



SVE Associates

Engineering
Planning
Landscape Architecture
Surveying

October 24, 2022

Mr. Derek Helie
One Development & Construction, Inc.
68 Union St.
Westfield, MA 01085

RE: Soil Evaluation Data and Summary
NUPRO Industrial Project Development

Dear Mr. Helie:

On Friday October 14th, 2022, SVE conducted soil evaluation test pits within the locus properties (Map 168, Parcels 21 & 21.2) where the proposed infiltration basins are located. The objective of the soil evaluation test pits was to determine the estimated seasonal high-water table (ESHWT) elevation.

SITE CONDITIONS

The locus properties are located north off the northern side of Merrigan Way. The lots consist of open field, pavement, building foundation and other utilities that were part of the former Oxford Food Plant and old Highway Garage. The pickling vats, and existing buildings of the pickling plan and highway garage have been removed from the premises leaving behind pavement and an open gravelly field covered in weed growth. There is a small detention basin located at the western side of the field behind some brush with a small drainage swale located to the north. Blackstone/Sugarloaf Brook runs along the north-northwestern property line and cuts off access to South Main Street. The eastern side of the site is mostly covered by existing pavement that was the parking area for the pickling facility and access to the old highway garage. It was raining prior to the beginning of the soil evaluation test pits and became overcast during.

FINDINGS

SVE conducted an online review of the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS) soil data for the site prior to the soil evaluation. The results of the online review showed the site consisting approximately 4 different types of soil. The majority of the site is mapped as Agawam fine sandy loam series which is considered to be a decent medium for infiltration practices being in Hydrologic Soil Group of 'B' and well drained. The second largest mapped soil on the locus properties is Udorthents-Urban land complex series which is a well-drained series being in Hydrologic Soil Group 'A'. The third largest mapped area within the locus properties is Windsor loamy sand which is reported as excessively drained and within the Hydrologic Soil Group 'A'. The final mapped soil, which is a small area just south of Blacksmith/Sugarloaf Brook, is Ninigret fine sandy loam. Ninigret fine sandy loam is classified under the Hydrologic Soil Group 'C'.

During the soil evaluation SVE found that the ESHWT varies throughout the site. Test pits 1 & 2 were conducted to determine the ESHWT within the location of the proposed western infiltration basin. The two test pits were consistent with each having a horizon of gravelly loamy sand fill over a loamy sand

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horizon over a sand horizon over a fine sand horizon. Test pits 1 & 2 had signs of depletion and redox features within the gravelly loamy sand fill. It is SVE's opinion that these depletions and redox features are a result of the pickling factory emptying the brine from the tanks onto the soil during operation. SVE believes the actual ESHWT for test pit 1 is lower based on additional redox features found. In test pit 1 the ESHWT was found to be approximately 48" below grade and the ESHWT test pit 2 was found to be 60" below grade. Test pits 3 through 5 were conducted in the location of the proposed eastern/northerly infiltration basin. Test pit 3 was conducted in the southeastern area of the site. It was conducted off the edge of pavement south of the former highway garage building between the pavement and Merrigan Way. The soil horizons consisted of gravelly sandy loam over a fine sand horizon. Redox features were found around 36" below grade. Test pit 4 was conducted in the eastern part of site north of the pavement that leads to Jewett Ave. Test pit 4 soil horizons consisted of a loamy sand over a fine sand layer over a sand layer. Redox features were found in test pit 4 at a depth of 53" and the hole was abandoned at a depth of 84" due to the continuous collapsing during excavation. Test pit 5 was conducted in the existing pavement. There was a 3-1/2" layer of pavement over approximately 1-1/2' of gravel fill over fine sand horizon over a sand horizon. Redox features as well as moist soil was found at a depth of 70" below grade.

Table 1: Summary of ESHWT (Depth Below Grade)

Test Pit ID	Depth to ESHWT
1	48"
2	60"
3	36"
4	53"
5	70"

CONCLUSION

It is my professional opinion that the ESHWT varies throughout the site. The ESHWT for within the proposed western basin is approximately 48" below ground level. The ESHWT in the southeastern corner of the site is approximately 36" below ground level. Going north along the eastern side of the site, the ESHWT deepens to 70" below ground level within the parking area.

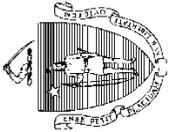
Sincerely,
SVE Associates



Mark Stadnicki, P.E.
Associate Engineer

Attached:

- MassDEP Form 11 sheets
- Test Pit Location Map
- USDA NRCS WSS Custom Soil Report



Commonwealth of Massachusetts
City/Town of Deerfield

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

A. Facility Information

NUPRO, LLC.
 Owner Name _____
 Off Merrigan Way _____ Map 168, Lot 21 & 21.1
 Street Address _____ Map/Lot # _____
 Deerfield _____ MA _____ 01373
 City _____ State _____ Zip Code _____

B. Site Information

1. (Check one) New Construction Upgrade

2. Soil Survey USDA NRCS WSS 255A, 275A, 276A, 656 Windsor loamy sand, Agawam fine sandy loam,
 Source Soil Map Unit Ninigret sandy loam, Udorthents-urban land complex
 Outwash Plains _____
 Landform Soil Limitations _____

3. Surficial Geological Report 2018, Stone & Digiacomo-Cohen Fine glacial stratified deposits
 Soil Parent material Year Published/Source Map Unit _____
very fine sand, silt and clay that occur as well-sorted, thin layers of alternating silt and clay (varves), or as thick layers of fine sand and silt. 1
 Description of Geologic Map Unit: _____

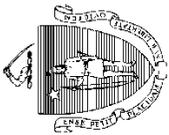
4. Flood Rate Insurance Map Within a regulatory floodway? Yes No

5. Within a velocity zone? Yes No

6. Within a Mapped Wetland Area? Yes No If yes, MassGIS Wetland Data Layer: _____
 Wetland Type Normal Below Normal

7. Current Water Resource Conditions (USGS): _____ Range: Above Normal Normal Below Normal
 Month/Day/ Year _____

8. Other references reviewed: _____
 (Zone II, IWPA, Zone A, EEA Data Portal, etc.) _____



**Commonwealth of Massachusetts
City/Town of Deerfield**

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 # 10/14/22 Date 10:15 Time Overcast Weather _____ Longitude
 _____ Latitude

1. Land Use Field wildflowers N.A. Slope (%)
 (e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.)
 Description of Location: _____
 Southwestern portion of the field where the pickling vats were located

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

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

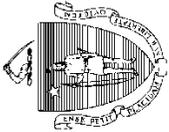
4. Unsuitable Materials Present: Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock

5. Groundwater Observed: Yes No If yes: _____ 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			
0-15	Fill	Gravelly Loamy Sand	10YR 3/4	Cnc : Dpl:			<50%	-	Granular	Very Weak	
15-20	B	Loamy Sand	10YR 3/4	Cnc : Dpl:			-	-	Granular	Very Weak	
20-28	C	Sand	10YR 5/8	Cnc : Dpl:			-	-	Granular	Very Weak	
28-82	C2	Fine Sand	10YR 5/3	Cnc :5YR 5/8 Dpl: 5Y 6/2	48"	10%	-	-	Granular	Very Weak	
				Cnc : Dpl:							
				Cnc : Dpl:							

Additional Notes:
 Depletions in 0-15" which is most likely due to dumping of brine from the pickling vats. Moist soil at 90"



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

D. Determination of High Groundwater Elevation

1. Method Used (Choose one):

Depth to soil redoximorphic features

Obs. Hole #1
48 inches

Obs. Hole #2
60 inches

Depth to observed standing water in observation hole

_____ inches

_____ inches

Depth to adjusted seasonal high groundwater (S_h)
(USGS methodology)

_____ inches

_____ inches

_____ Index Well Number _____ Reading Date

$$S_h = S_c - [S_r \times (OW_c - OW_{max}) / OW_r]$$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

Yes No

b. If yes, at what depth was it observed (exclude O, A, and E Horizons)?

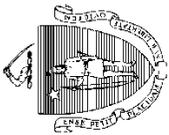
Upper boundary: _____ inches

Lower boundary: _____ inches

c. If no, at what depth was impervious material observed?

Upper boundary: _____ inches

Lower boundary: _____ inches



**Commonwealth of Massachusetts
City/Town of Deerfield**

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 # 10/14/22 Date 10:45 Time Overcast Weather <3% Longitude _____

1. Land Use Lawn grass Vegetation Pavement and foundation Latitude _____
 (e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) <3% Slope (%) _____

Description of Location: Lawn between the former highway garage and merrigan way

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

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

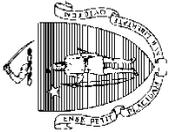
4. Unsuitable Materials Present: Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock

5. Groundwater Observed: Yes No If yes: _____ 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			
0-9	A	Gravelly Sandy Loam	10YR 3/4	Cnc : Dpl:			<30%	-	Granular	Very Weak	
9-58	C	Fine Sand	2.5Y 5/4	Cnc :2.5YR 4/8 Dpl: 2.5Y 6/1	<20%		-	-	Granular	Very Weak	
				Cnc : Dpl:							
				Cnc : Dpl:							
				Cnc : Dpl:							
				Cnc : Dpl:							

Additional Notes:



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

D. Determination of High Groundwater Elevation

1. Method Used (Choose one):

Depth to soil redoximorphic features

Depth to observed standing water in observation hole

Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)

Obs. Hole #1

36 inches

_____ inches

_____ inches

Obs. Hole #2

53 inches

_____ inches

_____ inches

_____ Index Well Number _____ Reading Date

$$S_h = S_c - [S_r \times (OW_c - OW_{max}) / OW_r]$$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

Yes No

b. If yes, at what depth was it observed (exclude O, A, and E Horizons)?

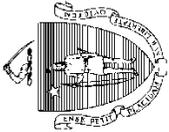
Upper boundary: _____ inches

Lower boundary: _____ inches

c. If no, at what depth was impervious material observed?

Upper boundary: _____ inches

Lower boundary: _____ inches



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 # 10/14/22 Date 1:30 Time Overcast Weather Latitude Longitude <3% Slope (%)

1. Land Use Pavement (e.g., woodland, agricultural field, vacant lot, etc.) N/A Vegetation Pavement Surface Stones (e.g., cobbles, stones, boulders, etc.) <3% Slope (%)

Description of Location: Middle of former parking lot for the pickling factory

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

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

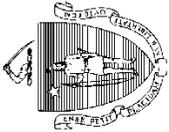
4. Unsuitable Materials Present: Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock

5. Groundwater Observed: Yes No If yes: _____ 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			
0-3.5	Pave	-	-	Cnc : Dpl:			-	-	-		
3.5-20	Gravel Fill			Cnc : Dpl:			-	-	-		
20-33	C	Fine Sand	2.5Y 5/4	Cnc : Dpl:			-	-	Granular	Weak	
33-84	C2	Sand	2.5Y 5/3	Cnc :10YR 6/8 Dpl: 5Y 6/2	70	10%	-	-	Granular	Weak	
				Cnc : Dpl:							
				Cnc : Dpl:							

Additional Notes:
Moist soil at 70"



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

D. Determination of High Groundwater Elevation

1. Method Used (Choose one):

Depth to soil redoximorphic features

Obs. Hole # 5
70 inches

Obs. Hole # _____
_____ inches

Depth to observed standing water in observation hole

_____ inches

Depth to adjusted seasonal high groundwater (S_h)
(USGS methodology)

_____ inches

Index Well Number _____ Reading Date _____

$$S_h = S_c - [S_r \times (OW_c - OW_{max}) / OW_r]$$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

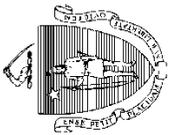
Yes No

b. If yes, at what depth was it observed (exclude O, A, and E Horizons)?

Upper boundary: _____ inches Lower boundary: _____ inches

c. If no, at what depth was impervious material observed?

Upper boundary: _____ inches Lower boundary: _____ inches



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

Mark Stadnicki SE# 13884

Typed or Printed Name of Soil Evaluator / License #

10/14/22

Date

6/30/25

Expiration Date of License

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:



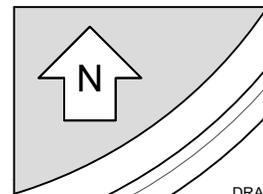
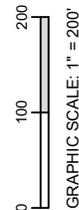
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**TEST PIT
LOCATION MAP**

NUPRO INDUSTRIAL
PROJECT DEVELOPMENT



PROJ. #:
G2073

DATE:
14-OCT-22

DRAWN: MJS

SHEET
1 / 1



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 **Franklin County, Massachusetts**



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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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.

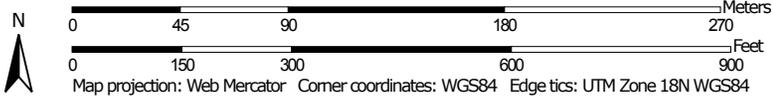
Soil Map

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



Map Scale: 1:3,130 if printed on A landscape (11" x 8.5") sheet.



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 1:12,000.

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: Franklin County, Massachusetts
 Survey Area Data: Version 12, Oct 6, 2017

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

Date(s) aerial images were photographed: Sep 29, 2013—Oct 16, 2016

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
255A	Windsor loamy sand, 0 to 3 percent slopes	3.0	11.6%
255C	Windsor loamy sand, 8 to 15 percent slopes	0.0	0.0%
256A	Deerfield loamy sand, 0 to 3 percent slopes	2.8	10.9%
275A	Agawam fine sandy loam, 0 to 3 percent slopes	10.9	41.8%
276A	Ninigret fine sandy loam, 0 to 3 percent slopes	5.9	22.8%
656	Udorthents-Urban land complex	3.3	12.8%
Totals for Area of Interest		26.0	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.

Franklin County, Massachusetts

255A—Windsor loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svkg

Elevation: 0 to 990 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Windsor, loamy sand, and similar soils: 85 percent

Minor components: 15 percent

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

Description of Windsor, Loamy Sand

Setting

Landform: Deltas, dunes, outwash plains, outwash terraces

Landform position (three-dimensional): Riser, tread

Down-slope shape: Linear, convex

Across-slope shape: Linear, convex

Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

O - 0 to 1 inches: moderately decomposed plant material

A - 1 to 3 inches: loamy sand

Bw - 3 to 25 inches: loamy sand

C - 25 to 65 inches: sand

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Excessively drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water storage in profile: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2s

Hydrologic Soil Group: A

Hydric soil rating: No

Minor Components

Deerfield, loamy sand

Percent of map unit: 10 percent
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hinckley, loamy sand

Percent of map unit: 5 percent
Landform: Deltas, eskers, kames, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

255C—Windsor loamy sand, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2svkq
Elevation: 0 to 1,260 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Windsor

Setting

Landform: — error in exists on —
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, riser
Down-slope shape: Convex
Across-slope shape: Convex, linear
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material

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Ap - 1 to 11 inches: loamy sand
Bw - 11 to 31 inches: loamy sand
C - 31 to 65 inches: sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

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

Minor Components

Hinckley

Percent of map unit: 10 percent
Landform: Deltas, eskers, kames, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Deerfield

Percent of map unit: 5 percent
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

256A—Deerfield loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9c6w
Elevation: 40 to 990 feet
Mean annual precipitation: 37 to 52 inches
Mean annual air temperature: 35 to 59 degrees F

Custom Soil Resource Report

Frost-free period: 127 to 182 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Deerfield and similar soils: 90 percent

Minor components: 10 percent

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

Description of Deerfield

Setting

Landform: Deltas, outwash plains, terraces

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Tread, talf

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Stratified sandy glaciofluvial deposits

Typical profile

Ap - 0 to 9 inches: loamy sand

Bw1 - 9 to 15 inches: loamy sand

Bw2 - 15 to 19 inches: loamy sand

BC - 19 to 27 inches: sand

C - 27 to 65 inches: sand

Properties and qualities

Slope: 0 to 3 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 high to very high (0.60 to 20.00 in/hr)

Depth to water table: About 13 to 17 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: A/D

Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 5 percent

Landform: Outwash plains, terraces

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread, rise

Down-slope shape: Convex

Across-slope shape: Convex

Hydric soil rating: No

Sudbury

Percent of map unit: 2 percent

Landform: Deltas, outwash plains, terraces

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Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Walpole

Percent of map unit: 2 percent
Landform: Deltas, outwash plains, outwash terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 1 percent
Landform: Deltas, outwash plains, outwash terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

275A—Agawam fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tyqw
Elevation: 0 to 1,040 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: All areas are prime farmland

Map Unit Composition

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

Description of Agawam

Setting

Landform: Kames, kame terraces, outwash plains, outwash terraces, moraines
Landform position (two-dimensional): Backslope, shoulder, footslope, summit
Landform position (three-dimensional): Side slope, crest, tread, riser, rise, dip
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from gneiss, granite, schist, and/or phyllite

Custom Soil Resource Report

Typical profile

Ap - 0 to 11 inches: fine sandy loam
Bw1 - 11 to 16 inches: fine sandy loam
Bw2 - 16 to 26 inches: fine sandy loam
2C1 - 26 to 39 inches: loamy fine sand
2C2 - 39 to 55 inches: loamy fine sand
2C3 - 55 to 65 inches: loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 15 to 35 inches to strongly contrasting textural stratification
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.4 inches)

Interpretive groups

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

Minor Components

Ninigret

Percent of map unit: 5 percent
Landform: Terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Windsor

Percent of map unit: 4 percent
Landform: Deltas, dunes, outwash plains, outwash terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Walpole

Percent of map unit: 3 percent
Landform: Deltas, depressions, depressions, outwash plains, outwash terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Hinckley

Percent of map unit: 3 percent
Landform: Deltas, eskers, kames, outwash plains

Custom Soil Resource Report

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise

Down-slope shape: Convex

Across-slope shape: Convex, linear

Hydric soil rating: No

276A—Ninigret fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tyr6

Elevation: 0 to 1,250 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: All areas are prime farmland

Map Unit Composition

Ninigret and similar soils: 85 percent

Minor components: 15 percent

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

Description of Ninigret

Setting

Landform: Depressions, kames, kame terraces, outwash plains, outwash terraces, drainageways, moraines

Landform position (two-dimensional): Backslope, shoulder, footslope, summit

Landform position (three-dimensional): Side slope, crest, tread, dip, rise

Down-slope shape: Concave, convex, linear

Across-slope shape: Concave, convex

Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from gneiss, granite, schist, and/or phyllite

Typical profile

Ap - 0 to 8 inches: fine sandy loam

Bw1 - 8 to 16 inches: fine sandy loam

Bw2 - 16 to 26 inches: fine sandy loam

2C - 26 to 65 inches: stratified loamy sand to loamy fine sand

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: 18 to 38 inches to strongly contrasting textural stratification

Natural drainage class: Moderately well drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)

Depth to water table: About 17 to 39 inches

Frequency of flooding: None

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Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.4 inches)

Interpretive groups

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

Minor Components

Deerfield

Percent of map unit: 5 percent
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Agawam

Percent of map unit: 5 percent
Landform: Kames, kame terraces, outwash plains, outwash terraces, moraines
Landform position (two-dimensional): Backslope, shoulder, footslope, summit
Landform position (three-dimensional): Side slope, crest, tread, riser, rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Deltas, dunes, outwash plains, outwash terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

656—Udorthents-Urban land complex

Map Unit Setting

National map unit symbol: 9c8s
Elevation: 100 to 1,670 feet
Mean annual precipitation: 37 to 53 inches
Mean annual air temperature: 33 to 59 degrees F
Frost-free period: 127 to 182 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 50 percent
Urban land: 45 percent

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Minor components: 5 percent

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

Description of Udorthents

Setting

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Talf

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Human reworked till and/or alluvium and/or glaciofluvial deposits

Typical profile

^A - 0 to 6 inches: fine sandy loam

^C1 - 6 to 23 inches: stratified loamy very fine sand to fine sandy loam

^C2 - 23 to 42 inches: stratified loamy very fine sand to fine sandy loam

^C3 - 42 to 46 inches: fine sand

^C4 - 46 to 65 inches: loamy fine sand

Properties and qualities

Slope: 0 to 15 percent

Percent of area covered with surface fragments: 0.0 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): Moderately high to very high (0.60 to 20.00 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 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4s

Hydrologic Soil Group: A

Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 5 percent

Landform: Outwash plains, terraces

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread, rise

Down-slope shape: Convex

Across-slope shape: Convex

Hydric soil rating: No

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