



United States Department of Agriculture

Natural Resources Conservation Service
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August 22nd, 2016

Mr. Ebrahim Masalehdan
Westford Gateway LLC
31 Progress Avenue
Tyngsborough, MA 01879

RECEIVED
AUG 30 2016
PERMITTING

Mr. Masalehdan:

On July 22nd, Maggie Payne, NRCS Resource Soil Scientist, visited 66-68 Boston Road, Westford to provide an on-site soil investigation as requested. She provided the attached report regarding the soil of the property based upon several "hand dug" test pits.

I prepared two map images of the property to base the comments I provide. One of the photos was taken in the spring of 2013 and the other early summer of 2016. The image from 2013 was taken prior to spring leaf out and at greater resolution than the 2016 image.

I created 5 arbitrary areas upon the image to reference several comments. The areas loosely resemble areas on the image that show management activity on the property the past few years.

Areas 2, 3, 4 consist primarily of Charlton soils (Ch) as referenced in the July 27th report by Maggie Payne. These areas have acceptable soil characteristics for annually tilled crop production. These areas will require a "modest" amount of field preparation to establish an agricultural crop. The land will require tillage (plowing and disking) to incorporate present vegetation, compost and other organic material on the soil surface. As this land has been managed as orchards for many years, it is likely that some surface stones will be exposed during the process. "Rock picking", the removal of surface stones in fields may be necessary. This is generally completed by hand, but specialized machinery is available to complete this task.

A soil test should be analyzed to determine the present nutrient status and pH of the soil. The soil analysis will provide crop specific agronomic recommendations for future crop production. The University of Massachusetts soil testing lab provides numerous soil services for crop production, <http://soiltest.umass.edu/>

Area 1 consists primarily of Udorthents – gravel (Ug) as referenced in the July 27th report by Maggie Payne. This soil description refers to areas that have been greatly manipulated or created by human activity. The area has approximately 12 inches of compost and organic material spread on top of a compacted gravelly soil material. It may require an extensive amount of field preparation to prepare the area for any type of agricultural operation. Annually tilled crops may not be possible in this area because of the limited top soil and compacted gravel subsoil.

Blueberries, cane berries and other small fruit may be possible with further manipulation and augmentation of the soil. Deep tillage (often using a bulldozer and ripper tooth) or other specialized tillage equipment may be needed to loosen the compacted gravel prior to plowing to incorporate the organic material on the soil surface. The organic material is a mixture of compost, mulch materials and coarse woody material and will be difficult to incorporate into the soil surface with one action. Multiple tillage or plowing actions will be needed in addition to "rock picking."

Area 5 consists primarily of Charlton soils – very stony (ChS) as referenced in the July 27th report by Maggie Payne. The area has remnants of landscape fabric used beneath potted flowers in recent years. There is sparse, weedy vegetation and many stones and cobbles on the soil surface. The potential for annually tilled crop production is limited because of the apparent limited top soil in some of the area. With the incorporation of additional organic matter or addition of acceptable topsoil, the area may be able to produce fruit and berry crops in the future. The presence of large stones and boulders affects the tillage options as well as crop growth potential of the soil.

An alternative means of assessing the potential for this area is to till and "rock pick" the area followed by the establishment of a suitable "cover crop." Assessing the growth of the cover crop will provide information of the productive capacity of the area. Areas of shallow soil or droughty patches will generally be observable in the plant response.

In Summary, Areas 2, 3, 4 have the greatest likelihood of annual crop production. Areas 1 and 5 will require greater effort to prepare the land for any type of agricultural production, but longer term crops will generally be better adapted to the site with corresponding management inputs.



Dan Lenthall

District Conservationist – NRCS
Westford, MA

United States Department of Agriculture



Natural Resources Conservation Service
15 Cranberry Highway
West Wareham, MA 02576
Phone: 508-295-5151x2 Fax: 855-896-7671



Helping People Help the Land...

To: Dan Lenthall, District Conservationist

Date: 7/22/2016

Subject: Onsite soils investigation at 66-68 Boston Road in Westford, MA

Purpose: An onsite soils investigation was requested at the property at 66-68 Boston Road in Westford to determine the current soil types and agricultural potential and limitations to the soils.

Participants: Maggie Payne, Resource Soil Scientist, NRCS
Dan Lenthall, District Conservationist, Westford, NRCS
Liz McGuire, Conservation Planner, MACD

Onsite Procedure: The soils were observed onsite through hand dug shovel pits. Soil descriptions were made at the test sites and a detailed soil map of the area was made based on soil observations and landscape patterns.

Results and Discussion: This approximately 8 acre property was planted as an orchard in the past. Beginning in the year 2000, portions of the orchard were removed and covered in plastic to grow potted plants. The section behind the building was stripped of sand and gravel and used as parking, storage for compost material, and greenhouse structures (see photos below of land use changes).



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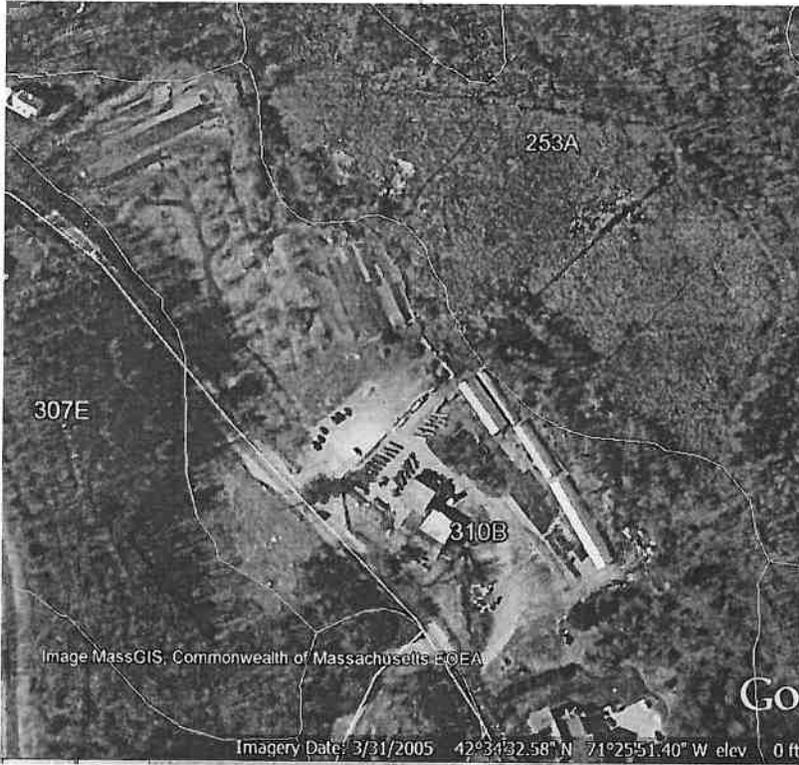
1995

The Natural Resources Conservation Service provides leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment.

An Equal Opportunity Provider and Employer



2003



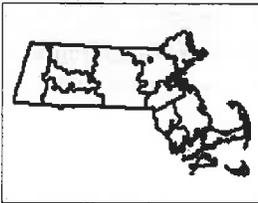
2005



2010

This entire property is mapped as 310B; Woodbridge fine sandy loam, 3-8% slopes in the Middlesex County Soil Survey, published in 2009. This soil survey was mapped at a scale of 1:25,000 with minimum delineations of 6-8 acres. Woodbridge soils are moderately well drained loamy soils formed in lodgment till. They have a dense soil layer within 100 cm of the soil surface. Woodbridge fine sandy loam 3-8% slopes is listed as a prime farmland soil for Middlesex County.

This onsite soils investigation showed the majority of the soils to be closer to the Charlton soil series as no dense layer was observed at the depths investigated. The soil map below indicates the observation points and the soil types observed onsite. This map represents a detailed onsite soil investigation and does not replace the official soil survey data for the county.



Legend

- ◆ Sample points
- 1m_contours
- Soil types



1:1,761

Created: 7/27/2016

Mapunit	acres	MU_symbol
Charlton soils, 8% slope	2.4	Ch
Charlton soils, very stony	2.1	ChS
Leicester soils, 3% slopes	0.6	Le
Udorthents - gravel	2	Ug
Urban land	1.3	Ub

Soil descriptions:

Ub – Urban land (1.3 acres) - This area is dominated by the building and parking lots and soils were not investigated here.

Ug – Udorthents – gravel (2 acres) - Point 294

This area was reportedly mined for sand and gravel. Historic aerial photography shows that it has been used for parking and storage of composting material. Approximately 12 inches (30 cm) of human transported material consisting of partially decomposed mulch and compost has been spread on the soil surface. This material would be considered a loamy sand with added organic material. It contains a large amount of undecomposed wood fragments and approximately 5% medium gravel. Below this layer is a very gravelly, firm, loamy sand soil with approximately 40% medium to coarse gravel and cobbles.

This soil would be considered limiting to agriculture due to the shallow depth (12 inches) to a root and water limiting layer as well as the very gravelly texture of the subsoil.



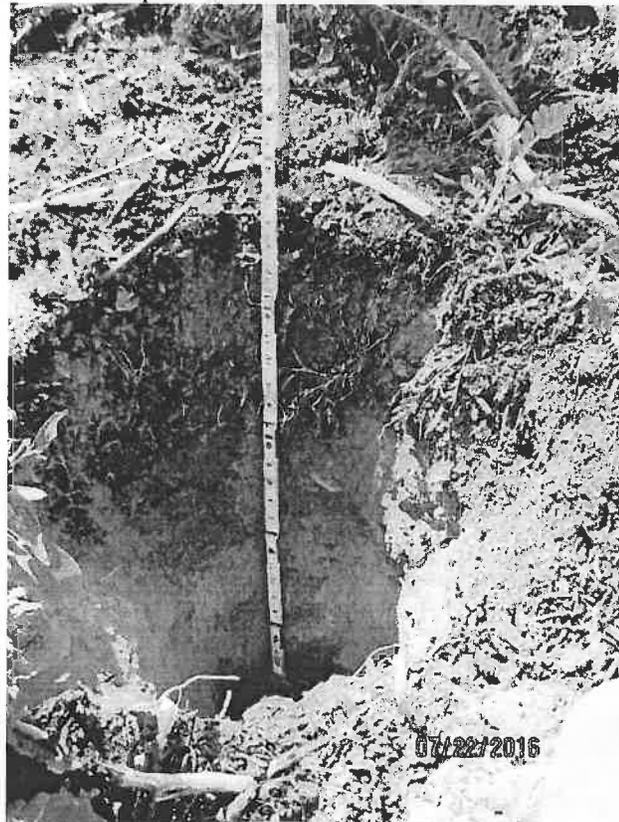
Date 7/22/2016 Described By: M. Payne Location: Site ID: wpt 294

Horizon			Texture		Matrix color	Redoximorphic Features					Structure			Consistence	other notes
Name	Depth (in)	Bndry	Class	% CF	Hue, Value/ Chroma	Type	Abundance	Size	Contrast	Color	Grade	Size	Shape (Type)		
^Ap	0-12	abrupt	sl	20% wood fragments; 5% gravel (1/2 to 1 inch)	10YR 3/2	-	-	-	-	-	0	-	MA	friable	common fine roots
Bw	12-21+		ls	40% subrounded gravel (1-8 inches)	2.5Y 4/3	-	-	-	-	-	0	-	MA	firm	

Ch: Charlton soils (2.4 acres) - Point 295

Charlton soils consist of loamy, well-drained soils formed in glacial till. This area consists of approximately 7 inches (18 cm) of human transported material from partially decomposed mulch and compost loamy sand material spread on the soil surface. The natural soils surface to approximately 14 inches (35 cm) is firm in place indicative of man-made compaction. The layer below this, down to 19 inches (48 cm) consists of fine sandy loam soil textures with a small fraction (5-10%) gravels. Beginning at 19 inches (48 cm), the subsoil is gravelly, friable, fine sandy loam.

Charlton soils are considered prime and important farmland soils in Middlesex County. The slope at this site is approximately 8%, making the risk of erosion due to slope the only limitation for farmland soil in this map unit.



Date: 7/22/2016 Described By: M. Payne Location: Site ID: wpt 295

Horizon			Texture		Matrix color	Redoximorphic Features					Structure			Consistence	other notes
Name	Depth (in)	Bndry	Class	% CF	Hue, Value/ Chroma	Type	Abundance	Size	Contrast	Color	Grade	Size	Shape (Type)		
^Ap	0-7	abrupt	ls	30% coarse woody debris	10YR 3/2	-	-	-	-	-	0	-	MA	friable	common fine roots
Ap	7-14	clear	fsl	5% fine and med gravel	10YR 3/2	-	-	-	-	-	1	-	SBK	firm in place	
Bw	14-19	clear	fsl	8% med and coarse gravel	10YR 5/6	-	-	-	-	-	1	-	SBK	friable	
C	19-28+		fsl	20% med and coarse gravel	10YR 5/4	-	-	-	-	-	0	-	SG	friable	

ChS: Charlton soils – very stony (2.1 acres) - Point 296

The shoulder slopes consists of soils similar to those in the area mapped as Charlton, but the soils in this area lack the finer surface texture. The very stony soil surface and high percentage of gravel and cobbles in the soil make this soil limiting to agriculture. It appears that past land use has caused erosion of the soil surface, leaving a shallow, rocky soil. These areas also contain some large exposed boulders and possible bedrock that would be indications of inclusions of Chatfield and Hollis soils.



Date 7/22/2016 Described By: M. Payne Location: Site ID: wpt 296

Horizon			Texture		Matrix color	Redoximorphic Features					Structure			Consistence	other notes
Name	Depth (in)	Bndry	Class	% CF	Hue, Value/ Chroma	Type	Abundance	Size	Contrast	Color	Grade	Size	Shape (Type)		
Ap	0-9	abrupt	fsl	15% gravel	10YR 3/3	-	-	-	-	-	0	-	SG	friable	common fine roots
				40% subrounded gravel and cobble (1-10")											
Bw	9-12+		fsl		10YR 5/6	-	-	-	-	-	0	-	SG	friable	

Le: Leicester soils (0.6 acres) - Point 297

These poorly drained soils formed in coarse-loamy till are found in the low-lying positions of the landscape. Evidence of the high water table was observed at 10 inches (25 cm). These soils have a fine sandy loam texture and lack the significant amount of gravel of the other soils on this site.

These soils can be well suited for agriculture, limited only by wetness during the spring.

Date 7/22/2016 Described By: M. Payne Location: Site ID: wpt 297

Horizon			Texture		Matrix color	Redoximorphic Features					Structure			Consistence
Name	Depth (in)	Bndry	Class	% CF	Hue, Value/ Chroma	Type	Abundance	Size	Contrast	Color	Grade	Size	Shape (Type)	
Ap1	0-10	clear	fsl		10YR 3/2	-	-	-	-	-	1	fine	SBK	friable
Ap2	10-19	clear	fsl		10YR 3/1	conc	5%	med	-	7.5YR 4/6	1	med	SBK	friable
Bw	19-21+		fsl	5% gravel	2.5Y 5/3	conc	10%	med	-	7.5YR 4/6	1	med	SBK	friable

Submitted 7/27/2016
 by
 Maggie Payne
 Resource Soil Scientist
 NRCS
 West Wareham, MA

66 - 68 Boston Road
(2016 image)

Date: 8/15/2016

Customer(s): Ebi Masalehdan



Field Office: Westford Service Center
Agency: USDA - NRCS
Assisted By: DANIEL LENTHALL

Approximate Acres: 8.5



Legend

-  Area 5
-  Area 4
-  Area 3
-  Area 2
-  Area 1
-  66-68 Boston Road

NE_EAWS_4B_2016

RGB

-  Red: Band_1
-  Green: Band_2
-  Blue: Band_3



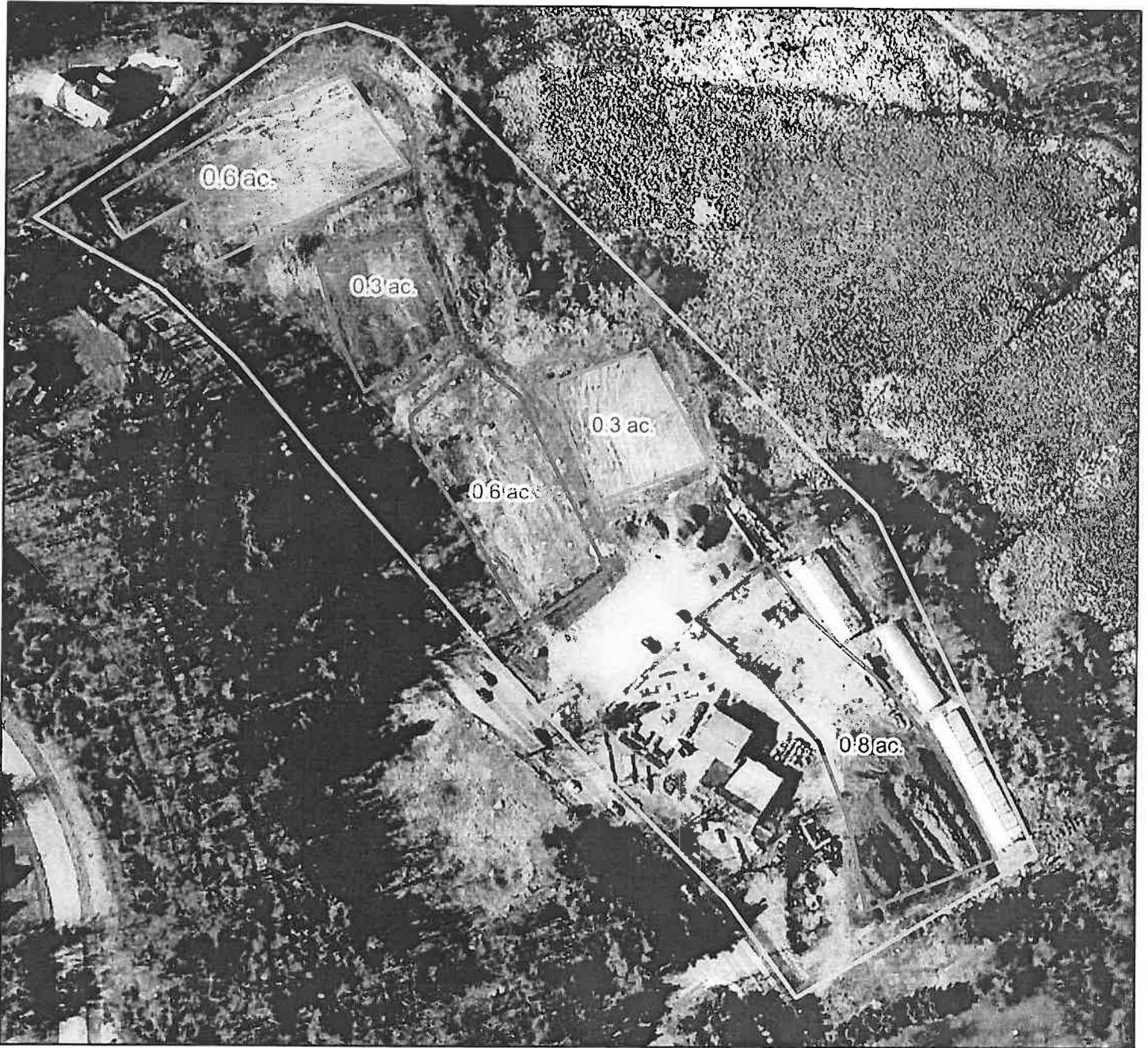
66 - 68 Boston Road
(2013 image)

Date: 8/15/2016

Customer(s): Ebi Masalehdan

Field Office: Westford Service Center
Agency: USDA - NRCS
Assisted By: DANIEL LENTHALL

Approximate Acres: 8.5



Legend

- Area 5
- Area 4
- Area 3
- Area 2
- Area 1
- 66-68 Boston Road
- MA Towns

