On-Site Soils Investigation

Buttermilk Way Storm water Treatment Project – Buzzards Bay. MA

February 28th, 2012

Glenn Stanisewski, Resource Soil Scientist, USDA-NRCS, West Wareham, MA

Introduction: The purpose of this on-site visit was to evaluate the soil at two predetermined locations for the installation of a subsurface storm water treatment system at Taylor Point in the town of Buzzards Bay. Currently untreated storm water runoff is entering Onset Bay and Butler Cove resulting in the closing of shellfish beds.

Participants: Bernie Taber – Soil Conservationist, NRCS West Wareham Service Center, and Glenn Stanisewski – Resource Soil Scientist, NRCS West Wareham Service Center.

Evaluation: The investigation involved describing the soil profile at the two desired locations to a depth of 65 inches (Figure 1). The town of Buzzards Bay Public Works department excavated the soil pits to a depth of six feet using a backhoe (Figure 2).

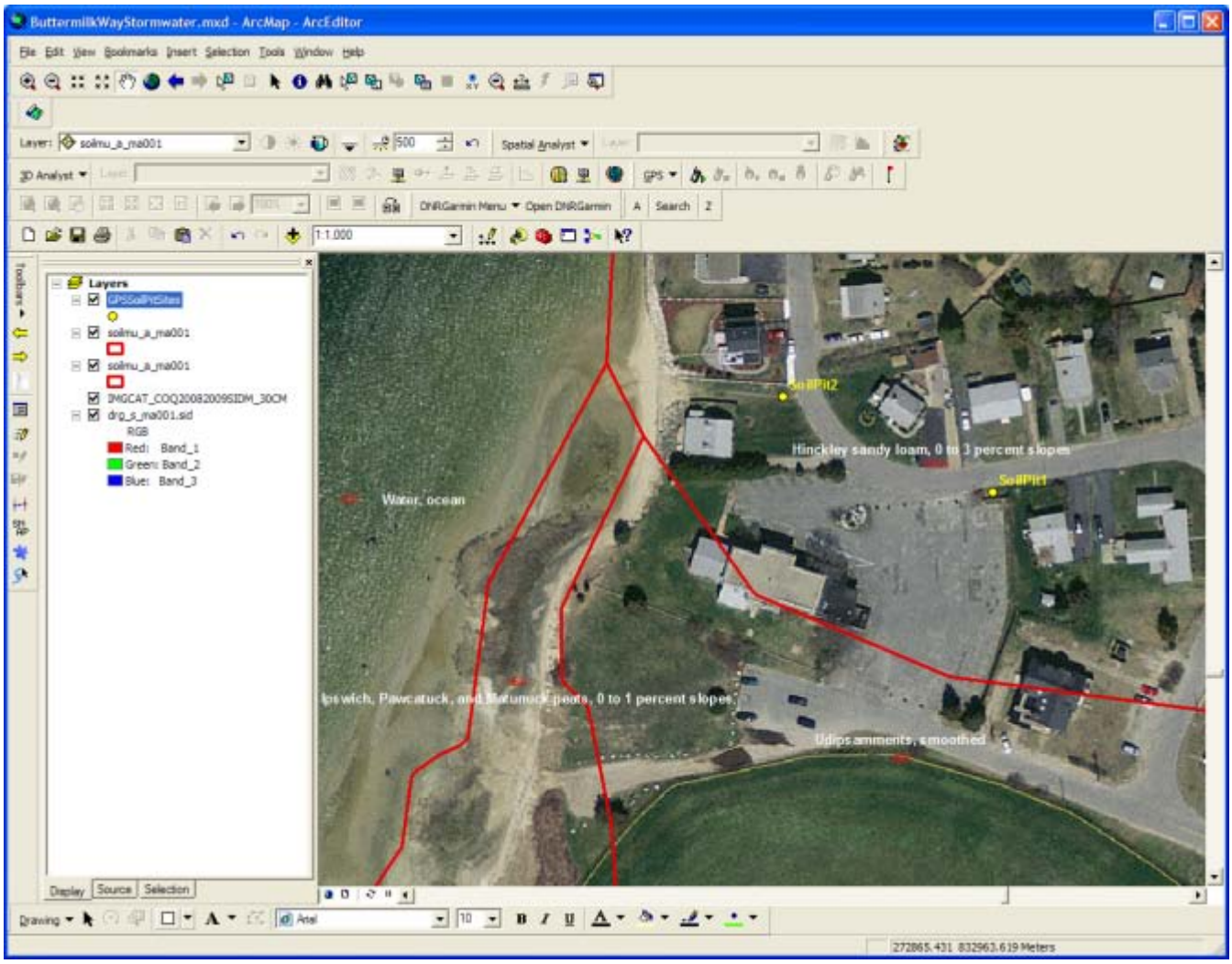

Figure 1: GPS locations of soil pits (yellow dots).

Figure 2: Soil pit #1 backhoe trench.

Results:

Soil Pit #1 – GPS Point 131 – Sandy Fill material over a Carver loamy coarse sand natural soil

Soil Survey Mapunit: 245A – Hinckley sandy loam, 0 to 3 percent slopes

Soil Parent Material: Glacial Till _____ Glacial Outwash___X____ Alluvium_____ Eolian _____

Outwash _____ Lacustrine_____ Fill____X____ Organic _____

Landform: Ridge _____ Terrace ___X_____ Esker _____ Moraine _____
Drumlin _____ Depression _____ Swale _____ Drainageway _____
Floodplain _____ Dune _____Kame ____X___ Upland _____

Slope Shape: Convex _____ Concave_____ Linear___X____ Undulating_____

Slope Gradient (%): ___1_____ **Elevation:** ___18 ft._____

GPS WP & Coordinates: WP131: 41.743 N Lat. 70.623 W Long.

Depth	Horizon	Color	Texture	Consistence	Structure	RMF's	% Rock Frags. by Volume
0-9"	^A1	10YR 2/2 – Very dark grayish brown	Loamy sand	Loose	Weak fine & medium granular	n/a	n/a
9-14"	^A2	10YR 2/2 – Very dark grayish brown	Loamy sand	Loose	Weak fine granular	n/a	n/a
14-19"	^Bw	10YR 4/4 – Yellowish brown	Coarse sandy loam	Very friable	Weak fine subangular blocky	n/a	n/a
19-26"	Ab	10YR 3/1 – Very dark gray	Loamy coarse sand	Loose	Single grain	n/a	n/a
26-28"	Eb	10YR 6/1 – Gray	Coarse sand	Loose	Single grain	n/a	n/a
28-36"	Bwb	7.5YR 4/4 – Brown	Sand	Loose	Single grain	n/a	n/a
36-50"	C1b	10YR 5/4 – Yellowish brown	Sand	Loose	Single grain	n/a	n/a
50-65"	C2b	10YR 5/4 – Yellowish brown	Gravelly sand	Loose	Single grain	n/a	15% gravel

Additional Notes (% surface stones, rock outcrop, etc.): Standing water observed in the trench at 65 inches from the surface. There is approximately 1.5 ft. of sandy fill over a loamy coarse sand Carver soil type.

Figure 3: Soil pit #1 profile showing ^A1, ^A2, ^Bw, Ab, Eb, and Bwb horizons (top to bottom) separated by tees.

Soil Pit #2 - GPS Point 132 – Thin layer of fill material over a Hinckley loamy sand soil

Soil Survey Mapunit: 245A – Hinckley sandy loam, 0 to 3 percent slopes

Soil Parent Material: Glacial Till _____ Glacial Outwash___X____ Alluvium_____ Eolian _____

Outwash _____ Lacustrine_____ Fill___X____ Organic _____

Landform: Ridge _____ Terrace ___X_____ Esker _____ Moraine _____
Drumlin _____ Depression _____ Swale _____ Drainageway _____
Floodplain _____ Dune _____Kame ____X___ Upland _____

Slope Shape: Convex _____ Concave_____ Linear_ ___X___ Undulating_____

Slope Gradient (%): ___0-1_____ **Elevation:** ___18 ft._____

GPS WP & Coordinates: WP132: 41.743 N Lat. 71.6234 W Long.

Depth	Horizon	Color	Texture	Consistence	Structure	RMF's	% Rock Frags. by Volume
0 – 3"	^A	10YR 3/2 – Very dark grayish brown	Loamy sand	Loose	Single grain	n/a	n/a
3 – 5"	^M	Black	Impermeable Asphalt	Rigid	Massive	n/a	n/a
5 – 7"	^C	10YR 4/4 – Yellowish brown	Gravelly sand (road base)	Loose	Single grain	n/a	15% fine gravel
7 – 12"	A	10YR 3/2 – Very dark grayish brown	Loamy sand	Loose	Single grain	n/a	5% fine gravel
12 – 16"	AE	10YR 4/2 – Dark Grayish Brown	Sand	Loose	Single grain	n/a	5% fine gravel
16 – 36"	Bhs	7.5YR 4/4 – Brown & 5 YR 3/4 – Dark Reddish Brown	Very Gravelly Sand	Loose	Single grain	n/a	35% gravel
36 – 53"	C1	7.5YR 4/4 – Brown	Very Gravelly Coarse Sand	Loose	Single grain	n/a	45% gravel
53 – 65"	C2	10YR 6/4 – Light yellowish brown	Sand	Loose	Single grain	n/a	5% fine gravel

Additional Notes (% surface stones, rock outcrop, etc.): Saturation observed in trench at 89 inches from surface. Bhs horizon had many, prominent, fine, medium, and coarse 5YR 3/4 masses of iron accumulation.

Figure 6: Soil pit#2 profile showing ^A, ^M, ^C, A, AE, Bhs, C1 and C2 horizons (top to bottom) separated by tees.

Figure 7: Close up of Soil Pit site #2 showing fill material (^A, ^M, ^C horizons) separated by tees.

Discussion: The soil described at Site #1 had between 1.5 feet and 2.0 feet of sandy fill material over a natural sandy glacial outwash soil known as Carver. The fill material is associated with the construction of the Massachusetts Maritime Academy's Capt. Charles Hurley library and parking lot which included a lot of land leveling in addition to the fill material (mapped as 665 – Udipsamments, smoothed in the soil survey report).

There were no indications of a seasonal high water table in soil pit #1 to a depth of 65 inches. Saturation was observed in the trench at a depth of 65 inches. Like the Carver soil, this soil is Excessively well drained with a Soil Hydrologic Group A designation.

The soil described at Site #2 was on the town's Right of Way (Beach Way) which is a public access point to the bay and a small beach area. The soil profile had a very thin layer of fill material (seven inches thick) that is associated with the construction of a paved walk way leading down to the beach. In recent years adjoining private landowners had installed sod over the asphalt covering it up (Figure 7).

There were no indications of a seasonal high water table in soil pit #2 to a depth of 65 inches. Saturation was observed in the trench at a depth of 89 inches. The natural soil profile had a subsurface Bhs horizon (at 16 -36 inches) that showed masses of iron accumulation consistent with spodic soil development. The natural soil profile fit the description of the Hinckley soil series that was identified on the soil survey map (mapunit 245A). Hinckley is an Excessively well drained sandy and gravelly glacial outwash soil with a Soil Hydrologic Group A designation.

Summary and Conclusions: Based on this on-site investigation there were no indicators of a seasonal high water table within the upper five feet for either soil pit sites. There appears to be no water table limitations for the installation of a subsurface storm water treatment system.

Additional Attachments

1. Soil Pit Location Map

2. Copies of original soil data sheets

Buttermilk Way Stormwater Project - Buzzards Bay, MA

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W E
S

Legend

- GPSSoilPitSites
- Barnstable County Soil Survey

On-Site Soils Description

Date: 10/28/2012 **Describer:** Glenn Stanisewski

Location: Buttermilk Way Soil Test Pit #2

Soil Survey Soil Mapunit: 245A - Hinckley sandy loam, 0 to 3% slopes

Soil Parent Material: Glacial Till _____ Glacial Outwash ✓ Alluvium _____ Eolian _____
Outwash _____ Lacustrine _____ Fill ✓ Organic _____

Landform: Ridge _____ Terrace ✓ Esker _____ Moraine _____
Drumlin _____ Depression _____ Swale _____ Drainageway _____
Floodplain _____ Dune _____ Kame ✓ Upland _____

Slope Shape: Convex _____ Concave _____ Linear ✓ Undulating _____

Slope Gradient (%): 0-1% **Elevation:** Approx. 18'

GPS WP & Coordinates: WP 132 - 41.743° N lat. 70.6234° W long.

Depth	Horizon	Color	Texture	Consistence	Structure	RMF's	% Rock Frags. by Volume
0-3"	A	10YR 3/2	ls	loose	single gr.	n/a	n/a
3-5"	M	black		Impermeable	Asphalt massive, rigid		
5-7"	C	10YR 4/4	gr-s	loose Road base	single gr.	n/a	15% fine gravel
7-12"	A	10YR 3/2	ls	loose	single gr	n/a	5% fine gr
12-16"	AE	10YR 4/2	sand	loose	single gr	n/a	5% fine gr
16-36"	Bhs	5YR 3/4 7.5YR 4/4	vgr-s	loose	single gr.	n/a	35% gravel
36-53"	C1	7.5YR 4/4	vgr-cos	loose	single gr.	n/a	45% gravel
53-65"	C2	10YR 6/4	sand	loose	single gr.	n/a	5% fine gravel

Additional Notes (% surface stones, rock outcrop, etc.):

Approx. 7"-8" of fill material over a buried Hinckley soil.

Saturation observed @ 89"

Bsb - iron coatings on sand grains & bridges

Bhs - 7.5YR 4/4 with many fine and medium 5YR 3/4 prominent masses of iron accumulation

On-Site Soils Description

Date: 02/28/2012 **Describer:** Glenn Stanisewski

Location: Buttermilk Way, Bourne MA

Soil Survey Soil Mapunit: 245A Hinckley sandy loam, 0 to 3% slopes

Soil Parent Material: Glacial Till _____ Glacial Outwash ✓ Alluvium _____ Eolian _____

Outwash _____ Lacustrine _____ Fill ✓ Organic _____

Landform: Ridge _____ Terrace ✓ Esker _____ Moraine _____

Drumlin _____ Depression _____ Swale _____ Drainageway _____

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Slope Shape: Convex _____ Concave _____ Linear ✓ Undulating _____

Slope Gradient (%): 0 - 1% **Elevation:** Approx. 18'

GPS WP & Coordinates: WP131 - 41.743°N Lat. 70.623°W Long.

Depth	Horizon	Color	Texture	Consistence	Structure	RMF's	% Rock Frags. by Volume
0-9"	Ap A1	10YR 2/2	ls	loose	weak fine & med. gr.	n/a	n/a
9-14"	Ap A2	10YR 2/2	ls	loose	weak fine gran.	n/a	n/a
14-19"	Bw	10YR 4/4	co s l	v. friable	weak fine blky.	n/a	n/a
19-26"	Ab	10YR 3/1	l cos	loose	single grain	n/a	n/a
26-28"	Eb	10YR 6/1	cos	loose	single grain	n/a	n/a
28-36"	Bwb	7.5YR 4/4	med sand	loose	single grain	n/a	n/a
36"-50"	C1b	10YR 5/4	sand	loose	single gr.	n/a	n/a
50-65"	C2b	10YR 5/4	gr-s	loose	single gr.	n/a	15%

Additional Notes (% surface stones, rock outcrop, etc.):

Approx. 1'/2 ft. of sandy fill material over a buried Carver soil.

Saturation & standing water @ 5'5". 12/5/60

65" from surface.