ECM
Eric C. Mitchell & Associates, Inc.
Planning, Site Design, Surveying, Environmental

ALLENSTOWN MAP 402-LOT 152-3
SUBDIVISION OF LAND AND LOT LINE ADJUSTMENT

Mount Delight & Middle Roads

ALLENSTOWN, NH

Job # 14-61
CULVERT CHECK

February 25, 2016

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INTRODUCTION

This proposal is for subdivision of the existing lot 152-3 of 10+- acres into 2 single family residential lots of 5 acres. The site is located within a residential community between two town roads Mount Delight Road and Middle Road. The two of the proposed lots will have access and frontage on Mount Delight Road. The purpose of this study is to provide adequate driveway culverts for the proposed driveways and adequately size a diversion berm along the westerly property line of Lot 152-3 at the request of the town during the Technical review Meeting on February 24, 2016 The drainage for these structures have been reviewed for the 10, and 25 year storm design storm event.

PREDEVELOPMENT CONDITIONS

Currently the site is an existing 10 acre vacant wooded lot. The site is moderately steep with numerous wetlands throughout the parcel. Drainage from the site flows in a general northerly direction into the existing roadside drainage ditch along Mount Delight Road. The area is undeveloped and primarily wooded

Soils on the site consist primarily of 250D Chatfield-Hollis Montauck Complex HSG B and 141D Hollis Rock outcrop HSG D. Soils were obtained from the most recent NRCS Webb Soil Survey.

POST DEVELOPMENT CONDITIONS

The proposed culverts and swales have been sized for the 25 year storm event and checked for flooding for the 50 year storm event.

CONCLUSION

The proposed driveway for lot 152-4 will require a driveway culvert of 15" this culvert will adequately pass the 25 year storm elevation and it has been checked for flooding for the 50 year storm event.

The roadway ditch along Mount Delight road is a 1 foot deep ditch this ditch adequately passes the 25 year storm event and does not flood for the 50 year storm event.
The proposed driveway for lot 152-3 will require a driveway culvert of 18". This culvert will adequately pass the 25 year storm event and does not flood for the 50 year storm event.

The diversion berm along the westerly property line has been provided at the request of the town to direct roadway water back out into the undisturbed woodlands and prevent drainage and erosion problems at the existing lot 152-2. The diversion berm has been sized for the 25 year storm event and adequately passes the 50 year storm event without flooding.

The proposed culverts have been provided with inlet and outlet rip rap protection and flared end sections as well as permanent stone dams places within the drainage swales and diversion berm to reduce erosion and prevent siltation.

METHODOLOGY

The storm water runoff was calculated using the TR 20 methodology, using Hydro CAD version 9.10 software. This program performs both the hydrologic calculations, for determining the amount of runoff for pre and post construction comparisons. Rainfall data was obtained from the most recent Extreme Precipitation Tables provided by Northeast Regional Climate Center. Calculations were performed for the 10yr storm events.

EXTREME PRECIPITATION TABLE

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	71.290 degrees West
Latitude	43.148 degrees North
Elevation	Unknown/Unavailable
Date/Time	Mon, 01 Feb 2016 11:04:48 -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	0.39	0.49	0.64	0.80	1.01	**1yr**	0.69	0.98	1.18	1.49	1.90	2.44	2.67	**1yr**	2.16	2.57	2.98	3.68	4.25	**1yr**
2yr	0.32	0.49	0.61	0.80	1.01	1.27	**2yr**	0.87	1.16	1.47	1.85	2.32	2.92	3.26	**2yr**	2.58	3.13	3.62	4.32	4.93	**2yr**
5yr	0.37	0.58	0.73	0.98	1.25	1.59	**5yr**	1.08	1.45	1.85	2.33	2.92	3.67	4.15	**5yr**	3.25	3.99	4.60	5.42	6.13	**5yr**
10yr	0.42	0.66	0.83	1.13	1.47	1.89	**10yr**	1.27	1.71	2.21	2.78	3.49	4.36	4.98	**10yr**	3.86	4.79	5.50	6.44	7.23	**10yr**
25yr	0.49	0.78	1.00	1.37	1.83	2.37	**25yr**	1.58	2.14	2.77	3.51	4.41	5.49	6.35	**25yr**	4.86	6.10	6.99	8.08	8.99	**25yr**
50yr	0.56	0.90	1.15	1.60	2.16	2.82	**50yr**	1.86	2.54	3.31	4.20	5.26	6.54	7.63	**50yr**	5.79	7.34	8.38	9.60	10.61	**50yr**
100yr	0.63	1.02	1.31	1.86	2.54	3.36	**100yr**	2.20	3.01	3.95	5.02	6.29	7.80	9.18	**100yr**	6.90	8.83	10.04	11.41	12.53	**100yr**
200yr	0.72	1.18	1.52	2.18	3.01	3.99	**200yr**	2.59	3.57	4.71	5.99	7.50	9.30	11.05	**200yr**	8.23	10.62	12.04	13.58	14.81	**200yr**
500yr	0.86	1.41	1.84	2.68	3.75	5.01	**500yr**	3.23	4.48	5.94	7.57	9.48	11.74	14.12	**500yr**	10.39	13.58	15.33	17.10	18.48	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.22	0.34	0.41	0.55	0.68	0.88	**1yr**	0.59	0.86	1.02	1.31	1.55	2.00	2.46	**1yr**	1.77	2.37	2.74	3.37	3.84	**1yr**
2yr	0.31	0.48	0.59	0.80	0.98	1.16	**2yr**	0.85	1.14	1.33	1.76	2.24	2.82	3.13	**2yr**	2.50	3.01	3.50	4.19	4.78	**2yr**
5yr	0.35	0.54	0.67	0.92	1.17	1.39	**5yr**	1.01	1.36	1.57	2.05	2.63	3.35	3.75	**5yr**	2.97	3.60	4.18	5.08	5.62	**5yr**
10yr	0.39	0.60	0.74	1.04	1.34	1.58	**10yr**	1.15	1.55	1.78	2.31	2.96	3.81	4.28	**10yr**	3.37	4.12	4.76	5.84	6.35	**10yr**
25yr	0.45	0.68	0.85	1.21	1.60	1.88	**25yr**	1.38	1.84	2.09	2.69	3.46	4.48	5.09	**25yr**	3.96	4.89	5.66	7.04	7.88	**25yr**
50yr	0.50	0.76	0.94	1.36	1.83	2.14	**50yr**	1.58	2.09	2.37	3.02	3.90	5.06	5.77	**50yr**	4.48	5.55	6.42	8.10	9.02	**50yr**
100yr	0.56	0.85	1.06	1.53	2.10	2.44	**100yr**	1.82	2.39	2.69	3.39	4.39	5.71	6.55	**100yr**	5.05	6.30	7.32	9.32	10.31	**100yr**
200yr	0.63	0.94	1.20	1.73	2.41	2.77	**200yr**	2.08	2.71	3.04	3.80	4.94	6.41	8.33	**200yr**	5.68	8.01	8.33	10.74	11.79	**200yr**
500yr	0.74	1.09	1.41	2.04	2.91	3.30	**500yr**	2.51	3.22	3.59	4.43	5.80	7.46	10.08	**500yr**	6.60	9.69	9.83	12.97	14.07	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.29	0.44	0.54	0.72	0.89	1.07	**1yr**	0.77	1.05	1.22	1.63	2.05	2.63	2.99	**1yr**	2.33	2.87	3.31	3.92	4.60	**1yr**
2yr	0.33	0.51	0.62	0.84	1.04	1.24	**2yr**	0.90	1.22	1.42	1.87	2.38	3.05	3.41	**2yr**	2.70	3.28	3.79	4.48	5.12	**2yr**
5yr	0.40	0.62	0.77	1.06	1.35	1.58	**5yr**	1.16	1.55	1.81	2.35	3.01	3.99	4.58	**5yr**	3.53	4.40	5.04	5.77	6.66	**5yr**
10yr	0.48	0.74	0.91	1.28	1.65	1.92	**10yr**	1.42	1.88	2.19	2.82	3.60	4.92	5.75	**10yr**	4.36	5.53	6.29	7.03	8.19	**10yr**
25yr	0.60	0.92	1.14	1.63	2.15	2.50	**25yr**	1.85	2.44	2.82	3.59	4.56	6.50	7.79	**25yr**	5.75	7.50	8.41	9.15	10.17	**25yr**
50yr	0.71	1.08	1.35	1.94	2.61	3.04	**50yr**	2.25	2.97	3.40	4.32	5.46	8.04	9.83	**50yr**	7.11	9.45	10.50	11.17	12.35	**50yr**
100yr	0.85	1.29	1.61	2.33	3.20	3.70	**100yr**	2.76	3.62	4.12	5.20	6.56	9.95	12.42	**100yr**	8.81	11.94	13.13	13.65	14.99	**100yr**
200yr	1.01	1.52	1.93	2.79	3.90	4.52	**200yr**	3.36	4.42	5.00	6.26	7.87	12.35	14.25	**200yr**	10.93	13.70	16.41	16.68	18.22	**200yr**
500yr	1.28	1.91	2.45	3.56	5.07	5.88	**500yr**	4.37	5.75	6.45	8.01	10.03	16.43	19.08	**500yr**	14.54	18.35	22.06	21.78	23.61	**500yr**

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NRCS WEBB SOIL SURVEY

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 Merrimack and Belknap Counties, New Hampshire, and Rockingham County, New Hampshire

February 1, 2016

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

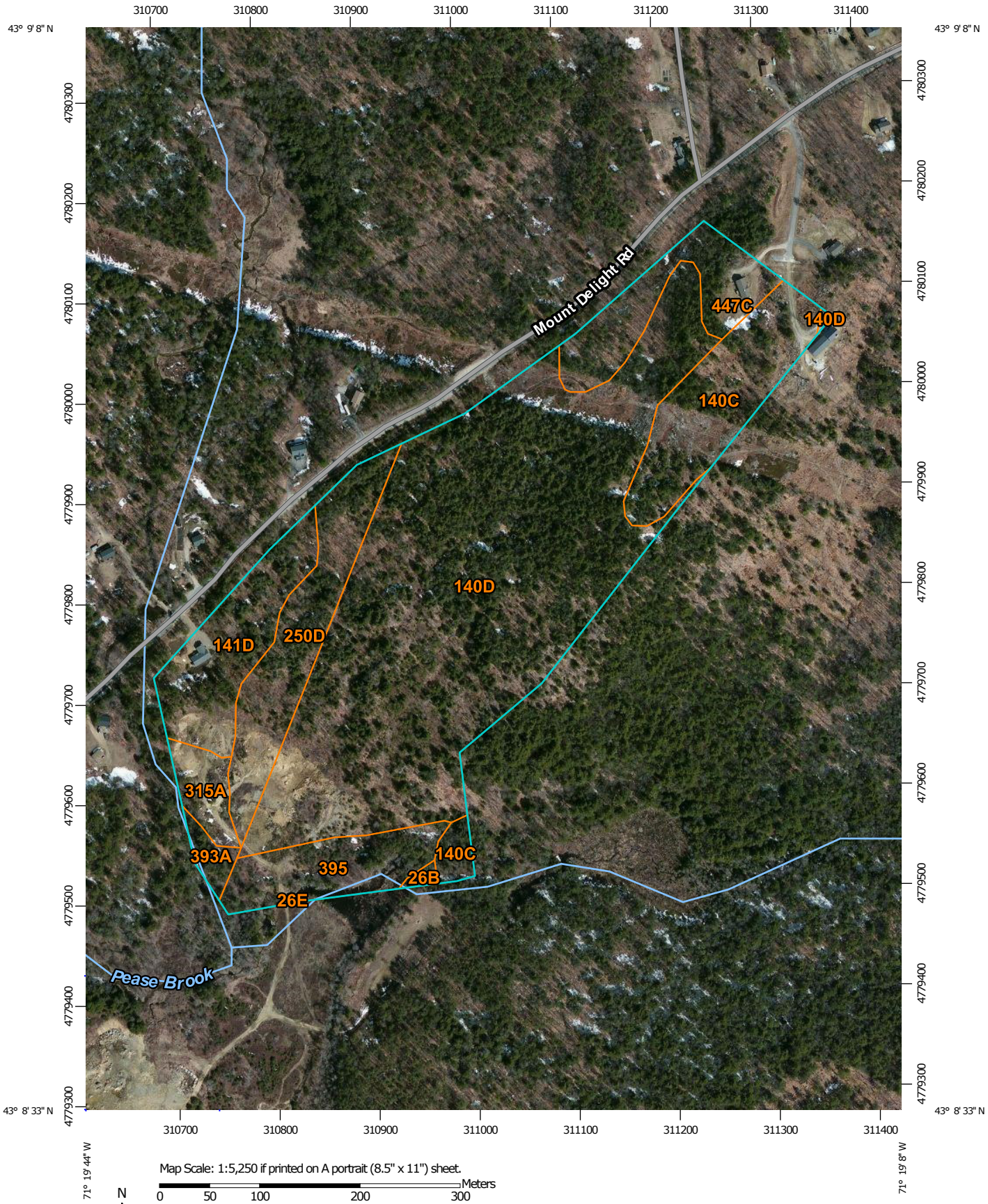
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:5,250 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

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.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Merrimack and Belknap Counties, New Hampshire
Survey Area Data: Version 20, Sep 22, 2015

Soil Survey Area: Rockingham County, New Hampshire
Survey Area Data: Version 17, Sep 18, 2015

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Apr 8, 2011—May 1, 2011

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

Map Unit Legend

Merrimack and Belknap Counties, New Hampshire (NH609)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
141D	Hollis-Rock outcrop-Chatfield complex, 15 to 35 percent slopes	3.9	7.9%
250D	Chatfield-Hollis-Montauk complex, 15 to 35 percent slopes, very stony	4.5	9.0%
315A	Mashpee sand 0 to 5 percent slopes	1.1	2.2%
393A	Swansea mucky peat, 0 to 2 percent slopes	0.5	1.0%
Subtotals for Soil Survey Area		**9.9**	**20.2%**
Totals for Area of Interest		**49.3**	**100.0%**

Rockingham County, New Hampshire (NH015)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
26B	Windsor loamy sand, 3 to 8 percent slopes	0.1	0.3%
26E	Windsor loamy sand, 15 to 60 percent slopes	0.0	0.1%
140C	Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, very stony	5.0	10.2%
140D	Chatfield-Hollis-Canton complex, 15 to 35 percent slopes, very stony	28.0	56.9%
395	Swansea mucky peat, 0 to 2 percent slopes	2.9	5.8%
447C	Scituate-Newfields complex, 8 to 15 percent slopes, very stony	3.2	6.5%
Subtotals for Soil Survey Area		**39.3**	**79.8%**
Totals for Area of Interest		**49.3**	**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.

Merrimack and Belknap Counties, New Hampshire

141D—Hollis-Rock outcrop-Chatfield complex, 15 to 35 percent slopes

Map Unit Setting

National map unit symbol: 9dh7
Elevation: 200 to 980 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 100 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Hollis and similar soils: 35 percent
Rock outcrop: 25 percent
Chatfield and similar soils: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis

Setting

Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Till

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
H1 - 2 to 4 inches: very fine sandy loam
H2 - 4 to 11 inches: very fine sandy loam
H3 - 11 to 15 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D

Description of Rock Outcrop

Setting

Parent material: Granite and gneiss

Properties and qualities

Slope: 15 to 35 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to very high (0.01 to 20.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s

Description of Chatfield

Setting

Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Till

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
H1 - 1 to 2 inches: fine sandy loam
H2 - 2 to 30 inches: gravelly fine sandy loam
H3 - 30 to 34 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B

Minor Components

Montauk

Percent of map unit: 5 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear

Canton

Percent of map unit: 5 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear

Paxton
Percent of map unit: 5 percent
Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Linear

Scituate
Percent of map unit: 3 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear

Newfields
Percent of map unit: 2 percent
Landform: Hillslopes

250D—Chatfield-Hollis-Montauk complex, 15 to 35 percent slopes, very stony

Map Unit Setting
National map unit symbol: 2w7zt
Elevation: 180 to 1,310 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
Montauk, very stony, and similar soils: 25 percent
Hollis, extremely stony, and similar soils: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chatfield, Very Stony

Setting
Landform: Hills, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy melt-out till derived from gneiss, granite, and/or schist

Typical profile
Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loam
Bw - 8 to 25 inches: flaggy silt loam

2R - 25 to 35 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B

Description of Montauk, Very Stony

Setting

Landform: Drumlins, ground moraines, hills, recessionial moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
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: 15 to 35 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Natural 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
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C

Description of Hollis, Extremely Stony

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oa - 0 to 1 inches: highly decomposed plant material
A - 1 to 6 inches: gravelly fine sandy loam
Bw1 - 6 to 9 inches: gravelly fine sandy loam
Bw2 - 9 to 15 inches: gravelly fine sandy loam
2R - 15 to 80 inches: bedrock

Properties and qualities

Slope: 3 to 15 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D

Minor Components

Scituate, very stony

Percent of map unit: 10 percent
Landform: Drumlins, ground moraines, hills
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex

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

Ridgebury, very stony

Percent of map unit: 5 percent
Landform: Depressions, drainageways, ground moraines, hills

Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave, linear
Across-slope shape: Concave

315A—Mashpee sand 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 21pfq
Elevation: 200 to 1,000 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 100 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Mashpee and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mashpee

Setting

Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy outwash

Typical profile

Oi - 0 to 3 inches: mucky peat
Oe - 3 to 6 inches: moderately decomposed plant material
H1 - 6 to 8 inches: sand
H2 - 8 to 11 inches: sand
H3 - 11 to 65 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 6.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D

Minor Components

Scarboro

Percent of map unit: 5 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave

Timakwa

Percent of map unit: 5 percent
Landform: Bogs
Down-slope shape: Concave
Across-slope shape: Concave

Deerfield

Percent of map unit: 5 percent
Landform: Terraces
Down-slope shape: Linear
Across-slope shape: Linear

Scituate

Percent of map unit: 5 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear

393A—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: Bogs, depressions, kettles, marshes, 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
Natural 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 storage in profile: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: B/D

Minor Components

Freetown

Percent of map unit: 7 percent
Landform: Bogs, depressions, kettles, marshes, swamps
Down-slope shape: Concave
Across-slope shape: Concave

Scarboro

Percent of map unit: 5 percent
Landform: Depressions, drainageways, outwash terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave

Walpole

Percent of map unit: 5 percent
Landform: Depressions, drainageways, outwash terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave

Rockingham County, New Hampshire

26B—Windsor loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svkf
Elevation: 0 to 1,210 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

Windsor, loamy sand, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor, Loamy Sand

Setting

Landform: Deltas, dunes, outwash plains, outwash terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

O - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: 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
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A

Minor Components

Hinckley, loamy sand

Percent of map unit: 10 percent

Landform: Deltas, eskers, kames, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear

Deerfield, loamy sand

Percent of map unit: 5 percent
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear

26E—Windsor loamy sand, 15 to 60 percent slopes

Map Unit Setting

National map unit symbol: 2w2ws
Elevation: 0 to 760 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

Windsor and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor

Setting

Landform: Deltas, dunes, outwash plains, outwash terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 15 to 60 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained

Runoff class: Medium
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
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A

Minor Components

Hinckley
Percent of map unit: 10 percent
Landform: Deltas, eskers, kames, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear

Deerfield
Percent of map unit: 5 percent
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear

140C—Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, very stony

Map Unit Setting
National map unit symbol: 9cmj
Elevation: 0 to 2,100 feet
Mean annual precipitation: 28 to 46 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 60 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Chatfield and similar soils: 35 percent
Canton and similar soils: 20 percent
Hollis and similar soils: 20 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chatfield

Setting

Parent material: Till

Typical profile

H1 - 0 to 20 inches: fine sandy loam
H2 - 20 to 31 inches: cobbly fine sandy loam
R - 31 to 35 inches: unweathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B

Description of Hollis

Setting

Parent material: Till

Typical profile

H1 - 0 to 2 inches: fine sandy loam
H2 - 2 to 13 inches: cobbly fine sandy loam
R - 13 to 17 inches: unweathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D

Description of Canton

Setting

Parent material: Till

Typical profile

H1 - 0 to 5 inches: gravelly fine sandy loam
H2 - 5 to 21 inches: gravelly fine sandy loam
H3 - 21 to 60 inches: loamy sand

Properties and qualities

Slope: 8 to 15 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A

Minor Components

Not named

Percent of map unit: 7 percent

Newfields

Percent of map unit: 5 percent

Ossipee and greenwood

Percent of map unit: 5 percent
Landform: Bogs

Scarboro

Percent of map unit: 3 percent
Landform: Depressions

Walpole

Percent of map unit: 3 percent
Landform: Depressions

Rock outcrop

Percent of map unit: 2 percent

140D—Chatfield-Hollis-Canton complex, 15 to 35 percent slopes, very stony

Map Unit Setting

National map unit symbol: 9cmk
Elevation: 0 to 2,100 feet
Mean annual precipitation: 28 to 56 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 60 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Chatfield and similar soils: 35 percent
Canton and similar soils: 20 percent
Hollis and similar soils: 20 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chatfield

Setting

Parent material: Till

Typical profile

H1 - 0 to 20 inches: fine sandy loam
H2 - 20 to 31 inches: cobbly fine sandy loam
R - 31 to 35 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 35 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B

Description of Hollis

Setting

Parent material: Till

Typical profile

H1 - 0 to 2 inches: fine sandy loam
H2 - 2 to 13 inches: cobbly fine sandy loam
R - 13 to 17 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 35 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D

Description of Canton

Setting

Parent material: Till

Typical profile

H1 - 0 to 5 inches: gravelly fine sandy loam
H2 - 5 to 21 inches: gravelly fine sandy loam
H3 - 21 to 60 inches: loamy sand

Properties and qualities

Slope: 15 to 35 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A

Minor Components

Montauk
Percent of map unit: 7 percent

Not named
Percent of map unit: 5 percent

Ossipee and greenwood
Percent of map unit: 5 percent
Landform: Bogs

Scarboro
Percent of map unit: 3 percent
Landform: Depressions

Walpole
Percent of map unit: 3 percent
Landform: Depressions

Rock outcrop
Percent of map unit: 2 percent

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: Bogs, depressions, kettles, marshes, 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
Natural 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 storage in profile: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: B/D

Minor Components

Freetown

Percent of map unit: 7 percent
Landform: Bogs, depressions, kettles, marshes, swamps
Down-slope shape: Concave
Across-slope shape: Concave

Scarboro

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

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

447C—Scituate-Newfields complex, 8 to 15 percent slopes, very stony

Map Unit Setting

National map unit symbol: 9cns
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: 8 to 15 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: About 32 inches to densic material
Natural 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 storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C

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: 8 to 15 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: More than 80 inches
Natural 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 storage in profile: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C

Minor Components

Canton
Percent of map unit: 5 percent

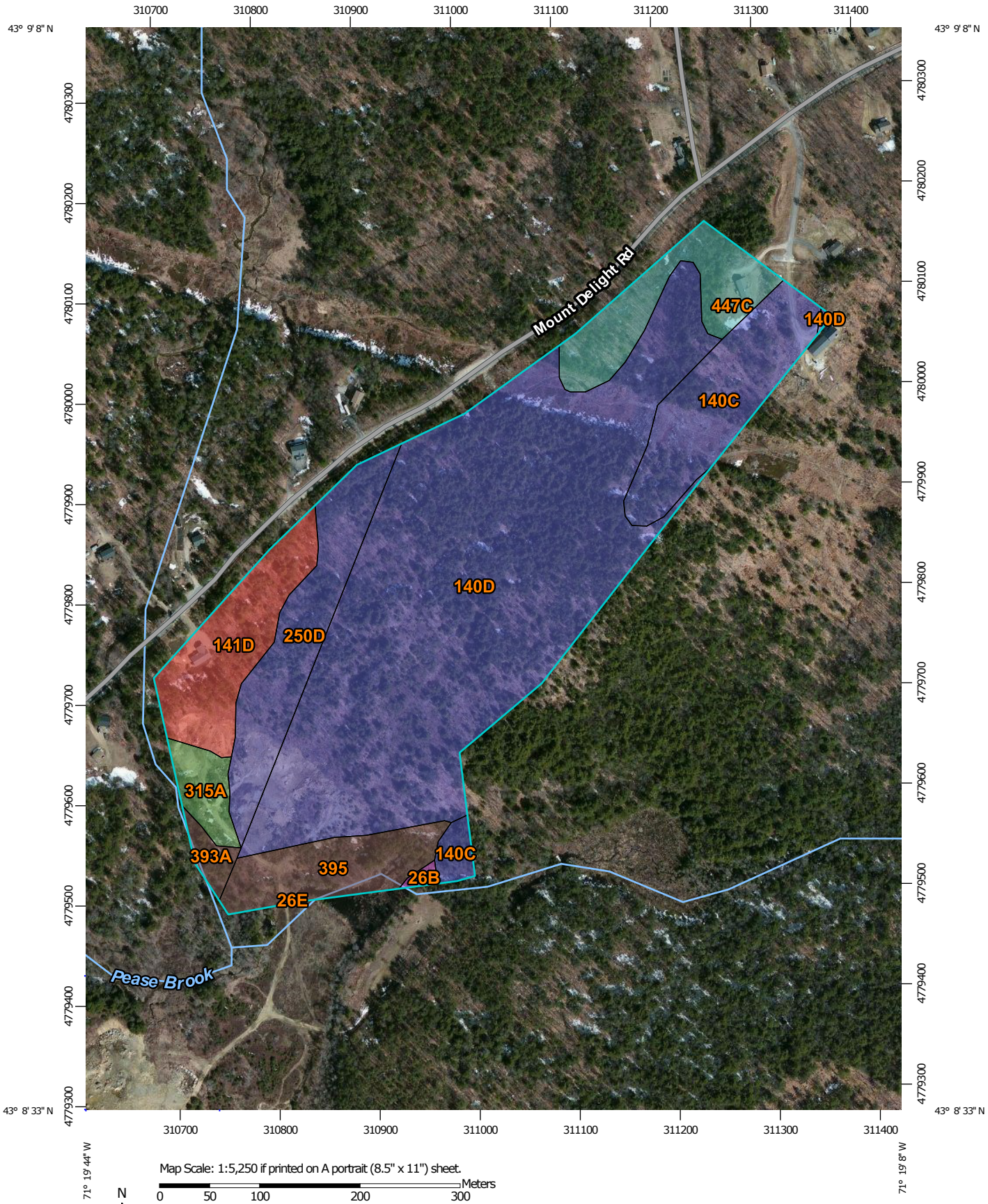
Montauk
Percent of map unit: 5 percent

Not named
Percent of map unit: 5 percent

Ridgebury
Percent of map unit: 5 percent
Landform: Depressions

Walpole
Percent of map unit: 5 percent
Landform: Depressions

Custom Soil Resource Report
Map—Hydrologic Soil Group (DEERFIELD)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Merrimack and Belknap Counties, New Hampshire
Survey Area Data: Version 20, Sep 22, 2015

Soil Survey Area: Rockingham County, New Hampshire
Survey Area Data: Version 17, Sep 18, 2015

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Apr 8, 2011—May 1, 2011

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

Table—Hydrologic Soil Group (DEERFIELD)

Hydrologic Soil Group— Summary by Map Unit — Merrimack and Belknap Counties, New Hampshire (NH609)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
141D	Hollis-Rock outcrop-Chatfield complex, 15 to 35 percent slopes	D	3.9	7.9%
250D	Chatfield-Hollis-Montauk complex, 15 to 35 percent slopes, very stony	B	4.5	9.0%
315A	Mashpee sand 0 to 5 percent slopes	A/D	1.1	2.2%
393A	Swansea mucky peat, 0 to 2 percent slopes	B/D	0.5	1.0%
Subtotals for Soil Survey Area			**9.9**	**20.2%**
Totals for Area of Interest			**49.3**	**100.0%**

Hydrologic Soil Group— Summary by Map Unit — Rockingham County, New Hampshire (NH015)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
26B	Windsor loamy sand, 3 to 8 percent slopes	A	0.1	0.3%
26E	Windsor loamy sand, 15 to 60 percent slopes	A	0.0	0.1%
140C	Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, very stony	B	5.0	10.2%
140D	Chatfield-Hollis-Canton complex, 15 to 35 percent slopes, very stony	B	28.0	56.9%
395	Swansea mucky peat, 0 to 2 percent slopes	B/D	2.9	5.8%
447C	Scituate-Newfields complex, 8 to 15 percent slopes, very stony	C	3.2	6.5%
Subtotals for Soil Survey Area			**39.3**	**79.8%**
Totals for Area of Interest			**49.3**	**100.0%**

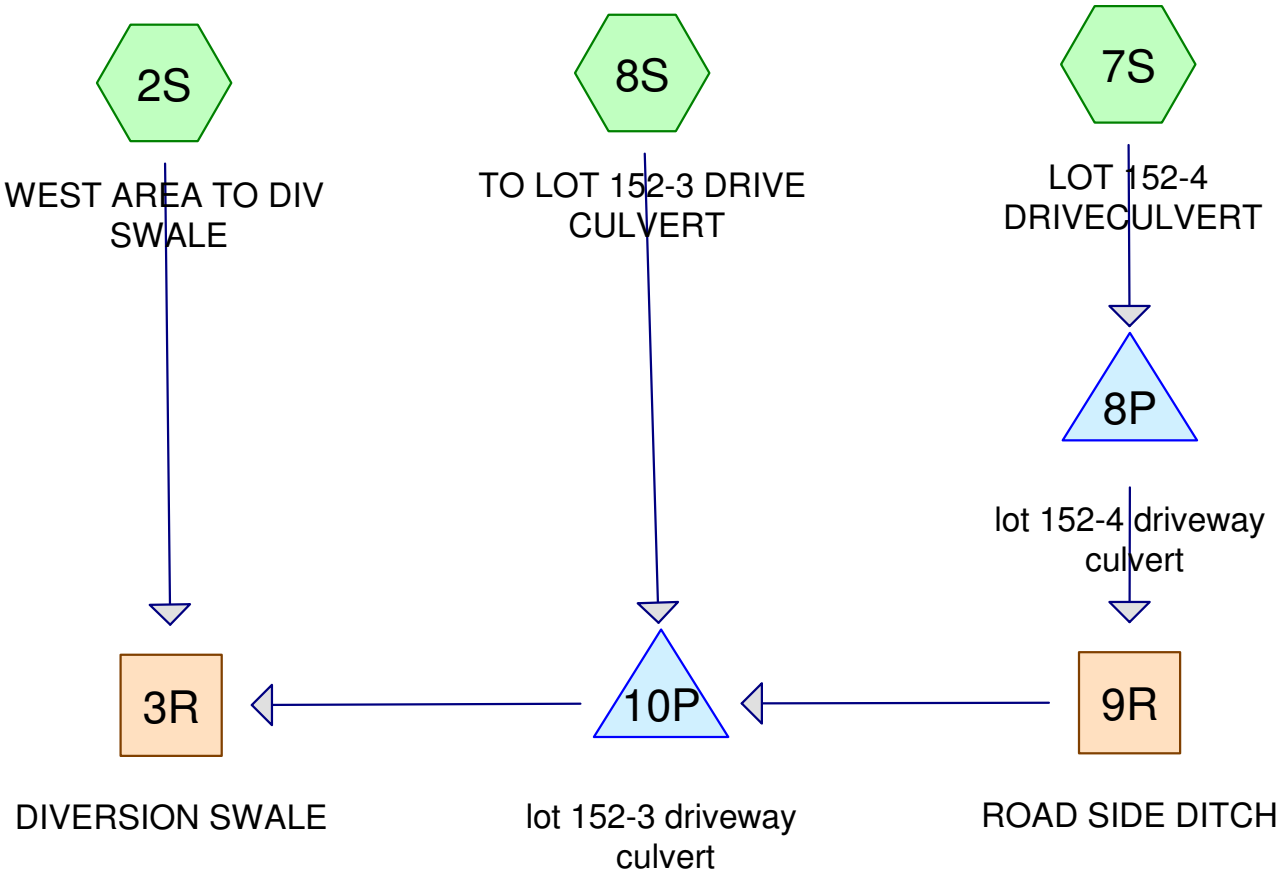
Rating Options—Hydrologic Soil Group (DEERFIELD)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

25 & 50 YEAR POST DEVELOPMENT COMPUTATIONS



Subcat Reach Pond Link

Drainage Diagram for 2-LOT POST

Prepared by {enter your company name here}, Printed 3/1/2016

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
228,538	55	Woods, Good, HSG B (2S, 7S, 8S)
10,000	61	>75% Grass cover, Good, HSG B (8S)
42,398	77	Woods, Good, HSG D (2S, 8S)
10,000	80	>75% Grass cover, Good, HSG D (2S)
6,900	98	Paved parking, HSG B (7S, 8S)
3,000	98	Paved parking, HSG D (2S)
3,000	98	Paved roads w/curbs & sewers, HSG B (8S)
303,836		**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
248,438	HSG B	2S, 7S, 8S
0	HSG C	
55,398	HSG D	2S, 8S
0	Other	
303,836		**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)	Fill (inches)
1	8P	293.50	293.20	30.0	0.0100	0.013	15.0	0.0	0.0
2	10P	275.61	275.31	30.0	0.0100	0.013	18.0	0.0	0.0

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

Subcatchment 2S: WEST AREA TO DIV Runoff Area=88,239 sf 3.40% Impervious Runoff Depth>1.82"
Tc=6.0 min CN=65 Runoff=4.49 cfs 13,393 cf

Subcatchment 7S: LOT 152-4 Runoff Area=158,742 sf 2.58% Impervious Runoff Depth>1.16"
Flow Length=700' Tc=18.9 min CN=56 Runoff=3.30 cfs 15,408 cf

Subcatchment 8S: TO LOT 152-3 DRIVE Runoff Area=56,855 sf 10.20% Impervious Runoff Depth>2.05"
Flow Length=648' Tc=20.3 min CN=68 Runoff=2.23 cfs 9,699 cf

Reach 3R: DIVERSION SWALE Avg. Flow Depth=1.22' Max Vel=1.38 fps Inflow=7.62 cfs 38,446 cf
n=0.140 L=360.0' S=0.0259 '/' Capacity=21.78 cfs Outflow=7.41 cfs 38,157 cf

Reach 9R: ROAD SIDE DITCH Avg. Flow Depth=0.68' Max Vel=3.54 fps Inflow=3.30 cfs 15,398 cf
n=0.050 L=250.0' S=0.0696 '/' Capacity=9.17 cfs Outflow=3.27 cfs 15,366 cf

Pond 8P: lot 152-4 driveway culvert Peak Elev=294.53' Storage=69 cf Inflow=3.30 cfs 15,408 cf
15.0" Round Culvert n=0.013 L=30.0' S=0.0100 '/' Outflow=3.30 cfs 15,398 cf

Pond 10P: lot 152-3 driveway culvert Peak Elev=276.90' Storage=92 cf Inflow=5.45 cfs 25,065 cf
18.0" Round Culvert n=0.013 L=30.0' S=0.0100 '/' Outflow=5.45 cfs 25,053 cf

Total Runoff Area = 303,836 sf Runoff Volume = 38,500 cf Average Runoff Depth = 1.52"
95.75% Pervious = 290,936 sf 4.25% Impervious = 12,900 sf

Summary for Subcatchment 2S: WEST AREA TO DIV SWALE

Runoff = 4.49 cfs @ 12.10 hrs, Volume= 13,393 cf, Depth> 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=5.49"

Area (sf)	CN	Description
23,146	77	Woods, Good, HSG D
52,093	55	Woods, Good, HSG B
3,000	98	Paved parking, HSG D
10,000	80	>75% Grass cover, Good, HSG D
88,239	65	Weighted Average
85,239		96.60% Pervious Area
3,000		3.40% Impervious Area

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

Summary for Subcatchment 7S: LOT 152-4 DRIVECULVERT

Runoff = 3.30 cfs @ 12.30 hrs, Volume= 15,408 cf, Depth> 1.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=5.49"

Area (sf)	CN	Description
154,642	55	Woods, Good, HSG B
4,100	98	Paved parking, HSG B
158,742	56	Weighted Average
154,642		97.42% Pervious Area
4,100		2.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.92"
2.7	265	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	335	0.1100	9.15	73.20	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.050
18.9	700	Total			

Summary for Subcatchment 8S: TO LOT 152-3 DRIVE CULVERT

Runoff = 2.23 cfs @ 12.30 hrs, Volume= 9,699 cf, Depth> 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=5.49"

Area (sf)	CN	Description
21,803	55	Woods, Good, HSG B
2,800	98	Paved parking, HSG B
3,000	98	Paved roads w/curbs & sewers, HSG B
10,000	61	>75% Grass cover, Good, HSG B
19,252	77	Woods, Good, HSG D
56,855	68	Weighted Average
51,055		89.80% Pervious Area
5,800		10.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.92"
4.5	448	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	100	0.1100	9.15	73.20	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.050
20.3	648	Total			

Summary for Reach 3R: DIVERSION SWALE

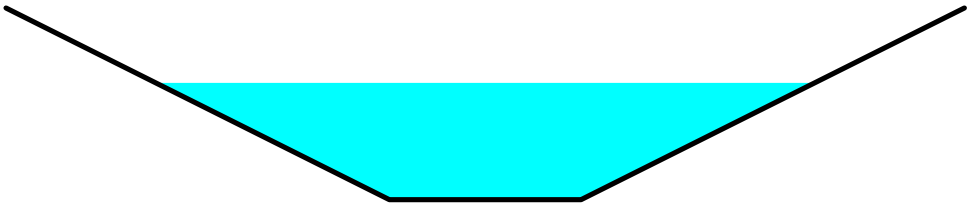
[79] Warning: Submerged Pond 10P Primary device # 1 INLET by 0.92'

Inflow Area = 303,836 sf, 4.25% Impervious, Inflow Depth > 1.52" for 25YR event
Inflow = 7.62 cfs @ 12.30 hrs, Volume= 38,446 cf
Outflow = 7.41 cfs @ 12.42 hrs, Volume= 38,157 cf, Atten= 3%, Lag= 7.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.38 fps, Min. Travel Time= 4.4 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 8.8 min

Peak Storage= 1,946 cf @ 12.34 hrs
Average Depth at Peak Storage= 1.22'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 21.78 cfs

2.00' x 2.00' deep channel, n= 0.140
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 360.0' Slope= 0.0259 '/'
Inlet Invert= 275.31', Outlet Invert= 266.00'



Summary for Reach 9R: ROAD SIDE DITCH

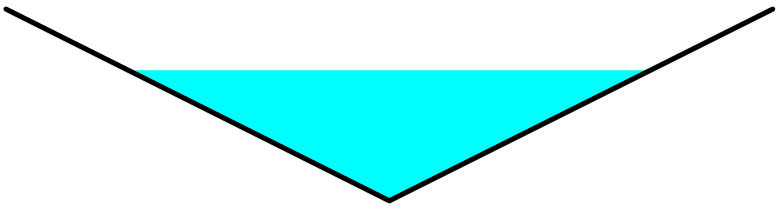
[79] Warning: Submerged Pond 8P Primary device # 1 INLET by 0.18'

Inflow Area = 158,742 sf, 2.58% Impervious, Inflow Depth > 1.16" for 25YR event
Inflow = 3.30 cfs @ 12.31 hrs, Volume= 15,398 cf
Outflow = 3.27 cfs @ 12.35 hrs, Volume= 15,366 cf, Atten= 1%, Lag= 2.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.54 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 2.02 fps, Avg. Travel Time= 2.1 min

Peak Storage= 232 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.68'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 9.17 cfs

0.00' x 1.00' deep channel, n= 0.050
Side Slope Z-value= 2.0 '/' Top Width= 4.00'
Length= 250.0' Slope= 0.0696 '/'
Inlet Invert= 293.00', Outlet Invert= 275.61'



Summary for Pond 8P: lot 152-4 driveway culvert

[88] Warning: Qout>Qin may require Finer Routing>1

Inflow Area = 158,742 sf, 2.58% Impervious, Inflow Depth > 1.16" for 25YR event
Inflow = 3.30 cfs @ 12.30 hrs, Volume= 15,408 cf
Outflow = 3.30 cfs @ 12.31 hrs, Volume= 15,398 cf, Atten= 0%, Lag= 0.3 min
Primary = 3.30 cfs @ 12.31 hrs, Volume= 15,398 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 294.53' @ 12.31 hrs Surf.Area= 77 sf Storage= 69 cf

Plug-Flow detention time= 0.6 min calculated for 15,398 cf (100% of inflow)
Center-of-Mass det. time= 0.4 min (842.1 - 841.7)

Volume	Invert	Avail.Storage	Storage Description
#1	293.50'	199 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
293.50	50	50.0	0	0	50
294.00	70	75.0	30	30	301
296.00	100	80.0	169	199	467

Device	Routing	Invert	Outlet Devices
#1	Primary	293.50'	**15.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 293.50' / 293.20' S= 0.0100 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=3.29 cfs @ 12.31 hrs HW=294.53' (Free Discharge)
1=Culvert (Barrel Controls 3.29 cfs @ 4.14 fps)

Summary for Pond 10P: lot 152-3 driveway culvert

[62] Hint: Exceeded Reach 9R OUTLET depth by 0.61' @ 12.35 hrs

Inflow Area = 215,597 sf, 4.59% Impervious, Inflow Depth > 1.40" for 25YR event
Inflow = 5.45 cfs @ 12.33 hrs, Volume= 25,065 cf
Outflow = 5.45 cfs @ 12.33 hrs, Volume= 25,053 cf, Atten= 0%, Lag= 0.3 min
Primary = 5.45 cfs @ 12.33 hrs, Volume= 25,053 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 276.90' @ 12.33 hrs Surf.Area= 83 sf Storage= 92 cf

Plug-Flow detention time= 0.5 min calculated for 24,970 cf (100% of inflow)
Center-of-Mass det. time= 0.3 min (834.6 - 834.2)

Volume	Invert	Avail.Storage	Storage Description
#1	275.61'	193 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
275.61	50	0	0
276.00	70	23	23
278.00	100	170	193

Device	Routing	Invert	Outlet Devices
#1	Primary	275.61'	**18.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 275.61' / 275.31' S= 0.0100 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=5.42 cfs @ 12.33 hrs HW=276.89' (Free Discharge)
1=Culvert (Barrel Controls 5.42 cfs @ 4.52 fps)

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

Subcatchment 2S: WEST AREA TO DIV Runoff Area=88,239 sf 3.40% Impervious Runoff Depth>2.54"
Tc=6.0 min CN=65 Runoff=6.33 cfs 18,655 cf

Subcatchment 7S: LOT 152-4 Runoff Area=158,742 sf 2.58% Impervious Runoff Depth>1.74"
Flow Length=700' Tc=18.9 min CN=56 Runoff=5.20 cfs 22,983 cf

Subcatchment 8S: TO LOT 152-3 DRIVE Runoff Area=56,855 sf 10.20% Impervious Runoff Depth>2.80"
Flow Length=648' Tc=20.3 min CN=68 Runoff=3.08 cfs 13,273 cf

Reach 3R: DIVERSION SWALE Avg. Flow Depth=1.46' Max Vel=1.52 fps Inflow=11.18 cfs 54,846 cf
n=0.140 L=360.0' S=0.0259 '/' Capacity=21.78 cfs Outflow=10.95 cfs 54,499 cf

Reach 9R: ROAD SIDE DITCH Avg. Flow Depth=0.81' Max Vel=3.98 fps Inflow=5.20 cfs 22,972 cf
n=0.050 L=250.0' S=0.0696 '/' Capacity=9.17 cfs Outflow=5.14 cfs 22,932 cf

Pond 8P: lot 152-4 driveway culvert Peak Elev=294.96' Storage=103 cf Inflow=5.20 cfs 22,983 cf
15.0" Round Culvert n=0.013 L=30.0' S=0.0100 '/' Outflow=5.20 cfs 22,972 cf

Pond 10P: lot 152-3 driveway culvert Peak Elev=277.37' Storage=134 cf Inflow=8.20 cfs 36,205 cf
18.0" Round Culvert n=0.013 L=30.0' S=0.0100 '/' Outflow=8.20 cfs 36,192 cf

Total Runoff Area = 303,836 sf Runoff Volume = 54,912 cf Average Runoff Depth = 2.17"
95.75% Pervious = 290,936 sf 4.25% Impervious = 12,900 sf

Summary for Subcatchment 2S: WEST AREA TO DIV SWALE

Runoff = 6.33 cfs @ 12.10 hrs, Volume= 18,655 cf, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50YR Rainfall=6.54"

Area (sf)	CN	Description
23,146	77	Woods, Good, HSG D
52,093	55	Woods, Good, HSG B
3,000	98	Paved parking, HSG D
10,000	80	>75% Grass cover, Good, HSG D
88,239	65	Weighted Average
85,239		96.60% Pervious Area
3,000		3.40% Impervious Area

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

Summary for Subcatchment 7S: LOT 152-4 DRIVECULVERT

Runoff = 5.20 cfs @ 12.29 hrs, Volume= 22,983 cf, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50YR Rainfall=6.54"

Area (sf)	CN	Description
154,642	55	Woods, Good, HSG B
4,100	98	Paved parking, HSG B
158,742	56	Weighted Average
154,642		97.42% Pervious Area
4,100		2.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.92"
2.7	265	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	335	0.1100	9.15	73.20	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.050
18.9	700	Total			

Summary for Subcatchment 8S: TO LOT 152-3 DRIVE CULVERT

Runoff = 3.08 cfs @ 12.29 hrs, Volume= 13,273 cf, Depth> 2.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50YR Rainfall=6.54"

Area (sf)	CN	Description
21,803	55	Woods, Good, HSG B
2,800	98	Paved parking, HSG B
3,000	98	Paved roads w/curbs & sewers, HSG B
10,000	61	>75% Grass cover, Good, HSG B
19,252	77	Woods, Good, HSG D
56,855	68	Weighted Average
51,055		89.80% Pervious Area
5,800		10.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.92"
4.5	448	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	100	0.1100	9.15	73.20	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.050
20.3	648	Total			

Summary for Reach 3R: DIVERSION SWALE

[79] Warning: Submerged Pond 10P Primary device # 1 INLET by 1.16'

Inflow Area = 303,836 sf, 4.25% Impervious, Inflow Depth > 2.17" for 50YR event
Inflow = 11.18 cfs @ 12.29 hrs, Volume= 54,846 cf
Outflow = 10.95 cfs @ 12.39 hrs, Volume= 54,499 cf, Atten= 2%, Lag= 6.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.52 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 0.73 fps, Avg. Travel Time= 8.2 min

Peak Storage= 2,596 cf @ 12.33 hrs
Average Depth at Peak Storage= 1.46'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 21.78 cfs

2.00' x 2.00' deep channel, n= 0.140
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 360.0' Slope= 0.0259 '/'
Inlet Invert= 275.31', Outlet Invert= 266.00'

Summary for Reach 9R: ROAD SIDE DITCH

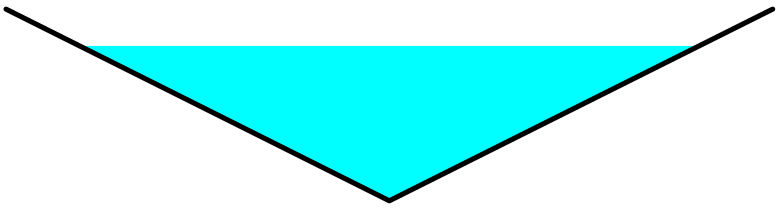
[79] Warning: Submerged Pond 8P Primary device # 1 INLET by 0.31'

Inflow Area = 158,742 sf, 2.58% Impervious, Inflow Depth > 1.74" for 50YR event
Inflow = 5.20 cfs @ 12.30 hrs, Volume= 22,972 cf
Outflow = 5.14 cfs @ 12.33 hrs, Volume= 22,932 cf, Atten= 1%, Lag= 1.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.98 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 2.17 fps, Avg. Travel Time= 1.9 min

Peak Storage= 326 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.81'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 9.17 cfs

0.00' x 1.00' deep channel, n= 0.050
Side Slope Z-value= 2.0 '/' Top Width= 4.00'
Length= 250.0' Slope= 0.0696 '/'
Inlet Invert= 293.00', Outlet Invert= 275.61'



Summary for Pond 8P: lot 152-4 driveway culvert

[88] Warning: Qout>Qin may require Finer Routing>1

Inflow Area = 158,742 sf, 2.58% Impervious, Inflow Depth > 1.74" for 50YR event
Inflow = 5.20 cfs @ 12.29 hrs, Volume= 22,983 cf
Outflow = 5.20 cfs @ 12.30 hrs, Volume= 22,972 cf, Atten= 0%, Lag= 0.4 min
Primary = 5.20 cfs @ 12.30 hrs, Volume= 22,972 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 294.96' @ 12.30 hrs Surf.Area= 84 sf Storage= 103 cf

Plug-Flow detention time= 0.5 min calculated for 22,896 cf (100% of inflow)
Center-of-Mass det. time= 0.3 min (832.7 - 832.4)

Volume	Invert	Avail.Storage	Storage Description
#1	293.50'	199 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
293.50	50	50.0	0	0	50
294.00	70	75.0	30	30	301
296.00	100	80.0	169	199	467

Device	Routing	Invert	Outlet Devices
#1	Primary	293.50'	**15.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 293.50' / 293.20' S= 0.0100 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=5.19 cfs @ 12.30 hrs HW=294.95' (Free Discharge)
1=Culvert (Barrel Controls 5.19 cfs @ 4.57 fps)

Summary for Pond 10P: lot 152-3 driveway culvert

[62] Hint: Exceeded Reach 9R OUTLET depth by 0.95' @ 12.30 hrs

Inflow Area = 215,597 sf, 4.59% Impervious, Inflow Depth > 2.02" for 50YR event
Inflow = 8.20 cfs @ 12.32 hrs, Volume= 36,205 cf
Outflow = 8.20 cfs @ 12.32 hrs, Volume= 36,192 cf, Atten= 0%, Lag= 0.3 min
Primary = 8.20 cfs @ 12.32 hrs, Volume= 36,192 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 277.37' @ 12.32 hrs Surf.Area= 91 sf Storage= 134 cf

Plug-Flow detention time= 0.4 min calculated for 36,192 cf (100% of inflow)
Center-of-Mass det. time= 0.3 min (826.5 - 826.2)

Volume	Invert	Avail.Storage	Storage Description
#1	275.61'	193 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
275.61	50	0	0
276.00	70	23	23
278.00	100	170	193

Device	Routing	Invert	Outlet Devices
#1	Primary	275.61'	**18.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 275.61' / 275.31' S= 0.0100 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=8.13 cfs @ 12.32 hrs HW=277.36' (Free Discharge)
1=Culvert (Barrel Controls 8.13 cfs @ 4.96 fps)

SUBCATCHMENT DIAGRAMS