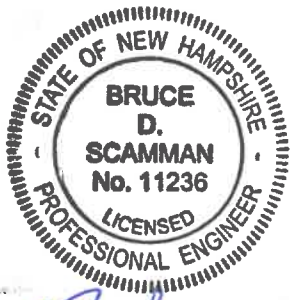
Stormwater Calculations
for Richmond Property Group
18 Garrison Avenue (Site)
Durham, NH 03824

March 24, 2020



3/25/20

Prepared for:
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EMANUEL ENGINEERING

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Stormwater Management Checklist

for Site Plan Review

X	**SITE PLAN REVIEW APPLICATION**			**Project Name**		**Richmond Property Group**	
X	**Date of Submittal 3/25/2020**			**Applicant's Name**		**Emanuel Engineering, Inc.**	
X	**Engineer**	**Emanuel Engineering, Inc.**		**Architect**		**Krittenbrink Architecture**	
☐	**New Development**			X	**Re-Development**		
X	**Total Area of Disturbance +/- 22,070 Square Feet (SF)**						
	☐	< 10,000 SF and No Water Quality Threat *{No Stormwater Management Plan Required}*					
	☐	< 10,000 SF and Possible Water Quality Threat *{Stormwater Management Plan Required}*					
	X	> 10,000 SF *{Stormwater Management Plan Required except as provided for in 9.03 (A) with an approved AOT permit}*					
STORMWATER MANAGEMENT PLAN – PART I							
X	**EXISTING CONDITIONS PLAN**						
	☐	Title Block, Appropriate Scale, Legend, Datum, Locus Plan, Professional Stamp(s)					
	X	Topographic Contours and benchmarks					
	X	Buildings, Structures, Wells, Septic Systems, Utilities					
	X	Water Bodies, Wetlands, Hydrologic Features, Soil Codes, Buffer Zone					
	X	Area of Impervious Surface 9,335 SF					
	X	Total Area of Pavement 7,260 SF			Area of Pervious Pavement 0 SF		
X	**PROPOSED CONDITIONS PLAN** (include above existing and below proposed features)						
	X	Title Block, Appropriate Scale, Legend, Datums, Locus Plan, Professional Stamp(s)					
	X	Topographic Contours and benchmarks					
	X	Buildings, Structures, Wells, Septic Systems, Utilities					
	X	Water Bodies, Wetlands, Hydrologic Features, Soil Codes, Buffer Zone					
	X	Impervious Surface Area 5,540 SF			Impervious Surface **DECREASE** 3,795 SF		
	X	Total Area of Pavement 11,410 SF			Area of Pervious Pavement 10,015 SF		
	X	Effective Impervious Area (EIA) 580 SF					
	X	Stormwater Management & Treatment System (Describe System Elements Below)					
		X	Name of Receiving Waterbody: Pettee Brook				
		☐	Closed Drain & Catch Basin Network	☐	Connected to Town Closed System		
		X	Detention Structure Types: Porous Pavement with drywells				
		X	Structural BMP Types: Porous Pavement				
		X	LID Strategies: Porous Pavement				
		X	Estimated Value of Parts to be Town Owned and/or Maintained			$0	

STORMWATER MANAGEMENT PLAN – PART II					
X	**DRAINAGE ANALYSIS**				
	24-Hour Storm Event		Runoff	Pre-Development	Post-Development
	X	1-inch	Rate	0.01 $Feet^3$/Sec (CFS)	0.01 CFS
	X	1-inch	Volume	261 $Feet^3$ (CF)	174 CF
	X	2-Year	Rate	2.09 CFS	1.36 CFS
	X	2-Year	Volume	7,144 CF	5,271 CF
	X	10-Year	Rate	3.95 CFS	2.66 CFS
	X	10-Year	Volume	15,072 CF	11,282 CF
	X	25-Year	Rate	5.38 CFS	3.68 CFS
	X	25-Year	Volume	21,998 CF	17,729 CF
	X	100-Year	Rate	8.19 CFS	5.68 CFS
	X	100-Year	Volume	37,157 CF	32,234 CF
X	**EROSION & SEDIMENT CONTROL PLAN**				
☐	**OTHER PERMITS OR PLANS REQUIRED BY USEPA or NHDES** (Where applicable)				
	☐	USEPA Pre- and Post-Construction Stormwater Pollution Prevention Plan			
	☐	NHDES Alteration of Terrain Permit			
	☐	Other (Please list) N/A			
X	**OPERATION & MAINTENANCE PLAN**				
X	**Need for 3rd Party Review?** YES _____ NO X				

STORMWATER ANALYSIS AREA WORKSHEET

EMANUEL ENGINEERING INC.

JOB: 19-083 RPG - ATO UNH
DATE: 3/24/2020
ENGINEER: JJM

PRE DEVELOPMENT DRAINAGE AREAS:

SOIL TYPE	*SOIL GROUP*	*CN#*	***SUBCAT ES1*** *Area (SF)*	***TOTAL AREA*** *(SF)*
Grass	B	61	9,080	**9,080**
	D	80	6,475	**6,475**
Brush	C	65	6,110	**6,110**
	D	73	1,950	**1,950**
Woods	B	55	2,075	**2,075**
	C	70	2,540	**2,540**
	D	77	40,285	**40,285**
Pavement	B	98	7,260	**7,260**
	D	98	65	**65**
Building	B	98	2,010	**2,010**
Total Area (SF)			**77,850**	**77,850**
Total Area (Acres)			**1.79**	**1.79**

Total Impervious (SF)	**9,270**	**9,335**
Impervious (Acres)	**0.21**	**0.21**

STORMWATER ANALYSIS AREA WORKSHEET

EMANUEL ENGINEERING INC.

JOB: 19-083 RPG - ATO UNH
DATE: 3/24/2020
ENGINEER: JJM

POST DEVELOPMENT DRAINAGE AREAS:

SOIL TYPE	*SOIL GROUP*	*CN#*	***SUBCAT PS1*** *Area (SF)*	***SUBCAT PS2*** *Area (SF)*	***SUBCAT PS3*** *Area (SF)*	***SUBCAT PS4*** *Area (SF)*	***SUBCAT PS5*** *Area (SF)*	***TOTAL AREA*** *(SF)*
Grass	B	61	2,945	2,650	0	275	0	**5,870**
	C		0	0	0	0	0	**0**
	D	80	5,665	0	0	0	0	**5,665**
Woods	B	55	1,105	0	0	0	0	**1,105**
	C	70	2,540	0	0	0	0	**2,540**
	D	77	39,055	0	0	0	0	**39,055**
Porous Pavment	B	98	0	7,910	0	0	0	**7,910**
	D	98	0	2,105	0	0	0	**2,105**
Pavement	B	98	270	1,125	0	0	0	**1,395**
Buildings	B	98	0	0	1,730	2,105	310	**4,145**
Brush	C	65	6,110	0	0	0	0	**6,110**
	D	73	1,950	0	0	0	0	**1,950**
Total Area (SF)			**59,640**	**13,790**	**1,730**	**2,380**	**310**	**77,850**
Area (Acres)			**1.37**	**0.32**	**0.04**	**0.05**	**0.01**	**1.79**

Total Impervious (SF)			**270**	**1,125**	**1,730**	**2,105**	**310**	**5,540**
Impervious (Acres)			**0.01**	**0.03**	**0.04**	**0.05**	**0.01**	**0.13**

STORMWATER/DRAINAGE SUMMARY

EMANUEL ENGINEERING, INC.
JOB: 19-083 RPG - ATO UNH
DATE: 3/25/2020
ENGINEER: JJM

PEAK FLOWS FROM HYDROCAD

Subcatchment Area	Storm Quality 1"		2-Year Storm 3.13"		10-Year Storm 4.74"		17-Year Storm 5.33"		25-Year Storm 6.01"		100-Year Storm 8.62"	
	Pre (CFS)	Post (CFS)	Pre (CFS)	Post (CFS)	Pre (CFS)	Post (CFS)	Pre (CFS)	Post (CFS)	Pre (CFS)	Post (CFS)	Pre (CFS)	Post (CFS)
POINTS OF DISCHARGE												
LINK L100	0.01	0.01	2.09	1.36	3.95	2.66	4.79	3.25	5.38	3.68	8.19	5.68
FLOW TOTALS (CFS)	**0.01**	**0.01**	**2.09**	**1.36**	**3.95**	**2.66**	**4.79**	**3.25**	**5.38**	**3.68**	**8.19**	**5.68**
Net Increase/(Decrease) (CFS)		**0.00**		**(0.73)**		**(1.29)**		**(1.54)**		**(1.70)**		**(2.51)**

VOLUMES FROM HYDROCAD

Subcatchment Area	Storm Quality 1"		2-Year Storm 3.13"		10-Year Storm 4.74"		17-Year Storm 5.33"		25-Year Storm 6.01"		100-Year Storm 8.62"	
	Pre (AF)	Post (AF)	Pre (AF)	Post (AF)	Pre (AF)	Post (AF)	Pre (AF)	Post (AF)	Pre (AF)	Post (AF)	Pre (AF)	Post (AF)
POINTS OF DISCHARGE												
LINK L100	0.006	0.004	0.164	0.121	0.346	0.259	0.418	0.326	0.505	0.407	0.853	0.740
Voume TOTALS (AF)	**0.006**	**0.004**	**0.164**	**0.121**	**0.346**	**0.259**	**0.418**	**0.326**	**0.505**	**0.407**	**0.853**	**0.740**
Net Increase/(Decrease) (AF)		**(0.002)**		**(0.043)**		**(0.087)**		**(0.092)**		**(0.098)**		**(0.113)**

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Strafford County, New Hampshire

March 24, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

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

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

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

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

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

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

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

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

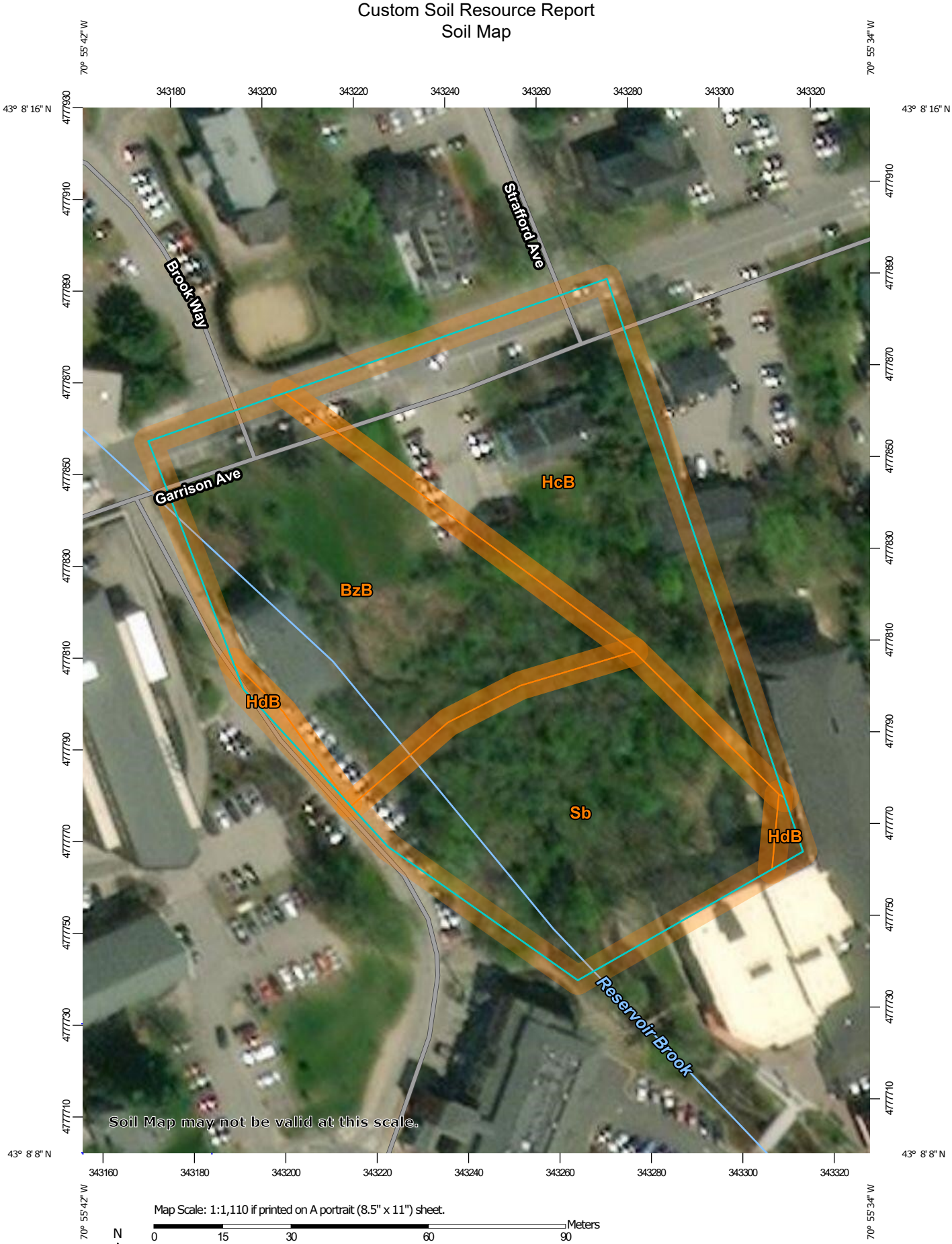
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,110 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

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

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

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

Soil Survey Area: Strafford County, New Hampshire
Survey Area Data: Version 19, Sep 16, 2019

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

Date(s) aerial images were photographed: Dec 31, 2009—Sep 9, 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
BzB	Buxton silt loam, 3 to 8 percent slopes	1.1	35.2%
HcB	Hollis-Charlton fine sandy loams, 3 to 8 percent slopes	1.0	32.7%
HdB	Hollis-Charlton very rocky fine sandy loams, 3 to 8 percent slopes	0.0	1.0%
Sb	Saugatuck loamy sand	1.0	31.1%
Totals for Area of Interest		**3.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Strafford County, New Hampshire

BzB—Buxton silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9d6p
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Buxton

Setting

Parent material: Glaciomarine

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 28 inches: silty clay loam
H3 - 28 to 43 inches: silty clay

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very 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 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Elmwood

Percent of map unit: 10 percent
Hydric soil rating: No

Not named

Percent of map unit: 5 percent
Hydric soil rating: No

HcB—Hollis-Charlton fine sandy loams, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9d7j
Elevation: 0 to 1,000 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 120 to 240 days
Farmland classification: Farmland of local importance

Map Unit Composition

Hollis and similar soils: 55 percent
Charlton and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis

Setting

Parent material: Till

Typical profile

H1 - 0 to 14 inches: fine sandy loam
H2 - 14 to 18 inches: bedrock

Properties and qualities

Slope: 3 to 8 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): Moderately high to high (0.60 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 2.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Charlton

Setting

Parent material: Till

Typical profile

H1 - 0 to 13 inches: fine sandy loam
H2 - 13 to 36 inches: fine sandy loam

H3 - 36 to 40 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 8 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 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Not named

Percent of map unit: 5 percent
Hydric soil rating: No

Buxton

Percent of map unit: 5 percent
Hydric soil rating: No

HdB—Hollis-Charlton very rocky fine sandy loams, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9d7m
Elevation: 0 to 1,000 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 120 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hollis and similar soils: 40 percent
Charlton and similar soils: 30 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis

Setting

Parent material: Till

Typical profile

H1 - 0 to 14 inches: very stony fine sandy loam
H2 - 14 to 18 inches: bedrock

Properties and qualities

Slope: 3 to 8 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): Moderately high to high (0.60 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 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Charlton

Setting

Parent material: Till

Typical profile

H1 - 0 to 13 inches: very stony fine sandy loam
H2 - 13 to 36 inches: fine sandy loam
H3 - 36 to 40 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 8 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 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 10 percent
Hydric soil rating: No

Buxton
Percent of map unit: 5 percent
Hydric soil rating: No

Not named
Percent of map unit: 5 percent
Hydric soil rating: No

Sutton
Percent of map unit: 5 percent
Hydric soil rating: No

Leicester
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Sb—Saugatuck loamy sand

Map Unit Setting
National map unit symbol: 9d8r
Elevation: 300 to 1,000 feet
Mean annual precipitation: 27 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 125 to 240 days
Farmland classification: Not prime farmland

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

Description of Saugatuck

Setting
Landform: Outwash terraces
Parent material: Outwash

Typical profile
H1 - 0 to 4 inches: loamy sand
H2 - 4 to 7 inches: sand
H3 - 7 to 26 inches: loamy sand
H4 - 26 to 42 inches: sand

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: 10 to 16 inches to undefined
Natural drainage class: Poorly drained
Runoff class: High

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 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Not named wet

Percent of map unit: 15 percent
Landform: Outwash terraces
Hydric soil rating: Yes

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Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	No
State	New Hampshire
Location	
Longitude	70.927 degrees West
Latitude	43.137 degrees North
Elevation	0 feet
Date/Time	Thu, 19 Mar 2020 14:22:53 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.26	0.40	0.49	0.66	0.81	1.00	**1yr**	0.70	0.98	1.13	1.59	2.03	2.61	2.84	**1yr**	2.31	2.73	3.13	3.85	4.43	**1yr**
2yr	0.32	0.49	0.61	0.82	1.01	1.19	**2yr**	0.88	1.17	1.39	1.86	2.41	3.13	3.47	**2yr**	2.77	3.34	3.84	4.57	5.20	**2yr**
5yr	0.37	0.57	0.70	0.96	1.23	1.48	**5yr**	1.06	1.44	1.72	2.32	2.96	3.97	4.45	**5yr**	3.51	4.28	4.89	5.78	6.54	**5yr**
10yr	0.41	0.63	0.78	1.10	1.42	1.73	**10yr**	1.22	1.69	2.02	2.73	3.46	4.74	5.37	**10yr**	4.20	5.17	5.88	6.91	7.78	**10yr**
25yr	0.48	0.74	0.91	1.31	1.72	2.14	**25yr**	1.48	2.09	2.51	3.39	4.26	6.01	6.90	**25yr**	5.32	6.63	7.51	8.75	9.80	**25yr**
50yr	0.54	0.83	1.03	1.48	1.99	2.51	**50yr**	1.72	2.46	2.96	4.01	4.99	7.19	8.34	**50yr**	6.37	8.02	9.04	10.47	11.68	**50yr**
100yr	0.62	0.93	1.17	1.69	2.31	2.95	**100yr**	2.00	2.89	3.48	4.73	5.84	8.62	10.08	**100yr**	7.62	9.69	10.88	12.54	13.92	**100yr**
200yr	0.70	1.05	1.33	1.93	2.69	3.47	**200yr**	2.32	3.40	4.10	5.59	6.84	10.32	12.19	**200yr**	9.13	11.72	13.10	15.02	16.60	**200yr**
500yr	0.83	1.23	1.59	2.31	3.28	4.31	**500yr**	2.83	4.21	5.10	6.97	8.44	13.11	15.67	**500yr**	11.60	15.07	16.75	19.07	20.97	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.24	0.37	0.45	0.60	0.74	0.90	**1yr**	0.64	0.88	0.91	1.26	1.55	2.00	2.51	**1yr**	1.77	2.42	2.94	3.28	4.03	**1yr**
2yr	0.32	0.49	0.60	0.81	1.00	1.18	**2yr**	0.86	1.16	1.37	1.83	2.36	3.04	3.38	**2yr**	2.69	3.25	3.73	4.45	5.05	**2yr**
5yr	0.35	0.54	0.67	0.92	1.17	1.40	**5yr**	1.01	1.37	1.62	2.15	2.78	3.71	4.13	**5yr**	3.29	3.97	4.58	5.42	6.13	**5yr**
10yr	0.38	0.59	0.73	1.02	1.32	1.60	**10yr**	1.14	1.57	1.82	2.45	3.14	4.29	4.81	**10yr**	3.79	4.62	5.33	6.29	7.06	**10yr**
25yr	0.44	0.67	0.83	1.19	1.56	1.91	**25yr**	1.35	1.87	2.11	2.85	3.67	5.06	5.86	**25yr**	4.48	5.63	6.53	7.66	8.53	**25yr**
50yr	0.48	0.74	0.92	1.32	1.77	2.19	**50yr**	1.53	2.14	2.36	3.21	4.13	5.81	6.79	**50yr**	5.14	6.53	7.62	8.88	9.83	**50yr**
100yr	0.54	0.82	1.02	1.48	2.03	2.51	**100yr**	1.75	2.46	2.64	3.60	4.62	6.66	7.87	**100yr**	5.89	7.56	8.89	10.30	11.29	**100yr**
200yr	0.60	0.91	1.15	1.66	2.32	2.87	**200yr**	2.00	2.81	2.94	4.03	5.17	7.63	9.12	**200yr**	6.75	8.77	10.39	11.96	13.01	**200yr**
500yr	0.70	1.05	1.35	1.96	2.79	3.46	**500yr**	2.40	3.39	3.42	4.67	6.02	9.10	11.08	**500yr**	8.05	10.65	12.76	14.58	15.61	**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	0.43	0.53	0.71	0.87	1.08	**1yr**	0.75	1.05	1.24	1.74	2.21	2.82	3.02	**1yr**	2.50	2.91	3.36	4.16	4.76	**1yr**
2yr	0.33	0.51	0.62	0.84	1.04	1.25	**2yr**	0.90	1.22	1.48	1.95	2.50	3.24	3.57	**2yr**	2.87	3.43	3.94	4.70	5.38	**2yr**
5yr	0.39	0.60	0.75	1.03	1.31	1.58	**5yr**	1.13	1.54	1.85	2.49	3.19	4.22	4.76	**5yr**	3.73	4.58	5.21	6.15	6.92	**5yr**
10yr	0.46	0.70	0.87	1.21	1.57	1.92	**10yr**	1.35	1.88	2.23	3.04	3.84	5.20	5.93	**10yr**	4.60	5.70	6.47	7.54	8.43	**10yr**
25yr	0.55	0.84	1.05	1.49	1.97	2.47	**25yr**	1.70	2.42	2.87	3.95	4.92	6.98	7.93	**25yr**	6.18	7.63	8.57	9.91	10.98	**25yr**
50yr	0.64	0.97	1.21	1.74	2.34	2.98	**50yr**	2.02	2.92	3.48	4.81	5.96	8.63	9.90	**50yr**	7.64	9.52	10.63	12.17	13.43	**50yr**
100yr	0.74	1.12	1.40	2.03	2.78	3.60	**100yr**	2.40	3.52	4.22	5.89	7.24	10.67	12.36	**100yr**	9.45	11.89	13.15	14.98	16.43	**100yr**
200yr	0.86	1.29	1.63	2.37	3.30	4.37	**200yr**	2.85	4.27	5.12	7.21	8.77	13.24	15.46	**200yr**	11.72	14.87	16.29	18.41	20.13	**200yr**
500yr	1.04	1.55	2.00	2.90	4.13	5.61	**500yr**	3.56	5.48	6.61	9.43	11.32	17.65	20.76	**500yr**	15.62	19.97	21.62	24.23	26.35	**500yr**

Powered by ACIS Northeast Regional Climate Center

NOTES:

1. OWNER OF RECORD:
   TAX MAP 2, LOT 12-12
   RICHMOND PROPERTY GROUP
   333 N. ALABAMA ST.
   INDIANAPOLIS, IN 46204
   SCRD BK 4626 PG 697

2. THE INTENT OF THIS PLAN IS TO CALCULATE PRE-DEVEOPLMENT SUBCATCHMENT AREAS AND FLOW PATHS FOR MODELING VARIOUS STORM EVENTS IN PREPARATION FOR SITE IMPROVEMENTS.

PRE-DEVELOPMENT DRAINAGE AREA CALCS:

DRAINAGE ANALYSIS TOTAL AREA = 77,850 SF

DRAINAGE ANALYSIS IMPERVIOUS = 9,335 SF
DRAINAGE ANALYSIS % IMPERVIOUS = 12.0%

DRAINAGE ANALYSIS UNDISTURBED = 77,850 SF
DRAINAGE ANALYSIS % UNDISTURBED = 100%

2 / 12-1
N/F ORION UNH, LLC
10 LIBERTY SQUARE 2nd FLOOR
BOSTON, MA 02109
S.C.R.D. 3990/886

2 / 12-3
N/F GP MADBURY 17 LLC
401 EDGEWATER PLACE SUITE 105
WAKEFIELD, MA 01880
S.C.R.D. 4084/888

2 / 9-3
N/F ALPHA XI DELTA
NEW HAMPSHIRE LLC
C/O JESSICA KLOPPER
8702 FOUNDERS RD.
INDIANAPOLIS, IN 46268
S.C.R.D. 4621/611

2 / 9-4
N/F FALL LINE PROPERTIES INC.
32 MADBURY RD.
DURHAM, NH 03824
S.C.R.D. 3648/992

2 / 12-12
N/F RICHMOND PROPERTY GROUP
333 N. ALABAMA ST.
INDIANAPOLIS, IN 46204
S.C.R.D. 4624/697
+/- 73,000 SF
+/- 1.7 ACRES

2 / 12-10
N/F UNIVERSITY OF NEW HAMPSHIRE

2 / 12-9
N/F UNIVERSITY OF NEW HAMPSHIRE

2 / 12-8
N/F GP ROSEMARY, LLC
1 PLEASANT ST. UNIT 1A-21
WESTFORD, MA 01886
S.C.R.D. 4176/879

2 / 13-0
N/F UNIVERSITY OF NEW HAMPSHIRE

STRAFFORD AVENUE
GARRISON AVENUE
PAVED SIDEWALK
ROSEMARY LANE
PETTEE BROOK
EDGE OF DELINEATED WETLAND
WETLAND LINE DELINEATED 2006/2008
EXISTING APARTMENT BUILDING
ELIZABETH DEMERITT HOUSE (1810 SF)
F.F. ELV. 65.00
BSMNT ELV. 56.00
RAMP
SHED
PAVEMENT
ES1
STONE & CONCRETE RETAINING WALL
STONE & CONCRETE FOUNDATION
GRANITE BLOCK CURB STOP
4" PVC o
GRANITE RETAINING WALL
GRAN. BLOCK
STONE WALL/ RET. WALL
STONE RET. WALL
CONC. HDWL 66" CMP INV.=42.1'
REMNANT STONE WALL
LOT LINE IS AT THE CENTERLINE OF PETTEE BROOK PER DEED
SEWER EASEMENT (SEE NOTES)
APPROXIMATE EXISTING APARTMENT BUILDING
299A/ccabb
299C/ccabb
229A/deccd
299E/deccd
229D/deccd
33A/P
134A/VP
L100

LOCUS PLAN
SCALE: 1"=1000'
RTE. 4
EDGEWOOD RD
STRAFFORD AVE
MADBURY RD
WOODMAN RD
MAIN ST.
SITE
QUAD WAY
MILL RD

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

ISS.	DATE:	DESCRIPTION OF ISSUE:	CHK.
1	MAR 24, 2020	FOR APPROVAL	

DRAWN: JJM | DESIGN: JJM
CHECKED: BDS | CHECKED: BDS

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CLIENT:
RICHMOND PROPERTY GROUP
333 N. ALABAMA ST.
INDIANAPOLIS, IN 46204

SEAL:

TITLE:
PREDEVELOPMENT DRAINAGE PLAN
FOR
RICHMOND PROPERTY GROUP
ELIZABETH DEMERITT HOUSE
18 GARRISON AVENUE (SITE)
DURHAM, NH 03824

PROJECT:	SCALE:	SHEET:
19-083	1"=20'	SW1

Durham Tax Map 2 Lot 12-12

Wetlands on the Southern Portion of Site

Subcat Reach Pond Link

Routing Diagram for ATO Predevelopment 03-19-20
Prepared by Microsoft, Printed 3/25/2020

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.048	55	Woods, Good, HSG B (ES1)
0.208	61	>75% Grass cover, Good, HSG B (ES1)
0.140	65	Brush, Good, HSG C (ES1)
0.058	70	Woods, Good, HSG C (ES1)
0.045	73	Brush, Good, HSG D (ES1)
0.925	77	Woods, Good, HSG D (ES1)
0.149	80	>75% Grass cover, Good, HSG D (ES1)
0.167	98	Paved parking, HSG B (ES1)
0.001	98	Paved parking, HSG D (ES1)
0.046	98	Roofs, HSG B (ES1)
1.787	**76**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.469	HSG B	ES1
0.199	HSG C	ES1
1.120	HSG D	ES1
0.000	Other	
1.787		**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
0.000	0.208	0.000	0.149	0.000	0.357	>75% Grass cover, Good	ES1
0.000	0.167	0.000	0.001	0.000	0.168	Paved parking	ES1
0.000	0.046	0.000	0.000	0.000	0.046	Roofs	ES1
0.000	0.000	0.140	0.045	0.000	0.185	Brush, Good	ES1
0.000	0.048	0.058	0.925	0.000	1.031	Woods, Good	ES1
0.000	**0.469**	**0.199**	**1.120**	**0.000**	**1.787**	**TOTAL AREA**	

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ES1: Durham Tax Map 2 Lot Runoff Area=77,850 sf 11.99% Impervious Runoff Depth=2.32"
Flow Length=190' Tc=5.7 min CN=76 Runoff=3.95 cfs 0.346 af

Link L100: Wetlands on the Southern Portion of Site Inflow=3.95 cfs 0.346 af
Primary=3.95 cfs 0.346 af

Total Runoff Area = 1.787 ac Runoff Volume = 0.346 af Average Runoff Depth = 2.32"
88.01% Pervious = 1.573 ac 11.99% Impervious = 0.214 ac

Summary for Subcatchment ES1: Durham Tax Map 2 Lot 12-12

[49] Hint: Tc<2dt may require smaller dt

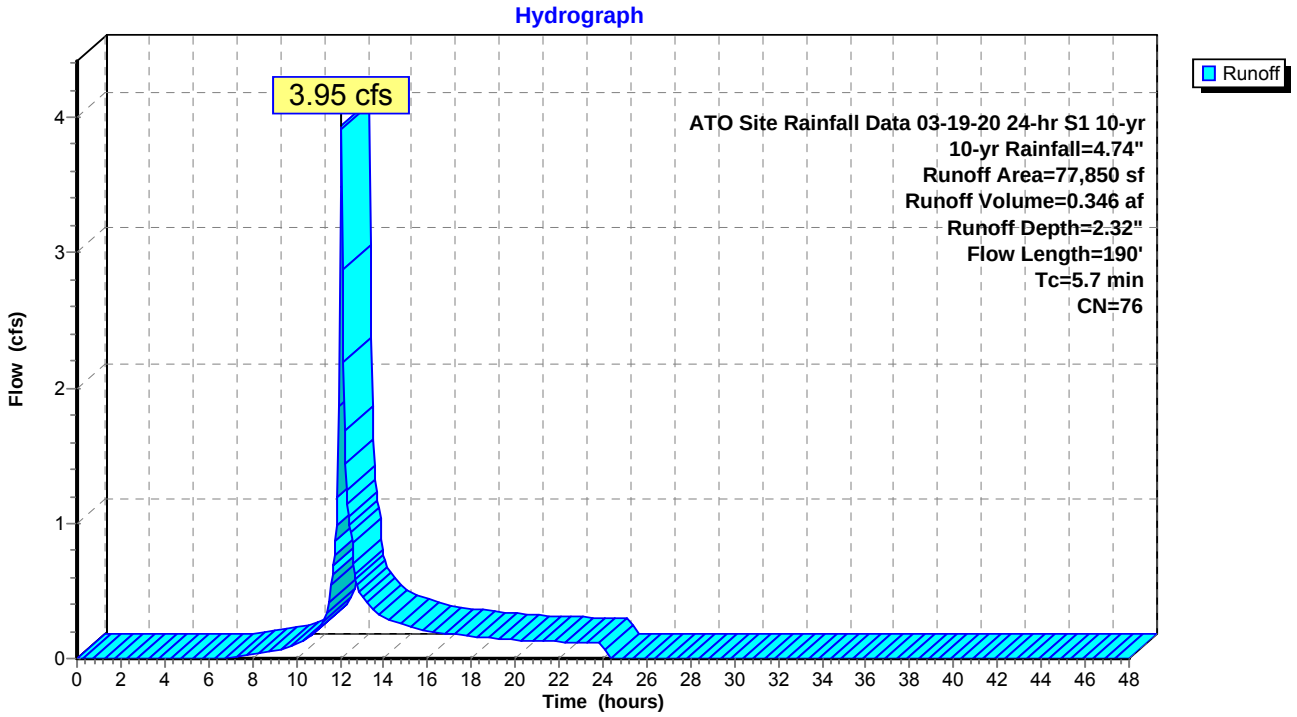
Runoff = 3.95 cfs @ 12.04 hrs, Volume= 0.346 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
ATO Site Rainfall Data 03-19-20 24-hr S1 10-yr 10-yr Rainfall=4.74"

Area (sf)	CN	Description
9,080	61	>75% Grass cover, Good, HSG B
6,475	80	>75% Grass cover, Good, HSG D
6,110	65	Brush, Good, HSG C
1,950	73	Brush, Good, HSG D
2,075	55	Woods, Good, HSG B
2,540	70	Woods, Good, HSG C
40,285	77	Woods, Good, HSG D
7,260	98	Paved parking, HSG B
65	98	Paved parking, HSG D
2,010	98	Roofs, HSG B
77,850	76	Weighted Average
68,515		88.01% Pervious Area
9,335		11.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	35	0.0150	0.12		**Sheet Flow, Grass** Grass: Short n= 0.150 P2= 3.13"
0.2	20	0.1000	2.21		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.3	65	0.0350	3.80		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.4	70	0.1500	2.71		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
5.7	190	Total			

Subcatchment ES1: Durham Tax Map 2 Lot 12-12

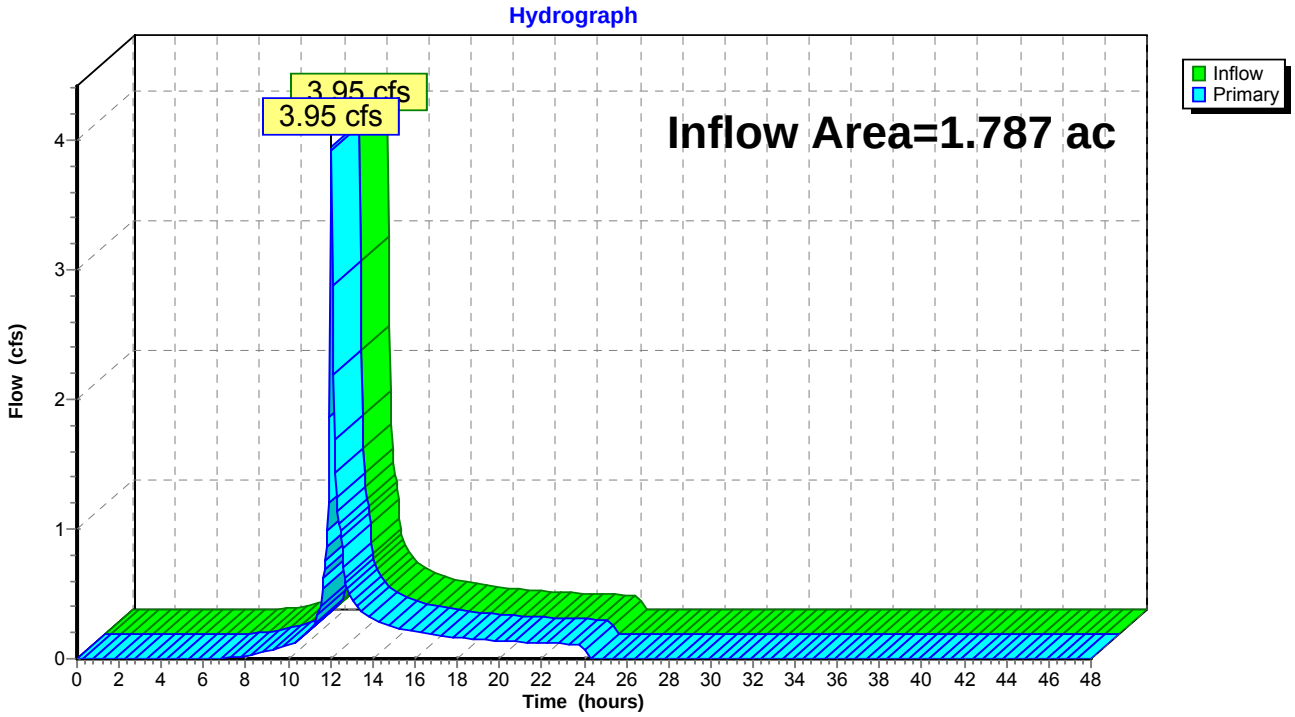


Summary for Link L100: Wetlands on the Southern Portion of Site

Inflow Area = 1.787 ac, 11.99% Impervious, Inflow Depth = 2.32" for 10-yr event
Inflow = 3.95 cfs @ 12.04 hrs, Volume= 0.346 af
Primary = 3.95 cfs @ 12.04 hrs, Volume= 0.346 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link L100: Wetlands on the Southern Portion of Site



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ES1: Durham Tax Map 2 Lot Runoff Area=77,850 sf 11.99% Impervious Runoff Depth=0.04"
Flow Length=190' Tc=5.7 min CN=76 Runoff=0.01 cfs 0.006 af

Link L100: Wetlands on the Southern Portion of Site Inflow=0.01 cfs 0.006 af
Primary=0.01 cfs 0.006 af

Total Runoff Area = 1.787 ac Runoff Volume = 0.006 af Average Runoff Depth = 0.04"
88.01% Pervious = 1.573 ac 11.99% Impervious = 0.214 ac

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ES1: Durham Tax Map 2 Lot Runoff Area=77,850 sf 11.99% Impervious Runoff Depth=1.10"
Flow Length=190' Tc=5.7 min CN=76 Runoff=2.09 cfs 0.164 af

Link L100: Wetlands on the Southern Portion of Site Inflow=2.09 cfs 0.164 af
Primary=2.09 cfs 0.164 af

Total Runoff Area = 1.787 ac Runoff Volume = 0.164 af Average Runoff Depth = 1.10"
88.01% Pervious = 1.573 ac 11.99% Impervious = 0.214 ac

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ES1: Durham Tax Map 2 Lot Runoff Area=77,850 sf 11.99% Impervious Runoff Depth=2.32"
Flow Length=190' Tc=5.7 min CN=76 Runoff=3.95 cfs 0.346 af

Link L100: Wetlands on the Southern Portion of Site Inflow=3.95 cfs 0.346 af
Primary=3.95 cfs 0.346 af

Total Runoff Area = 1.787 ac Runoff Volume = 0.346 af Average Runoff Depth = 2.32"
88.01% Pervious = 1.573 ac 11.99% Impervious = 0.214 ac

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ES1: Durham Tax Map 2 Lot Runoff Area=77,850 sf 11.99% Impervious Runoff Depth=2.81"
Flow Length=190' Tc=5.7 min CN=76 Runoff=4.79 cfs 0.418 af

Link L100: Wetlands on the Southern Portion of Site Inflow=4.79 cfs 0.418 af
Primary=4.79 cfs 0.418 af

Total Runoff Area = 1.787 ac Runoff Volume = 0.418 af Average Runoff Depth = 2.81"
88.01% Pervious = 1.573 ac 11.99% Impervious = 0.214 ac

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ES1: Durham Tax Map 2 Lot Runoff Area=77,850 sf 11.99% Impervious Runoff Depth=3.39"
Flow Length=190' Tc=5.7 min CN=76 Runoff=5.38 cfs 0.505 af

Link L100: Wetlands on the Southern Portion of Site Inflow=5.38 cfs 0.505 af
Primary=5.38 cfs 0.505 af

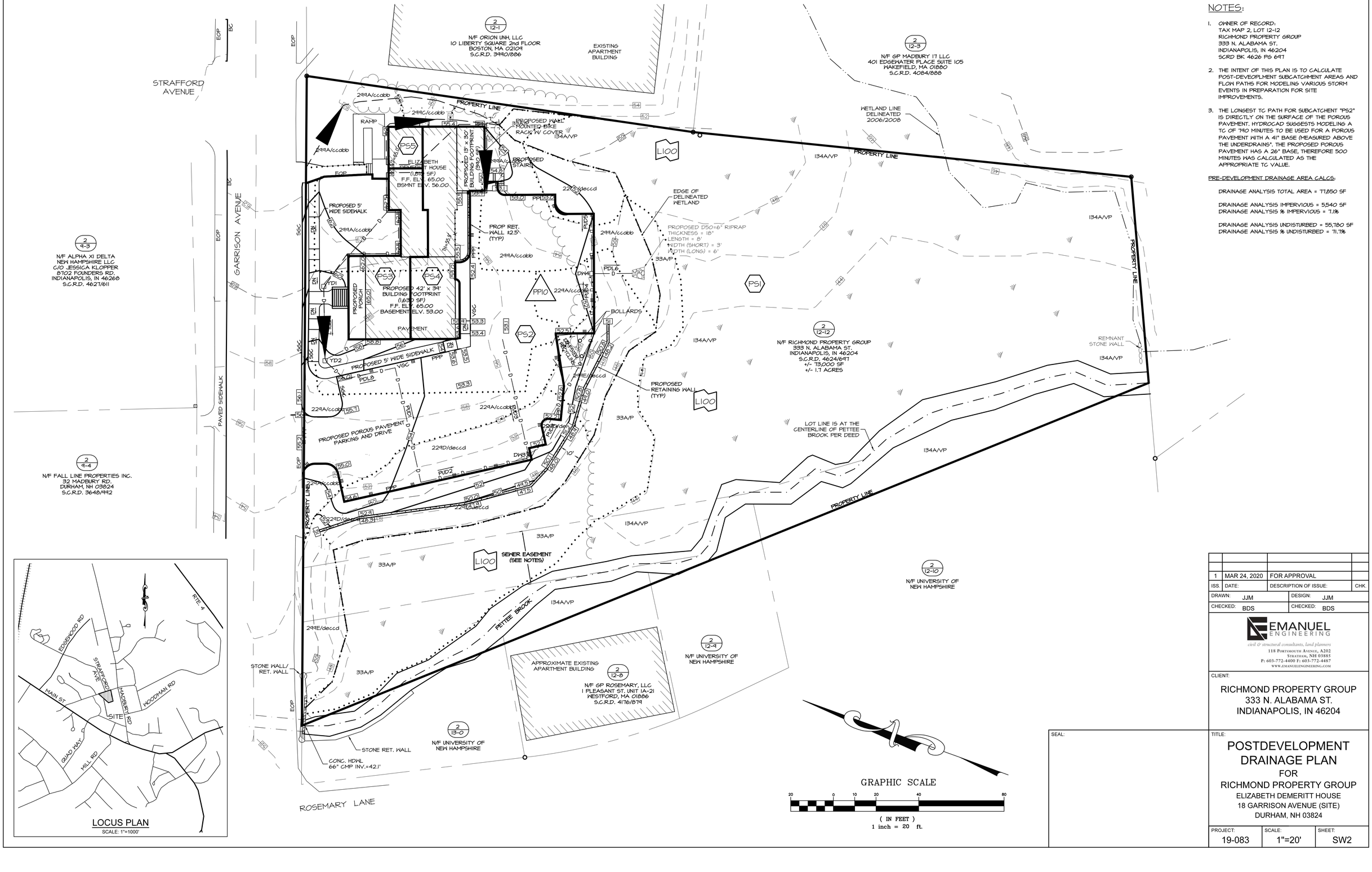
Total Runoff Area = 1.787 ac Runoff Volume = 0.505 af Average Runoff Depth = 3.39"
88.01% Pervious = 1.573 ac 11.99% Impervious = 0.214 ac

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ES1: Durham Tax Map 2 Lot Runoff Area=77,850 sf 11.99% Impervious Runoff Depth=5.73"
Flow Length=190' Tc=5.7 min CN=76 Runoff=8.19 cfs 0.853 af

Link L100: Wetlands on the Southern Portion of Site Inflow=8.19 cfs 0.853 af
Primary=8.19 cfs 0.853 af

Total Runoff Area = 1.787 ac Runoff Volume = 0.853 af Average Runoff Depth = 5.73"
88.01% Pervious = 1.573 ac 11.99% Impervious = 0.214 ac



NOTES:

1. OWNER OF RECORD:
   TAX MAP 2, LOT 12-12
   RICHMOND PROPERTY GROUP
   333 N. ALABAMA ST.
   INDIANAPOLIS, IN 46204
   SCRD BK 4626 PG 697

2. THE INTENT OF THIS PLAN IS TO CALCULATE POST-DEVELOPMENT SUBCATCHMENT AREAS AND FLOW PATHS FOR MODELING VARIOUS STORM EVENTS IN PREPARATION FOR SITE IMPROVEMENTS.

3. THE LONGEST TC PATH FOR SUBCATCHMENT "PS2" IS DIRECTLY ON THE SURFACE OF THE POROUS PAVEMENT. HYDROCAD SUGGESTS MODELING A TC OF 190 MINUTES TO BE USED FOR A POROUS PAVEMENT WITH A 41" BASE (MEASURED ABOVE THE UNDERDRAINS". THE PROPOSED POROUS PAVEMENT HAS A 26" BASE, THEREFORE 500 MINUTES HAS CALCULATED AS THE APPROPRIATE TC VALUE.

PRE-DEVELOPMENT DRAINAGE AREA CALCS:

DRAINAGE ANALYSIS TOTAL AREA = 77,850 SF

DRAINAGE ANALYSIS IMPERVIOUS = 5,540 SF
DRAINAGE ANALYSIS % IMPERVIOUS = 7.1%

DRAINAGE ANALYSIS UNDISTURBED = 55,780 SF
DRAINAGE ANALYSIS % UNDISTURBED = 71.7%

ISS.	DATE:	DESCRIPTION OF ISSUE:	CHK.
1	MAR 24, 2020	FOR APPROVAL	

DRAWN: JJM | DESIGN: JJM
CHECKED: BDS | CHECKED: BDS

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CLIENT:
RICHMOND PROPERTY GROUP
333 N. ALABAMA ST.
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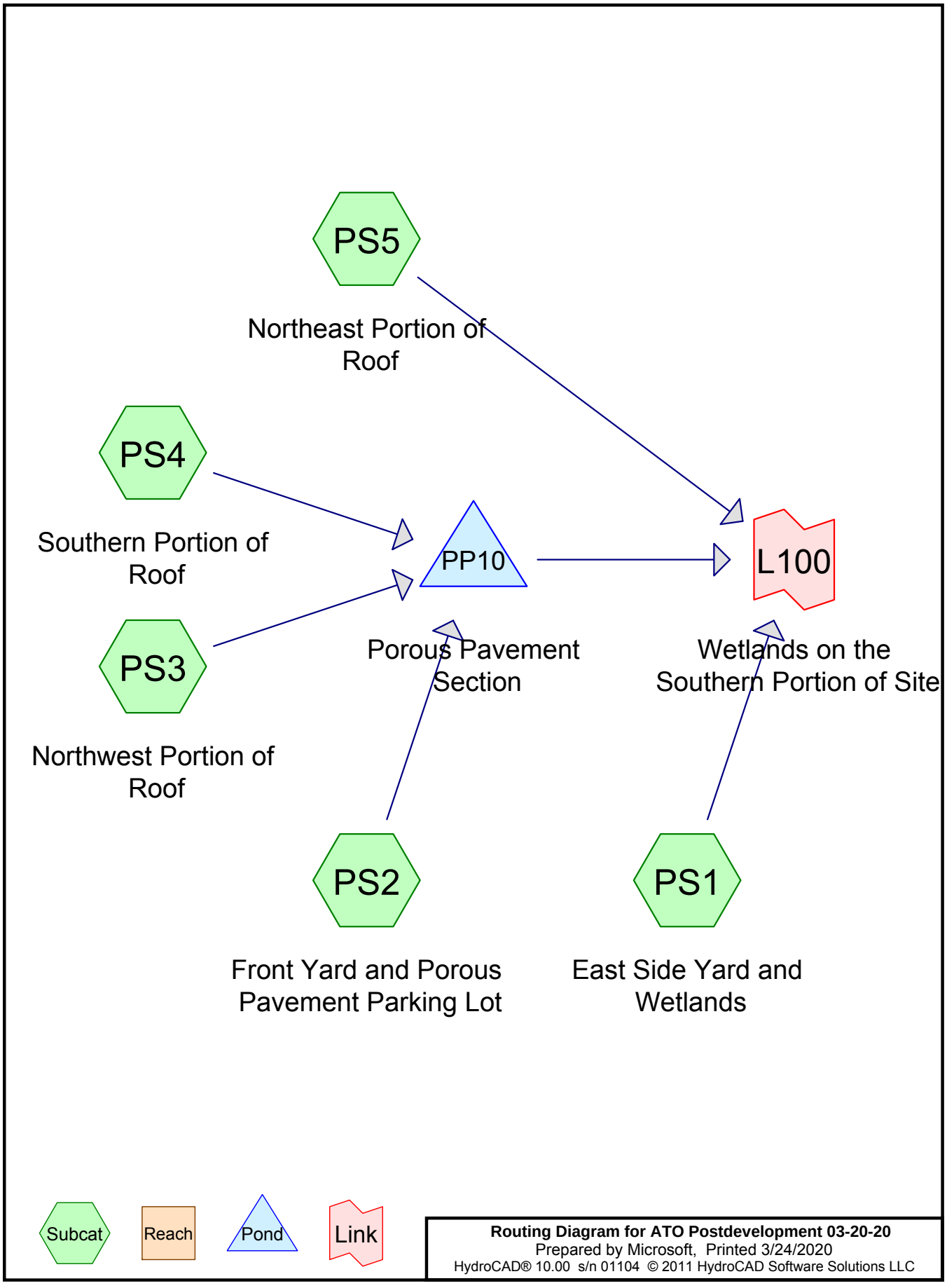
SEAL:

TITLE:
POSTDEVELOPMENT DRAINAGE PLAN
FOR
RICHMOND PROPERTY GROUP
ELIZABETH DEMERITT HOUSE
18 GARRISON AVENUE (SITE)
DURHAM, NH 03824

PROJECT:	SCALE:	SHEET:
19-083	1"=20'	SW2



Routing Diagram for ATO Postdevelopment 03-20-20
Prepared by Microsoft, Printed 3/24/2020

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.025	55	Woods, Good, HSG B (PS1)
0.135	61	>75% Grass cover, Good, HSG B (PS1, PS2, PS4)
0.140	65	Brush, Good, HSG C (PS1)
0.058	70	Woods, Good, HSG C (PS1)
0.045	73	Brush, Good, HSG D (PS1)
0.897	77	Woods, Good, HSG D (PS1)
0.130	80	>75% Grass cover, Good, HSG D (PS1)
0.032	98	Paved parking, HSG B (PS1, PS2)
0.095	98	Roofs, HSG B (PS3, PS4, PS5)
0.182	98	Water Surface, 0% imp, HSG B (PS2)
0.048	98	Water Surface, 0% imp, HSG D (PS2)
1.787	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.469	HSG B	PS1, PS2, PS3, PS4, PS5
0.199	HSG C	PS1
1.120	HSG D	PS1, PS2
0.000	Other	
1.787		**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
0.000	0.135	0.000	0.130	0.000	0.265	>75% Grass cover, Good	PS1, PS2, PS4
0.000	0.032	0.000	0.000	0.000	0.032	Paved parking	PS1, PS2
0.000	0.095	0.000	0.000	0.000	0.095	Roofs	PS3, PS4, PS5
0.000	0.000	0.140	0.045	0.000	0.185	Brush, Good	PS1
0.000	0.025	0.058	0.897	0.000	0.980	Woods, Good	PS1
0.000	0.182	0.000	0.048	0.000	0.230	Water Surface, 0% imp	PS2
0.000	**0.469**	**0.199**	**1.120**	**0.000**	**1.787**	**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	PS3	0.00	0.00	85.0	0.0050	0.010	4.0	0.0	0.0
2	PS3	0.00	0.00	55.0	0.0100	0.010	8.0	0.0	0.0
3	PS4	0.00	0.00	60.0	0.0050	0.010	4.0	0.0	0.0
4	PS5	0.00	0.00	18.0	0.0050	0.010	4.0	0.0	0.0
5	PP10	49.13	49.00	18.0	0.0072	0.013	12.0	0.0	0.0

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS1: East Side Yard and Runoff Area=59,640 sf 0.45% Impervious Runoff Depth=2.24"
Flow Length=110' Tc=8.1 min CN=75 Runoff=2.65 cfs 0.256 af

Subcatchment PS2: Front Yard and Porous Runoff Area=13,790 sf 8.16% Impervious Runoff Depth>3.73"
Tc=500.0 min CN=91 Runoff=0.11 cfs 0.098 af

Subcatchment PS3: Northwest Portion of Runoff Area=1,730 sf 100.00% Impervious Runoff Depth=4.50"
Flow Length=156' Tc=1.0 min CN=98 Runoff=0.18 cfs 0.015 af

Subcatchment PS4: Southern Portion of Runoff Area=2,380 sf 88.45% Impervious Runoff Depth=4.05"
Flow Length=82' Tc=0.6 min CN=94 Runoff=0.24 cfs 0.018 af

Subcatchment PS5: Northeast Portion of Runoff Area=310 sf 100.00% Impervious Runoff Depth=4.50"
Flow Length=89' Tc=0.5 min CN=98 Runoff=0.03 cfs 0.003 af

Pond PP10: Porous Pavement Section Peak Elev=49.16' Storage=1,068 cf Inflow=0.43 cfs 0.132 af
Discarded=0.07 cfs 0.131 af Primary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.132 af

Link L100: Wetlands on the Southern Portion of Site Inflow=2.66 cfs 0.259 af
Primary=2.66 cfs 0.259 af

Total Runoff Area = 1.787 ac Runoff Volume = 0.390 af Average Runoff Depth = 2.62"
92.88% Pervious = 1.660 ac 7.12% Impervious = 0.127 ac

Summary for Subcatchment PS1: East Side Yard and Wetlands

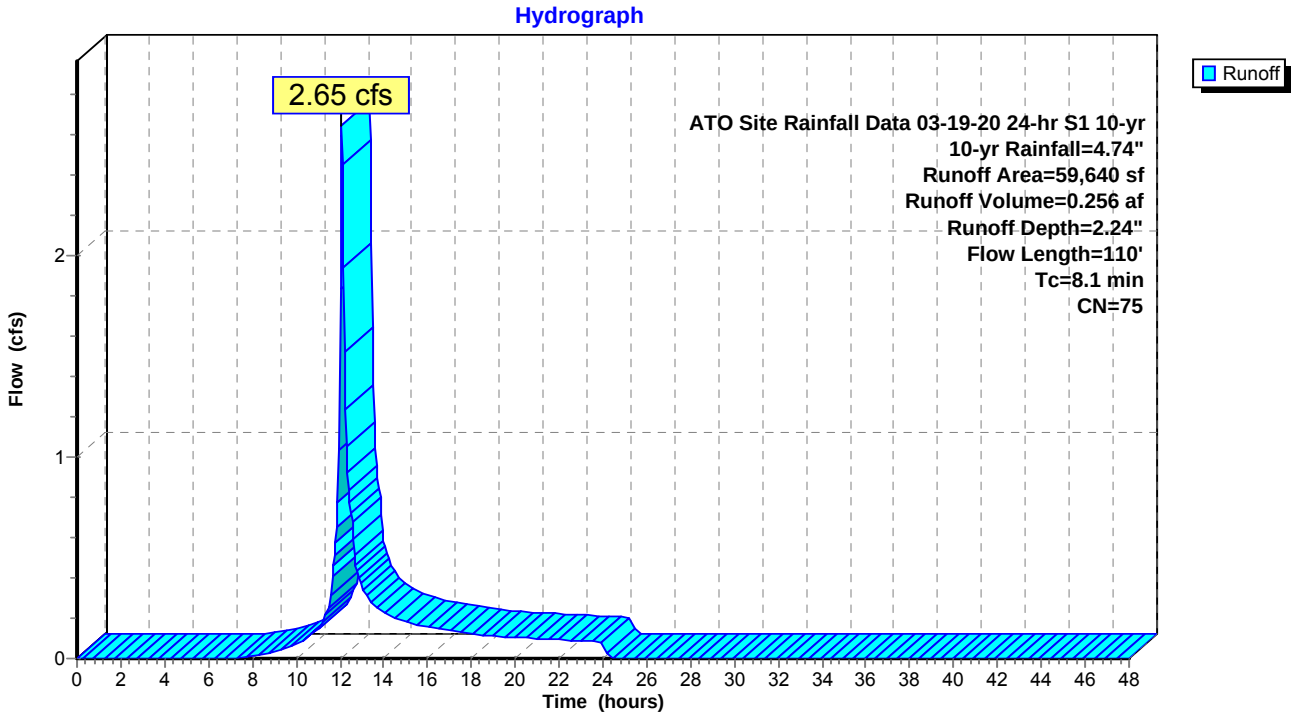
Runoff = 2.65 cfs @ 12.07 hrs, Volume= 0.256 af, Depth= 2.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
ATO Site Rainfall Data 03-19-20 24-hr S1 10-yr 10-yr Rainfall=4.74"

Area (sf)	CN	Description
2,945	61	>75% Grass cover, Good, HSG B
5,665	80	>75% Grass cover, Good, HSG D
1,105	55	Woods, Good, HSG B
2,540	70	Woods, Good, HSG C
39,055	77	Woods, Good, HSG D
270	98	Paved parking, HSG B
6,110	65	Brush, Good, HSG C
1,950	73	Brush, Good, HSG D
59,640	75	Weighted Average
59,370		99.55% Pervious Area
270		0.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	42	0.0100	0.11		**Sheet Flow, Grass** Grass: Short n= 0.150 P2= 3.13"
1.4	46	0.0120	0.55		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
0.2	22	0.1200	2.42		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
8.1	110	Total			

Subcatchment PS1: East Side Yard and Wetlands



Summary for Subcatchment PS2: Front Yard and Porous Pavement Parking Lot

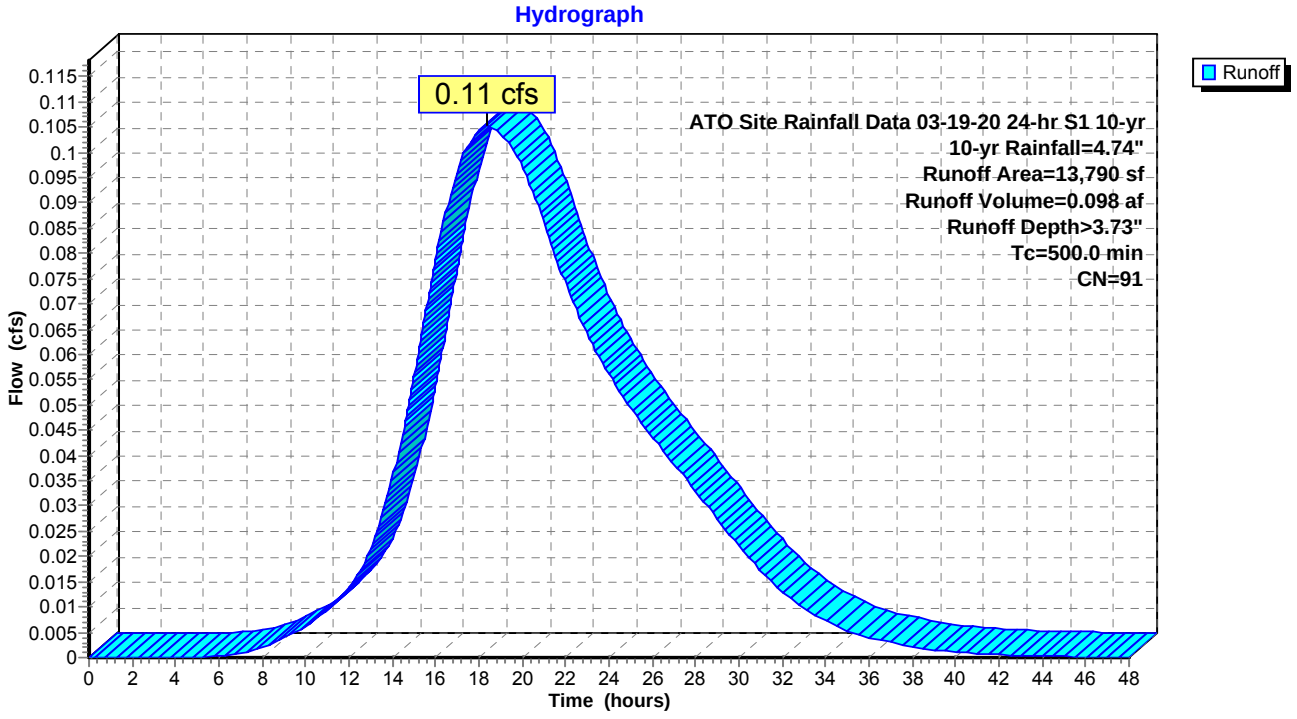
Runoff = 0.11 cfs @ 18.35 hrs, Volume= 0.098 af, Depth> 3.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
ATO Site Rainfall Data 03-19-20 24-hr S1 10-yr 10-yr Rainfall=4.74"

Area (sf)	CN	Description
2,650	61	>75% Grass cover, Good, HSG B
7,910	98	Water Surface, 0% imp, HSG B
2,105	98	Water Surface, 0% imp, HSG D
1,125	98	Paved parking, HSG B
13,790	91	Weighted Average
12,665		91.84% Pervious Area
1,125		8.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
500.0					**Direct Entry, Infiltration through 26" Porous Pavement Base Lay**

Subcatchment PS2: Front Yard and Porous Pavement Parking Lot



Summary for Subcatchment PS3: Northwest Portion of Roof

[49] Hint: Tc<2dt may require smaller dt

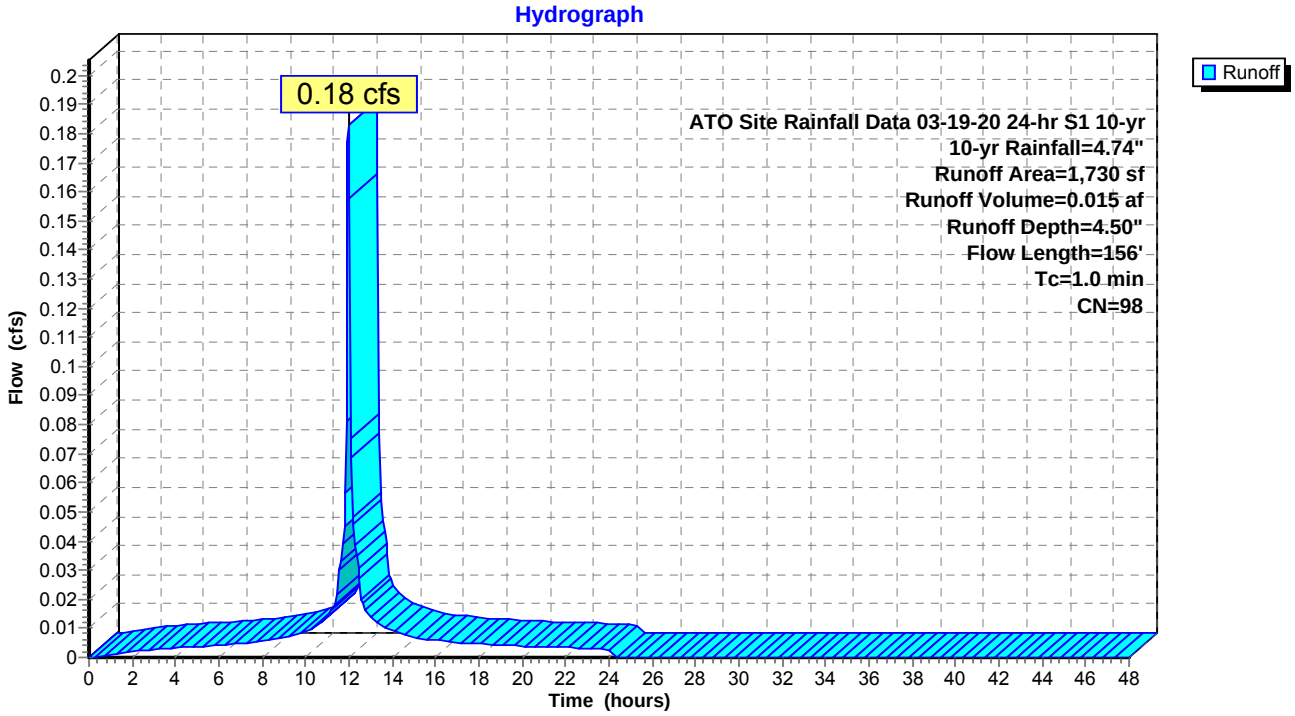
Runoff = 0.18 cfs @ 11.97 hrs, Volume= 0.015 af, Depth= 4.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
ATO Site Rainfall Data 03-19-20 24-hr S1 10-yr 10-yr Rainfall=4.74"

Area (sf)	CN	Description
1,730	98	Roofs, HSG B
1,730		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	16	0.8333	4.19		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 3.13"
0.7	85	0.0050	2.00	0.17	**Pipe Channel, Gutter** 4.0" Round Area= 0.1 sf Perim= 1.0' r= 0.08' n= 0.010 PVC, smooth interior
0.2	55	0.0100	4.50	1.57	**Pipe Channel, 8" SDR-35 Pipe** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
1.0	156	Total			

Subcatchment PS3: Northwest Portion of Roof



Summary for Subcatchment PS4: Southern Portion of Roof

[49] Hint: Tc<2dt may require smaller dt

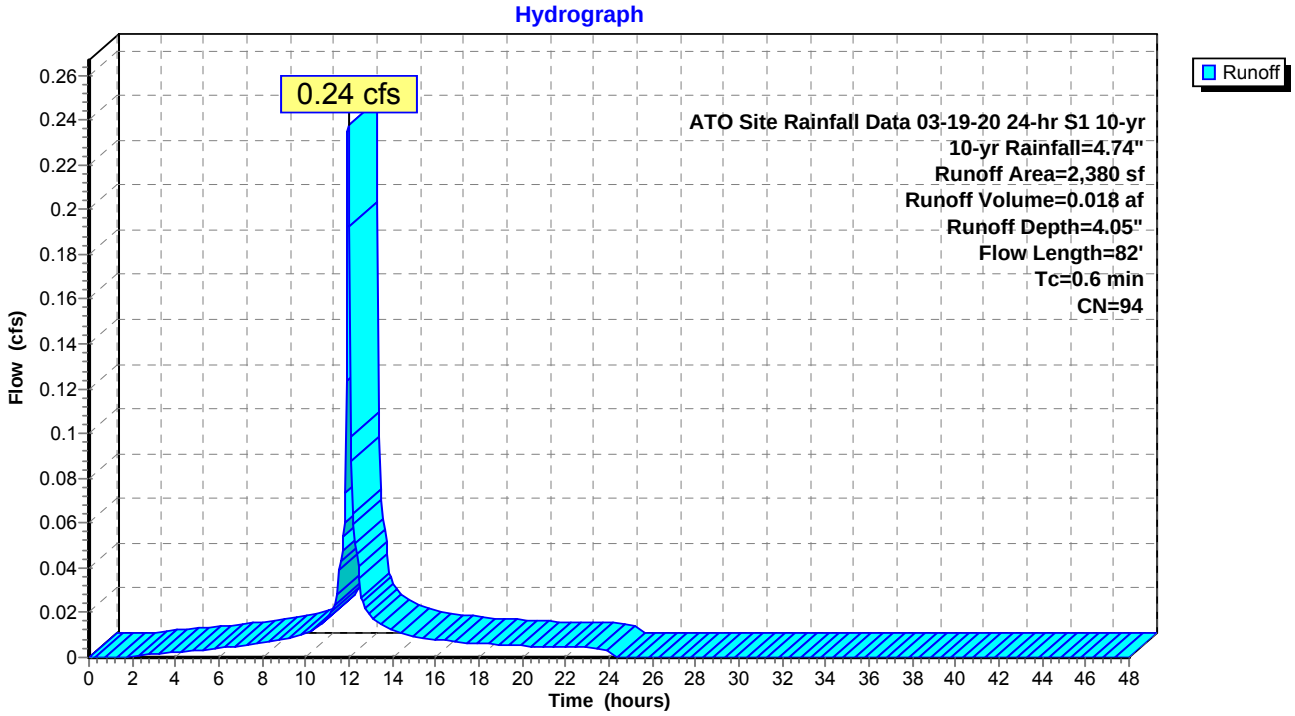
Runoff = 0.24 cfs @ 11.96 hrs, Volume= 0.018 af, Depth= 4.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
ATO Site Rainfall Data 03-19-20 24-hr S1 10-yr 10-yr Rainfall=4.74"

Area (sf)	CN	Description
275	61	>75% Grass cover, Good, HSG B
2,105	98	Roofs, HSG B
2,380	94	Weighted Average
275		11.55% Pervious Area
2,105		88.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	22	0.6667	4.09		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 3.13"
0.5	60	0.0050	2.00	0.17	**Pipe Channel, Gutter** 4.0" Round Area= 0.1 sf Perim= 1.0' r= 0.08' n= 0.010 PVC, smooth interior
0.6	82	Total			

Subcatchment PS4: Southern Portion of Roof



Summary for Subcatchment PS5: Northeast Portion of Roof

[49] Hint: Tc<2dt may require smaller dt

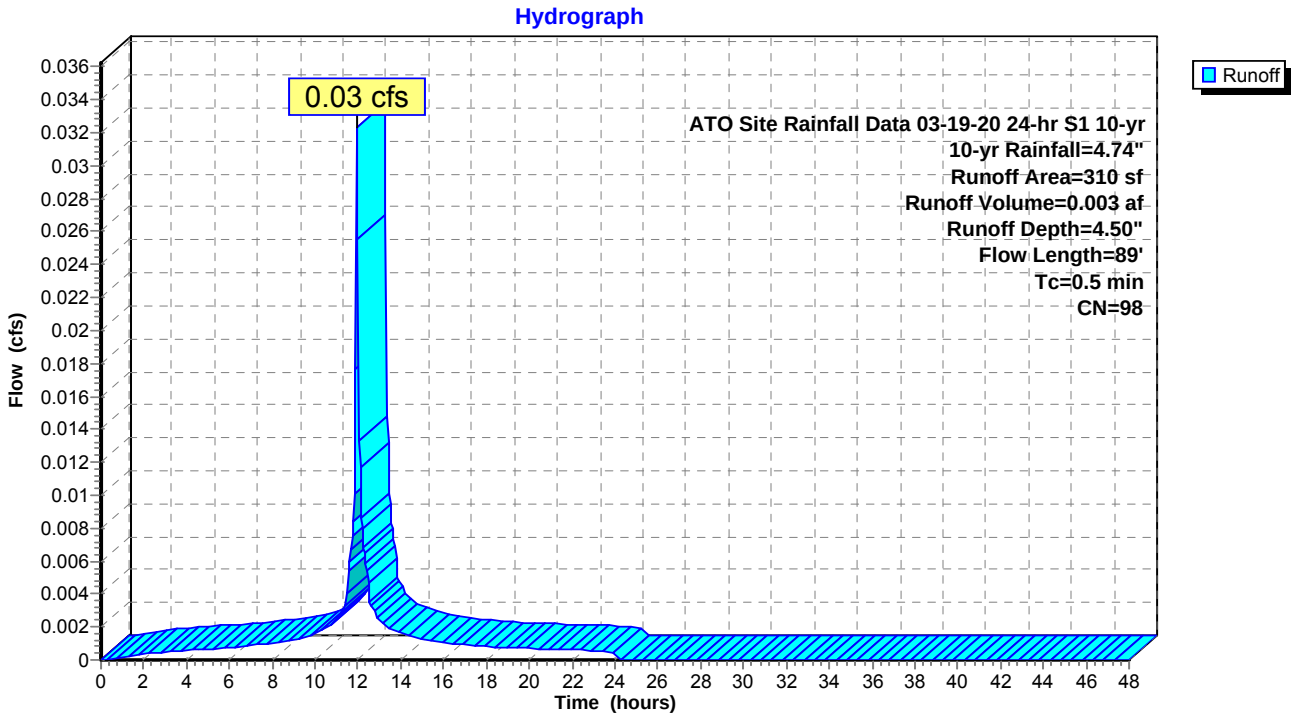
Runoff = 0.03 cfs @ 11.96 hrs, Volume= 0.003 af, Depth= 4.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
ATO Site Rainfall Data 03-19-20 24-hr S1 10-yr 10-yr Rainfall=4.74"

Area (sf)	CN	Description
310	98	Roofs, HSG B
310		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	16	0.8333	4.19		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 3.13"
0.1	18	0.0050	2.00	0.17	**Pipe Channel, Gutter** 4.0" Round Area= 0.1 sf Perim= 1.0' r= 0.08' n= 0.010 PVC, smooth interior
0.3	55	0.1500	2.71		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.5	89	Total			

Subcatchment PS5: Northeast Portion of Roof



Summary for Pond PP10: Porous Pavement Section

Inflow Area = 0.411 ac, 27.71% Impervious, Inflow Depth > 3.85" for 10-yr event
Inflow = 0.43 cfs @ 11.96 hrs, Volume= 0.132 af
Outflow = 0.07 cfs @ 22.99 hrs, Volume= 0.132 af, Atten= 84%, Lag= 661.5 min
Discarded = 0.07 cfs @ 11.80 hrs, Volume= 0.131 af
Primary = 0.00 cfs @ 22.99 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 49.16' @ 22.99 hrs Surf.Area= 10,000 sf Storage= 1,068 cf

Plug-Flow detention time= 134.0 min calculated for 0.132 af (100% of inflow)
Center-of-Mass det. time= 133.9 min (1,268.0 - 1,134.0)

Volume	Invert	Avail.Storage	Storage Description
#1	48.80'	9,000 cf	**Porous Pavement (Prismatic)**Listed below (Recalc) 30,000 cf Overall x 30.0% Voids

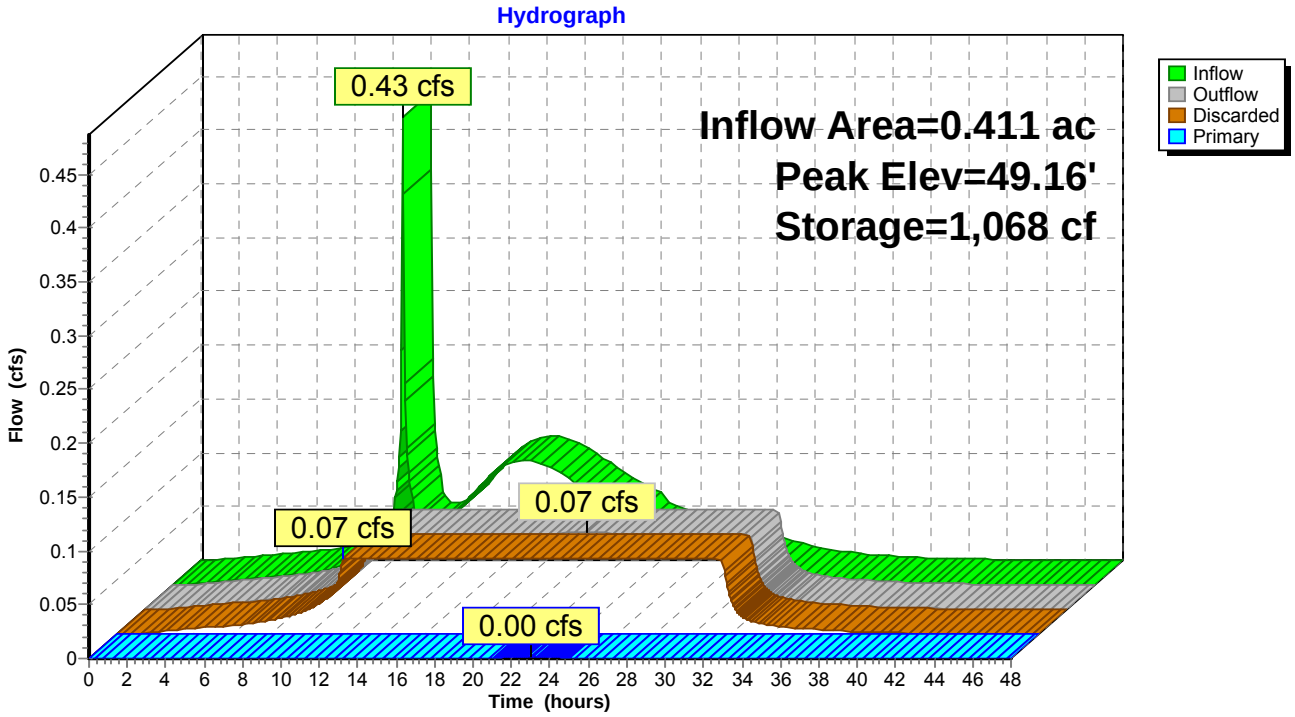
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
48.80	10,000	0	0
51.80	10,000	30,000	30,000

Device	Routing	Invert	Outlet Devices
#1	Primary	49.13'	**12.0" Round 12" HDPE Pipe** L= 18.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 49.13' / 49.00' S= 0.0072 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	48.80'	**0.300 in/hr Exfiltration to Groundwater over Surface area**

Discarded OutFlow Max=0.07 cfs @ 11.80 hrs HW=48.83' (Free Discharge)
↑—**2=Exfiltration to Groundwater** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 22.99 hrs HW=49.16' (Free Discharge)
↑—**1=12" HDPE Pipe** (Barrel Controls 0.00 cfs @ 0.53 fps)

Pond PP10: Porous Pavement Section

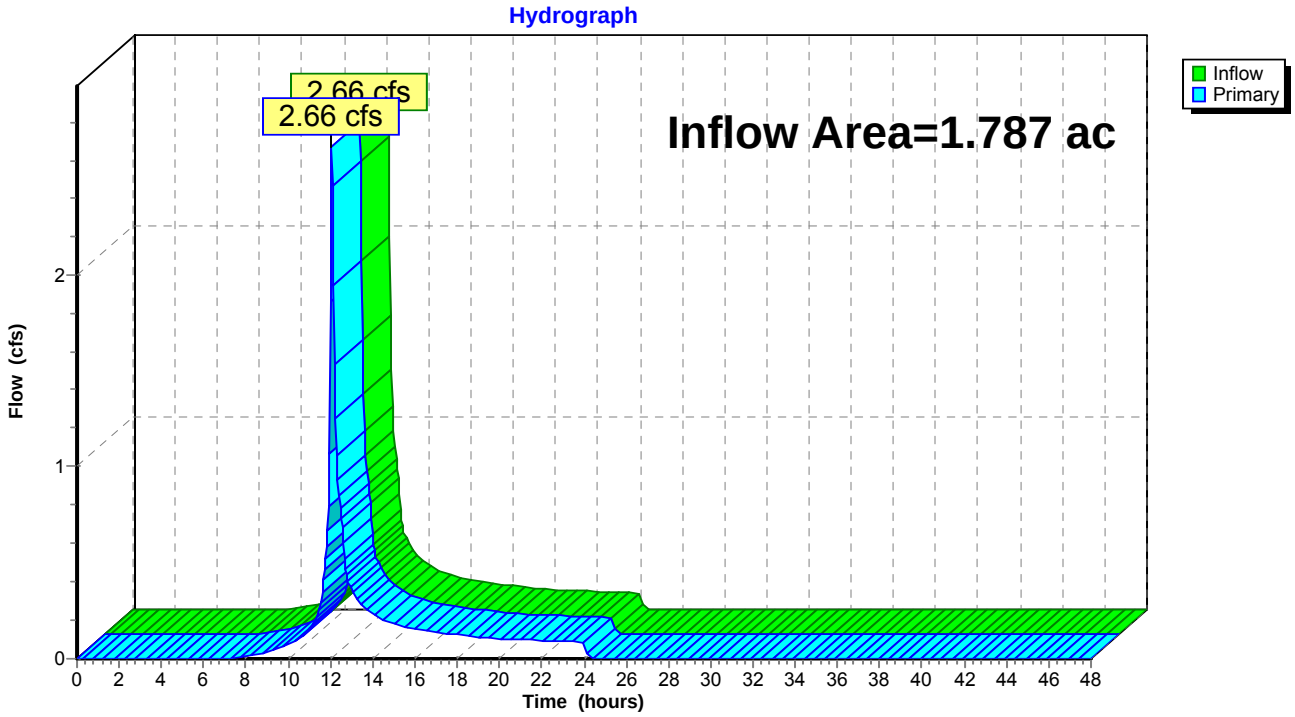


Summary for Link L100: Wetlands on the Southern Portion of Site

Inflow Area = 1.787 ac, 7.12% Impervious, Inflow Depth = 1.74" for 10-yr event
Inflow = 2.66 cfs @ 12.07 hrs, Volume= 0.259 af
Primary = 2.66 cfs @ 12.07 hrs, Volume= 0.259 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link L100: Wetlands on the Southern Portion of Site



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS1: East Side Yard and Runoff Area=59,640 sf 0.45% Impervious Runoff Depth=0.03"
Flow Length=110' Tc=8.1 min CN=75 Runoff=0.00 cfs 0.003 af

Subcatchment PS2: Front Yard and Porous Runoff Area=13,790 sf 8.16% Impervious Runoff Depth>0.36"
Tc=500.0 min CN=91 Runoff=0.01 cfs 0.009 af

Subcatchment PS3: Northwest Portion of Runoff Area=1,730 sf 100.00% Impervious Runoff Depth=0.79"
Flow Length=156' Tc=1.0 min CN=98 Runoff=0.04 cfs 0.003 af

Subcatchment PS4: Southern Portion of Runoff Area=2,380 sf 88.45% Impervious Runoff Depth=0.50"
Flow Length=82' Tc=0.6 min CN=94 Runoff=0.03 cfs 0.002 af

Subcatchment PS5: Northeast Portion of Runoff Area=310 sf 100.00% Impervious Runoff Depth=0.79"
Flow Length=89' Tc=0.5 min CN=98 Runoff=0.01 cfs 0.000 af

Pond PP10: Porous Pavement Section Peak Elev=48.81' Storage=33 cf Inflow=0.07 cfs 0.014 af
Discarded=0.03 cfs 0.014 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.014 af

Link L100: Wetlands on the Southern Portion of Site Inflow=0.01 cfs 0.004 af
Primary=0.01 cfs 0.004 af

Total Runoff Area = 1.787 ac Runoff Volume = 0.018 af Average Runoff Depth = 0.12"
92.88% Pervious = 1.660 ac 7.12% Impervious = 0.127 ac

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS1: East Side Yard and Runoff Area=59,640 sf 0.45% Impervious Runoff Depth=1.05"
Flow Length=110' Tc=8.1 min CN=75 Runoff=1.35 cfs 0.119 af

Subcatchment PS2: Front Yard and Porous Runoff Area=13,790 sf 8.16% Impervious Runoff Depth>2.19"
Tc=500.0 min CN=91 Runoff=0.06 cfs 0.058 af

Subcatchment PS3: Northwest Portion of Runoff Area=1,730 sf 100.00% Impervious Runoff Depth=2.90"
Flow Length=156' Tc=1.0 min CN=98 Runoff=0.14 cfs 0.010 af

Subcatchment PS4: Southern Portion of Runoff Area=2,380 sf 88.45% Impervious Runoff Depth=2.48"
Flow Length=82' Tc=0.6 min CN=94 Runoff=0.18 cfs 0.011 af

Subcatchment PS5: Northeast Portion of Runoff Area=310 sf 100.00% Impervious Runoff Depth=2.90"
Flow Length=89' Tc=0.5 min CN=98 Runoff=0.02 cfs 0.002 af

Pond PP10: Porous Pavement Section Peak Elev=48.86' Storage=184 cf Inflow=0.32 cfs 0.079 af
Discarded=0.07 cfs 0.079 af Primary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.079 af

Link L100: Wetlands on the Southern Portion of Site Inflow=1.36 cfs 0.121 af
Primary=1.36 cfs 0.121 af

Total Runoff Area = 1.787 ac Runoff Volume = 0.200 af Average Runoff Depth = 1.34"
92.88% Pervious = 1.660 ac 7.12% Impervious = 0.127 ac

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS1: East Side Yard and Runoff Area=59,640 sf 0.45% Impervious Runoff Depth=2.24"
Flow Length=110' Tc=8.1 min CN=75 Runoff=2.65 cfs 0.256 af

Subcatchment PS2: Front Yard and Porous Runoff Area=13,790 sf 8.16% Impervious Runoff Depth>3.73"
Tc=500.0 min CN=91 Runoff=0.11 cfs 0.098 af

Subcatchment PS3: Northwest Portion of Runoff Area=1,730 sf 100.00% Impervious Runoff Depth=4.50"
Flow Length=156' Tc=1.0 min CN=98 Runoff=0.18 cfs 0.015 af

Subcatchment PS4: Southern Portion of Runoff Area=2,380 sf 88.45% Impervious Runoff Depth=4.05"
Flow Length=82' Tc=0.6 min CN=94 Runoff=0.24 cfs 0.018 af

Subcatchment PS5: Northeast Portion of Runoff Area=310 sf 100.00% Impervious Runoff Depth=4.50"
Flow Length=89' Tc=0.5 min CN=98 Runoff=0.03 cfs 0.003 af

Pond PP10: Porous Pavement Section Peak Elev=49.16' Storage=1,068 cf Inflow=0.43 cfs 0.132 af
Discarded=0.07 cfs 0.131 af Primary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.132 af

Link L100: Wetlands on the Southern Portion of Site Inflow=2.66 cfs 0.259 af
Primary=2.66 cfs 0.259 af

Total Runoff Area = 1.787 ac Runoff Volume = 0.390 af Average Runoff Depth = 2.62"
92.88% Pervious = 1.660 ac 7.12% Impervious = 0.127 ac

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS1: East Side Yard and Runoff Area=59,640 sf 0.45% Impervious Runoff Depth=2.72"
Flow Length=110' Tc=8.1 min CN=75 Runoff=3.24 cfs 0.310 af

Subcatchment PS2: Front Yard and Porous Runoff Area=13,790 sf 8.16% Impervious Runoff Depth>4.30"
Tc=500.0 min CN=91 Runoff=0.12 cfs 0.114 af

Subcatchment PS3: Northwest Portion of Runoff Area=1,730 sf 100.00% Impervious Runoff Depth=5.09"
Flow Length=156' Tc=1.0 min CN=98 Runoff=0.21 cfs 0.017 af

Subcatchment PS4: Southern Portion of Runoff Area=2,380 sf 88.45% Impervious Runoff Depth=4.63"
Flow Length=82' Tc=0.6 min CN=94 Runoff=0.27 cfs 0.021 af

Subcatchment PS5: Northeast Portion of Runoff Area=310 sf 100.00% Impervious Runoff Depth=5.09"
Flow Length=89' Tc=0.5 min CN=98 Runoff=0.04 cfs 0.003 af

Pond PP10: Porous Pavement Section Peak Elev=49.24' Storage=1,307 cf Inflow=0.49 cfs 0.151 af
Discarded=0.07 cfs 0.139 af Primary=0.04 cfs 0.012 af Outflow=0.11 cfs 0.151 af

Link L100: Wetlands on the Southern Portion of Site Inflow=3.25 cfs 0.326 af
Primary=3.25 cfs 0.326 af

Total Runoff Area = 1.787 ac Runoff Volume = 0.465 af Average Runoff Depth = 3.12"
92.88% Pervious = 1.660 ac 7.12% Impervious = 0.127 ac

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS1: East Side Yard and Runoff Area=59,640 sf 0.45% Impervious Runoff Depth=3.29"
Flow Length=110' Tc=8.1 min CN=75 Runoff=3.66 cfs 0.375 af

Subcatchment PS2: Front Yard and Porous Runoff Area=13,790 sf 8.16% Impervious Runoff Depth>4.97"
Tc=500.0 min CN=91 Runoff=0.14 cfs 0.131 af

Subcatchment PS3: Northwest Portion of Runoff Area=1,730 sf 100.00% Impervious Runoff Depth=5.77"
Flow Length=156' Tc=1.0 min CN=98 Runoff=0.22 cfs 0.019 af

Subcatchment PS4: Southern Portion of Runoff Area=2,380 sf 88.45% Impervious Runoff Depth=5.31"
Flow Length=82' Tc=0.6 min CN=94 Runoff=0.28 cfs 0.024 af

Subcatchment PS5: Northeast Portion of Runoff Area=310 sf 100.00% Impervious Runoff Depth=5.77"
Flow Length=89' Tc=0.5 min CN=98 Runoff=0.04 cfs 0.003 af

Pond PP10: Porous Pavement Section Peak Elev=49.27' Storage=1,421 cf Inflow=0.52 cfs 0.174 af
Discarded=0.07 cfs 0.146 af Primary=0.07 cfs 0.028 af Outflow=0.14 cfs 0.174 af

Link L100: Wetlands on the Southern Portion of Site Inflow=3.68 cfs 0.407 af
Primary=3.68 cfs 0.407 af

Total Runoff Area = 1.787 ac Runoff Volume = 0.553 af Average Runoff Depth = 3.71"
92.88% Pervious = 1.660 ac 7.12% Impervious = 0.127 ac

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS1: East Side Yard and Runoff Area=59,640 sf 0.45% Impervious Runoff Depth=5.60"
Flow Length=110' Tc=8.1 min CN=75 Runoff=5.66 cfs 0.639 af

Subcatchment PS2: Front Yard and Porous Runoff Area=13,790 sf 8.16% Impervious Runoff Depth>7.54"
Tc=500.0 min CN=91 Runoff=0.20 cfs 0.199 af

Subcatchment PS3: Northwest Portion of Runoff Area=1,730 sf 100.00% Impervious Runoff Depth=8.38"
Flow Length=156' Tc=1.0 min CN=98 Runoff=0.28 cfs 0.028 af

Subcatchment PS4: Southern Portion of Runoff Area=2,380 sf 88.45% Impervious Runoff Depth=7.90"
Flow Length=82' Tc=0.6 min CN=94 Runoff=0.37 cfs 0.036 af

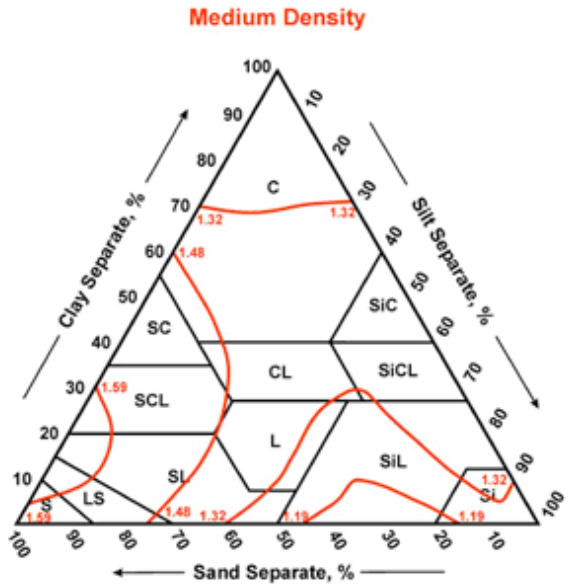
Subcatchment PS5: Northeast Portion of Runoff Area=310 sf 100.00% Impervious Runoff Depth=8.38"
Flow Length=89' Tc=0.5 min CN=98 Runoff=0.05 cfs 0.005 af

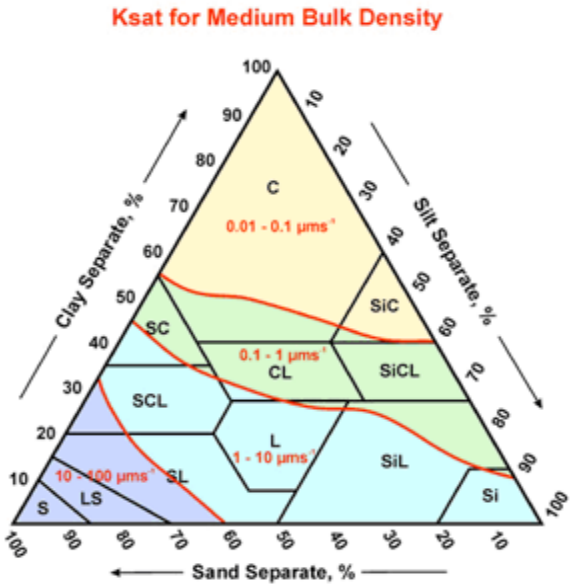
Pond PP10: Porous Pavement Section Peak Elev=49.35' Storage=1,644 cf Inflow=0.69 cfs 0.263 af
Discarded=0.07 cfs 0.167 af Primary=0.15 cfs 0.095 af Outflow=0.22 cfs 0.263 af

Link L100: Wetlands on the Southern Portion of Site Inflow=5.68 cfs 0.740 af
Primary=5.68 cfs 0.740 af

Total Runoff Area = 1.787 ac Runoff Volume = 0.907 af Average Runoff Depth = 6.09"
92.88% Pervious = 1.660 ac 7.12% Impervious = 0.127 ac

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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PO Box 76
Durham, NH 03824

SATURATED HYDRAULIC CONDUCTIVITY (K_{SAT})

K_{sat} refers to the ease with which pores in a saturated soil transmit water. The estimates presented here are expressed in terms of inches per hour (NRCS official data presents K_{sat} in both micrometers per second and inches per hour). K_{sat} values are based on soil characteristics observed in the field, particularly structure, consistence, porosity, and texture. (USDA NRCS, Web Soil Survey)

Saturated flow occurs when the soil water pressure is positive; that is, when the soil matric potential is zero (satiated wet condition). In most soils this situation takes place when about 95 percent of the total pore space is filled with water. The remaining 5 percent is filled with entrapped air. Saturated hydraulic conductivity cannot be used to describe water movement under unsaturated conditions. (Soil Survey Manual, 1993)

It is commonly known that soil features (and thus data) for a certain soil series name may be slightly different from one county soil survey to the next and the range in characteristics (via the Typical Pedon) may be slightly different. For example – a Marlow soil (series) in Carroll County may have a higher sand content in its B horizon as opposed to a Marlow soil (series) in Coos County; resulting in a slightly different Ksat range for the B horizon.

The K_{sat} data for this publication was obtained from the USDA-NRCS Soil Data Mart using the Typical Pedon from the county that best reflected the soil and/or had the most acres of that soil. This data is presented in B and C horizons only as it is assumed that the topsoil (A or A_p horizon) will be removed in typical construction practices.

References:

Web Soil Survey. *Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/.*

Soil Data Mart. *http://soildatamart.nrcs.usda.gov/.*

Soil Survey Manual. *Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.*

HYDROLOGIC SOIL GROUPS

Hydrologic group is a group of soils having the same runoff potential under similar storm and cover conditions.

Hydrologic groups are used in equations that estimate runoff from rainfall. These estimates are needed for solving hydrologic problems that arise in planning stormwater management, watershed protection, and flood-prevention projects and for planning or designing structures for the use, control, and disposal of water.

Classifications assigned to soils were based on the use of rainfall-runoff data from small watersheds and infiltrometer plots. From these data, relationships between soil properties and hydrologic groups were established. Assignment of soils to hydrologic groups is based on the relationship between soil properties and hydrologic groups. Wetness characteristics, permeability after prolonged wetting, and depth to very slowly permeable layers are properties that assist in estimating hydrologic groups. Minimum annual steady ponded infiltration rate for a bare ground surface determines the hydrologic soil groups.

Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonally high water table, intake rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. (The influence of ground cover is treated independently, not in hydrologic soil groups.).

The soils in the United States are placed into four groups, A, B, C, and D, and three dual classes, *A/D, B/D,* and *C/D.* In the definitions of the classes, infiltration rate is the rate at which water enters the soil at the surface and is controlled by the surface conditions. Transmission rate is the rate at which water moves in the soil and is controlled by soil properties. Definitions of the classes are as follows:

Group A- Saturated hydraulic conductivity is very high or in the upper half of high and internal free water occurrence is very deep. Soils in this group have low runoff potential when thoroughly wet. Water is transmitted freely through the soil. Group A soils typically have less than 10 percent clay and more than 90 percent sand or gravel and have gravel or sand textures. Some soils having loamy sand, sandy loam, loam or silt loam textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The limits on the diagnostic physical characteristics of group A are as follows. The saturated hydraulic conductivity of all soil layers exceeds 40.0 micrometers per second (5.67 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a water impermeable layer are in group A if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 10 micrometers per second (1.42 inches per hour).

Group B- Saturated hydraulic conductivity is in the lower half of high or in the upper half of moderately high and free water occurrence is deep or very deep. Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded. Group B soils typically have between 10 percent and 20 percent clay and 50 percent to 90 percent sand and have loamy sand or sandy loam textures. Some soils having loam, silt loam, silt, or sandy clay loam textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The limits on the diagnostic physical characteristics of group B are as follows. The saturated hydraulic conductivity in the least transmissive layer between the surface and 50 centimeters [20 inches] ranges from 10.0 micrometers per second (1.42 inches per hour) to 40.0 micrometers per second (5.67 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a water impermeable layer or water table are in group B if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 4.0 micrometers per second (0.57 inches per hour) but is less than 10.0 micrometers per second (1.42 inches per hour).

Group C- Saturated hydraulic conductivity is in the lower half of moderately high or in the upper half of moderately low and internal free water occurrence is deeper than shallow. Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted. Group C soils typically have between 20 percent and 40 percent clay and less than 50 percent sand and have loam, silt loam, sandy clay loam, clay loam, and silty clay loam textures. Some soils having clay, silty clay, or sandy clay textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The limits on the diagnostic physical characteristics of group C are as follows. The saturated hydraulic conductivity in the least transmissive layer between the surface and 50 centimeters [20 inches] is between 1.0 micrometers per second (0.14 inches per hour) and 10.0 micrometers per second (1.42 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a restriction or water table are in group C if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 0.40 micrometers per second (0.06 inches per hour) but is less than 4.0 micrometers per second (0.57 inches per hour). .

Group D- Saturated hydraulic conductivity is below the upper half of moderately low, and/or internal free water occurrence is shallow or very shallow and transitory through permanent. Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted. Group D soils typically have greater than 40 percent clay, less than 50 percent sand, and have clayey textures. In some areas, they also have high shrink-swell potential. All soils with a depth to a water impermeable layer less than 50 centimeters [20 inches] and all soils with a water table within 60 centimeters [24 inches] of the surface are in this group, although some may have a dual classification, as described in the next section, if they can be adequately drained. The limits on the physical diagnostic characteristics of group D are as follows. For soils with a water impermeable layer at a depth between 50 centimeters and 100 centimeters [20 and 40 inches], the saturated hydraulic conductivity in the least transmissive soil layer is less than or equal to 1.0 micrometers per second (0.14 inches per hour). For soils that are deeper than 100 centimeters [40 inches] to a restriction or water table, the saturated hydraulic

conductivity of all soil layers within 100 centimeters [40 inches] of the surface is less than or equal to 0.40 micrometers per second (0.06 inches per hour).

Dual hydrologic soil groups-Certain wet soils are placed in group D based solely on the presence of a water table within 60 centimeters [24 inches] of the surface even though the saturated hydraulic conductivity may be favorable for water transmission. If these soils can be adequately drained, then they are assigned to dual hydrologic soil groups *(A/D, B/D,* and *C/D)* based on their saturated hydraulic conductivity and the water table depth when drained. The first letter applies to the drained condition and the second to the undrained condition. For the purpose of hydrologic soil group, adequately drained means that the seasonal high water table is kept at least 60 centimeters [24 inches] below the surface in a soil where it would be higher in a natural state.

References:

National Engineering Handbook, Natural Resource Conservation Service, U.S. Department of Agriculture.

Soil Data Mart. *http://soildatamart.nrcs.usda.gov/*.

Soil Survey Manual. *Soil Survey Division Staff. 1993. Soil survey manual. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 18.*

TABLE A

NUMERICAL LEGEND

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Occum	1	0.6	2.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	mesic	loamy	no	loamy over loamy sand
Suncook	2	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	occasionally flooded
Lim	3	0.6	2.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Pootatuck	4	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	mesic	loamy	no	single grain in C
Rippowam	5	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Saco	6	0.6	2.0	6.00	20.0	D	6	Flood Plain (Bottom Land)	mesic	silty	no	strata
Hadley	8	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand
Winooski	9	0.6	6.0	0.60	6.0	B		Flood Plain (Bottom Land)	mesic	silty over loamy	no	
Merrimac	10	2.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	gravelly sand	no	loamy cap
Gloucester	11	6.0	20.0	6.00	20.0	A	1	Sandy Till	mesic	sandy-skeletal	no	loamy cap
Hinckley	12	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	
Sheepscot	14	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly coarse sand
Searsport	15	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	frigid	sandy	no	organic over sand
Saugatuck	16	0.06	0.2	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	yes	ortstein
Colton, gravelly	21	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly surface
Colton	22	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	
Masardis	23	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	slate, loamy cap
Agawam	24	6.0	20.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Windsor	26	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	sandy	no	
Groveton	27	0.6	2.0	0.60	6.0	B	2	Outwash and Stream Terraces	frigid	loamy	yes	loamy over sandy
Madawaska	28	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Woodbridge	29	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	mesic	loamy	no	sandy loam in Cd
Unadilla	30	0.6	2.0	2.00	20.0	B	2	Terraces and glacial lake plains	mesic	silty	no	silty over gravelly
Hartland	31	0.6	2.0	0.20	2.0	B	2	Terraces and glacial lake plains	mesic	silty	no	very fine sandy loam
Boxford	32	0.1	0.2	0.00	0.2	C	3	Silt and Clay Deposits	mesic	fine	no	silty clay loam
Scitico	33	0.0	0.2	0.00	0.2	C	5	Silt and Clay Deposits	mesic	fine	no	
Wareham	34	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Champlain	35	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	gravelly sand	no	
Adams	36	6.0	20.0	20.00	99.0	A	1	Outwash and Stream Terraces	frigid	sandy	yes	
Melrose	37	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	silty clay loam in C
Eldridge	38	6.0	20.0	0.06	0.6	C	3	Sandy/loamy over silt/clay	mesic	sandy over loamy	no	
Millis	39					C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Canton	42	2.0	6.0	6.00	20.0	B	2	Loose till, sandy textures	mesic	loamy over sandy	no	loamy over loamy sand
Montauk	44	0.6	6.0	0.06	0.6	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Henniker	46	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Madawaska, aquentic	48	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Whitman	49	0.0	0.2	0.00	0.2	D	6	Firm, platy, loamy till	mesic	loamy	no	mucky loam
Hermon	55	2.0	20.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	loamy cap
Becket	56	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	gravelly sandy loam in Cd
Waumbeck	58	2.0	20.0	6.00	20.0	B	3	Loose till, sandy textures	frigid	sandy-skeletal	yes	very cobbly loamy sand
Charlton	62	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	mesic	loamy	no	fine sandy loam
Paxton	66	0.6	2.0	0.00	0.2	C	3	Firm, platy, loamy till	mesic	loamy	no	
Sutton	68	0.6	6.0	0.60	6.0	B	3	Loose till, loamy textures	mesic	loamy	no	
Berkshire	72	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	fine sandy loam
Marlow	76	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Peru	78	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	
Thorndike	84	0.6	2.0	0.60	2.0	C/D	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	less than 20 in. deep
Hollis	86	0.6	6.0	0.60	6.0	C/D	4	Loose till, bedrock	mesic	loamy	no	less than 20 in. deep
Winnecook	88	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Chatfield	89	0.6	6.0	0.60	6.0	B	4	Loose till, bedrock	mesic	loamy	no	20 to 40 in. deep
Hogback	91	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Lyman	92	2.0	6.0	2.00	6.0	A/D	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Woodstock	93	2.0	6.0	2.00	6.0	C/D	4	Loose till, bedrock	frigid	loamy	no	less than 20 in. deep
Rawsonville	98	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Tunbridge	99	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Ondawa	101	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	loamy over loamy sand
Sunday	102	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	occasionally flooded
Winooski	103	0.6	6.0	0.60	6.0	B	3	Flood Plain (Bottom Land)	mesic	silty	no	very fine sandy loam
Podunk	104	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	frigid	loamy	no	loamy to coarse sand in C
Rumney	105	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	frigid	loamy	no	
Hadley	108	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand, occ flooded
Limerick	109	0.6	2.0	0.60	2.0	C	5	Flood Plain (Bottom Land)	mesic	silty	no	
Scarboro	115	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	mesic	sandy	no	organic over sand, non stony
Finch	116					C	3	Outwash and Stream Terraces	frigid	sandy	yes	cemented (ortstein)
Sudbury	118	2.0	6.0	2.00	20.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	loam over gravelly sand
Telos	123	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Chesuncook	126	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Allagash	127	0.6	2.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy	yes	loamy over sandy
Elliottsville	128	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	20 to 40 in. deep
Hitchcock	130	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam to silt in C
Burnham	131	0.2	6.0	0.02	0.2	D	6	Firm, platy, silty till, schist & phylitte	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 & phylitte	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
Madawaska, aquer	48	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Marlow	76	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Masardis	23	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	slate, loamy cap
Mashpee	315	6.0	20.0	6.00	20.0	B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Matunuck	797			20.00	100.0	D	6	Tidal Flat	mesic	sandy	no	organic over sand
Maybid	134	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	mesic	fine	no	silt over clay
Meadowsedge	894					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Medomak	406	0.6	2.0	0.60	2.0	D	6	Flood Plain (Bottom Land)	frigid	silty	no	organic over silt
Melrose	37	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	silty clay loam in C
Merrimac	10	2.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	gravelly sand	no	loamy cap
Metacomet	458	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Metallak	404	6.0	100.0	6.00	100.0	B	3	Flood Plain (Bottom Land)	frigid	loamy over sandy	no	sandy or sandy-skeletal
Millis	39					C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Millsite	251	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	no	20 to 40 in. deep
Monadnock	142	0.6	2.0	2.00	6.0	B	2	Loose till, sandy textures	frigid	oamy over sandy, sandy-skeleta	yes	gravelly loamy sand in C
Monarda	569	0.2	2.0	0.02	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Monson	133	0.6	2.0	0.60	2.0	D	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	less than 20 in. deep
Montauk	44	0.6	6.0	0.06	0.6	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Moosilauke	414	6.0	20.0	6.00	20.0	C	5	Loose till, sandy textures	frigid	sandy	no	

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Mundal	610	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	gravelly sandy loam in Cd
Natchaug	496			0.20	2.0	D	6	Organic Materials - Freshwater	mesic	loamy	no	organic over loam
Naumburg	214	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Newfields	444	0.6	2.0	0.60	2.0	B	3	Loose till, sandy textures	mesic	loamy over sandy	no	sandy or sandy-skeletal
Nicholville	632	0.6	2.0	0.60	2.0	C	3	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Ninigret	513	0.6	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	mesic	loamy over sandy	no	sandy or sandy-skeletal
Occum	1	0.6	2.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	mesic	loamy	no	loamy over loamy sand
Ondawa	101	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	loamy over loamy sand
Ondawa	201	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	occ flood, loamy over l. sand
Ossipee	495			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Pawcatuck	497			20.00	100.0	D	6	Tidal Flat	mesic	sandy or sandy-skeletal	no	organic over sand
Paxton	66	0.6	2.0	0.00	0.2	C	3	Firm, platy, loamy till	mesic	loamy	no	
Peacham	549	0.6	2.0	0.00	0.2	D	6	Firm, platy, silty till, schist & phylitte	frigid	loamy	no	organic over loam
Pemi	633	0.6	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	
Pennichuck	460	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy-skeletal	no	20 to 40 in. deep
Peru	78	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	
Pillsbury	646	0.6	2.0	0.06	0.2	C	5	Firm, platy, loamy till	frigid	silty	no	
Pipestone	314					B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Pittstown	334	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Plaisted	563	0.6	2.0	0.06	0.6	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Podunk	104	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	frigid	loamy	no	loamy to coarse sand in C
Pondicherry	992			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Poocham	230	0.6	2.0	0.20	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam in C
Pootatuck	4	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	mesic	loamy	no	single grain in C
Quonset	310	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	shale
Rawsonville	98	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Raynham	533	0.2	2.0	0.06	0.2	C	5	Terraces and glacial lake plains	mesic	silty	no	
Raypol	540	0.6	2.0	6.00	100.0	D	5	Outwash and Stream Terraces	mesic	co. loamy over sandy (skeletal)	no	
Redstone	665	2.0	6.0	6.00	20.0	A	1	Weathered Bedrock Till	frigid	fragmental	yes	loamy cap
Ricker	674	2.0	6.0	2.00	6.0	A	4	rganic over bedrock (up to 4" of minera	cryic	fibric to hemic	no	well drained, less than 20 in. deep
Ridgebury	656	0.6	6.0	0.00	0.2	C	5	Firm, platy, loamy till	mesic	loamy	no	
Rippowam	5	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Roundabout	333	0.2	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	silt loam in the C
Rumney	105	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	frigid	loamy	no	
Saco	6	0.6	2.0	6.00	20.0	D	6	Flood Plain (Bottom Land)	mesic	silty	no	strata
Saddleback	673	0.6	2.0	0.60	2.0	C/D	4	Loose till, bedrock	cryic	loamy	yes	less than 20 in. deep
Salmon	630	0.6	2.0	0.60	2.0	B	2	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Saugatuck	16	0.06	0.2	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	yes	ortstein
Scantic	233	0.0	0.2	0.00	0.2	D	5	Silt and Clay Deposits	frigid	fine	no	
Scarboro	115	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	mesic	sandy	no	organic over sand, non stony
Scio	531	0.6	2.0	0.60	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	gravelly sand in 2C
Scitico	33	0.0	0.2	0.00	0.2	C	5	Silt and Clay Deposits	mesic	fine	no	
Scituate	448	0.6	2.0	0.06	0.2	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Searsport	15	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	frigid	sandy	no	organic over sand
Shaker	439	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	mesic	co. loamy over clayey	no	
Shapleigh	136					C/D	4	Sandy Till	mesic	sandy	yes	less than 20 in. deep
Sheepscot	14	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly coarse sand
Sisk	667	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	sandy loam in Cd
Skerry	558	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Squamscott	538	6.0	20.0	0.06	0.6	C	5	Sandy/loamy over silt/clay	mesic	sandy over loamy	yes	
Stetson	523	0.6	6.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	loamy over gravelly
Stissing	340	0.6	2.0	0.06	0.2	C	5	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	
Success	154	2.0	6.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	cemented
Sudbury	118	2.0	6.0	2.00	20.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	loam over gravelly sand

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Suffield	536	0.6	2.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	silty over clayey	no	deep to clay C
Sunapee	168	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	
Sunapee var	269	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	frigid dystrudept
Suncook	2	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	occasionally flooded
Suncook	402	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	frequent flooding
Sunday	102	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	occasionally flooded
Sunday	202	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	frequently flooded
Surplus	669	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	mwd, sandy loam in Cd
Sutton	68	0.6	6.0	0.60	6.0	B	3	Loose till, loamy textures	mesic	loamy	no	
Swanton	438	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	frigid	co. loamy over clayey	no	
Telos	123	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Thorndike	84	0.6	2.0	0.60	2.0	C/D	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	less than 20 in. deep
Timakwa	393			6.00	100.0	D	6	Organic Materials - Freshwater	mesic	sandy or sandy-skeletal	no	organic over sand
Tunbridge	99	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Unadilla	30	0.6	2.0	2.00	20.0	B	2	Terraces and glacial lake plains	mesic	silty	no	silty over gravelly
Vassalboro	150					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Walpole	546	2.0	6.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Wareham	34	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Warwick	210	2.0	6.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	loamy-skeletal	no	loamy over slate gravel
Waskish	195					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Waumbeck	58	2.0	20.0	6.00	20.0	B	3	Loose till, sandy textures	frigid	sandy-skeletal	yes	very cobbly loamy sand
Westbrook	597			0.00	2.0	D	6	Tidal Flat	mesic	loamy	no	organic over loam
Whitman	49	0.0	0.2	0.00	0.2	D	6	Firm, platy, loamy till	mesic	loamy	no	mucky loam
Windsor	26	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	sandy	no	
Winnecook	88	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Winooski	9	0.6	6.0	0.60	6.0	B		Flood Plain (Bottom Land)	mesic	silty over loamy	no	
Winooski	103	0.6	6.0	0.60	6.0	B	3	Flood Plain (Bottom Land)	mesic	silty	no	very fine sandy loam
Wonsqueak	995			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Woodbridge	29	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	mesic	loamy	no	sandy loam in Cd
Woodstock	93	2.0	6.0	2.00	6.0	C/D	4	Loose till, bedrock	frigid	loamy	no	less than 20 in. deep

no longer recognized
organic materials

TABLE C

NHDES SOIL GROUPINGS

Soil Series	number	NHDES Soil Group	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Adams	36	1	6.0	20.0	20.00	99.0	A	Outwash and Stream Terraces	frigid	sandy	yes	
Boscawen	220	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	no	loamy cap
Caesar	526	1	20.0	100.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	coarse sand	no	
Champlain	35	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	gravelly sand	no	
Colton	22	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	
Colton, gravelly	21	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly surface
Gloucester	11	1	6.0	20.0	6.00	20.0	A	Sandy Till	mesic	sandy-skeletal	no	loamy cap
Hermon	55	1	2.0	20.0	6.00	20.0	A	Sandy Till	frigid	sandy-skeletal	yes	loamy cap
Hinckley	12	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	sandy-skeletal	no	
Hoosic	510	1	2.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	sandy-skeletal	no	slate, loamy cap
Masardis	23	1	6.0	20.0	6.00	20.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	slate, loamy cap
Merrimac	10	1	2.0	20.0	6.00	20.0	A	Outwash and Stream Terraces	mesic	gravelly sand	no	loamy cap
Quonset	310	1	2.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	sandy-skeletal	no	shale
Redstone	665	1	2.0	6.0	6.00	20.0	A	Weathered Bedrock Till	frigid	fragmental	yes	loamy cap
Success	154	1	2.0	6.0	6.00	20.0	A	Sandy Till	frigid	sandy-skeletal	yes	cemented
Suncook	2	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	mesic	sandy	no	occasionally flooded
Suncook	402	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	mesic	sandy	no	frequent flooding
Sunday	102	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	frigid	sandy	no	occasionally flooded
Sunday	202	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	frigid	sandy	no	frequently flooded
Warwick	210	1	2.0	6.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	loamy-skeletal	no	loamy over slate gravel
Windsor	26	1	6.0	20.0	6.00	20.0	A	Outwash and Stream Terraces	mesic	sandy	no	
Abenaki	501	2	0.6	2.0	6.00	99.0	B	Outwash and Stream Terraces	frigid	loamy over sandy-skeletal	no	loamy over gravelly
Agawam	24	2	6.0	20.0	20.00	100.0	B	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Allagash	127	2	0.6	2.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	loamy over sandy	yes	loamy over sandy
Bangor	572	2	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam
Berkshire	72	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	fine sandy loam
Bice	226	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	no	sandy loam
Canton	42	2	2.0	6.0	6.00	20.0	B	Loose till, sandy textures	mesic	loamy over sandy	no	loamy over loamy sand
Charlton	62	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	mesic	loamy	no	fine sandy loam
Dutchess	366	2	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	mesic	loamy	no	very channery
Fryeburg	208	2	0.6	2.0	2.00	6.0	B	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Groveton	27	2	0.6	2.0	0.60	6.0	B	Outwash and Stream Terraces	frigid	loamy	yes	loamy over sandy
Hadley	8	2	0.6	2.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand
Hadley	108	2	0.6	2.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand, occ flooded
Hartland	31	2	0.6	2.0	0.20	2.0	B	Terraces and glacial lake plains	mesic	silty	no	very fine sandy loam
Haven	410	2	0.6	2.0	20.00	100.0	B	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Houghtonville	795	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	cobbly fine sandy loam
Lombard	259	2	0.6	6.0	2.00	20.0	C/D	Weathered bedrock, phyllite	frigid	loamy	no	very channery
Monadnock	142	2	0.6	2.0	2.00	6.0	B	Loose till, sandy textures	frigid	bamy 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
Madawaska, 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 & phylitte	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 & phylitte	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

Sorted by DES Soil Group for Establishing Lot Size
K_{sat} B and C horizons
SSSNNE pub no. 5

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VIA EMAIL

August 29, 2019
File No. 04.0191010.00

Mr. Bruce Scamman, P.E.
Emanuel Engineering, Inc.
118 Portsmouth Avenue
Stratham, New Hampshire 03885

Re: Site Specific Soil Mapping
Property of Richmond Property Group, Ltd.
18 Garrison Avenue, Tax Map 2 Lot 12-12
Durham, New Hampshire

Dear Mr. Scamman:

This letter report presents the findings of a Site-Specific Soil Mapping survey conducted by GZA GeoEnvironmental, Inc. (GZA) at 18 Garrison Avenue (i.e. Tax Map 2, Lot 12-12) in the Town of Durham, New Hampshire (Site) on August 23, 2019. The Site totals approximately 1.6 acres and is bounded by Garrison Avenue to the north, developed property to the east, and by Pettee Brook and associated wetlands to the west. The northern portion of the Site is developed and contains a building known as the Elizabeth DeMeritt House and associated parking. The southern portion of the property contains a forested wetland system. It is our understanding that the Site-Specific Soil Mapping is needed in support of the redevelopment of the property. This report is subject to the limitations in **Appendix A**.

The Site-Specific Soil Mapping was conducted by New Hampshire Certified Soil Scientist, James H. Long, (CSS No. 15) in accordance with the *New Hampshire Supplement of the Site-Specific Soil Mapping Standard for New Hampshire and Vermont*, Version 5.0, February 2017, published by the Society of Soil Scientists of Northern New England. Soil map units identified on the Site were classified using the *New Hampshire State-Wide Numerical Soils Legend,* United States Department of Agriculture (USDA) Natural Resource Conservation Service, Issue No. 10, January 2011. The Site-Specific Standards are based on a universally recognized taxonomic system of soil classification and are supported by national soil mapping standards established by the USDA National Cooperative Soil Survey. The attached Site-Specific Soil Map (see **Appendix B**) has been prepared to comply with soil mapping requirements of RSA 485 A:17 and New Hampshire Department of Environmental Services (DES) Env-Wq 1500, Alteration of Terrain rules.

This report and the attached soil series descriptions (see **Appendix C**) provide soil information such as soil drainage classification, physical characteristics, and depth to bedrock (if encountered). Soil characteristics on the property were evaluated through the tile spade and hand-auger probe observations conducted on Site. Slope phases were measured using a clinometer and augmented by the topography shown on the base plan prepared Doucet Survey. Slope is depicted on the base plan at a contour interval of two feet. The accompanying Site-Specific Soil Map (**Appendix B**) was developed by GZA in August 2019 using the plan titled "Existing Conditions Plan," prepared by Doucet Survey, LLC dated 8/19/19 as the mapping base.

Soil parent materials encountered consist of marine deposits, organic soils, and anthropogenic soils. The Soil Map Units identified during the soil survey are briefly described below. Soil characteristics for each Soil Map Unit comply with the Range in Characteristics described in the Official Series Descriptions for each Soil Map Unit (see **Appendix C).**

Based on our observations, the Site contains disturbed areas that are the result of anthropogenic processes and consist of excavated, regraded, and filled areas (i.e. map units 299A, 299B, 299C, 299D, and 299E, see **Table 1**). In GZA's opinion, fill material has been added to the native site soils. Also, the soil material making up the map units appear to have come from near the immediate area, as the excavated, filled, and regraded materials contains characteristics similar to the marine soils and glacial till that is mapped in the area. The undisturbed Scitico soils are most likely the soils that are underlain by the fill material. Scitico soils are classified as hydrologic soil Group D as they have an estimated seasonal high-water table of less than 24 inches and have a saturated hydraulic conductivity (Ksat) value of 0.00 inches per hour in the lower C horizon. This value is in the lower end of the range based on the most limiting soil layer.

In the well-drained and moderately well drained filled area, GZA has estimated a moderate Ksat value and assigned a hydrologic soil Group of B. The well-drained and moderately well-drained filled areas contain a mix of soils and no mineral restrictive feature in our control section (40 inches). The moderately well drained fill area that has a mineral restrictive feature in the disturbed soil areas has a low Ksat value and GZA assigned a hydrologic soil Group of D with soils having an estimated seasonal high water table of less than 24 inches. This is based on field observations and standards outlined in "Site Specific Soil Mapping Standards for New Hampshire and Vermont," dated December 2017. The disturbed areas have been identified using the *Disturbed Soil Mapping Unit Supplement for DES AOT Site Specific Soil Maps* section of the standards **(**see **Appendix D)**.

Table 1. Description of the soils mapped on site on August 23, 2019.

MAP UNIT NO.	SOIL TAXONOMIC NAME	DESCRIPTION
33A P	Scitico.	Poorly drained soils formed in marine material. These soils are on marine terraces Saturated hydraulic conductivity is slow and the K sat value is low. Slopes range from 0-3%.
134A VP	Maybid 0-3% slope	Very deep, very poorly drained soils formed in marine sediments. They are nearly level on lowlands. Saturated hydraulic conductivity is moderately high or high in the surface layer and very low to moderately high in the subsoil and substratum. Slopes range from 0-3%.
299A/ccabb	Udorthents, smooth 3-8% slope	This map unit represents areas that have been cut and filled to create a large level on nearly level area. Soil material making up the map units typically comes from the immediate area. The drainage class is well drained and there is no natural soil within 60". There is no restrictive layer. The Ksat value is moderate and the hydrologic soil group is B. Slopes range from 0-3%.
299C/ccabb	Udorthents, smooth 8-15% slope	. This map unit represents areas that have been cut and filled to create a large level on nearly level area. Soil material making up the map units typically comes from the immediate area. The drainage class is well drained and there is no natural soil

MAP UNIT NO.	SOIL TAXONOMIC NAME	DESCRIPTION
		within 60". There is no restrictive layer. The Ksat value is moderate and the hydrologic soil group is B. Slopes range from 8-15%.
299A/deccd	Udorthents, smooth 0-3% slope	This map unit represents areas that have been cut and filled to create a large level on nearly level area. Soil material making up the map units typically comes from the immediate area. The drainage class is moderately well drained, and the parent material is glacial till with a mineral restrictive feature. The Ksat value is low and the hydrologic soil group is D. Slopes range from 0-3%.
299D /deccd	Udorthents, smooth 15-25% slope	This map unit represents areas that have been cut and filled to create a large level on nearly level area. Soil material making up the map units typically comes from the immediate area. The drainage class is moderately well drained, and the parent material is glacial till with a mineral restrictive feature. The Ksat value is low and the hydrologic soil group is D. Slopes range from 15-25%.
299E/deccd	Udorthents, smooth 25-50% slope	This map unit represents areas that have been cut and filled to create a large level on nearly level area. Soil material making up the map units typically comes from the immediate area. The drainage class is moderately well drained, and the parent material is glacial till with a mineral restrictive feature. The Ksat value is low and the hydrologic soil group is D. Slopes range from 25-50%.

GZA submits this report and Site-Specific Soil map in support of your current planning needs consistent with our correspondence. Once you have reviewed the report and soils information, please do not hesitate to contact Mr. James Long at 603-232-8756 if you have any questions or require additional information.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

James H. Long, CSS, CWS
Senior Technical Specialist

Deborah M. Zarta Gier, CNRP
Consultant / Reviewer

Tracy L. Tarr, CWS, CESSWI, CWB
Principal-in-Charge

JHL/DMZ/TLT
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Attachments: Appendix A - Limitations
Appendix B - Site-Specific Soil Map
Appendix C - Official Series Descriptions
Appendix D - Disturbed Soil Mapping Unit Supplement

Appendix A - Natural Resource Limitations

USE OF REPORT

1. GZA GeoEnvironmental, Inc. (GZA) has prepared this report on behalf of, and for the exclusive use of Emanuel Engineering, Inc. ("Client") for the stated purpose(s) and location(s) identified in the report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not identified in the agreement, for any use, without our prior written permission, shall be at that party's risk, and without any liability to GZA.

STANDARD OF CARE

2. GZA's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in the Report and/or proposal, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the data gathered and observations made during the course of our work. Conditions other than described in this report may be found at the subject location(s).

3. GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

LIMITS TO OBSERVATIONS

4. Natural resource characteristics are inherently variable. Biological community composition and diversity can be affected by seasonal, annual or anthropogenic influences. In addition, soil conditions are reflective of subsurface geologic materials, the composition and distribution of which vary spatially.

5. The observations described in this report were made on the dates referenced and under the conditions stated therein. Conditions observed and reported by GZA reflect the conditions that could be reasonably observed based upon the visual observations of surface conditions and/or a limited observation of subsurface conditions at the specific time of observation. Such conditions are subject to environmental and circumstantial alteration and may not reflect conditions observable at another time.

6. The conclusions and recommendations contained in this report are based upon the data obtained from a limited number of surveys performed during the course of our work on the site, as described in the Report. There may be variations between these surveys and other past or future surveys due to inherent environmental and circumstantial variability.

RELIANCE ON INFORMATION FROM OTHERS

7. Preparation of this Report may have relied upon information made available by Federal, state and local authorities; and/or work products prepared by other professionals as specified in the report. Unless specifically stated, GZA did not attempt to independently verify the accuracy or completeness of that information.

COMPLIANCE WITH REGULATIONS AND CODES

8. GZA's services were performed to render an opinion on the presence and/or condition of natural resources as described in the Report. Standards used to identify or assess these resources as well as regulatory jurisdiction, if any, are stated in the Report. Standards for identification of jurisdictional resources and regulatory control over them may vary between governmental agencies at Federal, state and local levels and are subject to change over time which may affect the conclusions and findings of this report.

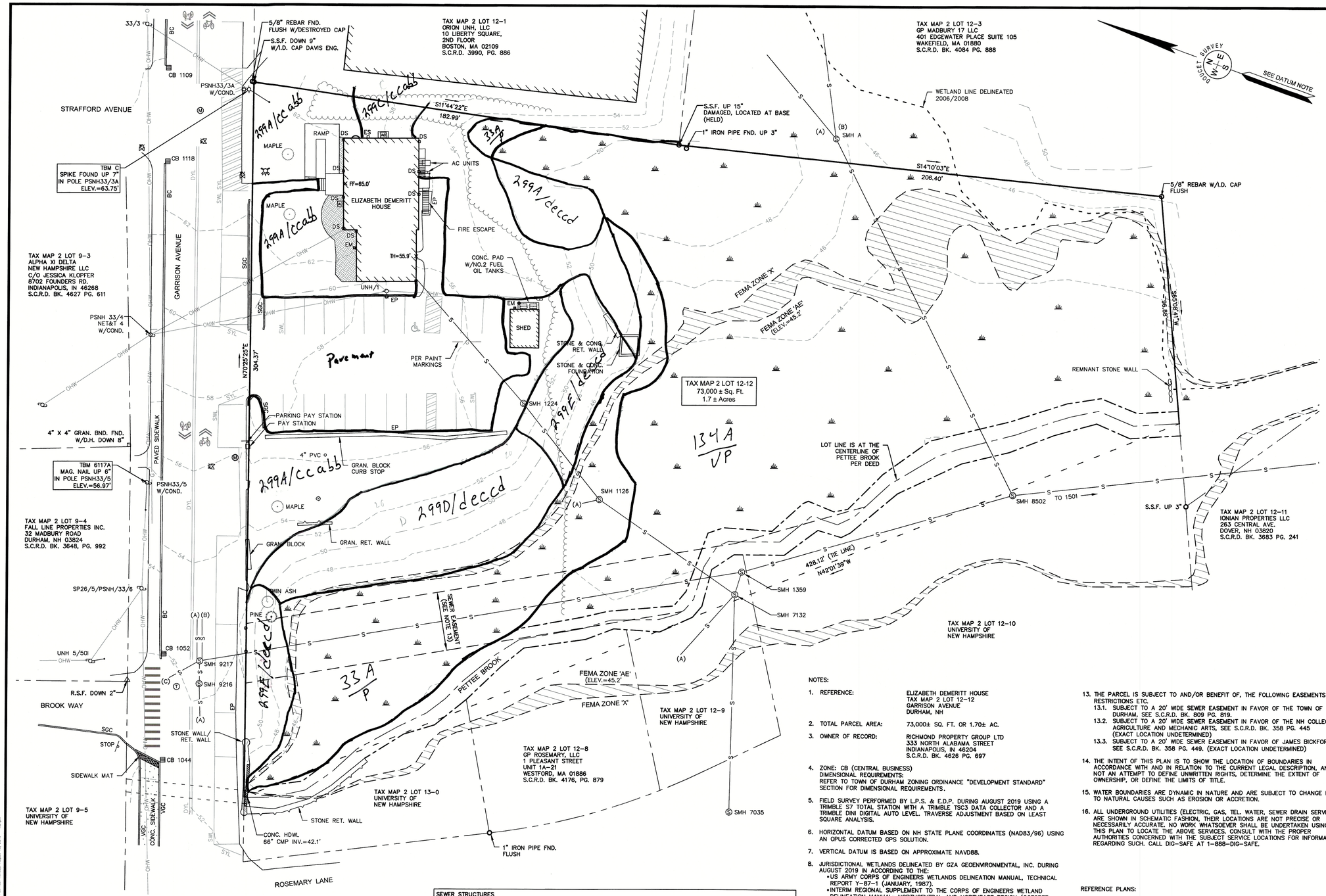
NEW INFORMATION

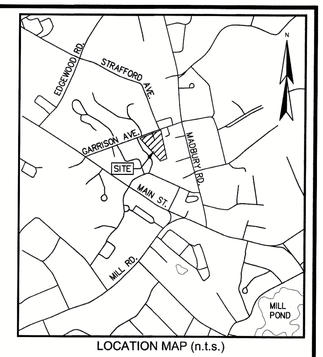
9. In the event that the Client or others authorized to use this report obtain information on environmental regulatory compliance issues at the site not contained in this report, such information shall be brought to GZA's attention forthwith. GZA will evaluate such information and, on the basis of this work, may modify the conclusions stated in this report.

ADDITIONAL SERVICES

10. GZA recommends that we be retained to provide further investigation, if necessary, which would allow GZA to (1) observe compliance with the concepts and recommendations contained herein; (2) evaluate whether the manner of implementation creates a potential new finding; and (3) evaluate whether the manner of implementation affects or changes the conditions on which our opinions were made.

Appendix B - Site-Specific Soil Map





LOCATION MAP (n.t.s.)

LEGEND

- LOT LINE
- APPROXIMATE ABUTTERS LOT LINE
- EXISTING EASEMENT LINE
- APPROXIMATE CENTERLINE OF BROOK
- EDGE OF BROOK
- RETAINING WALL
- STONE WALL
- OHW OVERHEAD WIRE
- S SEWER LINE
- D DRAIN LINE
- G GAS LINE
- 50 MAJOR CONTOUR LINE
- 48 MINOR CONTOUR LINE
- TREE LINE
- EDGE OF DELINEATED WETLAND (2019)
- EDGE OF DELINEATED WETLAND (2006/2008)
- WETLAND AREA
- CONCRETE
- LANDSCAPED AREA
- FEMA ZONE 'X' 0.2% ANNUAL CHANCE FLOOD HAZARD
- UTILITY POLE
- UTILITY POLE & GUY WIRE
- UTILITY POLE W/LIGHT
- SIGN
- IRON PIPE/ROD FOUND
- FIRE HYDRANT
- WATER GATE VALVE
- CATCH BASIN
- MANHOLE
- TELEPHONE MANHOLE
- SEWER MANHOLE
- WOODED POST
- BOLLARD
- CONIFEROUS TREE
- DECIDUOUS TREE

TYP.	TYPICAL
S.S.F.	STEEL STAKE FOUND
CONC.	CONCRETE
GRAN.	GRANITE
HDWL	HEADWALL
FF	FINISHED FLOOR ELEVATION
TH	THRESHOLD ELEVATION
EP	EDGE OF PAVEMENT
VGC	VERTICAL GRANITE CURB
SGC	SLOPED GRANITE CURB
EM	ELECTRIC METER
ES	ELECTRIC SWITCH
BC	BITUMINOUS CURB
SWL	SINGLE WHITE LINE
SYL	SINGLE YELLOW LINE
DYL	DOUBLE YELLOW LINE
DS	DOWN SPOUT
CC	CENTERLINE CHANNEL

NOTES:

1. REFERENCE: ELIZABETH DEMERITT HOUSE, TAX MAP 2 LOT 12-12, GARRISON AVENUE, DURHAM, NH
2. TOTAL PARCEL AREA: 73,000± SQ. FT. OR 1.70± AC.
3. OWNER OF RECORD: RICHMOND PROPERTY GROUP LTD, 333 NORTH ALABAMA STREET, INDIANAPOLIS, IN 46204, S.C.R.D. BK. 4626 PG. 697
4. ZONE: CB (CENTRAL BUSINESS) DIMENSIONAL REQUIREMENTS: REFER TO TOWN OF DURHAM ZONING ORDINANCE "DEVELOPMENT STANDARD" SECTION FOR DIMENSIONAL REQUIREMENTS.
5. FIELD SURVEY PERFORMED BY L.P.S. & E.D.P. DURING AUGUST 2019 USING A TRIMBLE S7 TOTAL STATION WITH A TRIMBLE TSC3 DATA COLLECTOR AND A TRIMBLE DINI DIGITAL AUTO LEVEL. TRAVERSE ADJUSTMENT BASED ON LEAST SQUARE ANALYSIS.
6. HORIZONTAL DATUM BASED ON NH STATE PLANE COORDINATES (NAD83/96) USING AN OPUS CORRECTED GPS SOLUTION.
7. VERTICAL DATUM IS BASED ON APPROXIMATE NAVD88.
8. JURISDICTIONAL WETLANDS DELINEATED BY GZA GEOENVIRONMENTAL, INC. DURING AUGUST 2019 IN ACCORDING TO THE:
   - US ARMY CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL, TECHNICAL REPORT Y-87-1 (JANUARY, 1987).
   - INTERIM REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION (OCTOBER 2009).
   - NATIONAL LIST OF PLANT SPECIES THAT OCCUR IN WETLANDS: NORTHEAST (REGION 1). U.S. FISH AND WILDLIFE SERVICE (MAY 1988).
   - CODE OF ADMINISTRATIVE RULES. WETLANDS BOARD, STATE OF NEW HAMPSHIRE (CURRENT).
9. FLOOD HAZARD ZONES: "X" & "AE", PER FIRM MAP #33017C0318E, DATED 9/15/15.
10. PROPER FIELD PROCEDURES WERE FOLLOWED IN ORDER TO GENERATE CONTOURS AT 2' INTERVALS. ANY MODIFICATION OF THIS INTERVAL WILL DIMINISH THE INTEGRITY OF THE DATA, AND DOUCET SURVEY. WILL NOT BE RESPONSIBLE FOR ANY SUCH ALTERATION PERFORMED BY THE USER.
11. UNDERGROUND UTILITIES SHOWN HEREON ARE BASED ON OBSERVED PHYSICAL EVIDENCE AND PAINT MARKS FOUND ON-SITE.
12. THE ACCURACY OF MEASURED UTILITY INVERTS AND PIPE SIZES/TYPES IS SUBJECT TO NUMEROUS FIELD CONDITIONS, INCLUDING; THE ABILITY TO MAKE VISUAL OBSERVATIONS, DIRECT ACCESS TO THE VARIOUS ELEMENTS, MANHOLE CONFIGURATION, ETC.
13. THE PARCEL IS SUBJECT TO AND/OR BENEFIT OF, THE FOLLOWING EASEMENTS RESTRICTIONS ETC.
    - 13.1. SUBJECT TO A 20' WIDE SEWER EASEMENT IN FAVOR OF THE TOWN OF DURHAM, SEE S.C.R.D. BK. 809 PG. 819.
    - 13.2. SUBJECT TO A 20' WIDE SEWER EASEMENT IN FAVOR OF THE NH COLLEGE OF AGRICULTURE AND MECHANIC ARTS, SEE S.C.R.D. BK. 358 PG. 445 (EXACT LOCATION UNDETERMINED)
    - 13.3. SUBJECT TO A 20' WIDE SEWER EASEMENT IN FAVOR OF JAMES BICKFORD, SEE S.C.R.D. BK. 358 PG. 449. (EXACT LOCATION UNDETERMINED)
14. THE INTENT OF THIS PLAN IS TO SHOW THE LOCATION OF BOUNDARIES IN ACCORDANCE WITH AND IN RELATION TO THE CURRENT LEGAL DESCRIPTION, AND IS NOT AN ATTEMPT TO DEFINE UNWRITTEN RIGHTS, DETERMINE THE EXTENT OF OWNERSHIP, OR DEFINE THE LIMITS OF TITLE.
15. WATER BOUNDARIES ARE DYNAMIC IN NATURE AND ARE SUBJECT TO CHANGE DUE TO NATURAL CAUSES SUCH AS EROSION OR ACCRETION.
16. ALL UNDERGROUND UTILITIES (ELECTRIC, GAS, TEL. WATER, SEWER DRAIN SERVICES) ARE SHOWN IN SCHEMATIC FASHION, THEIR LOCATIONS ARE NOT PRECISE OR NECESSARILY ACCURATE. NO WORK WHATSOEVER SHALL BE UNDERTAKEN USING THIS PLAN TO LOCATE THE ABOVE SERVICES. CONSULT WITH THE PROPER AUTHORITIES CONCERNED WITH THE SUBJECT SERVICE LOCATIONS FOR INFORMATION REGARDING SUCH. CALL DIG-SAFE AT 1-888-DIG-SAFE.

REFERENCE PLANS:

1. "PLAN OF LAND, LAND OF THE UNIVERSITY OF NEW HAMPSHIRE FOR GAMMA THETA CORPORATION, GARRISON AVENUE, (NO TAX MAP/LOT NUMBER ASSIGNED) DURHAM, NEW HAMPSHIRE" DATED JULY 11, 2014 BY DOUCET SURVEY, INC. S.C.R.D. PLAN 108-020.
2. "EXISTING CONDITIONS PLAN OF 17 & 21 MADBURY ROAD FOR AG ARCHITECTS, PC" DATED MAY 11, 2006 BY DOUCET SURVEY, INC.
3. "TOWN OF DURHAM SEWER EASEMENTS, PETTEE BROOK INTERCEPTOR" DATED NOVEMBER 1964 BY G.L. DAVIS & ASSOCIATES S.C.R.D. POCKET 4 FOLDER 4 PLAN 26.
4. "RE-SUBDIVISION OF LAND IN DURHAM, NH PREPARED FOR THETA GAMMA OF DELTA ZETA HOUSE CORP." DATED AUGUST 4, 1980 BY JOHN W. DURGIN ASSOCIATES, INC. S.C.R.D. DRAWER 21, PLAN 86.
5. "PLAN OF LAND FOR ERNEST CUTTER" DATED OCTOBER 1977 BY JOHN W. DURGIN ASSOCIATES, INC.
6. "UNIVERSITY OF NEW HAMPSHIRE GARRISON AVENUE AREA" DATED SEPTEMBER 16, 1957 BY G.L. DAVIS & ASSOCIATES.

SEWER STRUCTURES			
SMH A	SMH 1224	SMH 7132	SMH 9216
RIM ELEV.=46.3'	RIM ELEV.=54.6'	RIM ELEV.=45.3'	RIM ELEV.=52.3'
(A) 8" CIP INV.=42.2'	(BLDG) 6" PVC INV.=47.8'	(A) 8" PVC INV.=38.5'	(A) 8" UNK. INV.=39.6'
(B) 6" CIP INV.=42.5'	(1226) 6" PVC INV.=47.8'	(7035) 8" PVC INV.=38.5'	(9217) 8" UNK. INV.=39.6'
(8502) 8" CIP=42.2'		(1126) 8" PVC INV.=38.5'	
	SMH 1359	(1359) 10" UNK. INV.=38.5'	SMH 9217
SMH 1126	RIM ELEV.=44.6'		RIM ELEV.=52.5'
RIM ELEV.=44.8'	(7132) 10" PVC INV.=36.4'	SMH 8502	(A) 8" CLAY INV.=45.7'
(A) UNK. PVC=39.2'	(9217) 18" PVC INV.=35.6'	RIM ELEV.=42.9'	(B) 8" UNK. INV.=37.3'
(1224) 6" PVC=39.1'	(8502) 18" PVC INV.=35.6'	(SMH A) CC ELEV.=36.1'	(9216) 8" UNK. INV.=37.2'
(7132) 8" PVC=39.1'		(1359) CC ELEV.=35.1'	(C) 18" UNK. CC ELEV.=36.6'
		(1501) CC ELEV.=35.1'	(1359) 18" UNK. CC ELEV.=36.6'

DRAFT
8/19/19

PURSUANT TO RSA 676:18, III:

I CERTIFY THAT THIS SURVEY PLAT IS NOT A SUBDIVISION PURSUANT TO THIS TITLE AND THAT THE LINES OF STREETS AND WAYS SHOWN ARE THOSE OF PUBLIC OR PRIVATE STREETS OR WAYS ALREADY ESTABLISHED AND THAT NO NEW WAYS ARE SHOWN.

I CERTIFY THAT THIS SURVEY AND PLAN WERE PREPARED BY ME OR BY THOSE UNDER MY DIRECT SUPERVISION AND FALLS UNDER THE URBAN SURVEY CLASSIFICATION OF THE NH CODE OF ADMINISTRATIVE RULES OF THE BOARD OF LICENSURE FOR LAND SURVEYORS. I CERTIFY THAT THIS SURVEY WAS MADE ON THE GROUND AND IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. RANDOM TRAVERSE SURVEY BY TOTAL STATION, WITH A PRECISION GREATER THAN 1:15,000."

_____ L.L.S. #916

_____ DATE

THE CERTIFICATIONS SHOWN HEREON ARE INTENDED TO MEET REGISTRY OF DEED REQUIREMENTS AND ARE NOT A CERTIFICATION TO TITLE OR OWNERSHIP OF PROPERTY SHOWN. OWNERS OF ADJOINING PROPERTIES ARE ACCORDING TO CURRENT TOWN ASSESSORS RECORDS.

20 0 20 40
SCALE: 1 INCH = 20 FT.

EXISTING CONDITIONS PLAN

FOR
EMANUEL ENGINEERING
OF THE
ELIZABETH DEMERITT HOUSE
TAX MAP 2 LOT 12-12
18 GARRISON AVENUE
DURHAM, NEW HAMPSHIRE

NO.	DATE	DESCRIPTION	BY

DRAWN BY:	M.T.L.	DATE:	AUGUST 2019
CHECKED BY:	S.V.M.	DRAWING NO.	6117A
JOB NO.	6117	SHEET	1 OF 1

DOUCET SURVEY LLC
Serving Your Professional Surveying & Mapping Needs
102 Kent Place, Newmarket, NH 03857 (603) 659-6560
2 Commerce Drive (Suite 202) Bedford, NH 03110 (603) 614-4060
10 Storer Street (Riverview Suite) Kennebunk, ME (207) 502-7005
http://www.doucetsurvey.com

Appendix C - Soil Series Descriptions

LOCATION SCITICO CT+MA NH

Established Series
Rev. MFF-SMF
07/2003

SCITICO SERIES

The Scitico series consists of very deep, poorly drained soils formed in silty and clayey sediments. They are nearly level to very gently sloping soils in low-lying positions of glaciolacustrine and marine terraces. Slope ranges from 0 to 5 percent. Permeability is moderate or moderately slow in the surface layer, moderately slow or slow in the upper part of the subsoil, slow or very slow in the lower part of the subsoil, and very slow in the substratum. Mean annual temperature is about 50 degrees F., and mean annual precipitation is about 43 inches.

TAXONOMIC CLASS: Fine, mixed, semiactive, nonacid, mesic Typic Endoaquepts

TYPICAL PEDON: Scitico silt loam, 1 percent slope in a broad, slightly concave low area. (Colors are for moist soil unless otherwise noted.)

Ap-- 0 to 8 inches; very dark grayish brown (2.5Y 3/2) silt loam, light gray (5Y 7/1) dry; moderate fine and medium granular structure; friable, sticky, plastic; few very fine, fine and medium roots; slightly acid; clear smooth boundary. (6 to 12 inches thick)

Eg-- 8 to 11 inches; olive gray (5Y 5/2) silt loam; moderate medium blocky structure; friable, sticky, plastic; few very fine and fine roots; common fine prominent light olive brown (2.5Y 5/4), yellowish brown (10YR 5/4), and dark yellowish brown (10YR 4/4) masses of iron accumulation; slightly acid; clear smooth boundary. (0 to 6 inches thick)

Bg1-- 11 to 18 inches; olive gray (5Y 5/2 and 5Y 4/2) silty clay loam; moderate coarse blocky structure; firm, very sticky, plastic; few fine roots between peds; continuous distinct gray (5Y 5/1) coatings on ped faces; common fine prominent dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) masses of iron accumulation; neutral; clear smooth boundary.

Bg2-- 18 to 30 inches; dark gray (5Y 4/1) silty clay loam; moderate coarse prismatic structure parting to coarse blocky; firm, very sticky, plastic; few fine roots between peds; continuous distinct gray (5Y 5/1) coatings on vertical structure faces; few worm casts along prism faces; many fine prominent dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) masses of iron accumulation; neutral; clear smooth boundary.

Bg3-- 30 to 38 inches; olive gray (5Y 5/2) and grayish brown (2.5Y 5/2) silty clay; weak coarse prismatic structure; firm, very sticky, plastic; few fine roots between prisms; continuous distinct gray (5Y 5/1) coatings on vertical structure faces; few worm casts along prism faces; many fine prominent yellowish brown (10YR 5/6) and dark yellowish brown (10YR 5/6) masses of iron accumulation; neutral; clear smooth boundary. (Combined thickness of the Bg horizons is 10 to 30 inches.)

Cg1-- 38 to 52 inches; olive gray (5Y 5/2), dark gray (5Y 4/1), grayish brown (2.5Y 5/2), and light olive brown (2.5Y 5/4) varved silt and clay (silty clay loam weighted average texture); few yellowish brown (10YR 5/6, 5/8) masses of iron accumulation; massive separating to weak thin plates along varved bedding planes; firm, very sticky, plastic; few fine prominent yellowish brown (10YR 5/6 and 10YR 5/8) masses of iron accumulation; neutral; clear smooth boundary. (0 to 30 inches thick)

Cg2-- 52 to 65 inches; olive gray (5Y 5/2), gray (5Y 5/1), grayish brown (2.5Y 5/2), and light olive brown (2.5Y 5/4) varved silt and clay (silty clay weighted average texture); massive separating to weak thin plates along

varved bedding planes; firm, very sticky, plastic; few fine prominent dark yellowish brown (10YR 4/4 and 10YR 4/6) masses of iron accumulation; neutral.

TYPE LOCATION: Hartford County, Connecticut; town of East Windsor, 2,000 feet west of the intersection of Newberry Road and Winkler Road, 100 feet north of Newberry Road. USGS Broad Brook topographic quadrangle, latitude 41 degrees 55 minutes 20 seconds N., longitude 72 degrees 35 minutes 22 seconds W., NAD 27

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 20 to 45 inches. Rock fragments, mostly fine gravel, range from 0 to 3 percent by volume throughout. Reaction ranges from very strongly acid to neutral in the A horizon, strongly acid to neutral in the Eg and upper part of the Bg horizons, and moderately acid to slightly alkaline in the lower part of the Bg horizon and in the C horizon.

The Ap horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 to 3. Dry value is 6 or more. 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 silt loam or silty clay loam. It has weak or moderate granular or subangular blocky structure and is friable or very friable.

The Eg horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 1 or 2. It is silt loam, silty clay loam, or silty clay. The horizon has weak or moderate granular, blocky, or platy structure, or it is massive. Consistence is friable or firm.

The Bg horizon has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 1 or 2. It is silt loam, silty clay loam, or silty clay in the upper part and silty clay loam, silty clay, or clay in the lower part. The Bg horizon has weak or moderate prismatic, blocky, or platy structure. Consistence is friable or firm.

The C horizon is neutral or has hue of 7.5YR to 5Y, value of 3 to 6, and dominant chroma of 0 to 2. Some pedons have individuals varves with chroma of 3 or 4, but they make up less than 40 percent of the horizon. Texture of individual varves is silt, silt loam, silty clay loam, silty clay, or clay, but the weighted average texture of the horizon is silty clay, clay, or silty clay loam. The C horizon is massive, or has platy structure, or weak prismatic structure separating to plates. Consistence is firm or very firm.

COMPETING SERIES: There are no other soils currently in this family.

The Binghamville, Boxford, Brancroft, Canadice, Canandaiga, Fonda, Latty, Livingston, Maybid, Munson, Parsippany, Raynham, Scantic, and Shaker series are similar soils in related families in LRRs L, R, and S. Bellingham soils have mixed mineralogy. Binghamville and Raynham soils are coarse-silty. Boxford and Brancroft soils have matrix chroma of 3 or more to a depth of 30 inches. Canadice and Parsippany soils have an argillic horizon. Canandaiga soils are fine-silty. Fonda soils have a mollic epipedon. Latty soils have carbonates in the series control section and in the substratum. Livingston soils are in a very fine family. Maybid soils have a thicker, darker A horizon that is high in organic matter. Munson soils are coarse-silty over clayey. Scantic soils are frigid. Shaker soils are coarse-loamy over clayey.

GEOGRAPHIC SETTING: Scitico soils are nearly level to very gently sloping soils on lacustrine and marine terraces. Slope ranges from 0 to 5 percent. The soils formed in silty and clayey glaciolacustrine and marine deposits. Typically, these soils are in low-lying, broad, flat or slightly concave areas. Mean annual temperature ranges from 45 to 54 degrees F., mean annual precipitation ranges from 36 to 50 inches, and the growing season ranges from 125 to 190 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Agawam, Amostown, Belgrade, Boxford, Brancroft, Elmridge, Enfield, Haven, Ninigret, Pollux, Raynham, Shaker, and Tisbury soils on nearby landscapes. The moderately well to somewhat poorly drained Boxford and Brancroft soils and the very poorly drained Maybid soils are associated in a drainage sequence. Agawam, Enfield, Haven, Ninigret, and Tisbury soils are terrace associates formed in loamy over stratified sandy and gravelly deposits. Amostown and Pollux

soils are better drained loamy soils underlain by silty lacustrine materials. The silty Belgrade soils and the loamy over clayey Elmridge soils are moderately well drained associates on nearby terraces.

DRAINAGE AND PERMEABILITY: Poorly drained. Surface runoff is slow. Permeability is moderate or moderately slow in the surface layer, moderately slow or slow in the upper part of the subsoil, slow or very slow in the lower part of the subsoil, and very slow in the substratum. Scitico soils have a water table at or near the surface much of the year.

USE AND VEGETATION: Cleared areas are used for hay or pasture. A few areas are used for silage corn and a small acreage is used for sod farming. Some areas are wooded and a few areas are in community development. Common trees are red maple, gray birch, alder, aspen, white pine, and swamp oak.

DISTRIBUTION AND EXTENT: Glaciolacustrine and marine terraces in The Connecticut Valley Lowland of Connecticut and Massachusetts and coastal areas of Massachusetts and New Hampshire; MLRAS 144A AND 145. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Hampshire County, Massachusetts, Central Part, 1980.

REMARKS: This revision reflects a change in classification to the 8th Edition of the Keys. Cation exchange activity class placement determined from a review of limited lab data and similar or associated soils.

Scitico soils were previously classified as Typic Haplaquepts and Typic Endoaquepts.

Diagnostic horizons and features recognized in this pedon are:

1. Ochric epipedon - the zone from 0 to 11 inches (Ap and Eg horizons).
2. Cambic horizon - the zone from 11 to 38 inches (Bg horizons).
3. Typic Endoaquepts subgroup - saturation in all layers from the upper boundary of saturation to a depth of 200 cm from the mineral surface layer and dominant chroma of 2 or less to a depth of 75 cm. (Eg and Bg horizons).

National Cooperative Soil Survey
U.S.A.

LOCATION MAYBID MA +CT NH

Established Series
Rev. WHT-SMF-MFF
08/2004

MAYBID SERIES

The Maybid series consists of very deep, very poorly drained soils formed in lacustrine or marine sediments. They are nearly level or level soils on lowlands. Slope ranges from 0 to 3 percent. Saturated hydraulic conductivity is moderately high or high in the surface layer and very low to moderately high in the subsoil and substratum. Mean annual temperature is about 48 degrees F. and the mean annual precipitation is about 45 inches.

TAXONOMIC CLASS: Fine, mixed, semiactive, nonacid, mesic Typic Humaquepts

TYPICAL PEDON: Maybid silt loam forested, at an elevation of about 85 feet. (Colors are for moist soils.)

A--0 to 7 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable, slightly sticky, nonplastic; many fine, medium and coarse woody roots; moderately acid; clear smooth boundary. (6 to 10 inches thick)

Bg1--7 to 11 inches; gray (5Y 5/1) silty clay loam; moderate medium and coarse blocky structure; friable, sticky, slightly plastic; common fine, medium and coarse woody roots; moderately acid; clear wavy boundary.

Bg2--11 to 19 inches; greenish gray (5GY 5/1) silty clay; massive; firm, sticky, plastic; very few fine woody roots; few fine prominent brown (7.5YR 4/4) masses of iron accumulation; neutral; gradual smooth boundary. (Combined thickness of the Bg horizons is 6 to 22 inches.).

Cg1--19 to 27 inches; greenish gray (5GY 5/1) silty clay; massive; firm, sticky, plastic; neutral; gradual smooth boundary. (0 to 30 inches thick)

Cg2--27 to 65 inches; dark greenish gray (5GY 4/1) silty clay; massive; firm, sticky, plastic; neutral.

TYPE LOCATION: Essex County, Massachusetts; Town of Amesbury, 100 yards east of Woodward Road at the Massachusetts - New Hampshire state line. USGS Exeter, NH-MASS 7 1/2 minute quadrangle; latitude 42 degrees 52 minutes 55 seconds N., longitude 70 degrees 56 minutes 11 seconds W., NAD 27.

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 18 to 30 inches. Content of rock fragments is usually less than 1 percent by volume. The soil ranges from strongly acid to moderately acid in the A horizon and from strongly acid to neutral in the B and C horizons. At least one horizon within 40 inches is moderately acid to neutral.

The A horizon is neutral or has hue of 10YR to 5Y, value of 2 or 3, and chroma of 0 to 2. It is silt loam or silty clay loam. It is nonsticky or slightly sticky.

The upper part of the Bg horizon is neutral or has hue of 5Y, 5G, 5GY or 5BG, value of 3 to 6, and chroma of 0 to 2. Some redoximorphic features are present in some pedons. It is silt loam, silty clay loam, or silty clay. It has weak platy, weak to moderate subangular blocky or blocky, or moderate fine granular structure, or the horizon is massive. It is friable or firm and slightly sticky or sticky.

The lower part of the Bg horizon is neutral or has hue of 5Y or 5GY, value of 4 to 6, and chroma of 0 to 2. It has distinct to prominent high chroma iron accumulations that comprise less than 40 percent of the matrix. The Bg

horizon is silty clay, silty clay loam, or clay. It has weak to moderate prismatic or blocky structure, or the horizon is massive.

The Cg horizon is neutral or has hue of 5Y, 5GY, 5G, or 5BG, value of 4 to 6, and chroma of 0 or 1. It is silty clay loam, silty clay, or clay.

COMPETING SERIES: The Maybid series is the only known member of this family.

The Alden, Biddeford, Birdsall, Canandaigua, Clatsop, Defiance, Dunning, Fonda, Livingston, Madalin, Papakating, Toledo and Tughill series are in related families. Alden, Birdsall, Canadaigua, and Tughill soils have less than 35 percent clay in the particle-size control section. Biddeford soils have histic epipedons. Madalin soils have an argillic horizon. Clatsop soils have acid reaction. Defiance, Dunning, and Papakating soils have irregular decrease in organic matter with depth. In addition, the Papakating soils have less than 35 percent clay. Fonda, Livingston, and Toledo soils have ochric epipedons; the Livingston soils, in addition, have more than 60 percent clay.

GEOGRAPHIC SETTING: Maybid soils are level or nearly level soils on lowlands of silty and clayey sediments. The soils formed in water deposited material of marine or lacustrine origin. Slope ranges from 0 to 3 percent. Mean annual temperature ranges from 45 to 50 degrees F.; mean annual precipitation ranges from 40 to 50 inches; and mean growing season ranges from 120 to 180 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Belgrade, Birdsall, Boxford, Brancroft, Elmwood, Raynham, Scitico, Scio, Suffield, Swanton, Unadilla, and Whately soils. Belgrade, Birdsall, Raynham, Scio, and Unadilla soils have coarse-silty particle-size control sections. Brancroft soils are fine-silty. The moderately well and somewhat poorly drained Boxford soils, the poorly drained Scitico soils, and well drained Suffield soils are members of a drainage sequence in the same landscape. Elmwood, Swanton, and Whately soils have coarse-loamy over clayey particle-size control sections.

DRAINAGE AND PERMEABILITY: Very poorly drained. Internal drainage is very slow. Permeability is slow or very slow. Saturated hydraulic conductivity is moderately high or high in the surface layer very low to moderately high in the subsoil and substratum. The soil is intermittently ponded or has very low runoff.

USE AND VEGETATION: Mostly brush land and woodland. Woodland consists of red maple, elm, tamarack, willow, alder, black spruce, and white pine. Cattails and sedges are common in nonwooded areas.

DISTRIBUTION AND EXTENT: Glaciolacustrine or marine lowlands in MLRA 144A in Massachusetts, Connecticut, New Hampshire, and possibly eastern New York. The series is of small extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Essex County, Massachusetts, 1977.

REMARKS: The Maybid soils were formerly included with the Biddeford series which has a histic epipedon. Mineralogy and cation exchange activity class are changed in this revision from illitic to mixed based upon a review of similar soils.

Diagnostic horizons and other features recognized in this pedon are:

1. Umbric epipedon - the zone from the surface of the soil to a depth of 10 inches, when mixed (A and part of the Bg1 horizon).
2. Cambic horizon - the zone from 7 inches to a depth of 19 inches (Bg horizon).
3. Particle size class - the zone from 10 to 40 inches averages about 55 percent clay (fine).

ADDITIONAL DATA: The A horizon of the typical pedon was sampled (RT77-MA173) for base saturation (B.S.- 44 percent).

Appendix D - Disturbed Soil Mapping Unit Supplement

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

Supplemental symbols may be used at the discretion of the Certified Soil Scientist who creates the Site Specific Soil Survey. 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 wetlands
i- Organic Materials-Tidal wetlands

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

Inspection & Maintenance Plan

Richmond Property Group
18 Garrison Avenue (Site)
Durham, NH 03824

March 24, 2020

Prepared for: Richmond Property Group
333 North Alabama Street
Indianapolis, IN 46204

Prepared by: Emanuel Engineering, Inc.
Bruce Scamman, PE
118 Portsmouth Avenue, Suite A202
Stratham, NH 03885
EEI Project # 19-083

Introduction

Emanuel Engineering, Inc. has prepared the following Stormwater Management System Inspection & Maintenance Plan for **18 Garrison Avenue, Durham, NH 03824**. The intent of this plan is to provide the client, **Richmond Property Group,** with a list of procedures that document the inspection and maintenance requirements of the Stormwater Management System for this site.

The following inspection and maintenance program is necessary in order to keep the Stormwater Management System functioning properly. By following the enclosed procedures the owners and property management will be able to maintain the functional design of the Stormwater Management System and maximize its ability to remove sediment and other contaminants from site generated stormwater runoff.

Stormwater Management System Components

The Stormwater Management System has been designed to mitigate both the quantity and quality of site-generated stormwater runoff. As a result, its design included the following elements:

Non-Structural Best Management Practices (BMP's)

Non-Structural best management practices (BMP's) are designed to minimize and/or remove contaminants before they enter the stormwater collection system. Several of these BMP's have been incorporated into the Stormwater Management System including pavement sweeping, reduced use of road salt, and litter/trash removal. These types of BMP's are a highly effective initial treatment measure for reducing stormwater pollutant loading.

Closed Drainage Collection and Piping System

The closed drainage system is designed to collect and convey stormwater runoff from the paved areas and infiltrate stormwater back into the water table. Stormwater is collected by catch basins located throughout the site. Key catch basins are designed with deep sumps to provide storage areas for sediment and control sediment outflow.

Source Control & Maintenance

The following are the areas to be accomplished and maintained because this site is considered a “High Load Area” from the maintenance and repair of vehicles on site. This plan is to provide to **Richmond Property Group** with an outline of best management practices (BMPs) and operations that are prohibited on site. Descriptions and maintenance requirements of BMPs and operations in this section were taken from the *New Hampshire Stormwater Manual, Volume 2* dated December 2008 (http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-08-20b.pdf). A log is attached at the end of this document for the owner or designee to confirm that best management practices are occurring on-site.

Street Sweeping

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.

Maintenance - At a minimum, street sweeping should be performed once annually for traditional pavement, preferably as soon as possible after the snow melts to reduce the amount of sand, grit, and debris and associated pollutants from winter sanding from entering surface waters. Street sweeping should be performed more frequently for permeable pavements. See the "Permeable Pavements" maintenance section for appropriate occurrence.

Snow & Ice Management

To address the concerns associated with the application of chlorides and other deicing materials, NHDES recommends the development of a Road Salt and Deicing Minimization Plan when a development will create one acre or more of pavement, including parking lots and roadways. The plan should address the policies that the development will keep in place to minimize salt and other deicer use after the project has been completed. A component of the plan should include tracking the use of salt and other deicers for each storm event and compiling salt use data annually. See below for deicing application rate guidelines.

New Hampshire does not yet have salt reduction guidance, but recommends following the guidelines available in reference cited below.
Minnesota Snow and Ice Control handbook, available at:
http://www.mnltap.umn.edu/publications/handbooks/documents/snice_2012_wb.pdf

Deicing Application Rate Guidelines

24' of pavement (typical two-lane road)

These rates are not fixed values, but rather the low end of a range to be selected and adjusted by an agency according to its local conditions and experience.

			Lbs/ two-lane mile			
Pavement Temp. (°F) and Trend (↑↓)	Weather Condition	Maintenance Actions	Salt Prewetted/ Pretreated With Salt Brine	Salt Prewetted/ Pretreated With Other Blends	Dry Salt*	Winter Sand (abrasives)
>30° ↑	Snow	Plow, treat intersections only	80 (40/lane mile)	70	100*	Not recommended
	Frz. rain	Apply chemical	80 – 160	70 – 140	100 – 200*	Not recommended
30° ↓	Snow	Plow & apply chemical	80 – 160	70 – 140	100 – 200*	Not recommended
	Frz. rain	Apply chemical	150 – 200	130 – 180	180 – 240*	Not recommended
25 - 30° ↑	Snow	Plow & apply chemical	120 – 160	100 – 140	150 – 200*	Not recommended
	Frz. rain	Apply chemical	150 – 200	130 – 180	180 – 240*	Not recommended
25 - 30° ↓	Snow	Plow & apply chemical	120 – 160	100 – 140	150 – 200*	Not recommended
	Frz. rain	Apply chemical	160 – 240	140 – 210	200 – 300*	400
20 - 25° ↑	Snow or frz. rain	Plow & apply chemical	160 – 240	140 – 210	200 – 300*	400
20 - 25° ↓	Snow	Plow & apply chemical	200 – 280	175 – 250	250 – 350*	Not recommended
	Frz. rain	Apply chemical	240 – 320	210 – 280	300 – 400*	400
15 - 20° ↑	Snow	Plow & apply chemical	200 – 280	175 – 250	250 – 350*	Not recommended
	Frz. rain	Apply chemical	240 – 320	210 – 280	300 – 400*	400
15 - 20° ↓	Snow or Frz. rain	Plow & apply chemical	240 – 320	210 – 280	300 – 400*	500 for frz. rain
0 to 15° ↑↓	Snow	Plow, treat with blends, sand hazardous areas	Not recommended	300 – 400	Not recommended	500 – 750 spot treat as needed
< 0°	Snow	Plow, treat with blends, sand hazardous areas	Not recommended	400 – 600**	Not recommended	500 – 750 spot treat as needed

*Dry salt is not recommended. It is likely to blow off the road before it melts ice.

**A blend of 6 – 8 gal/ton $MgCl_2$ or $CaCl_2$ added to NaCl can melt ice as low as -10°.

Permeable Pavement:

Permeable pavement consists of a porous surface, base, and sub-base materials which allow penetration of runoff through the surface into underlying soils. Pervious asphalt is installed on a base which serves as a filter course between the pavement surface and the underlying sub-base material. The sub-base material typically comprises a layer of crushed stone that not only supports the overlying pavement structure, but also serves as a reservoir to store runoff that penetrates the pavement surface until it can percolate into the ground.

Although traffic loading capacities vary, permeable pavement alternatives are generally appropriate for low traffic areas. Pavement type and thickness are selected based on anticipated load (light, moderate, heavy) and maintenance requirements. Careful maintenance is essential for long term use and effectiveness.

Frequently, permeable pavements filter only the runoff generated on the pavement surface itself. However, runoff from other areas can be directed to permeable pavement if properly designed. Runoff generated from adjacent areas of the site may require pretreatment prior to discharge to the pavement surface, to prevent clogging of the pavement structure and (where the pavement is used to infiltrate as well as filter the runoff) the underlying soils.
Porous asphalt is very similar to conventional asphalt except that it is mixed without particles smaller than coarse sand. Without these smaller size particles, water is able to pass through the surface and into a crushed stone storage area. The lack of fine particles in the asphalt, however, limits the loading capacity of the asphalt relative to conventional asphalt. Because of this limitation, pervious asphalt should not be used in high-traffic areas. An advantage to the use of porous asphalt is the reduced need for stormwater conveyance systems and other additional BMPs.

Maintenance -

- Provision of signs is recommended, to indicate locations of permeable pavements and the applicability of special maintenance measures.
- No winter sanding of permeable pavements is permitted.
- Minimize application of salt for ice control.
- Never reseal or repave with impermeable materials.
- Inspect annually for pavement deterioration or spalling.
- Monitor periodically to ensure that the pavement surface drains effectively after storms
- **Clean periodically (2-4 times per year) using a vacuum sweeper. Power washing may be required prior to vacuum sweeping, to dislodge trapped particles.**
- Major clogging may necessitate replacement of pavement surface, and possibly filter course and sub-base course.

Conveyance Swales

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.

Maintenance -

- 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.

Outlet Protection

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.

Maintenance - Inspect the outlet protection annually for damage and deterioration. Repair damages immediately.

Manicured Landscaped Areas – Litter Control

Landscaped areas tend to filter debris and contaminates that may block drainage systems and pollute the surface and ground waters.

Maintenance -

- Litter control and lawn maintenance involves removing litter such as trash, leaves, lawn clippings, pet wastes, oil and chemicals from streets, parking lots, and lawns before materials are transported into surface water.
- Litter control should be implemented as part of the daily grounds maintenance program.

Manicured Landscaped Areas – Fertilizer Management

Fertilizer management involves controlling the rate, timing, and method of fertilizer application so that the nutrients are taken up by the plants, thereby reducing the chance of polluting the surface and ground waters. Fertilizer management can be effective in reducing the amounts of phosphorus and nitrogen in runoff from landscape areas, particularly lawns. Soil tests should be conducted to determine fertilizer application rates.

Maintenance

- Have the soil tested by your landscaper or local Soil Conservation Service for nutrient requirements and follow the recommendations.
- Do not apply fertilizer to frozen ground.
- Clean up any fertilizer spills
- Do not allow fertilizer to be broadcast into water bodies.
- When fertilizing a lawn, water thoroughly, but do not create a situation where water runs off the surface of the lawn.

Catch Basin/Drywell/Yard Drain Cleaning

Catch basins collect stormwater, primarily from parking lots. The stormwater often contains sediment and contaminants. The catch basin sumps trap sediment, trace metals, nutrients, and hydrocarbons.

Maintenance -

- Remove leaves and debris from catch basin grates on an as-needed basis.
- Sumps should be cleaned on an annual basis to protect water quality. Catch basin debris shall be disposed of at a solid waste disposal site.

Culverts, Drainage Pipes, and Roof Drains

Culverts, drainage pipes, and roof drains convey stormwater away from buildings, walkways, and parking areas.

Maintenance – Culverts, drainage pipes, and roof drains should be inspected semi-annually, or more often as needed, for accumulation of debris and structural integrity. Leaves and other debris should be removed from the inlet and outlet to insure the functionality of drainage structures. Debris shall be disposed of on the site where it will not concentrate back at the drainage structures or at a solid waste disposal facility.

General Cleanup

Upon completion of the project, the contractor shall remove all temporary stormwater erosion control structures (i.e., temporary stone check dams, silt fence, etc.). Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required shall be dressed to conform with the existing grade, prepared, and seeded. Culverts and catch basins shall be cleaned, removing any sediment that may have accumulated during construction.

Inspection & Maintenance Log

The following pages contain an Inspection & Maintenance Log and blank copy of the Stormwater Management System's Inspection & Maintenance Log. These forms are provided to **Richmond Property Group** with the inspection and maintenance of the **18 Garrison Avenue, Durham, NH 03824** Stormwater Management System.

Proper inspection, maintenance, and repair are key elements in maintaining a successful stormwater management program on a developed property. Programs should be implemented at all of the owner's properties to ensure permit compliance and the highest quality of stormwater discharge. Routine inspection can also reduce the potential for deterioration of infrastructure or a catastrophic event, like a breach of detention pond.

For the purpose of this Stormwater Management Program, a significant rainfall event is considered an event of three (3) inches in a 24-hour period or 0.5 inches in a one-hour period. It is anticipated that a short, intense event is likely to have a higher potential of erosion for the site than a longer, high volume event.

Applicant	Date
Town Planner	Date
Town Manager	Date

FILE: P:\2019 JOBS\19-083 RPG - ATO UNH\Drainage\Stormwater Maintenance Plan 03-24-20.doc

Stormwater Management System Inspection & Maintenance Log

Richmond Property Group / 18 Garrison Avenue, Durham, NH 03824

BMP/System Component	Date Inspected	Inspector	Cleaning/Repair Needed (*List Items/Comments)*	Date of Cleaning/Repair	Performed By

CONTROL OF INVASIVE PLANTS

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

Background:

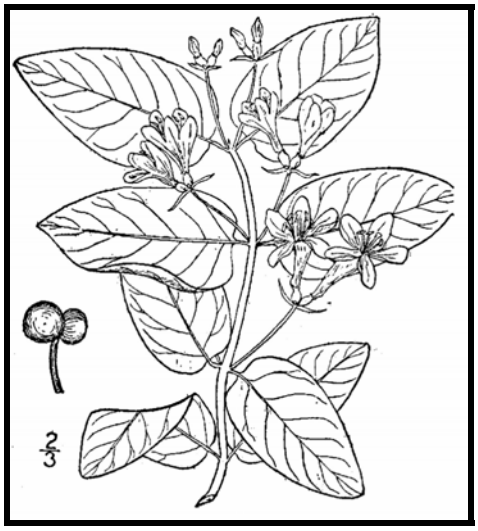
Invasive plants are introduced, alien, or non-native plants, which have been moved by people from their native habitat to a new area. Some exotic plants are imported for human use such as landscaping, erosion control, or food crops. They also can arrive as "hitchhikers" among shipments of other plants,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

UNIVERSITY of NEW HAMPSHIRE COOPERATIVE EXTENSION

Methods for Disposing Non-Native Invasive Plants

Prepared by the Invasives Species Outreach Group, volunteers interested in helping people control invasive plants. Assistance provided by the Piscataquog Land Conservancy and the NH Invasives Species Committee. Edited by Karen Bennett, Extension Forestry Professor and Specialist.



Tatarian honeysuckle
Lonicera tatarica
USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. *An illustrated flora of the northern United States, Canada and the British Possessions*. Vol. 3: 282.

Non-native invasive plants crowd out natives in natural and managed landscapes. They cost taxpayers billions of dollars each year from lost agricultural and forest crops, decreased biodiversity, impacts to natural resources and the environment, and the cost to control and eradicate them.

Invasive plants grow well even in less than desirable conditions such as sandy soils along roadsides, shaded wooded areas, and in wetlands. In ideal conditions, they grow and spread even faster. There are many ways to remove these non-native invasives, but once removed, care is needed to dispose the removed plant material so the plants don't grow where disposed.

Knowing how a particular plant reproduces indicates its method of spread and helps determine the appropriate disposal method. Most are spread by seed and are dispersed by wind, water, animals, or people. Some reproduce by vegetative means from pieces of stems or roots forming new plants. Others spread through both seed and vegetative means.

Because movement and disposal of viable plant parts is restricted (see NH Regulations), viable invasive parts can't be brought to most transfer stations in the state. Check with your transfer station to see if there is an approved, designated area for invasives disposal. This fact sheet gives recommendations for rendering plant parts non-viable.

Control of invasives is beyond the scope of this fact sheet. For information about control visit www.nhinvasives.org or contact your UNH Cooperative Extension office.

New Hampshire Regulations

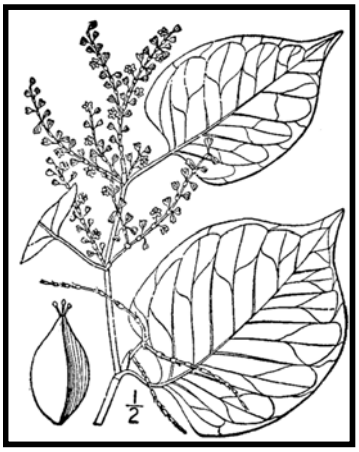
Prohibited invasive species shall only be disposed of in a manner that renders them nonliving and nonviable. (Agr. 3802.04)

No person shall collect, transport, import, export, move, buy, sell, distribute, propagate or transplant any living and viable portion of any plant species, which includes all of their cultivars and varieties, listed in Table 3800.1 of the New Hampshire prohibited invasive species list. (Agr 3802.01)

How and When to Dispose of Invasives?

To prevent seed from spreading remove invasive plants before seeds are set (produced). Some plants continue to grow, flower and set seed even after pulling or cutting. Seeds can remain viable in the ground for many years. If the plant has flowers or seeds, place the flowers and seeds in a heavy plastic bag "head first" at the weeding site and transport to the disposal site. The following are general descriptions of disposal methods. See the chart for recommendations by species.

Burning: Large woody branches and trunks can be used as firewood or burned in piles. For outside burning, a written fire permit from the local forest fire warden is required unless the ground is covered in snow. Brush larger than 5 inches in diameter can't be burned. Invasive plants with easily airborne seeds like black swallow-wort with mature seed pods (indicated by their brown color) shouldn't be burned as the seeds may disperse by the hot air created by the fire.



Japanese knotweed
Polygonum cuspidatum
USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. *An illustrated flora of the northern United States, Canada and the British Possessions*. Vol. 1: 676.

Bagging (solarization): Use this technique with softer-tissue plants. Use heavy black or clear plastic bags (contractor grade), making sure that no parts of the plants poke through. Allow the bags to sit in the sun for several weeks and on dark pavement for the best effect.

Tarping and Drying: Pile material on a sheet of plastic and cover with a tarp, fastening the tarp to the ground and monitoring it for escapes. Let the material dry for several weeks, or until it is clearly nonviable.

Chipping: Use this method for woody plants that don't reproduce vegetatively.

Burying: This is risky, but can be done with watchful diligence. Lay thick plastic in a deep pit before placing the cut up plant material in the hole. Place the material away from the edge of the plastic before covering it with more heavy plastic. Eliminate as much air as possible and toss in soil to weight down the material in the pit. Note that the top of the buried material should be at least three feet underground. Japanese knotweed should be at least 5 feet underground!

Drowning: Fill a large barrel with water and place soft-tissue plants in the water. Check after a few weeks and look for rotted plant material (roots, stems, leaves, flowers). Well-rotted plant material may be composted. A word of caution- seeds may still be viable after using this method. Do this before seeds are set. This method isn't used often. Be prepared for an awful stink!

Composting: Invasive plants can take root in compost. Don't compost any invasives unless you know there is no viable (living) plant material left. Use one of the above techniques (bagging, tarping, drying, chipping, or drowning) to render the plants nonviable before composting. Closely examine the plant before composting and avoid composting seeds.

Be diligent looking for seedlings for *years* in areas where removal and disposal took place.

Suggested Disposal Methods for Non-Native Invasive Plants

This table provides information concerning the disposal of removed invasive plant material. If the infestation is treated with herbicide and left in place, these guidelines don't apply. Don't bring invasives to a local transfer station, unless there is a designated area for their disposal, or they have been rendered non-viable. This listing includes wetland and upland plants from the New Hampshire Prohibited Invasive Species List. The disposal of aquatic plants isn't addressed.

<table>
<tr><th>Woody Plants</th><th>Method of Reproducing</th><th>Methods of Disposal</th></tr>
<tr><td rowspan="2">Norway maple
(Acer platanoides)
European barberry
(Berberis vulgaris)
Japanese barberry
(Berberis thunbergii)
autumn olive
(Elaeagnus umbellata)
burning bush
(Euonymus alatus)
Morrow's honeysuckle
(Lonicera morrowii)
Tatarian honeysuckle
(Lonicera tatarica)
showy bush honeysuckle
(Lonicera x bella)
common buckthorn
(Rhamnus cathartica)
glossy buckthorn
(Frangula alnus)</td><td rowspan="2">Fruit and Seeds
  </td><td>Prior to fruit/seed ripening
Seedlings and small plants
▪ Pull or cut and leave on site with roots exposed. No special care needed.
Larger plants
▪ Use as firewood.
▪ Make a brush pile.
▪ Chip.
▪ Burn.</td></tr>
<tr><td>After fruit/seed is ripe
Don't remove from site.
▪ Burn.
▪ Make a covered brush pile.
▪ Chip once all fruit has dropped from branches.
▪ Leave resulting chips on site and monitor.</td></tr>
<tr><td rowspan="2">oriental bittersweet
(Celastrus orbiculatus)
multiflora rose
(Rosa multiflora)</td><td rowspan="2">Fruits, Seeds, Plant Fragments
  </td><td>Prior to fruit/seed ripening
Seedlings and small plants
▪ Pull or cut and leave on site with roots exposed. No special care needed.
Larger plants
▪ Make a brush pile.
▪ Burn.</td></tr>
<tr><td>After fruit/seed is ripe
Don't remove from site.
▪ Burn.
▪ Make a covered brush pile.
▪ Chip – only after material has fully dried (1 year) and all fruit has dropped from branches. Leave resulting chips on site and monitor.</td></tr>
</table>

Non-Woody Plants	Method of Reproducing	Methods of Disposal
garlic mustard *(Alliaria petiolata)* spotted knapweed *(Centaurea maculosa)* ▪ Sap of related knapweed can cause skin irritation and tumors. Wear gloves when handling. black swallow-wort *(Cynanchum nigrum)* ▪ May cause skin rash. Wear gloves and long sleeves when handling. pale swallow-wort *(Cynanchum rossicum)* giant hogweed *(Heracleum mantegazzianum)* ▪ Can cause major skin rash. Wear gloves and long sleeves when handling. dame's rocket *(Hesperis matronalis)* perennial pepperweed *(Lepidium latifolium)* purple loosestrife *(Lythrum salicaria)* Japanese stilt grass *(Microstegium vimineum)* mile-a-minute weed *(Polygonum perfoliatum)*	**Fruits and Seeds** 	**Prior to flowering** Depends on scale of infestation Small infestation ▪ Pull or cut plant and leave on site with roots exposed. Large infestation ▪ Pull or cut plant and pile. (You can pile onto or cover with plastic sheeting). ▪ Monitor. Remove any re-sprouting material. **During and following flowering** Do nothing until the following year or remove flowering heads and bag and let rot. Small infestation ▪ Pull or cut plant and leave on site with roots exposed. Large infestation ▪ Pull or cut plant and pile remaining material. (You can pile onto plastic or cover with plastic sheeting). ▪ Monitor. Remove any re-sprouting material.
common reed (*Phragmites australis*) Japanese knotweed *(Polygonum cuspidatum)* Bohemian knotweed *(Polygonum x bohemicum)*	**Fruits, Seeds, Plant Fragments** Primary means of spread in these species is by plant parts. Although all care should be given to preventing the dispersal of seed during control activities, the presence of seed doesn't materially influence disposal activities.	**Small infestation** ▪ Bag all plant material and let rot. ▪ Never pile and use resulting material as compost. ▪ Burn. **Large infestation** ▪ Remove material to unsuitable habitat (dry, hot and sunny or dry and shaded location) and scatter or pile. ▪ Monitor and remove any sprouting material. ▪ Pile, let dry, and burn.

January 2010