

R LEVESQUE ASSOCIATES, INC.

40 School Street, P.O. BOX 640, Westfield, MA 01085

p 413.568.0985 · f 413.568.0986 · www.rlaland.com



January 14, 2026

Via email: acapra@southhadleyma.gov

Anne Capra, Director
Town of South Hadley Planning and Conservation
116 Main Street
South Hadley, Massachusetts 01075

RE: Groundwater Mounding Analysis Memo
506 Granby Road
South Hadley, Massachusetts 01075
(Map 32, Parcel 52)
RLA Project File No. 240926

Dear Ms. Capra,

On behalf of the applicant and property owner, SAI SHYAM, LLC c/o Mr. Himanshu Patel, R Levesque Associates, Inc. is providing this groundwater mounding analysis letter to satisfy peer review comments issued by BETA Group, Inc. for the above-referenced project.

The purpose of the evaluation was to assess potential groundwater mounding beneath and adjacent to the proposed basin and to determine whether the anticipated mounding would adversely affect basin performance or surrounding environmental conditions.

The analysis was conducted using a spreadsheet that solves the Hantush (1967) equation for groundwater mounding beneath an infiltration basin. This spreadsheet is publicly available and was developed as a convenience for users wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102, "*Groundwater mounding beneath hypothetical stormwater infiltration basins*". The Hantush method utilizes seven variables: recharge rate (R), specific yield (Sy), horizontal hydraulic conductivity (K), one-half basin length (x), one-half basin width (y), duration of infiltration (t), and initial thickness of the saturated zone, [hi(0)].

The recharge rate (feet/day) used in the analysis was calculated from the basin infiltration rate. The infiltration rate is based on the Rawls rate of 1.02 inches per hour for Hydrologic Soil Group B soils, consistent with Sudbury fine sandy loam as identified by NRCS soil mapping. This rate converts to 2.04 feet per day and was used as the recharge rate.

A LAND PLANNING SERVICES COMPANY

R LEVESQUE ASSOCIATES, INC.

40 School Street, P.O. BOX 640, Westfield, MA 01085

p 413.568.0985 · f 413.568.0986 · www.rlalnd.com



Specific yield is a dimensionless parameter ranging between 0 and 1; the value selected for this analysis was 0.21, which represents the average specific yield for fine sand as reported in *"Specific Yield—Compilation of Specific Yields for Various Materials"* by A. I. Johnson (1967).

Horizontal hydraulic conductivity (feet/day) was determined using a vertical anisotropy ratio of 10:1, as recommended in USGS Scientific Investigations Report 2010-5102. Using a vertical hydraulic conductivity equal to the infiltration rate of 2.04 feet per day, the resulting horizontal hydraulic conductivity applied in the analysis was 20.4 feet per day.

The x and y variables represent one-half the basin dimensions measured from the basin center to the basin edges. For the rectangular basin proposed at the site, the shorter basin dimension was assigned as x and the longer dimension as y, consistent with the Hantush method convention.

The duration of the infiltration period (days) was obtained from the HydroCAD analysis for the subsurface infiltration basin. The HydroCAD output indicates that infiltration occurs over a 32-hour period, which corresponds to 1.33 days and was used as the infiltration duration in the analysis.

The initial thickness of the saturated zone was defined as the vertical distance between the estimated seasonal high groundwater elevation (ESHGW) and bedrock beneath the basin. Bedrock elevation was approximated using MassDEP well data from five surrounding wells, which indicate a bedrock elevation of approximately 152.6 feet. Test pit data collected on site indicates an estimated seasonal high groundwater elevation of 214.2 feet, resulting in an initial saturated thickness of 61.6 feet.

The results of the groundwater mounding analysis indicate a maximum groundwater mound height of approximately 1.221 feet beneath the infiltration basin. The proposed basin is located 3.300 feet above the estimated seasonal high groundwater elevation; therefore, the predicted groundwater mounding will not adversely affect the function or performance of the basin. The groundwater mound diminishes with increasing distance from the basin, and no adverse impacts to surrounding environmental resources or downgradient properties are anticipated.

If there are any questions, please do not hesitate to contact our office.

Sincerely,
R LEVESQUE ASSOCIATES, INC.



Mike Bowen, EIT
Civil Engineer



Filipe Cravo, P.E.
Project Engineer

A LAND PLANNING SERVICES COMPANY



R LEVESQUE ASSOCIATES, INC.

40 School Street · Westfield, MA 01085
 p 413.568.0985 · f 413.568.0986 · www.rlalnd.com

Client: Himanshu Patel
 Project: 506 Granby Road
 Designed By: Mike Bowen Date: 1/7/2026
 Checked By: Filipe Cravo, P.E. Date: 1/7/2026
 RLA Project Number: 240926 Sheet: 1 of 1

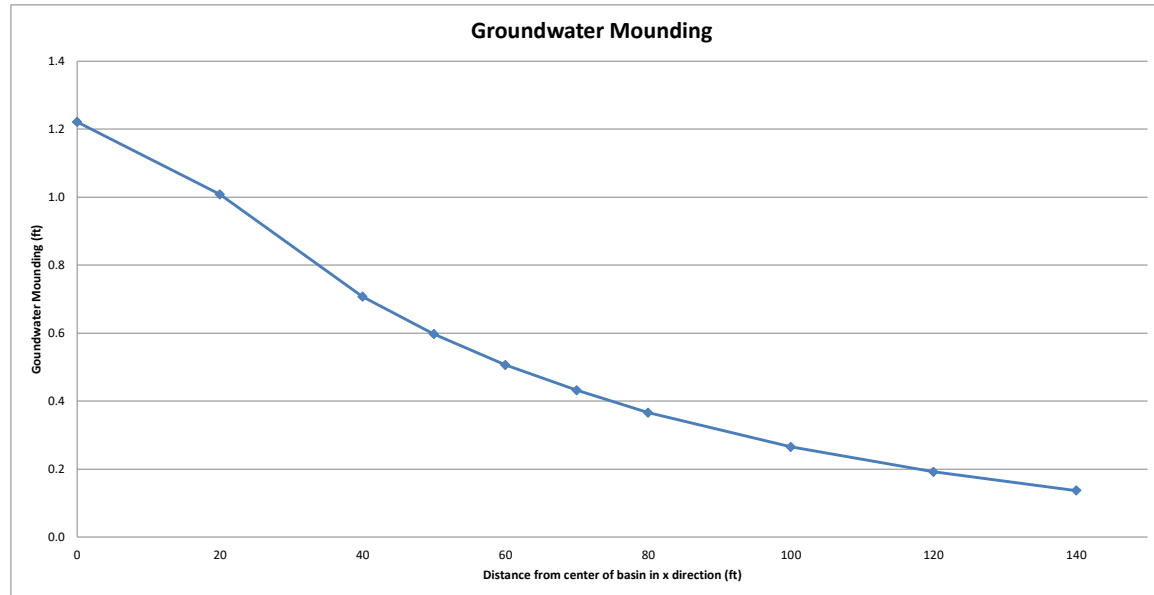
Mounding Analysis - Input Parameters

Hantush Method Variables

Values	Parameter	Description	Unit	Notes
2.04	R	Recharge Rate	ft/day	Based on Rawl's rate for Sudbury fine sandy loam
0.21	Sy	Specific Yield	unitless	Based on "Compilation of Specific Yields for Various Materials", Johnson, (1967)
20.4	K	Horizontal Hydraulic Conductivity	ft/day	10:1 Ratio of Horizontal to Vertical Hydraulic Conductivity per USGS SIR2010-5102
17.38	x	1/2 Length of Basin (x-direction)	ft	
33.91	y	1/2 Length of Basin (y-direction)	ft	
1.33	t	Duration of Infiltration Period	days	Based on HydroCAD results, duration of "discarded" CFS of Pond 1P
62	hi(0)	Initial Thickness of Saturated Zone	ft	Vertical distance from ESHGW to bedrock

Mounding Plot - Output from USGS Mounding Analysis Tool

Groundwater Mounding, in feet	
Groundwater Mounding (ft)	Distance from center of basin in x direction (ft)
1.221	0
1.008	20
0.707	40
0.597	50
0.506	60
0.432	70
0.366	80
0.265	100
0.192	120
0.137	140



This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0)), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.

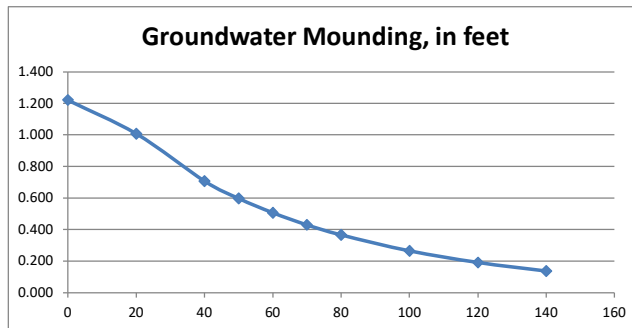
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. **The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed** otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

Input Values		use consistent units (e.g. feet & days or inches & hours)	Conversion Table		
			inch/hour	feet/day	
2.0400	R	Recharge (infiltration) rate (feet/day)	0.67	1.33	
0.210	Sy	Specific yield, Sy (dimensionless, between 0 and 1)			
20.40	K	Horizontal hydraulic conductivity, Kh (feet/day)*	2.00	4.00	In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).
17.375	x	1/2 length of basin (x direction, in feet)			
33.910	y	1/2 width of basin (y direction, in feet)	hours	days	
1.333	t	duration of infiltration period (days)	36	1.50	
61.600	hi(0)	initial thickness of saturated zone (feet)			
62.821	h(max)	maximum thickness of saturated zone (beneath center of basin at end of infiltration period)			
1.221	Δh(max)	maximum groundwater mounding (beneath center of basin at end of infiltration period)			

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
1.221	0
1.008	20
0.707	40
0.597	50
0.506	60
0.430	70
0.366	80
0.265	100
0.192	120
0.137	140



Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

HYDROLOGIC PROPERTIES OF EARTH MATERIALS

SPECIFIC YIELD—COMPILATION OF SPECIFIC YIELDS FOR VARIOUS MATERIALS

By A. I. JOHNSON

ABSTRACT

Specific yield is defined as the ratio of (1) the volume of water that a saturated rock or soil will yield by gravity to (2) the total volume of the rock or soil. Specific yield is usually expressed as a percentage. The value is not definitive, because the quantity of water that will drain by gravity depends on variables such as duration of drainage, temperature, mineral composition of the water, and various physical characteristics of the rock or soil under consideration. Values of specific yield, nevertheless, offer a convenient means by which hydrologists can estimate the water-yielding capacities of earth materials and, as such, are very useful in hydrologic studies.

The present report consists mostly of direct or modified quotations from many selected reports that present and evaluate methods for determining specific yield, limitations of those methods, and results of the determinations made on a wide variety of rock and soil materials. Although no particular values are recommended in this report, a table summarizes values of specific yield, and their averages, determined for 10 rock textures. The following is an abstract of the table:

Specific yields, in percent, of various materials

[Rounded to nearest whole percent]

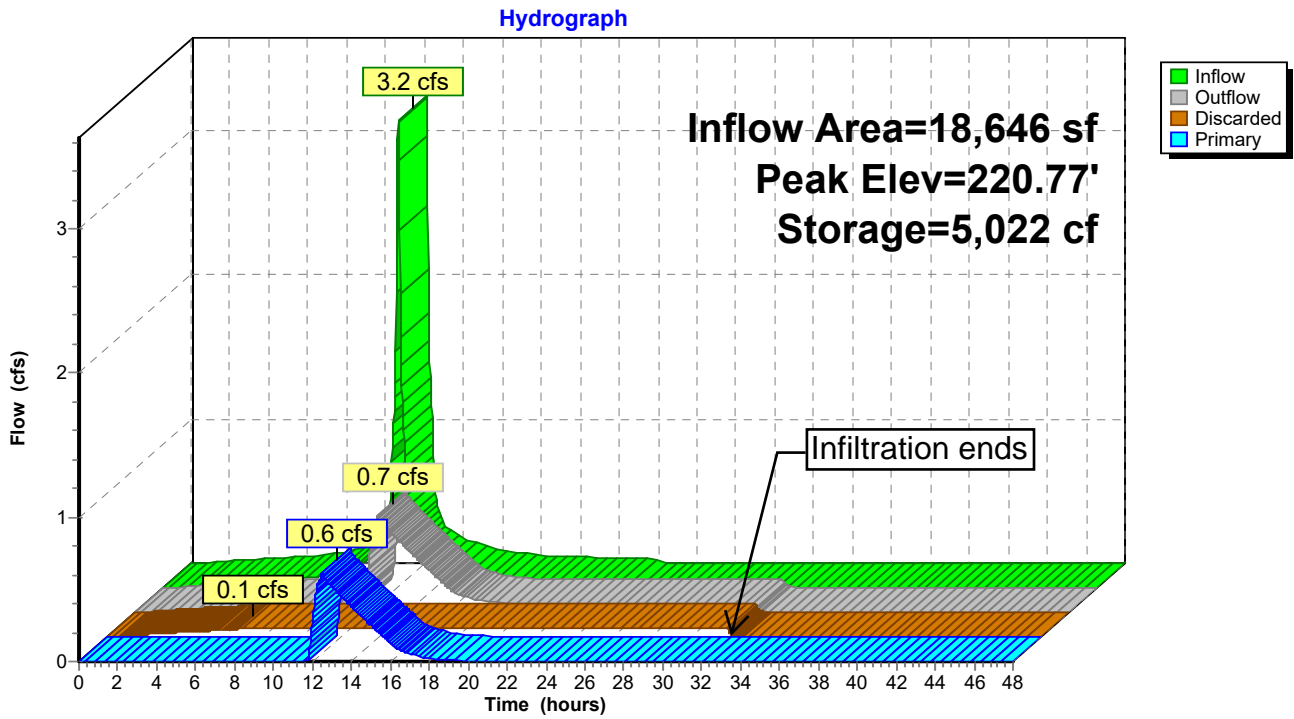
Material	Number of determinations	Specific yield		
		Maximum	Minimum	Average
Clay.....	15	5	0	2
Silt.....	16	19	3	8
Sandy clay.....	12	12	3	7
Fine sand.....	17	28	10	21
Medium sand.....	17	32	15	26
Coarse sand.....	17	35	20	27
Gravelly sand.....	15	35	20	25
Fine gravel.....	17	35	21	25
Medium gravel.....	14	26	13	23
Coarse gravel.....	14	26	12	22

INTRODUCTION

PURPOSE AND SCOPE

The purpose of this report is to assist hydrologists in estimating the quantity of water in storage in ground-water reservoirs by providing

Pond 1P: Subsurface Infiltration Basin





R LEVESQUE ASSOCIATES, INC.

40 School Street · Westfield, MA 01085

p 413.568.0985 · f 413.568.0986 · www.rlaland.com

Client: Himanshu Patel
Project: 506 Granby Road
Designed By: Mike Bowen Date: 1/7/2026
Checked By: Filipe Cravo, P.E. Date: 1/7/2026
RLA Project Number: 240926 Sheet: 1 of 1

Initial Thickness of Saturated Zone

Well Data

Well Date	Well #	Address	Distance from basin (ft)	Depth to bedrock (ft)	Ground Elevation (ft)	Bedrock Elevation (ft)
5/8/2022	109148	295 East St	1500	90	235	145
9/20/1996	311743	251 East St	1600	67	235	168
2/9/2004	126777	262 East St	1800	83	235	152
7/13/1989	311803	Pine Grove Condo #145	950	80	220	140
7/10/1989	311804	Pine Grove Condo #47	950	62	220	158

Saturated Zone Thickness Calcs

ESHGW (ft)	Avg. Bedrock Elevation (ft)	Sat. Zone Thickness (ft)
214.2	152.6	61.6



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 Hampshire County, Massachusetts, Central Part

506 Granby Road, South Hadley
MA



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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface	2
How Soil Surveys Are Made	5
Soil Map	8
Soil Map.....	9
Legend.....	10
Map Unit Legend.....	12
Map Unit Descriptions.....	12
Hampshire County, Massachusetts, Central Part.....	14
39A—Scarboro mucky fine sandy loam, 0 to 3 percent slopes.....	14
258A—Amostown fine sandy loam, 0 to 3 percent slopes.....	15
260A—Sudbury fine sandy loam, 0 to 3 percent slopes.....	16
397B—Wethersfield fine sandy loam, 3 to 8 percent slopes.....	18
398C—Wethersfield fine sandy loam, 8 to 15 percent slopes, very stony..	19
References	21

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

Custom Soil Resource Report

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

Custom Soil Resource Report

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

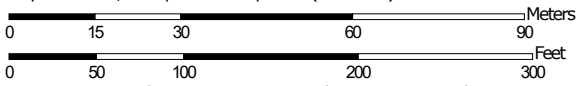
The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Soil Map may not be valid at this scale.


Map Scale: 1:1,320 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N 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 1:15,800.

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: Hampshire County, Massachusetts, Central Part
 Survey Area Data: Version 19, Aug 28, 2024

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

Date(s) aerial images were photographed: Oct 15, 2020—Oct 31, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

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
39A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	0.3	6.8%
258A	Amostown fine sandy loam, 0 to 3 percent slopes	0.4	10.1%
260A	Sudbury fine sandy loam, 0 to 3 percent slopes	2.8	71.3%
397B	Wethersfield fine sandy loam, 3 to 8 percent slopes	0.5	11.6%
398C	Wethersfield fine sandy loam, 8 to 15 percent slopes, very stony	0.0	0.1%
Totals for Area of Interest		3.9	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

Custom Soil Resource Report

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.

Hampshire County, Massachusetts, Central Part

39A—Scarboro mucky fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svky
Elevation: 0 to 1,320 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Scarboro

Setting

Landform: Drainageways, outwash deltas, outwash terraces, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy glaciofluvial deposits derived from schist and/or sandy glaciofluvial deposits derived from gneiss and/or sandy glaciofluvial deposits derived from granite

Typical profile

Oe - 0 to 3 inches: mucky peat
A - 3 to 11 inches: mucky fine sandy loam
Cg1 - 11 to 21 inches: sand
Cg2 - 21 to 65 inches: gravelly coarse sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (1.42 to 14.17 in/hr)
Depth to water table: About 0 to 2 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A/D
Ecological site: F144AY031MA - Very Wet Outwash
Hydric soil rating: Yes

Minor Components

Swansea

Percent of map unit: 10 percent
Landform: Bogs, swamps
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Wareham

Percent of map unit: 5 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Walpole

Percent of map unit: 5 percent
Landform: Deltas, depressions, outwash terraces, depressions, outwash plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

258A—Amostown fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 99z0
Elevation: 110 to 280 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Amostown and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Amostown

Setting

Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex

Custom Soil Resource Report

Parent material: Friable sandy glaciofluvial deposits over silty glaciolacustrine deposits

Typical profile

H1 - 0 to 7 inches: fine sandy loam

H2 - 7 to 32 inches: fine sandy loam

H3 - 32 to 60 inches: stratified very fine sand to silt loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)

Depth to water table: About 18 to 36 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: B

Ecological site: F145XY005MA - Moist Lake Plain

Hydric soil rating: No

Minor Components

Pollux

Percent of map unit: 15 percent

Hydric soil rating: No

Agawam

Percent of map unit: 10 percent

Hydric soil rating: No

260A—Sudbury fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9b1z

Elevation: 0 to 2,100 feet

Mean annual precipitation: 40 to 50 inches

Mean annual air temperature: 45 to 52 degrees F

Frost-free period: 140 to 240 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Sudbury and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sudbury

Setting

Landform: Outwash plains

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Concave

Parent material: Friable loamy eolian deposits over loose sandy glaciofluvial deposits

Typical profile

H1 - 0 to 10 inches: fine sandy loam

H2 - 10 to 16 inches: fine sandy loam

H3 - 16 to 28 inches: gravelly loamy sand

H4 - 28 to 60 inches: stratified gravelly sand to very gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)

Depth to water table: About 18 to 36 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: B

Ecological site: F144AY027MA - Moist Sandy Outwash

Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent

Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent

Hydric soil rating: No

Walpole

Percent of map unit: 5 percent

Landform: Terraces

Hydric soil rating: Yes

397B—Wethersfield fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9b26
Elevation: 100 to 440 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Wethersfield

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable coarse-loamy eolian deposits over firm loamy basal till derived from sandstone and shale

Typical profile

H1 - 0 to 9 inches: fine sandy loam
H2 - 9 to 16 inches: fine sandy loam
H3 - 16 to 23 inches: loam
H4 - 23 to 26 inches: gravelly loam
H5 - 26 to 60 inches: very gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 31 inches to densic material
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F145XY012CT - Well Drained Dense Till Uplands

Custom Soil Resource Report

Hydric soil rating: No

Minor Components

Ridgebury

Percent of map unit: 5 percent

Landform: Depressions

Hydric soil rating: Yes

Woodbridge

Percent of map unit: 5 percent

Hydric soil rating: No

Paxton

Percent of map unit: 5 percent

Hydric soil rating: No

398C—Wethersfield fine sandy loam, 8 to 15 percent slopes, very stony

Map Unit Setting

National map unit symbol: 9b2c

Elevation: 100 to 520 feet

Mean annual precipitation: 40 to 50 inches

Mean annual air temperature: 45 to 52 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Wethersfield and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wethersfield

Setting

Landform: Hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Friable coarse-loamy eolian deposits over firm loamy basal till derived from sandstone and shale

Typical profile

H1 - 0 to 9 inches: fine sandy loam

H2 - 9 to 16 inches: fine sandy loam

H3 - 16 to 23 inches: loam

H4 - 23 to 26 inches: gravelly loam

H5 - 26 to 60 inches: very gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent

Custom Soil Resource Report

Surface area covered with cobbles, stones or boulders: 2.0 percent
Depth to restrictive feature: 20 to 31 inches to densic material
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F145XY012CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Ridgebury

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

Woodbridge

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

Paxton

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

References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 1 Hole # 3-19-2025 Date 9 AM Time 40°F clear Weather _____ Latitude _____ Longitude

1. Land Use Paved parking lot (e.g., woodland, agricultural field, vacant lot, etc.) N/A Vegetation Pavement Surface Stones (e.g., cobbles, stones, boulders, etc.) 1-2 Slope (%)

Description of Location: _____

2. Soil Parent Material: _____ Landform Plain Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body >75 feet Drainage Way >75 feet Wetlands >50 feet
 Property Line >20 feet Drinking Water Well _____ feet Other _____ feet

4. Unsuitable Materials Present: Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock

5. Groundwater Observed: Yes No If yes: 46" Depth to Weeping in Hole 52" Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-2	Asphalt	-	-	-	Cnc : - Dpl: -	-	-	-	-	-	
2-36	fill	mixed	mixed	-	Cnc : - Dpl: -	-	20	10	massive	firm	gravel, stones, loam
36-130"	C	Fine sand	2.5Y 7/2	48"	Cnc : 10YR 5/4 Dpl: 10YR 6/1	10%	-	-	single grain	loose	Dense, varved heavy weeping note collapsing
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes: _____



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 2 3-19-2025 10 AM 50°F Sunny _____
Hole # Date Time Weather Latitude Longitude

1. Land Use paved parking lot NIA _____
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)

Description of Location: _____

2. Soil Parent Material: _____
Landform Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body >75 feet Drainage Way >75 feet Wetlands >75 feet
 Property Line >50 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock

5. Groundwater Observed: Yes No If yes: 46" Depth to Weeping in Hole _____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-3	Asphalt	-	-	-	Cnc : - Dpl: -	-	-	-	-	-	
3-14	Fill	-	varies	-	Cnc : - Dpl: -	-	20	10	massive	Firm	gravel, sand, stones
14-98"	C	very fine Sand	2.5Y 7/2	46"	Cnc : 10YR 5/6 Dpl: 7.5YR 6/2	30%	-	-	single grain	loose	Dense, varved hole collapsing heavy weeping
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 3 Hole # 3-19-2025 Date 11 AM Time 50°F Sunny Weather _____ Latitude _____ Longitude

1. Land Use Paved parking 10+ (e.g., woodland, agricultural field, vacant lot, etc.) N/A Vegetation Asphalt Surface Stones (e.g., cobbles, stones, boulders, etc.) 1-2 Slope (%)

Description of Location: _____

2. Soil Parent Material: _____ Landform Plain Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body >50 feet Drainage Way >50 feet Wetlands >50 feet
 Property Line >50 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock

5. Groundwater Observed: Yes No If yes: 62" Depth to Weeping in Hole _____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-3	Asphalt	-	-	-	Cnc : - Dpl: -	-	-	-	-	-	
3-17	Fill	mixed	varies	-	Cnc : - Dpl: -	-	25	10	massive	firm	gravel, sand, loam
17-117"	C	very fine sand	2.5Y 7/2	34"	Cnc : 10YR 5/6 Dpl: 10YR 6/1	20%	-	-	single grain	loose	Dense, varved hole collapsing heavy weeping
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes: _____



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 4 Hole # 3-19-2025 Date 1 PM Time 55°F Sunny Weather _____ Latitude _____ Longitude

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Sumac + Maple Vegetation _____ Surface Stones (e.g., cobbles, stones, boulders, etc.) 2-3 Slope (%)

Description of Location: _____

2. Soil Parent Material: _____ Landform Plain Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body >75 feet Drainage Way >50 feet Wetlands >50 feet
 Property Line >50 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock

5. Groundwater Observed: Yes No If yes: 38" Depth to Weeping in Hole _____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	LS	10YR 3/2	-	Cnc : Dpl:	-	-	-	granular	very friable	
8-16	Bw	LS	10YR 5/4	-	Cnc : Dpl:	-	-	-	massive	"	
16-110"	C	Very fine Sand	2.5Y 7/2	29"	Cnc : 10YR 5/6 Dpl:	15%	-	-	single grain	loose	Dense, hole collapsing varved, heavy weeping
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes: _____



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 5 3-19-2025 1:20 pm 60°F Sunny _____
Hole # Date Time Weather Latitude Longitude

1. Land Use woodland Sumac + Maple N/A _____
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, FS, TS, Plain) Plain

3. Distances from: Open Water Body >50 feet Drainage Way >50 feet Wetlands >50 feet
 Property Line >30 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock

5. Groundwater Observed: Yes No If yes: 40" Depth to Weeping in Hole _____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-16	A	LS	10YR 3/2	-	Cnc : - Dpl: -	-	-	-	granular	Very friable	
16-26	B _w	LS	10YR 5/4	-	Cnc : - Dpl: -	-	-	-	massive	II	
26-110"	C	Very fine Sand	2.5Y 7/2	36"	Cnc : 10YR 5/6 Dpl: -	20%	-	-	single grain	loose	varved, dense, hole collapsing, weeping
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes: _____



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 6 Hole # 3-19-2025 Date 1:45 pm Time 60°F Sunny Weather _____ Latitude _____ Longitude

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Sumac, maple Vegetation N/A Surface Stones (e.g., cobbles, stones, boulders, etc.) 1-2 Slope (%)

Description of Location: _____

2. Soil Parent Material: _____ Landform Plain Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body >75 feet Drainage Way >75 feet Wetlands >75 feet
 Property Line >20 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock

5. Groundwater Observed: Yes No If yes: 32" Depth to Weeping in Hole _____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	LS	10YR 3/2	-	Cnc : - Dpl: -	-	-	-	granular	very friable	
12-26	Bw	LS	10YR 5/4	-	Cnc : - Dpl: -	-	-	-	massive	"	
26-110"	C	very fine Sand	2.5Y 6/2	36"	Cnc : 10YR 5/6 Dpl: 10YR 6/1	25%	-	-	Single grain	loose	Dense, varved, heavy weeping, hole collapsing
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes: _____



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 7 Hole # 3-19-25 Date 2:15 pm Time 60°F Sunny Weather _____ Latitude _____ Longitude
 1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Red Maple Vegetation N/A Surface Stones (e.g., cobbles, stones, boulders, etc.) 1-2 Slope (%)

Description of Location: _____

2. Soil Parent Material: _____ Landform Plain Position on Landscape (SU, SH, BS, FS, TS, Plain) _____

3. Distances from: Open Water Body >100 feet Drainage Way >75 feet Wetlands >75 feet
 Property Line >20 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock

5. Groundwater Observed: Yes No If yes: 22" Depth to Weeping in Hole _____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10	A	LS	10YR 3/2	-	Cnc : - Dpl: -	-	-	-	granular	very friable	
10-23	Bw	LS	10YR 5/4	-	Cnc : - Dpl: -	-	-	-	massive	"	
23-110"	C	very fine sand	2.5Y 6/2	26"	Cnc : 10YR 5/4 Dpl: 10YR 6/1	20%	-	-	single grain	loose	Dense, varved, hole collapsing, heavy weeping
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes: _____



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 8 Hole # 3-19-2025 Date 2:30 pm Time 60°F Sunny Weather _____ Latitude _____ Longitude

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Red maple, dogwood Vegetation N/A Surface Stones (e.g., cobbles, stones, boulders, etc.) 1-2 Slope (%)

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, FS, TS, Plain) Plain

3. Distances from: Open Water Body >100 feet Drainage Way >75 feet Wetlands >75 feet
 Property Line >20 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock

5. Groundwater Observed: Yes No If yes: 24" Depth to Weeping in Hole _____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	LS	10YR 3/2	-	Cnc : Dpl:	-	-	-	granular	Very friable	
12-26	Bw	LS	10YR 5/4	-	Cnc : Dpl:	-	-	-	massive	"	
26-110"	C	Very fine Sand	2.5Y 6/2	26"	Cnc : 10YR 5/6 Dpl:	30%	-	-	Single grain	loose	Dense, varved, heavy weeping, hole collapsing
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes: _____



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 9 Hole # 3-19-2025 Date 3 pm Time 60°F Sunny Weather _____ Latitude _____ Longitude
 1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Maple Vegetation N/A Surface Stones (e.g., cobbles, stones, boulders, etc.) 2-3 Slope (%)

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, FS, TS, Plain) Plain

3. Distances from: Open Water Body >75 feet Drainage Way >75 feet Wetlands >75 feet
 Property Line >10 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock

5. Groundwater Observed: Yes No If yes: 44" Depth to Weeping in Hole _____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	LS	10YR 3/2	-	Cnc: - Dpl: -	-	-	-	granular	very friable	
12-22	Bw	LS	10YR 5/4	-	Cnc: - Dpl: -	-	-	-	massive	"	
22-100"+	C	very fine Sand	2.5Y 6/2	28"	Cnc: 10YR 5/6 Dpl: 10YR 6/1	30%	-	-	single grain	loose	Dense, varved, hole collapsing, heavy weeping
					Cnc: - Dpl: -						
					Cnc: - Dpl: -						
					Cnc: - Dpl: -						

Additional Notes: _____



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator
Ryan Nelson

Date
3/19/2025

Typed or Printed Name of Soil Evaluator / License #
Ryan Nelson
N/A

Expiration Date of License
6/30/2025

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Test pit locations GPS Surveyed by R Levesque Associates on 3/19/25