimentation Chamber or Forebay Inlet Inspection		Some trash has accumulated
No evidence of sediment accumulation, trash, and debris.	S U	
Good condition, no need for repair	S U	
5. Vegetation Coverage		Plants are in good condition. Forebay is >95% cattails. Treatment cells are densely vegetated.
50 % coverage established throughout system by first year	S U	
Robust coverage by year 2 or later	S U	
6. Inlet and Outlet Controls		
Flow is unobstructed in openings (grates, orifices, etc)	S U	
Structures are operational with no evidence of deterioration	S U	
7. Vegetation removal (once every 3 years)		No maintenance has been done to date.
Prune dead, diseased, or decaying plants	S U	

Corrective Action Needed	Due Date
1. Maintain vegetation = cut down to base of plant and remove vegetation from system	
COMMENT: Perimeter ground water drainage is a 6” PUD in 2’x3’ stone trench. Flow is directed to inlets.	

TREELINE NOTE:

THE DRAINAGE ANALYSIS CONSIDERS THE MORE CONSERVATIVE TREELINE WITHIN THE PROPOSED MODEL. TREE LINES WERE EXPANDED TO SHOW TREE CUTTING AROUND THE 4K LEACHING AREAS. THE SECOND, LESS CONSERVATIVE TREELINE SHOWN ON THE EROSION & SEDIMENT CONTROL PLAN IS PROVIDED AS THE PROBABLE TREELINE, AS THE LEACHFIELDS WILL MOST LIKELY NOT BE CONSTRUCTED WHERE THE 4K LEACHING AREAS ARE SHOWN IN THE PLAN SET. THE 4K LEACHING AREAS ARE DONE IN THIS MANNER TO OBTAIN NHDES SUBDIVISION APPROVAL.



NOTES:

1.) OWNER: FREDERICK FERNALD
PO.BOX 1805
WOLFEBORO, NH 03894

2.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

3.) THE PROJECT PARCEL IS TAX MAP 23, LOT 11

4.) LOT AREA: 4,477,048 Sq. Ft., 102.77 ACRES

5.) UNDERGROUND UTILITY LOCATIONS ARE BASED UPON BEST AVAILABLE EVIDENCE AND ARE NOT FIELD VERIFIED. LOCATING AND PROTECTING ANY ABOVE AND BELOW GROUND UTILITIES IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. ANY UTILITY CONFLICTS SHOULD BE REPORTED IMMEDIATELY TO THE DESIGN ENGINEER.

6.) THE CONTRACTOR SHALL CALL AND COORDINATE WITH DIGSAFE AT 1-888-344-7233 AT LEAST 72 HOURS PRIOR TO COMMENCING ANY EXCAVATION ON PUBLIC OR PRIVATE PROPERTY.

7.) ALL DRAINAGE PIPE IS TO BE HDPE N-12. INDIVIDUAL PIPE SIZES ARE SPECIFIED ON GRADING AND DETAIL PLAN SHEETS, GREEN PIPE.

8.) ALL ELEVATIONS TO BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. THE DESIGN ENGINEER IS TO BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCY. TEMPORARY BENCHMARKS (T.B.M.) ARE TO BE PROVIDED BY THE DESIGN ENGINEER.

9.) UPON FINAL COMPLETION AND 85% STABILIZATION, THE DRAINAGE SYSTEM IS TO BE CLEANED OF ALL DEBRIS. SEDIMENT CONTROL PRACTICES REMOVED AND DISPOSED OF PROPERLY, AND ANNUAL MAINTENANCE PREFORMED ON ALL DRAINAGE PRACTICES.

10.) 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 NOTTINGHAM 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.

11.) 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) PERIMETER CONTROL IS SEDIMENT CONTROL E.G.; SILT FENCE, SILT SOXX, OR EROSION CONTROL MULCH BERM. 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 ARE REQUIRED WHEN UPGRADIENT DISTURBED SOIL IS GREATER THAN 5%. MULCH BERM CAN BE USED WHEN THE UPGRADIENT DISTURBED SOIL IS 5% OR LESS.

12.) THE FOLLOWING STORMWATER MEASURES ARE REQUIRED:

A.) ALL PROPOSED BMPs WILL CONFORM TO THE NH STORMWATER MANUAL VOLUME 3.
B.) EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED PRIOR TO ANY SOIL LAND DISTURBANCE AND MUST BE REVIEWED AND APPROVED BY COMMUNITY SERVICE.
C.) TEMPORARY STABILIZATION MEASURES SHOULD BE IN PLACE WITHIN SEVEN CALENDAR DAYS FOR EXPOSED SOILS AREAS THAT ARE WITHIN ONE HUNDRED FEET OF A SURFACE WATER BODY OR A WETLAND AND NO MORE THAN 14 CALENDAR DAYS FOR ALL OTHER AREAS. PERMANENT STABILIZATION SHOULD BE IN PLACE WITHIN THREE CALENDAR DAYS FOLLOWING COMPLETION OF FINAL GRADING OF EXPOSED SOIL AREAS.
D.) ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED IN FUNCTIONING CONDITION UNTIL FINAL STABILIZATION IS ACCOMPLISHED.
E.) TOWN OF NOTTINGHAM TECHNICAL EMPLOYEES OR THEIR DESIGNATED AGENT SHALL HAVE ACCESS TO THE SITE TO COMPLETE ROUTINE INSPECTIONS AND SHALL BE NOTIFIED 24-HOURS PRIOR TO INSTALLATION OF A STORMWATER BMP IN ORDER TO SCHEDULE AN INSPECTION, DURING NORMAL WORKING HOURS.
F.) THE PLANNING BOARD REQUIRES THE DESIGN ENGINEER AND/OR AN INDEPENDENT, THIRD-PARTY INSPECTION AND OVERSIGHT OF THE CONSTRUCTION OF STORMWATER MANAGEMENT FACILITIES AND EROSION AND SEDIMENT CONTROL AT THEIR DISCRETION. THE OWNER / APPLICANT IS RESPONSIBLE FOR ALL FEES ASSOCIATED WITH INSPECTIONS.
G.) 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 STORMWATER INSPECTOR (CESSWI), OR A CERTIFIED PROFESSIONAL IN STORMWATER QUALITY (CPSWQ). INSPECTION REPORTS WILL BE SUBMITTED TO THE PLANNING DEPARTMENT / LAND USE OFFICE.

13.) CONTRACTOR IS REQUIRED TO HAVE A CONSTRUCTION ENTRANCE. 3" ANGULAR STONE IS REQUIRED.

14.) CONTRACTOR IS RESPONSIBLE FOR SWEEPING THE ROADWAY, AND ANYTHING DISTURBED, TO ENSURE THAT NO SEDIMENT IS BEING TRACKED ONTO SMOKE STREET.

15.) CONTRACTOR IS RESPONSIBLE FOR CLEANING AND MAINTAINING THE INLET PROTECTION ONCE INSTALLED.

16.) FUGITIVE DUST IS TO BE CONTROLLED THROUGHOUT THE CONSTRUCTION PROCESS IN ACCORDANCE WITH ENV-A 1000.

17.) CONTRACTOR IS TO MEET THE REQUIREMENTS SPECIFIED IN RSA 430:51-57 AND AGR 3800, RELATING TO INVASIVE SPECIES.

18.) 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.

19.) WINTER STABILIZATION NOTES ARE INCLUDED ON SHEET E-102 TO INCLUDE THE LIMIT OF ONE ACRE OF UN-STABILIZED SOIL AFTER OCTOBER 15TH.

20.) THE CONTRACTOR IS TO NOTE THE REQUIRED PHASING PLAN. DURING THE EXCAVATION PERIOD THE LOAM WITH THE EXCAVATED AREA IS TO REMAIN ONSITE, SCREENED AND REPLACED FOR STABILIZATION.

GRAPHIC SCALE

(IN FEET)
1 inch = 40 ft.

SOILS & DEWATERING:

12	*- HINCKLEY LOAMY SAND*	*K = 0.17*
43	*- CANTON FINE SANDY LOAM*	*K = 0.24*
67	*- PAXTON FINE SANDY LOAM*	*K = 0.43*
140	*- CHATFIELD-HOLLIS-CANTON COMPLEX*	*K = 0.24*
313	*- DEERFIELD LOAMY FINE SAND*	*K = 0.17*
547	*- WALPOLE VERY FINE SANDY LOAM, VERY STONY*	

SEE SITE SPECIFIC SOILS MAP (SSSM)
SEE WEBSOIL USDA-NRCS
ERODIBILITY FACTOR - K, CPESC MANUAL, ENVIROCERT INTERNATIONAL INC. & ROCKINGHAM COUNTTY SOIL SURVEY, ROCKWEB SOIL ATTRIBUTES.

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.

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.

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.

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

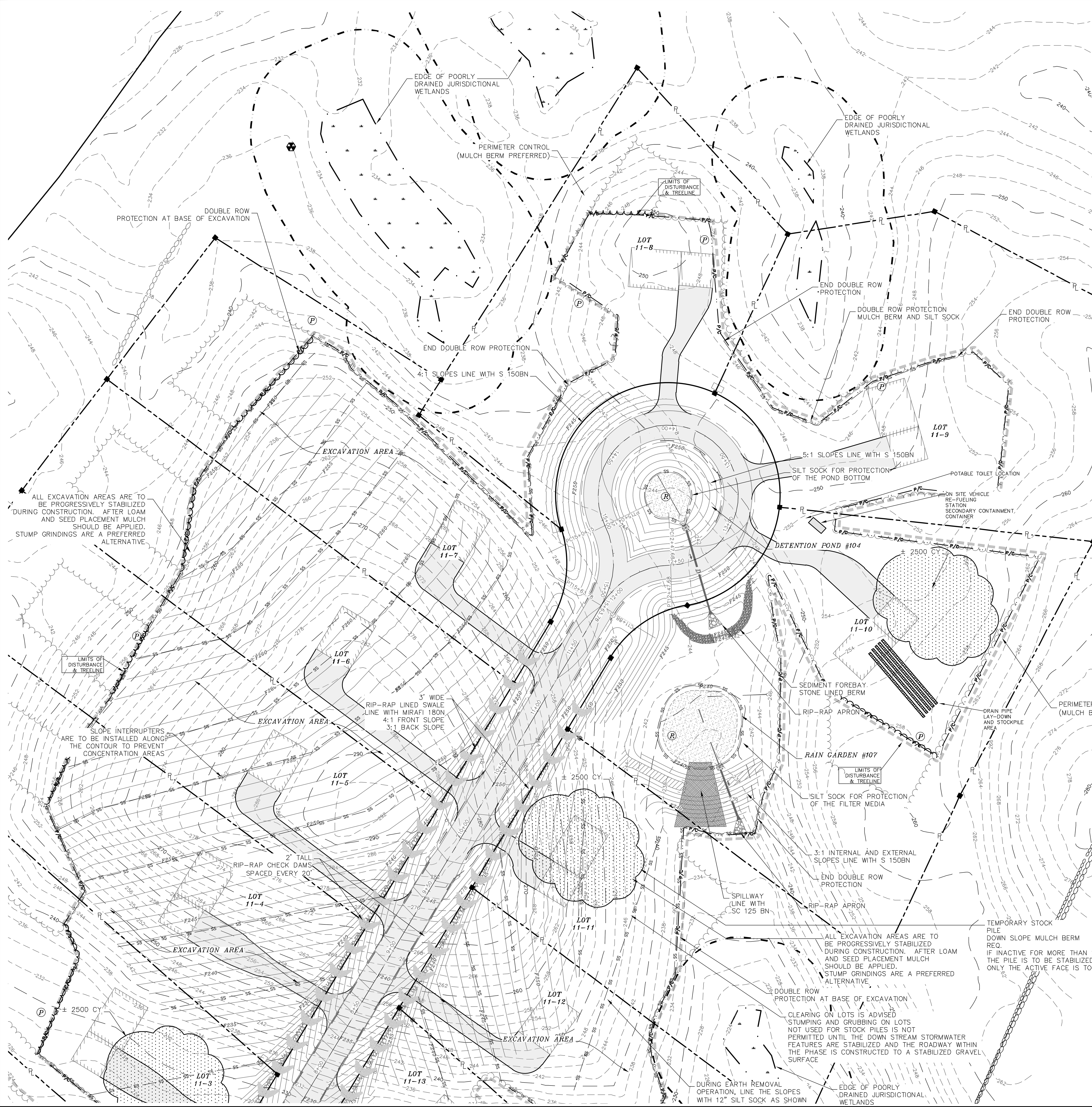
EROSION AND SEDIMENT CONTROL PLAN PEEKABOO DRIVE 0+00 - 8+00

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 40 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14246
LICENSED
PROFESSIONAL ENGINEER



NOTES:

1.) OWNER: FREDERICK FERNALD
PO.BOX 1805
WOLFEBORO, NH 03894

2.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

3.) THE PROJECT PARCEL IS TAX MAP 23, LOT 11

4.) LOT AREA: 4,477,048 Sq. Ft., 102.77 ACRES

5.) SEE SHEET 66 FOR OTHER E+SC NOTES

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

TREELINE NOTE:

THE DRAINAGE ANALYSIS CONSIDERS THE MORE CONSERVATIVE TREELINE WITHIN THE PROPOSED MODEL. TREE LINES WERE EXPANDED TO SHOW TREE CUTTING AROUND THE 4K LEACHING AREAS. THE SECOND, LESS CONSERVATIVE TREELINE SHOWN ON THE EROSION & SEDIMENT CONTROL PLAN IS PROVIDED AS THE PROBABLE TREELINE, AS THE LEACHFIELDS WILL MOST LIKELY NOT BE CONSTRUCTED WHERE THE 4K LEACHING AREAS ARE SHOWN IN THE PLAN SET. THE 4K LEACHING AREAS ARE DONE IN THIS MANNER TO OBTAIN NHDES SUBDIVISION APPROVAL.

LEGEND:

- 3/4" REBAR W/ ID CAP ~TBS~
- GRANITE BOUND ~FND~
- STEEL STAKE ~FND~
- EXISTING/PROPOSED CATCH BASIN W/ STRUCTURE
- PROPOSED STORMWATER BMP OUTLET STRUCTURE
- TEMPORARY BENCHMARK (T.B.M.)
- DETAIL SHEET / DETAIL
- POORLY DRAINED JURISDICTIONAL WETLAND
- 50' POORLY DRAINED WETLAND SETBACK
- CONTOUR MINOR, EXISTING
- CONTOUR MAJOR, EXISTING
- CONTOUR MINOR, PROPOSED
- CONTOUR MAJOR, PROPOSED
- CENTER LINE
- EXISTING DRAINAGE LINE
- PROPOSED DRAINAGE LINE
- RIP RAP
- SPILLWAY MATTING
- STORMWATER BEST MANAGEMENT PRACTICE (BMP)
- BERM
- SILT FENCE / EROSION MIX BERM
- FILTREXX 8" - 12" SILT SOXX AS SPECIFIED
- ORANGE CONSTRUCTION PERIMETER FENCE
- PERIMETER CONTROL
- Ⓑ BEST MANAGEMENT POND PROTECTION
- Ⓟ PERIMETER CONTROL
- Ⓒ RESIDENTIAL/ROADWAY CONSTRUCTION

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

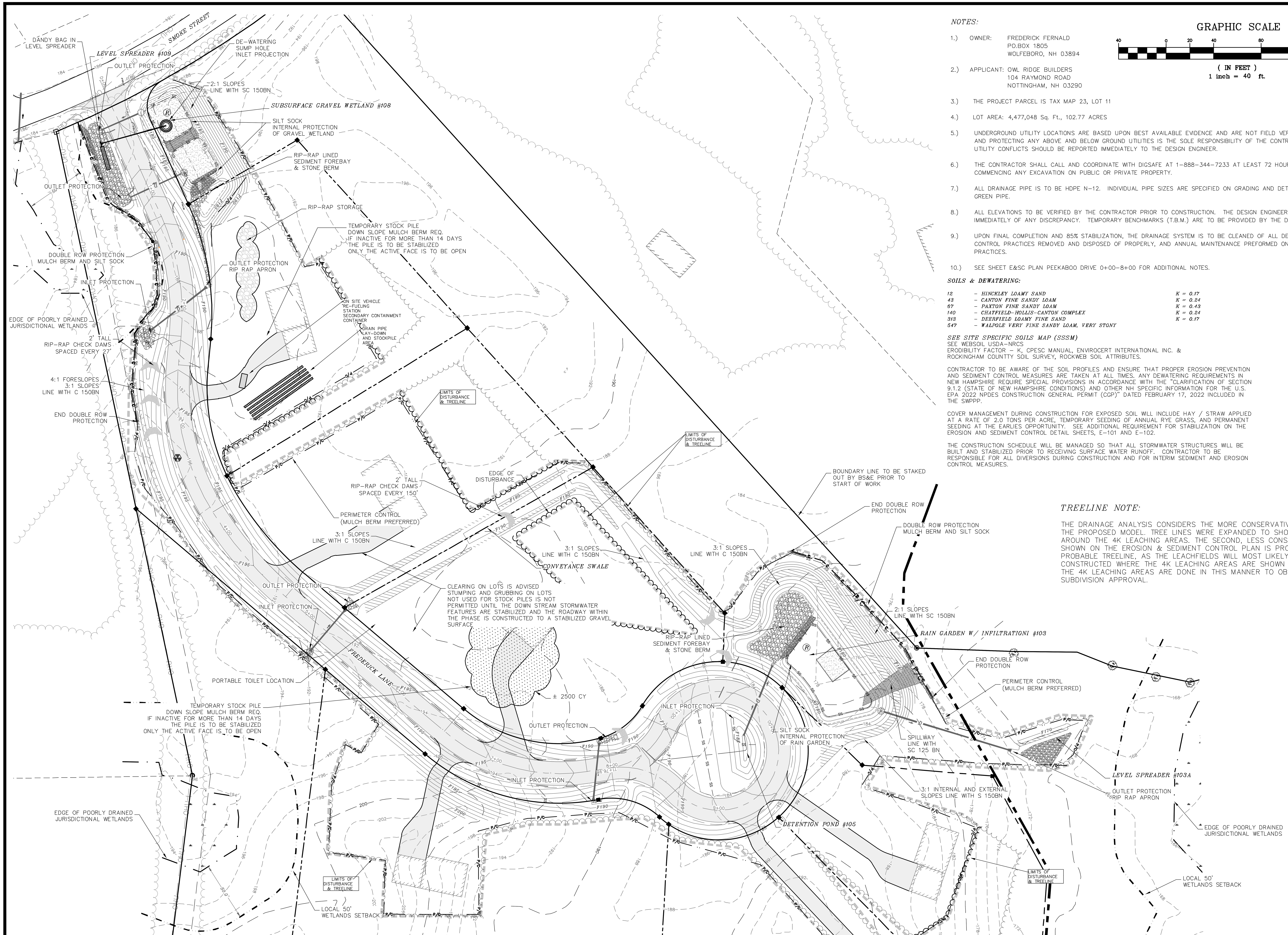
EROSION AND SEDIMENT CONTROL PLAN PEEKABOO DRIVE 8+00 – END

FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 40 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14240
LICENSED
PROFESSIONAL ENGINEER



NOTES:

1.) OWNER: FREDERICK FERNALD
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WOLFEBORO, NH 03894

2.) APPLICANT: OWL RIDGE BUILDERS
104 RAYMOND ROAD
NOTTINGHAM, NH 03290

3.) THE PROJECT PARCEL IS TAX MAP 23, LOT 11

4.) LOT AREA: 4,477,048 Sq. Ft., 102.77 ACRES

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8.) ALL ELEVATIONS TO BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. THE DESIGN ENGINEER IS TO BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCY. TEMPORARY BENCHMARKS (T.B.M.) ARE TO BE PROVIDED BY THE DESIGN ENGINEER.

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10.) SEE SHEET E&SC PLAN PEEKABOO DRIVE 0+00-8+00 FOR ADDITIONAL NOTES.

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

SOILS & DEWATERING:

12	*- HINCKLEY LOAMY SAND*	*K = 0.17*
43	*- CANTON FINE SANDY LOAM*	*K = 0.24*
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SEE SITE SPECIFIC SOILS MAP (SSSM)
SEE WEBSOIL USDA-NRCS
ERODIBILITY FACTOR - K, CPESC MANUAL, ENVIROCERT INTERNATIONAL INC. &
ROCKINGHAM COUNTTY SOIL SURVEY, ROCKWEB SOIL ATTRIBUTES.

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.

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.

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.

TREELINE NOTE:

THE DRAINAGE ANALYSIS CONSIDERS THE MORE CONSERVATIVE TREELINE WITHIN THE PROPOSED MODEL. TREE LINES WERE EXPANDED TO SHOW TREE CUTTING AROUND THE 4K LEACHING AREAS. THE SECOND, LESS CONSERVATIVE TREELINE SHOWN ON THE EROSION & SEDIMENT CONTROL PLAN IS PROVIDED AS THE PROBABLE TREELINE, AS THE LEACHFIELDS WILL MOST LIKELY NOT BE CONSTRUCTED WHERE THE 4K LEACHING AREAS ARE SHOWN IN THE PLAN SET. THE 4K LEACHING AREAS ARE DONE IN THIS MANNER TO OBTAIN NHDES SUBDIVISION APPROVAL.

REVISION	DATE	DESCRIPTION
#1	12-11-23	REVISED PER CMA ENGINEERS REVIEW

EROSION AND SEDIMENT CONTROL PLAN, FREDERICK LANE
FOR
OWL RIDGE BUILDERS
LAND OF
FREDERICK FERNALD
SMOKE STREET & FORT HILL ROAD
NOTTINGHAM, N.H.
TAX MAP 23, LOT 11

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

SCALE : 1 IN. EQUALS 40 FT.
DATE : FEBRUARY 15, 2023
FILE NO. : DB 2020 - 065

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14240
LICENSED
PROFESSIONAL ENGINEER

NOT FOR CONSTRUCTION