
Law,
Policy, &
Standards


Production


Collection

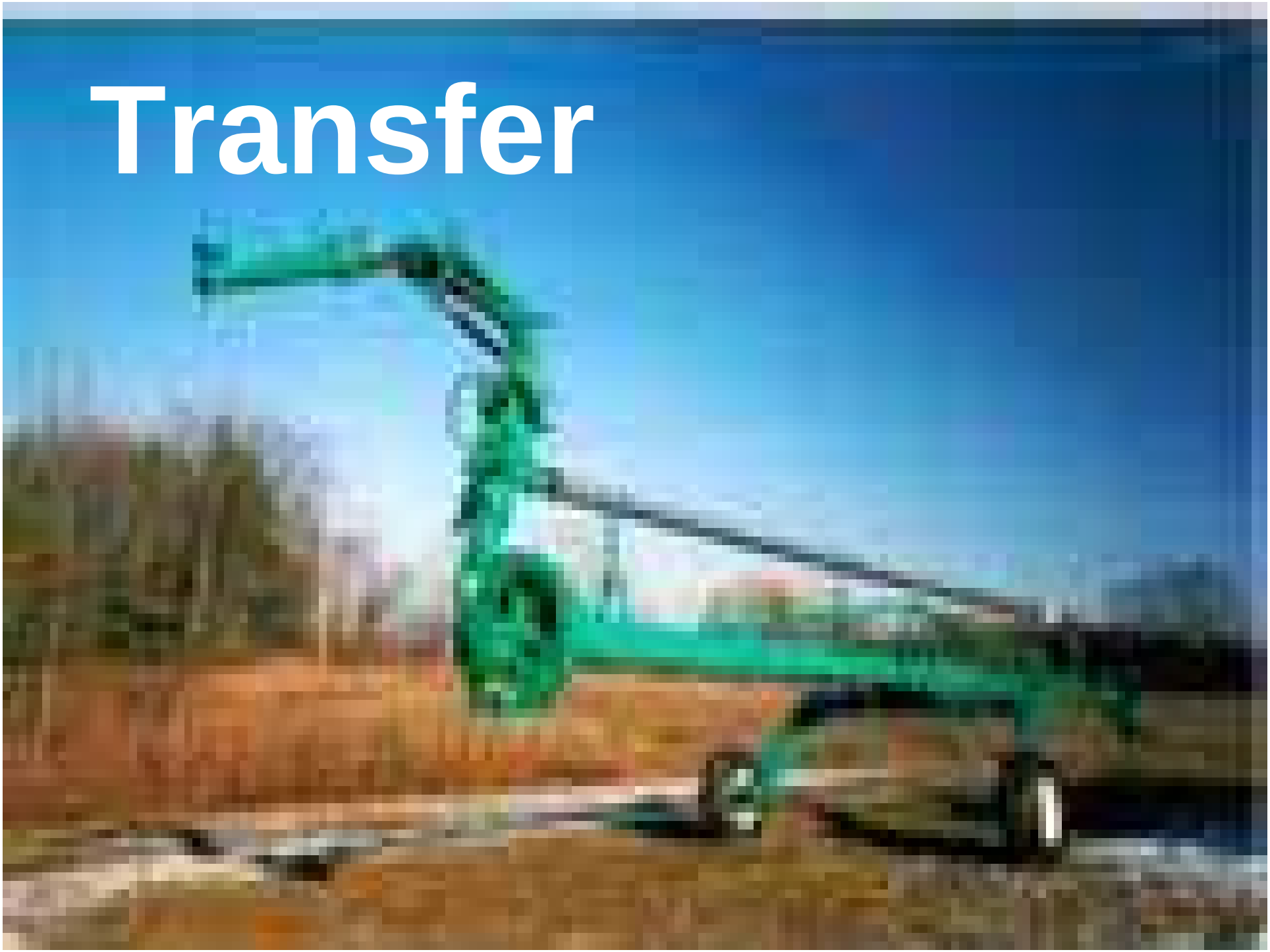

Collection

Storage


Storage

Treatment

Transfer




Transfer

Transfer

Utilization

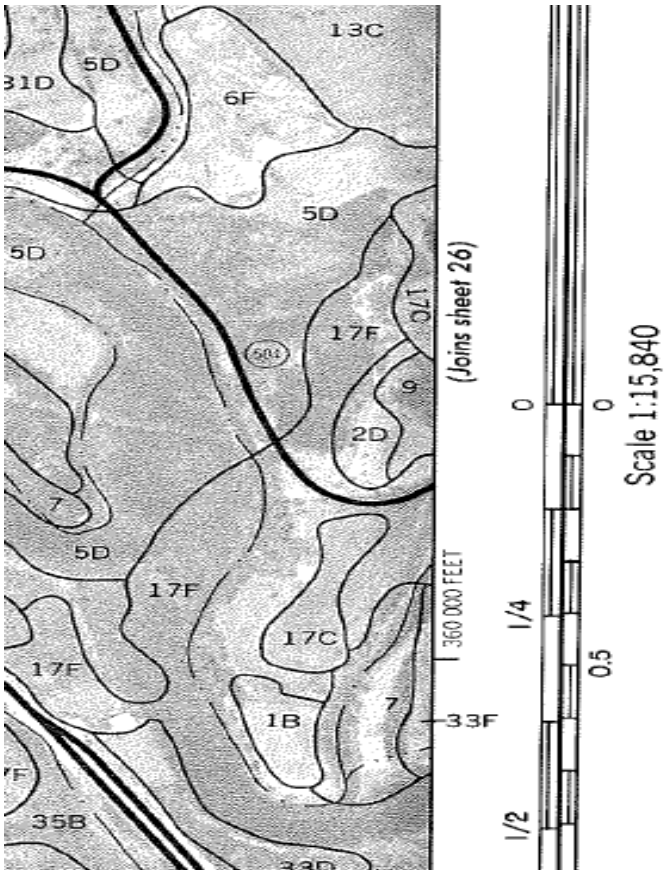
USDA NRCS Conservation Practice Standard

Waste Storage Facility
Section IV Code 313-VA-1

On-Site Soils Evaluation

By: J. C. Freyman, Soil Resource Specialist
For: ICE Training 2008

Soil Survey is a General Planning Tool

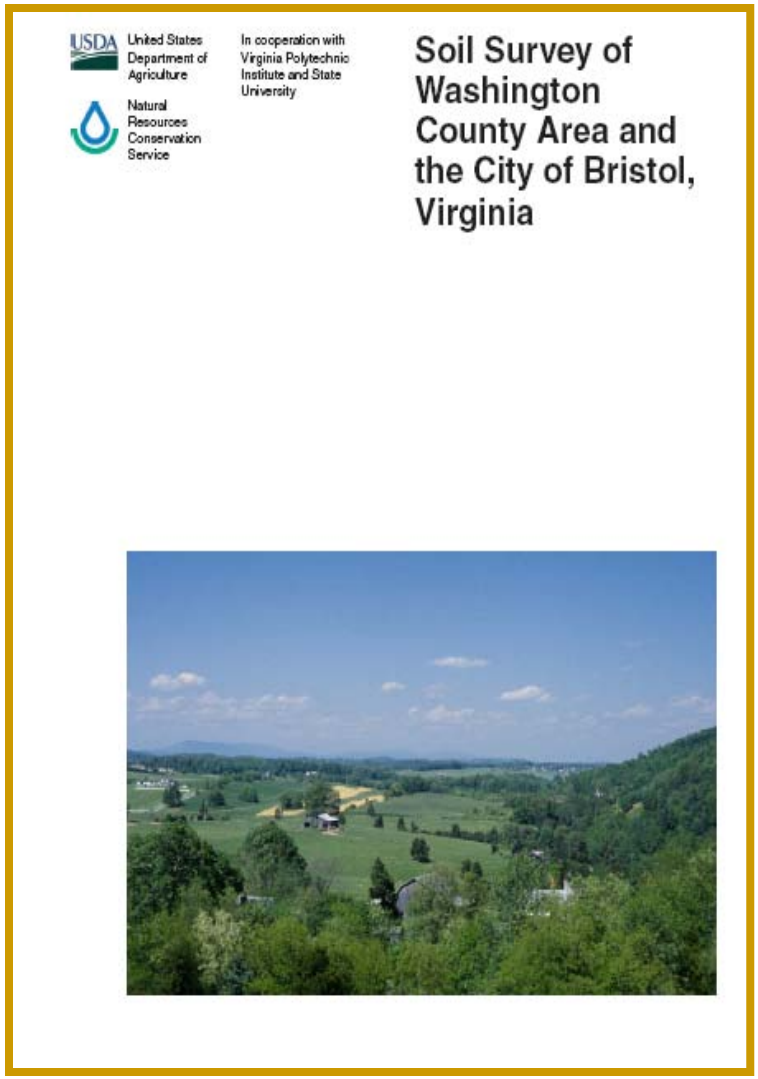


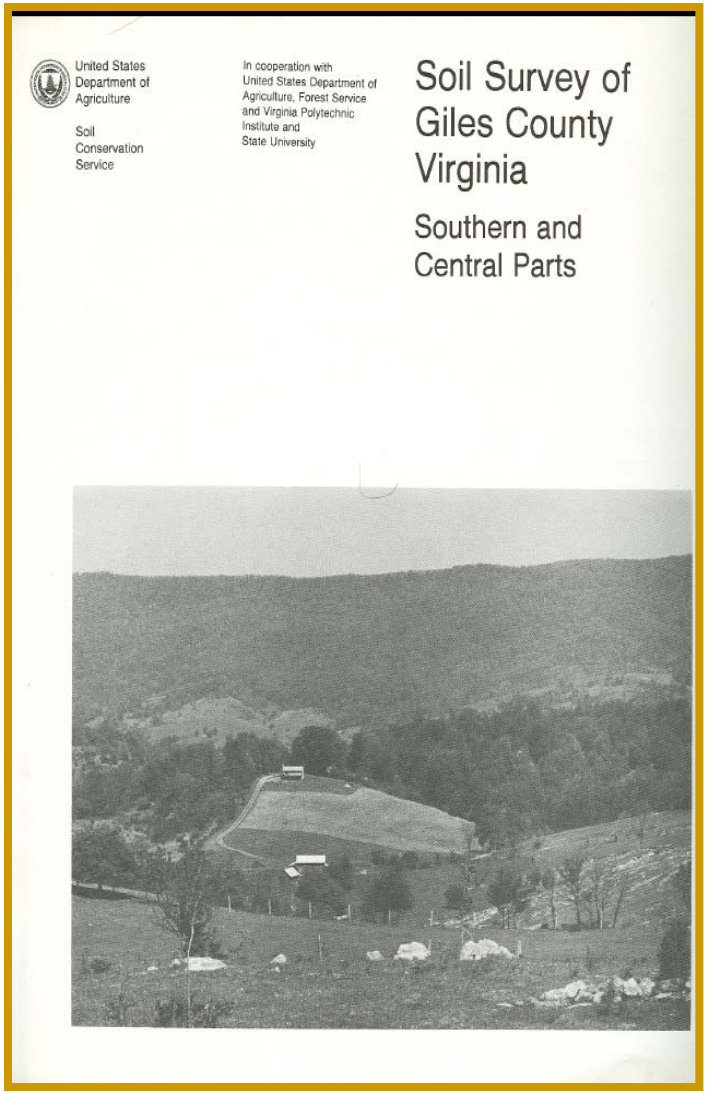
The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation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

Where is General Soils Knowledge?

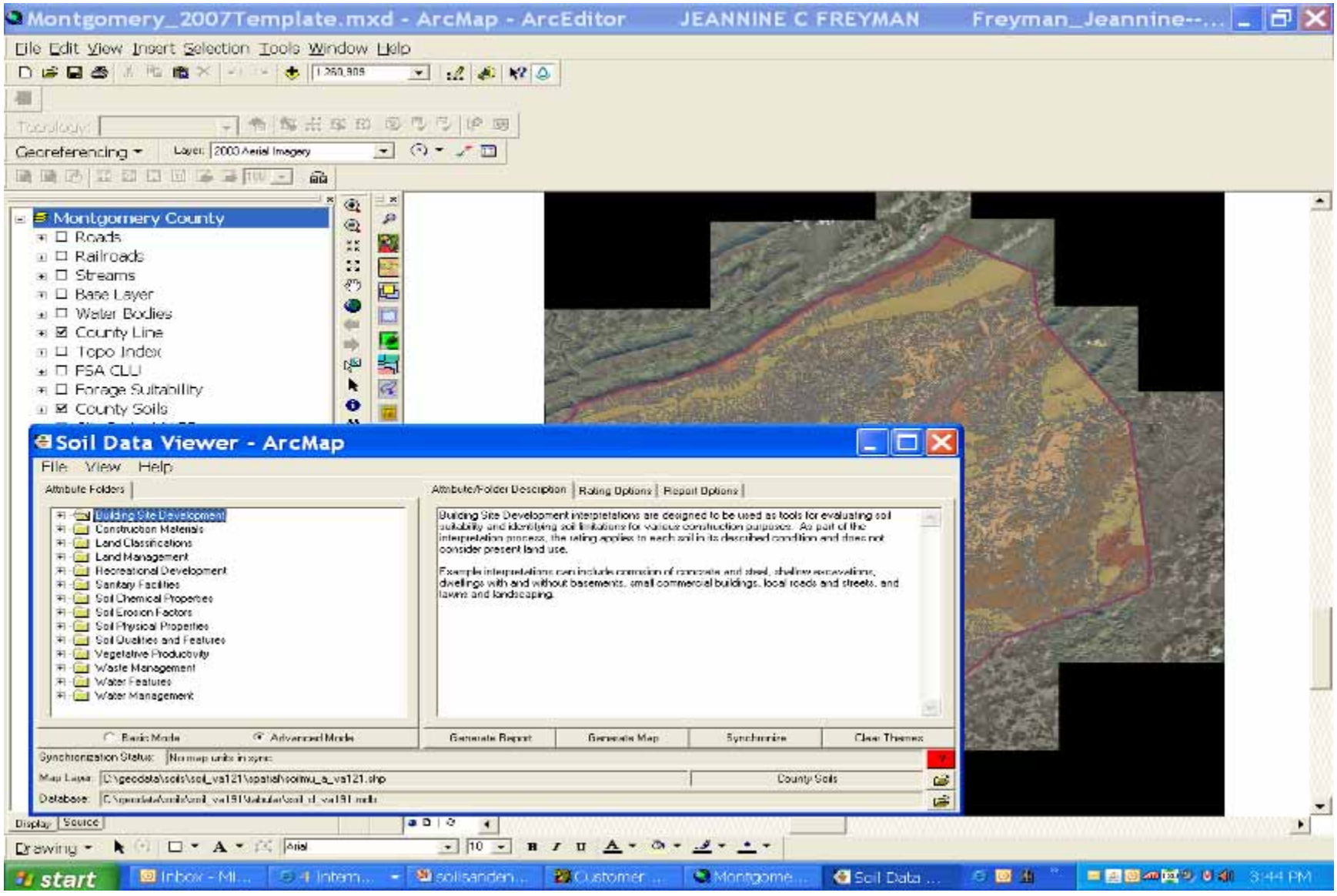
- Soil Survey Manuscripts
  (Paper Publication or CD Copy)
- GIS (Toolkit – Soil Data Viewer)
- Web (Web soil Survey)

Soil Survey Manuscripts





GIS – Toolkit and Soil Data Viewer



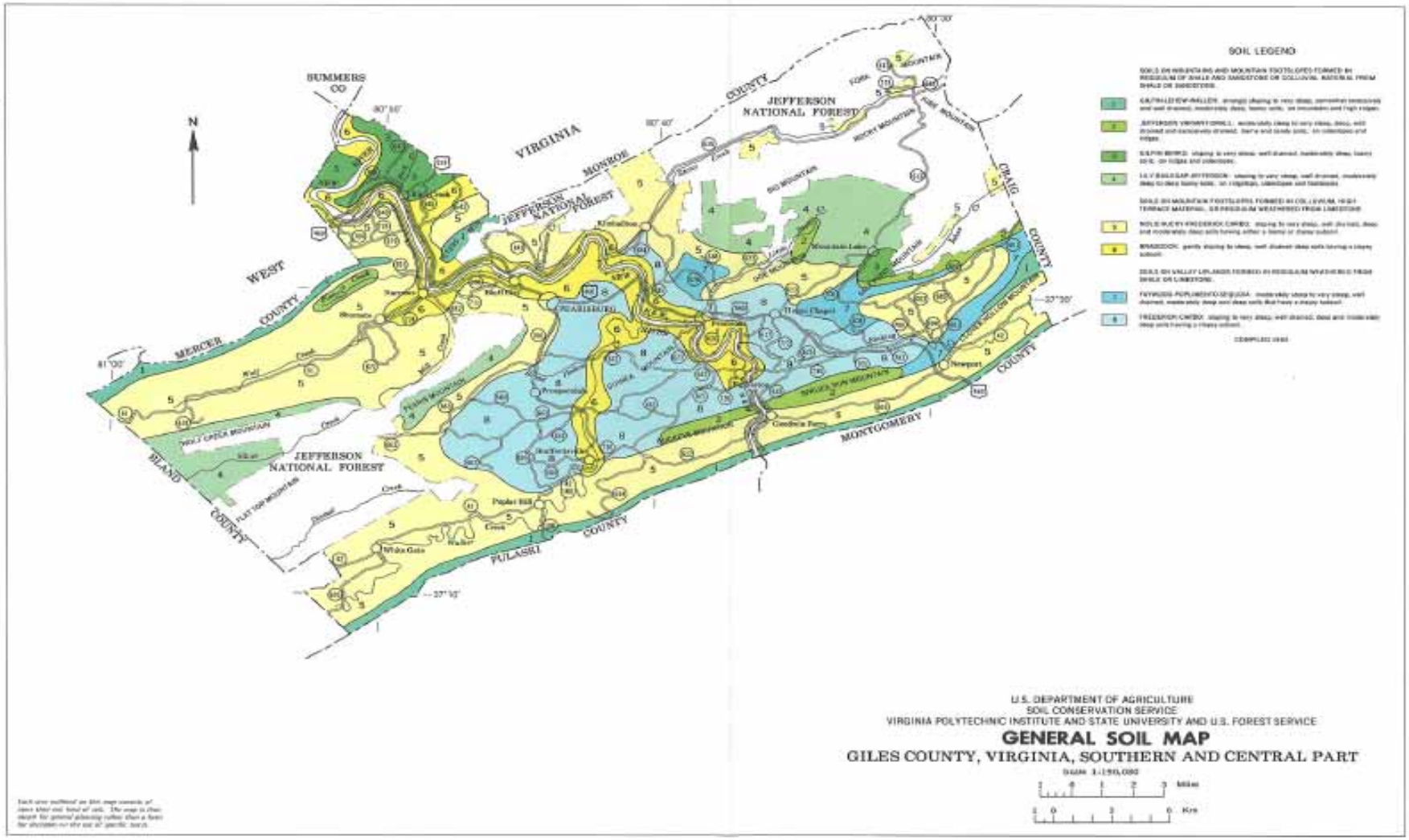
Web Soil Survey

http://websoilsurvey.nrcs.usda.gov/app/

What should the Conservation Planner know?

- General Soils Map
- Map Unit descriptions
- Specific interpretation tables

General Soil Map



General Soil Map Unit Description

8. Frederick-Carbo

Gently sloping to very steep, well drained, very deep or moderately deep soils with a clayey subsoil; on limestone uplands

This unit makes up about 24 percent of the survey area. It is mostly on rolling or hilly uplands dissected by dendritic drainageways. Sinkholes are common throughout the unit.

Gently sloping to steep Frederick soils make up about 65 percent of the unit. They formed in the weathered products of limestone, dolomite, or interbedded sandstone and dolomite and are very deep to bedrock. Most areas have stones on the surface.

Gently sloping to very steep Carbo soils make up about 10 percent of the unit. They formed in the weathered products of limestone and are moderately deep to bedrock. The Carbo soils are dotted by small areas of rock outcrop, and many areas are covered by a dense growth of eastern red-cedar.

Minor soils make up about 25 percent of the unit. They consist of very deep, well drained Allegheny, Chavies Variant, Chagrin, and Timberville Variant soils, all on terraces and flood plains.

Most of this map unit is farmed or used for nonfarm development. Some areas still are wooded and are too steep, too stony, or too rocky for other uses. The Frederick soils with slopes of less than 25 percent are suited to cultivated crops such as corn. The areas with slopes of more than 25 percent are used for hay and pasture and are suited to those uses. Most areas of Carbo soils that have been cleared are used for pasture where it is practical to use farm machinery.

Slope, low strength, and permeability limit the Frederick soils for nonfarm use. Slow permeability, a high shrink-swell potential, low strength, and the depth to bedrock limit the Carbo soils for nonfarm use. The erosion hazard is very severe in disturbed areas and areas with no plant cover.

Detailed Soil Map Units

Carbo Series

The soils of the Carbo series are moderately deep and well drained. They formed in the weathered products of argillaceous limestone. The soils are on upland areas characterized by numerous limestone outcrops and sinkholes. Slopes range from 2 to 65 percent.

Carbo soils commonly are near Frederick and Timberville Variant soils. The Carbo soils are not as deep to bedrock as and have a thinner solum than the Frederick soils and have more clay in the subsoil than the Timberville Variant soils.

Typical pedon of Carbo silty clay loam, in an area of Carbo-Rock outcrop complex, 25 to 65 percent slopes, 1.25 miles east of the intersection of VA Routes 608 and 777, on VA Route 608:

Ap—0 to 5 inches; brown (7.5YR 4/4) silty clay loam; moderate fine granular structure; friable, sticky, slightly plastic; many fine roots; neutral; clear smooth boundary.

Bt1—5 to 15 inches; strong brown (7.5YR 5/6) clay; moderate fine and medium subangular blocky structure; firm, sticky, plastic; few roots; continuous clay films; neutral; clear smooth boundary.

Bt2—15 to 25 inches; strong brown (7.5YR 5/6) clay; weak fine and medium subangular blocky structure; very firm, sticky, plastic; few roots; continuous clay films; neutral; abrupt smooth boundary.

R—25 inches; gray argillaceous limestone.

The depth to bedrock and the solum thickness range from 20 to 40 inches. Rock fragments of shale, limestone, or quartz make up 0 to 10 percent of the A horizon and 0 to 15 percent in the B horizon. The soil is slightly acid or neutral.

The A horizon has hue of 7.5YR or 10YR, value of 3 through 5, and chroma of 3 or 4. It is silt loam or silty clay loam.

The B horizon has hue of 7.5YR, value of 5 or 6, and chroma of 6 or 8.

Soil Interpretation Tables

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1B---------- Allegheny	Moderate: flooding.	Severe: flooding.	Moderate: flooding, too clayey.	Moderate: flooding.	Fair: too clayey.
1C---------- Allegheny	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
2D, 2F---------- Berks	Severe: depth to rock, slope.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Poor: small stones, slope, area reclaim.
3F---------- Berks	Severe: depth to rock, slope.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Poor: small stones, slope, area reclaim.
4B---------- Braddock	Moderate: percs slowly.	Severe: seepage.	Severe: seepage, too clayey.	Slight----------	Poor: too clayey, hard to pack.
4C---------- Braddock	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
4D, 4E---------- Braddock	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
5C---------- Carbo	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.

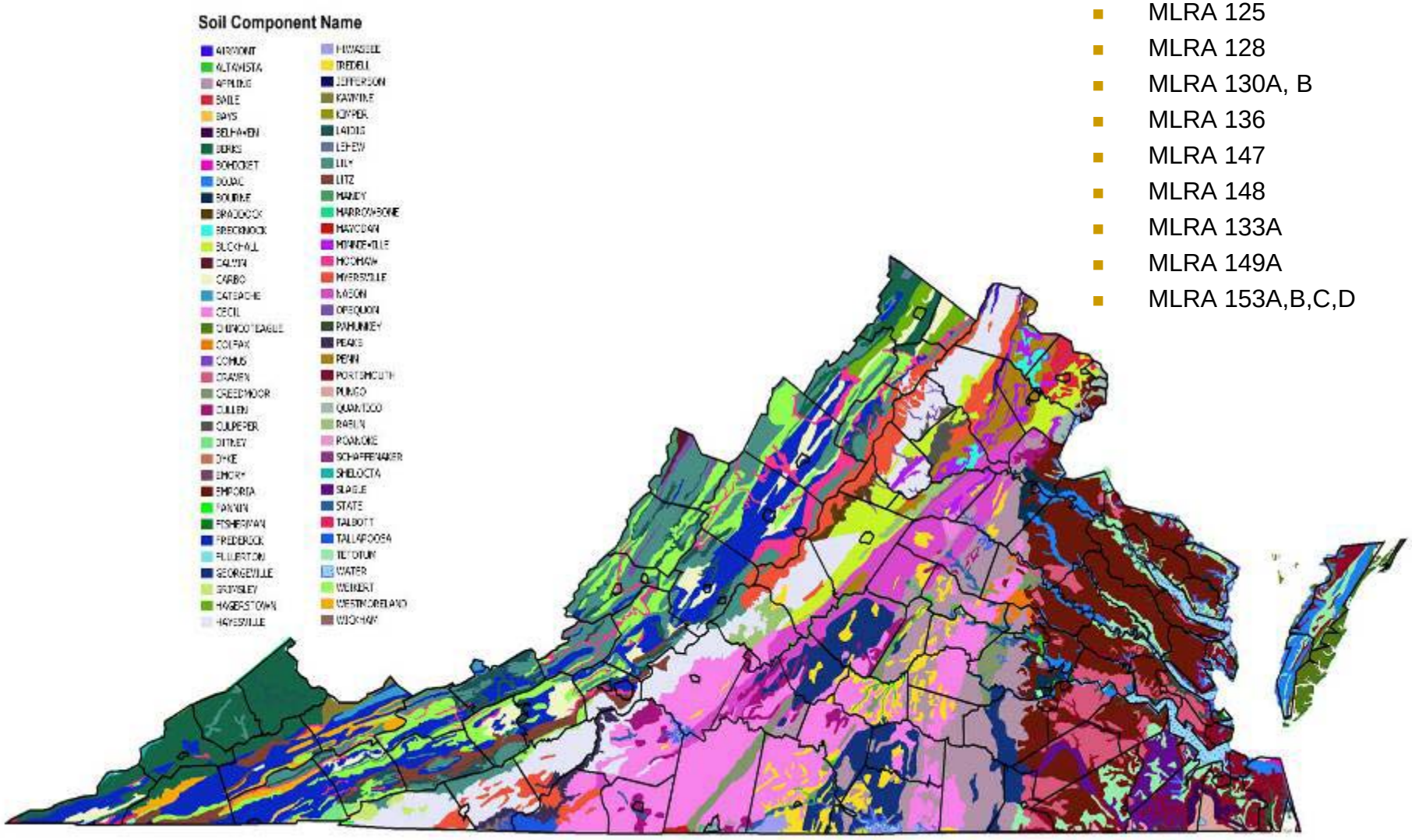
Soil Properties Table

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

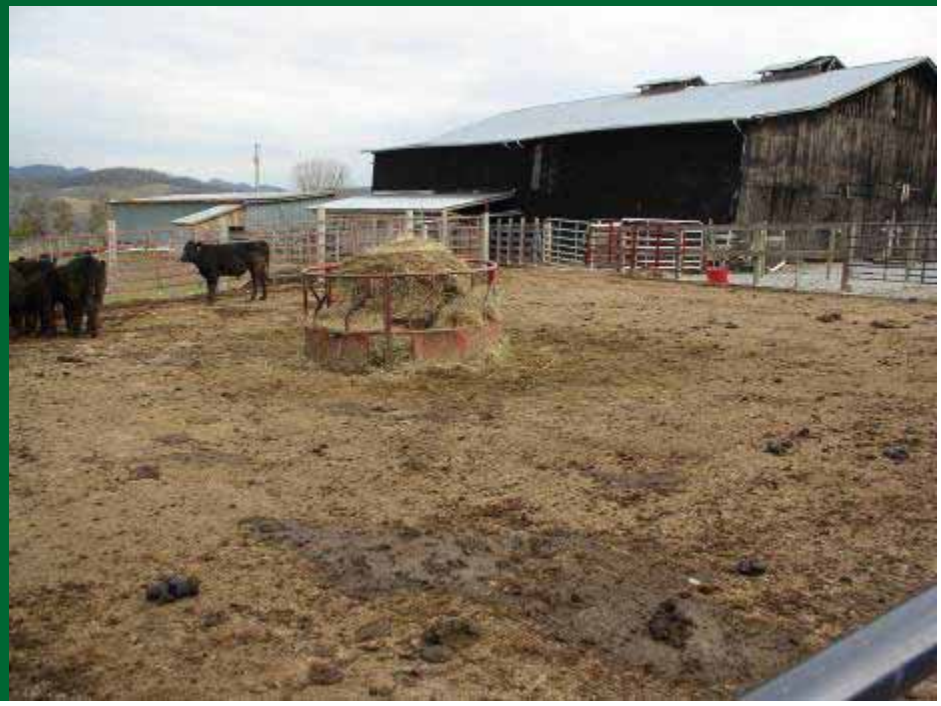
Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1B, 1C---------- Allegheny	0-7	Loam----------	ML, CL, CL-ML	A-4	0	90-100	80-100	65-100	55-95	<35	NP-10
	7-39	Clay loam, loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	80-100	65-95	35-80	<35	NP-15
	39-60	Clay loam, sandy loam, gravelly sandy loam.	SM, GC, ML, CL	A-4, A-6, A-2, A-1	0-5	65-100	55-100	35-95	20-75	<35	NP-15
2D, 2F---------- Berks	0-8	Shaly silt loam	GM, ML, GC, SC	A-2, A-4	0-20	50-80	45-70	40-60	30-55	25-36	5-10
	8-23	Shaly loam, very shaly silt loam, shaly silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	23	Weathered bedrock	---	---	---	---	---	---	---	---	---
3F---------- Berks	0-8	Very stony silt loam.	GM, SM, GC, SC	A-2, A-4	15-30	40-80	35-70	30-60	25-45	25-36	5-10
	8-23	Shaly loam, very shaly silt loam, shaly silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	23	Weathered bedrock	---	---	---	---	---	---	---	---	---
4B, 4C, 4D, 4E--- Braddock	0-11	Sandy loam-------	CL, SM, ML, SC	A-2, A-4	0-5	85-100	75-95	50-85	25-65	<30	NP-10
	11-80	Clay loam, gravelly sandy clay, clay.	MH, CH, CL, SC	A-7, A-2	0-15	70-95	70-90	45-90	20-80	42-60	15-33
5C, 5D---------- Carbo	0-5	Silty clay loam	CL	A-6, A-7	0-2	95-100	90-100	85-95	75-85	30-50	10-15
	5-25	Clay----------	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

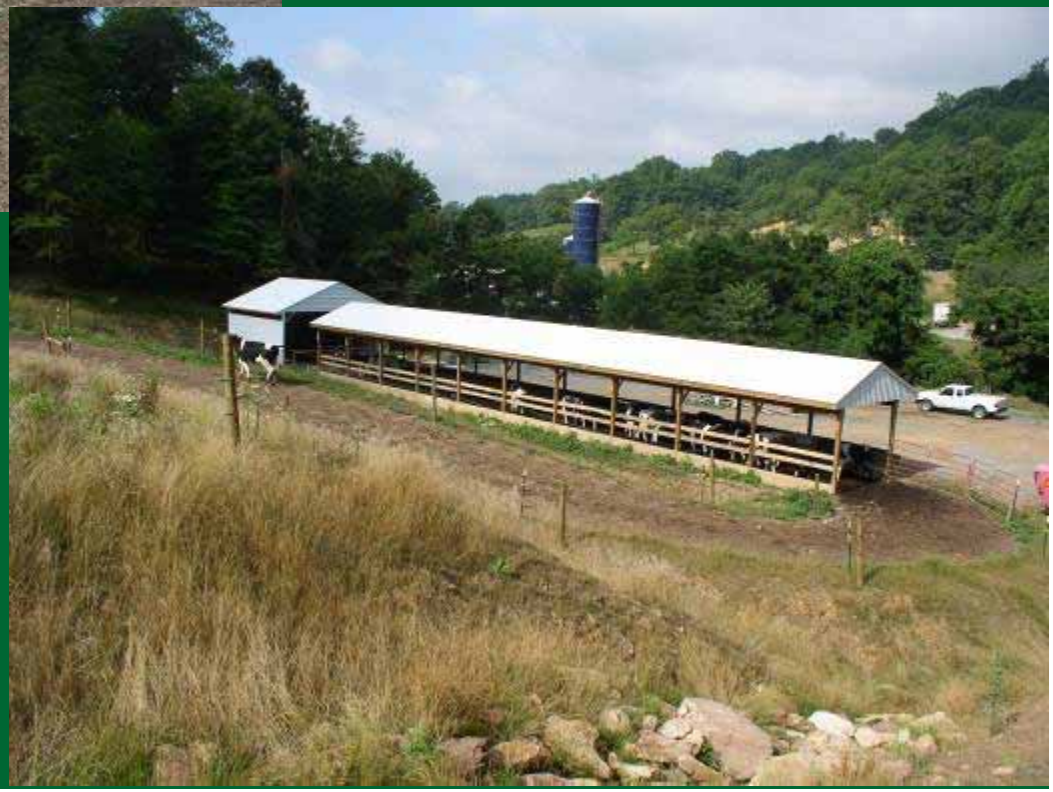
General Soils Map of Virginia



- MLRA 125
- MLRA 128
- MLRA 130A, B
- MLRA 136
- MLRA 147
- MLRA 148
- MLRA 133A
- MLRA 149A
- MLRA 153A,B,C,D


NRCS
NRCS





Technical Guide
Section IV
313-VA-1

NATURAL RESOURCES CONSERVATION SERVICE

VIRGINIA CONSERVATION PRACTICE STANDARD

WASTE STORAGE FACILITY

(No.)

Code 313

Why Site Specific Soil Investigation?

- If Soil Survey is mapped at 1:24,000 scale, then
- Smallest soil map unit (polygon) is 5 acres

What type Soils Information from On-Site Investigation

- Soil textures
- Soil classification
- Soil limitations
- Geomorphology
- Water flow - surface/subsurface
- Geology
- Landscape position
- Flooding frequency

Commonly Evaluated Soil Properties

by MLRA

MLRA 125	MLRA 128, 147	MLRA 130	MLRA 136, 148	MLRA 133, 149, 153
mine soils				
	karst geology			
		micaceous soil	micaceous soil	
			high shrink swell soils	
depth to bedrock	depth to bedrock	depth to bedrock	depth to bedrock	
depth of surface horizon	depth of surface horizon	depth of surface horizon	depth of surface horizon	depth of surface horizon
depth to water table	depth to water table	depth to water table	depth to water table	depth to water table
perched water table	perched water table	perched water table	perched water table	
spring seeps	spring seeps	spring seeps	spring seeps	
toe slope seeps	toe slope seeps	toe slope seeps	toe slope seeps	
	clay content of subsoil	clay content of subsoil	clay content of subsoil	clay content of subsoil
hydric soils	hydric soils	hydric soils	hydric soils	
flood class	flood class	flood class	flood class	

Who Does On-Site Soil Investigation?

- Area Soil Resource Specialist

SCS-378
Rev. 1-67

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL INVESTIGATION TO DETERMINE SUITABILITY OF PROPOSED POND SITE

FARMER'S NAME _____ DISTRICT _____
DATE _____ COUNTY _____
S. C. S. PHOTO SHEET NO. _____ WORK UNIT _____

WATERSHED AREA MEASUREMENTS

CROPLAND ____ ACRES PASTURE ____ ACRES
WOODLAND ____ ACRES TOTAL ____ ACRES

POND CLASS

WORK UNIT CONSERVATIONIST

SKETCH OF PROPOSED POND SHOWING WHERE BORINGS WERE MADE (Approx. scale 1" = ____ feet)
Locate reference point on center line of dam and identify on sketch.

SHOW DEPTH SCALE

BORING NUMBER AND PROFILE

Make and file duplicate and additional borings first - then graded cross - and borings on key map - separate with vertical red line. (Continued on back where necessary) Show water table elevations on data on borings.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

BORINGS MADE BY _____ SIGNATURE & TITLE _____

TYPES OF MATERIAL ENCOUNTERED IN BORINGS
(Use one of systems below)

UNIFIED CLASSIFICATION	USDA CLASSIFICATION
GW - Well graded gravels; gravel, sand mix	g - gravel
GP - Poorly graded gravels	s - sand
GM - Silty gravels; gravel-sand-silt mix	vfs - very fine sand
GC - Clayey gravels; gravel-sand-clay mix	sl - sandy loam
SW - Well graded sands; sand-gravel mix	fsl - fine sandy loam
SP - Poorly graded sands	l - loam
SM - Silty sand	gl - gravelly loam
SC - Clayey sands; sand-clay mixtures	si - silt
ML - Silts; silty, v. fine sands; sandy or clayey silt	sil - silt loam
CL - Clays of low to medium plasticity	cl - clay loam
CH - Inorganic clays of high plasticity	sicl - silty clay loam
MH - Elastic silts	scl - sandy clay loam
OL - Organic silts and silty clays, low plasticity	sic - silty clay
OH - Organic clays, medium to high plasticity	c - clay

1. Suitable material for embankment is available ☐ Yes ☐ No *(Indicate where located on the sketch on reverse side)*

REMARKS:

2. Explain hazards requiring special attention in design *(Seepage, piping, rock etc.)*

GENERAL REMARKS:

24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51

An On-site Soil Investigation

USDA Texture and Unified Texture

TYPES OF MATERIAL ENCOUNTERED IN BORINGS (Use one of systems below)	
UNIFIED CLASSIFICATION	**USDA CLASSIFICATION**
GW - Well graded gravels; gravel, sand mix	g - gravel
GP - Poorly graded gravels	s - sand
GM - Silty gravels; gravel-sand-silt mix	vfs - very fine sand
GC - Clayey gravels; gravel-sand-clay mix	sl - sandy loam
SW - Well graded sands; sand-gravel mix	fsl - fine sandy loam
SP - Poorly graded sands	l - loam
SM - Silty sand	gl - gravelly loam
SC - Clayey sands; sand-clay mixtures	si - silt
ML - Silts; silty, v. fine sands; sandy or clayey silt	sil - silt loam
CL - Clays of low to medium plasticity	cl - clay loam
CH - Inorganic clays of high plasticity	sicl - silty clay loam
MH - Elastic silts	scl - sandy clay loam
OL - Organic silts and silty clays, low plasticity	sic - silty clay
OH - Organic clays, medium to high plasticity	c - clay

Water Table

- The seasonal high water table shall be determined either by long-term monitoring or by the presence of diagnostic soil redoximorphic features as identified during on-site investigations conducted by an individual trained in soil and water relationships.

A Subsurface Investigation

- Is required for all waste storage facilities.
  Subsurface investigations shall be conducted by individuals trained in soil science, engineering, geology, or a related field.

A Subsurface Investigation

- Existing ground surface elevation;
- A description of the soil material encountered using the Unified Soil Classification System;
- Depth to changes in the soil material encountered;
- Depth and location of bedrock;
- Depth to any seeps encountered;
- Depth to high water (note method of determination: mottling, free water encountered, etc.); and
- Depth to bottom of test hole, pit, or boring.

Soils and Foundation

- A detailed soils investigation must be considered in each design with special attention to the water table depth, potential seepage problems, and depth and location of bedrock.

Design Bottom Elevation

- The design bottom elevation of the fabricated structure waste storage facility shall be no lower than the **seasonal high water** table unless hydrostatic and buoyant forces are taken into account during the design of the structure. Dry stack facilities with earth floors must be installed with the elevation of the top of the floor at least 2 feet (0.6 m) above the **seasonal high water table.**

- The design bottom elevation of the waste storage pond shall be no lower than 2 feet (0.6 m) above the **seasonal high water table** unless features of special design are incorporated that address buoyant forces, **pond seepage** rate and non encroachment of the water table by contaminants.

Check Out of a Completed Waste Storage Facility by the local Conservation Planner


99 12


DEERE
99 12 6

Virginia NRCS Beef Waste Structure Sizing Data Worksheet

Cooperator: _____ Service Center: _____

Conservation District: _____ Assisted By: _____

Tract Number: _____ Field Number: _____

Date: 3/5/2008 Storage Period: _____ days

Number of Cows: _____ Average weight: _____ % confinement: _____ for _____ days
_____ for _____ days

Replacement Heifers: _____ Average weight: _____ % confinement: _____ for _____ days
_____ for _____ days

Calves: _____ Average weight: _____ % confinement: _____ for _____ days
_____ for _____ days

Other: _____ Average weight: _____ % confinement: _____ for _____ days

Enter bedding volume for the planned storage period here = _____ cubic feet
(this value should be obtained directly from cooperator when possible)

Enter feed waste volume for the planned storage period here = _____ cubic feet
(this value should be obtained directly from cooperator when possible)

Drainage area to structure (paved area) = _____ square feet

Refer to Table 2-2 in the Engineering Field Handbook

Total amount of runoff for paved area (less evaporation) over the entire storage period = _____ inches

Drainage area to structure (unpaved area) = _____ square feet

Total amount of runoff for unpaved area (less evaporation) over the entire storage period = _____ inches

25-year, 24-hour storm rainfall depth = _____ inches

I. Manure Production:

0	Cows	X	0	animal units	X	1.0 cf/AU/day	X	% confinement:	0	for	0	days	=	0	cubic feet
									0	for	0	days	=	0	cubic feet
0	Heifers	X	0	animal units	X	1.0 cf/AU/day	X	% confinement:	0	for	0	days	=	0	cubic feet
									0	for	0	days	=	0	cubic feet
0	Calves	X	0	animal units	X	1.0 cf/AU/day	X	% confinement:	0	for	0	days	=	0	cubic feet
									0	for	0	days	=	0	cubic feet
0	Other	X	0	animal units	X	1.0 cf/AU/day	X	% confinement:	0	for	0	days	=	0	cubic feet

II. Bedding & Feed Waste:

Bedding & Feed Waste volumes should be obtained directly from cooperator where possible and entered above: = 0 cubic feet

III. Runoff:

Paved area:	0	square feet	X	0.0	" of runoff (less evaporation) for storage period	=	0 cubic feet
Unpaved area:	0	square feet	X	0.0	" of runoff (less evaporation) for storage period	=	0 cubic feet
25 year storm:	0	square feet	X	0.0	" of rainfall depth	=	0 cubic feet

Subtotal of I-III = **0** cubic feet