DESCRIPTION & INTERPRETIVE GUIDE TO SOILS IN FAIRFAX COUNTY

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INTRODUCTION

This guide has been prepared to be used in conjunction with the soil maps of Fairfax County prepared by the United States Department of Agriculture-Natural Resources Conservation Service (NRCS) and publicly released in January 2008.

Fairfax County is located in the northeastern part of Virginia. It has an approximate area of 400 square miles (256,000 acres) and is considered part of the Washington, DC metropolitan region. Fairfax County adjoins the state of Maryland along the Potomac River and the counties of Arlington, Prince William and Loudoun in Virginia.

The original Soil Survey of Fairfax County was published in May 1963 by the USDA Soil Conservation Service (now the Natural Resources Conservation Service) in cooperation with the Virginia Agricultural Experiment Station (Virginia Polytechnic and State University) and Fairfax County. The survey was based on field work that was completed in 1955. The soil maps were published at a scale of 1"=1,667' (1:20,000). This original survey, now out of print, contained black and white aerial photographs overlain with the soil maps. Approximately 60 percent of the county was mapped at that time. The survey discusses the general soil series as well as characteristics of each individual soil. Although the survey placed a lot of emphasis on agricultural uses, the engineering properties of the soils were also covered.

The county opened a soil science office sometime around 1966. The 1963 maps were transferred to the property identification maps at a scale of 1”=500’. The office mapped some previously unmapped tracts of land for rezonings, building permits and special studies at a scale of 1"=500'. The soil science office also identified 20 additional soil types that were not covered in the 1963 survey. The soil science office published its last survey update in 1990. About 40,000 acres of unmapped land remained. The soil science office was closed in 1996. As a result of the lack of information on several parcels of land, particularly in the eastern part of the County, the County requested the Natural Resources Soil Conservation Service (NRCS) to complete the maps.

Intense growth and development drastically changed the landscape of Fairfax County between the 1963 soil survey and the commencement of the NRCS soil survey in 2002. The county wanted a soil survey that would account for the change and map the previously unsurveyed 40,000 acres. This guide describes soils that were mapped as a result of that effort. The survey was conducted with the collaboration of Fairfax County, NRCS and the Northern Virginia Soil and Water Conservation District (NVSWCD). Field surveying was performed by NRCS and NVSWCD soil scientists.

Differences between this survey and earlier surveys are as follows:

1) The entire county has been surveyed and mapped to national standards at a scale of 1”=1,000’ or 1:12,000.
2) The soil map is available to the general public on the County’s website through the Digital Map Viewer at

http://www.fairfaxcounty.gov/gis/DMV/Default.aspx. The descriptions, properties and technical data can be accessed online through the NRCS Web Soil Survey website at: http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm).

3) Several soil names have changed for consistency with the national naming standards.
4) The soil maps connect at the borders with soil maps from surrounding counties.
5) Previously, only small tracts of land were identified as “made land” or “cut or fill.” This survey identifies large tracts of land that have been developed or altered. They are identified as “Disturbed Soils” or “Urban Land.” Specifically, disturbed soils are soils that have been mixed, graded, compacted or altered. Urban land encompasses any large area completely covered by impervious surfaces such as asphalt, concrete or rooftop.

When a soil is disturbed its traits, characteristics and taxonomy are changed significantly as compared to the natural soil or soils from which it was created. Graded baseball and soccer fields are good examples of the pure disturbed soil map units. Six disturbed soil types were created for the updated soils survey; one soil type for each unique geologic region in the county.

The disturbed soil types and the geologic area which they cover are as follows:

1) Barkers Crossroads loam: Piedmont granite bedrock
2) Chantilly loam: Triassic Basin sedimentary bedrock
3) Grist Mill sandy loam: Low Coastal Plain sediments
4) Hattontown silt loam: Ultramafic igneous bedrock
5) Kingstowne sandy clay loam: High Coastal Plain sediments
6) Wheaton loam: Piedmont micaceous schist and phyllite bedrock

The disturbed soil map units can exist on their own or in a complex with Urban Land or undisturbed natural soil types. Urban Land-Disturbed soil complexes exist in dense developments where more than half of the land surface is covered by impervious surfaces and the remainder consists of disturbed soils. Disturbed soil-natural soil complexes cover less dense, primarily residential areas of the county where significant soil disturbance exists, but undisturbed natural soils are still present in back and front yards.

This guide is to be used in conjunction with the Fairfax County soil map for general estimates of properties only. Site-specific soil investigations are recommended for more precise information. The soil map is available on the County’s website through the Digital Map Viewer at http://www.fairfaxcounty.gov/gis/DMV/Default.aspx.

The original, 1963, and the 1990 soil surveys, which are out of print, may be viewed at the NVSWCD, 12055 Government Center Parkway, Suite 905, Fairfax, VA 22035. The NVSWCD’s telephone number is 703-324-1422, TTY 711.

Questions or comments pertaining to the use of this guide may be directed to:

Site Development and Inspection Division's
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GEOLOGIC SETTING

The soils in Fairfax County can be divided into three major regions based on geology and physiography. The eastern part of the county is underlain by unconsolidated sediments of the Coastal Plain Province. The central part of the county is underlain by crystalline metamorphic and igneous rocks of the Piedmont Province. The western part is underlain by sedimentary and crystalline rocks of the Triassic Basin Province.

Most of the area of the Piedmont and Triassic Basin Provinces are covered by soil and weathered rock which formed from in-place weathering of the underlying bedrock. The weathering products have physical and engineering properties which generally result from the unweathered rock from which they are derived. The coastal plain sediments were transported to the area by water and have not been lithified.

The three distinct regions illustrated in the following map are further described below.

Coastal Plain

The Coastal Plain Physiographic Province occupies approximately 26 percent of Fairfax County predominantly east of Shirley Memorial Highway (I-95). The province consists of unconsolidated sand, silt, clay and gravel strata deposited by ancient oceans and freshwater rivers. The province can be subdivided into the High Coastal Plain and Low Coastal Plain. The High Coastal Plain is found at elevations above150 feet. The Low Coastal Plain is between 150 feet and sea level. Soils of the High Coastal Plain tend to be better drained and more gravelly than those of the Low Coastal Plain. The Low Coastal Plain occupies the low, flat and wet portions of Hybla Valley, Mason Neck and Gunston Cove. Soils frequently have high water tables and thick subsoil clay layers. The hills at the border of the High and Low Coastal Plains cut through many layers of sediment including highly plastic clays. Soils containing marine clay are most often found on these hills. The overall drainage is to the southeast. Drainage patterns are well developed in the western portion of the province. Broad, nearly level areas are found in the central (Hybla Valley) and southern (Gunston, Mason Neck) portions.

Piedmont Upland

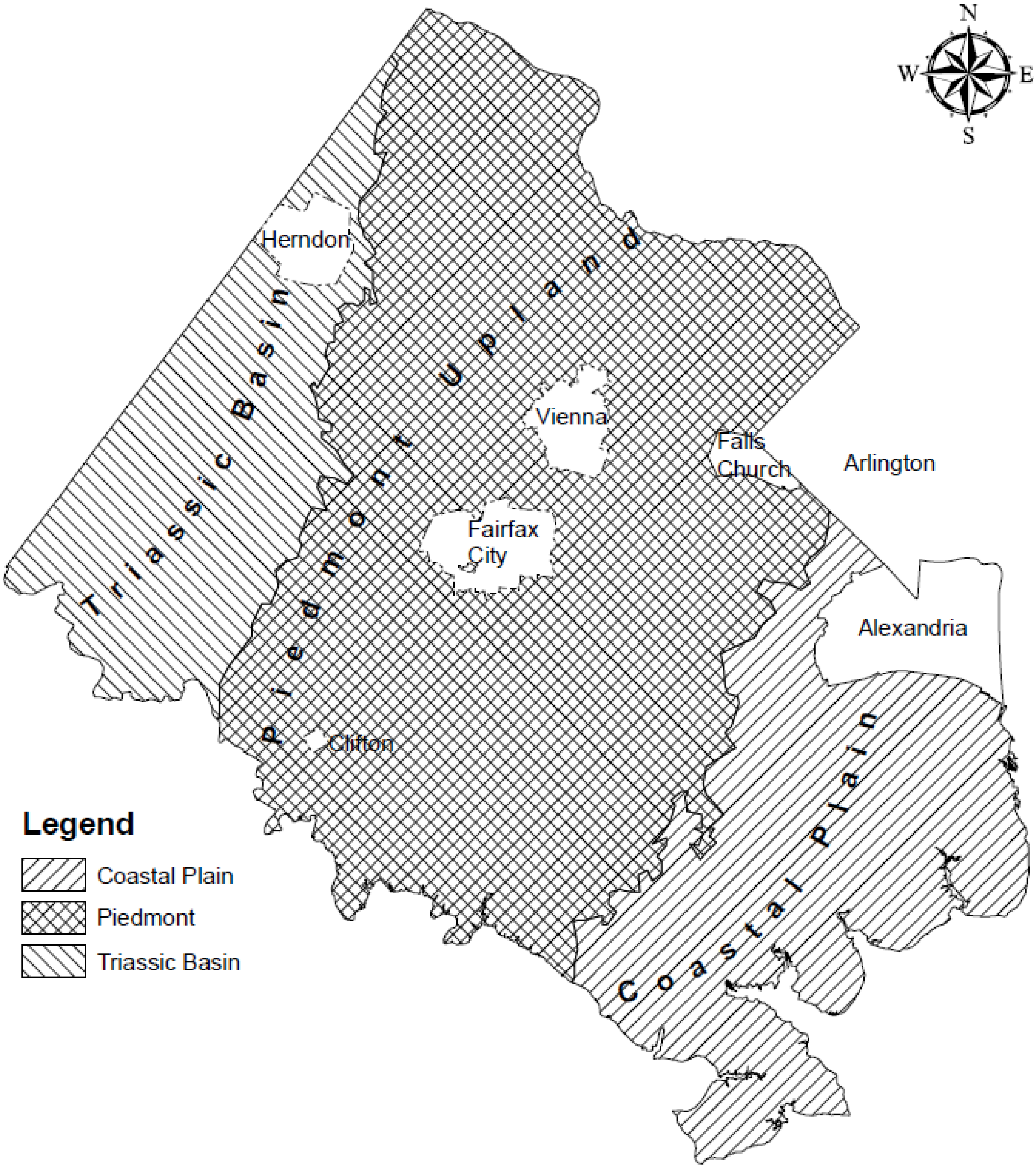
The Piedmont Upland Physiographic Province occupies approximately 56 percent of Fairfax County. It occurs in the central portion of the county, west of the Coastal Plain and east of the Triassic Basin. The province is underlain by metamorphic rocks, predominantly micaceous schist, granite, gneiss and greenstone. Areas of greenstone bedrock can feature soils with thick plastic clays and naturally occurring asbestos fibers. A remnant capping of Coastal Plain sediments may be found on high, broad ridge tops in the eastern half of the province. The largest such capping is found in the Tyson's Corner area. A well-dissected, dendritic drainage pattern occurs throughout the province. The hilltops are typically fairly wide and rolling, except in places along the lower tributaries of large streams. Here, V-shaped valleys with steep slopes and narrow ridge tops occur.

Triassic (Culpeper) Basin

The Triassic, or Culpeper Basin, is actually a sub-province of the Piedmont Upland. It occurs in the west along the border with Loudoun and Prince William Counties and occupies approximately 18 percent of the county. The geology consists largely of red sedimentary (sandstone, siltstone, shale and conglomerate) rocks. Two horseshoe-shaped intrusions of igneous diabase, diorite and syenite, and metamorphic hornfels occur in the vicinity of Herndon and Centreville. The drainage is somewhat dendritic, but not as well developed as in the Piedmont Upland. The hilltops are wide and gently rolling, with long gently sloping side slopes and nearly level areas.

The soils over the red sedimentary rocks are often shallow; bedrock depths are between 2 and 10 feet. Large flat areas are often slowly permeable and poorly drained. Soils forming over the igneous bedrock have a distinct plastic clay layer.

PHYSIOGRAPHIC PROVINCES OF FAIRFAX COUNTY



NATURAL RESOURCES CONSERVATION SERVICE MAPS

On the NRCS maps, soil boundaries are identified by solid lines. Soils exist as a continuum across the landscape and soil properties tend to change gradually between soil types. As a result, the soil boundaries are approximate. Map units will frequently contain soils near their borders that have the characteristics of neighboring map units. In addition, small areas of differing soil types, too small to separate because of the map scale, may occur within a larger soil map unit.

Numbers are used for soil identification followed by alphabets. The alphabetical characters identify the slope.

Example: If the soil map indicates 39B, then the Soil Number is 39 and the Slope Class is B (between 2 and 7 percent slope).

The slope classes on the maps are as shown below.

Slope Classes on the Maps

Key	Range of Slope
A	0 - 2 percent slope
B	2 - 7 percent slope
C	7 - 15 percent slope
D	15 - 25 percent slope
E	25+ percent slope

Selected Properties and Ratings of Soils in Fairfax County

Soil Number	Soil Name[1]	Soil Problem Class[2]	Soil Hydrologic Group[3]	Soil Erosion Factor[4] Surface K	Soil Erosion Factor[4] Critical K	Soil Erosion Factor[4] T (tons/acre-year)	Subsoil Permeability Rate[5] (in/hr)	Depth to Water Table[6] (ft)	Depth to Hard Bedrock[7] (ft)	Soil Drainage[8]	Suitability for Septic Drainfields[9]	Suitability for Infiltration Trenches[10]	Erosion Potential[11]	Foundation Support[12]	Other Notes[13]
1	Albano silt loam	III	D	0.43	0.43	3	0.06 to 0.2	0.0 to 1.5	3.5 to 5	poor - w, s	poor - w, s, r, c	poor - w, s	low	poor - b, w, c	Hyd
2	Ashburn silt loam	II	C	0.37	0.37	3	0.2 to 0.6	1.5 to 2.5	3 to 5	poor - p, r	poor - w, s, r	poor - r, p	moderate	fair - p	As**
3	Barkers Crossroads loam	IVB	D	0.32	0.32	5	0.06 to 0.2	>6	>5	fair - s	poor - s	marginal - s	moderate	fair - c, b	
4	Barker Crossroads - Nathalie complex*	IVB	D	0.32	0.32	4	0.06 to 2.0	>6	>5	good	fair - c, s	good	high	fair - c, b	
5	Barkers Crossroads - Rhodhiss complex*	IVB	D	0.32	0.32	3	0.06 to 6.0	>6	>5	good	good	good	medium	fair - c, b	
6	Barkers Crossroads-Rhodhiss-Rock Outcrop complex*	IVB	D	0.32	0.32	3	0.06 to 6.0	>6	0 to >6	good	poor - r, s	poor - r , s	high	fair - c, b	As**
7	Beltsville silt loam	II	C	0.37	0.37	3	0.06 to 0.2	1.5 to 2.5	>50	marginal - p, s	poor - p, s	marginal - p, s	low	fair - p	
8	Bermudian silt loam	III	B	0.37	0.37	4	0.6 to 6.0	>6	>6	poor - f	poor - f	marginal - f, w	low	fair - f	
9	Birdsboro loam	II	B	0.37	0.37	4	0.6 to 2.0	4 to 6	7 to 20	marginal - w	fair - w, i	fair - w	medium	fair - w	As**
10	Bowmansville silt loam	III	B/D	0.32	0.32	4	0.2 to 0.6	0 to 1.0	>6	poor - w, f	poor - f, w, s	poor - f, w	low	poor - f, w, b	Hyd
11	Catlett gravelly silt loam	I	C/D	0.20	0.20	2	0.6 to 2.0	>6	1 to 3	fair - r	poor - r	poor - r	medium	good	As**
12	Chantilly loam	IVB	D	0.32	0.32	5	0.06 to 0.2	2.0 to >6	>5	fair - s	poor - s	marginal - s	high	fair - c, b	
13	Chantilly - Albano complex*	IVA	D	0.43	0.43	3	0.06 to 0.2	0.0 to >6	≥3.5	poor - w, s	poor - w, s, r, c	poor - w, s	low	poor - b, w, c	Hyd
14	Chantilly - Ashburn complex*	IVB	D	0.37	0.37	3	0.06 to 0.6	1.5 to >6	≥3	poor - p, r, s	poor - w, s, r	poor - r, p, s	meidum	fair - p	
15	Chantilly - Bermudian complex*	IVA	D	0.37	0.37	4	0.06 to 6.0	2.0 to >6	>5	poor - f, s	poor - f, s	marginal - f, w, s	low	fair - f	
16	Chantilly - Birdsboro complex*	IVB	D	0.37	0.37	4	0.06 to 2.0	2.0 to >6	>5	marginal - w	fair - w, i	fair - w	medium	fair - w	
17	Chantilly - Bowmansville complex*	IVA	D	0.32	0.32	4	0.06 to 0.6	0 to >6	>5	poor - w, f, s	poor - f, w, s	poor - f, w, s	low	poor - f, w, b	Hyd
18	Chantilly - Catlett complex*	IVB	D	0.32	0.32	2	0.06 to 2.0	2.0 to >6	≥1	fair - r, s	poor - r, s	poor - r, s	medium	good	As**
19	Chantilly - Clover complex*	IVB	D	0.32	0.32	5	0.06 to 2	2.0 to >6	>5	good	good	good	medium	fair - c	As**
20	Chantilly - Delanco complex*	IVA	D	0.32	0.32	5	0.06 to 0.6	2.0 to >6	>5	marginal - w, s	poor - w, s, c	poor - w, s	medium	poor - w, b, c	
21	Chantilly - Dulles complex*	IVA	D	0.43	0.43	3	0.06 to 0.6	1.0 to >6	≥5	poor - p, c, s, r	poor - p, s, c, r	poor - r, p ,s ,c	medium	poor - w, b, c	
22	Chantilly - Manassas complex*	IVB	D	0.37	0.37	4	0.06 to 6.0	2.0 to >6	>5	poor - w, s	poor - w, s	marginal - w, s	medium	marginal - w, b	As**
23	Chantilly - Montalto complex*	IVB	D	0.32	0.32	5	0.06 to 0.6	2.0 to >6	≥5	good	marginal - c, s	fair - r, s	medium	fair - c	
24	Chantilly - Nestoria complex*	IVB	D	0.32	0.32	1	0.06 to 2	2.0 to >6	≥1.5	fair - r, s	poor - r, s	poor - r, s	high	good	As**
25	Chantilly - Penn complex*	IVB	D	0.32	0.32	3	0.06 to 2.0	2.0 to >6	≥3	fair - r, s	poor - r, s	poor - r, s	medium	good	As**
26	Chantilly - Rowland complex*	IVA	D	0.37	0.37	4	0.06 to 2.0		>5	poor - f, w, s	poor - f, w, s	poor - f, w, s	low	poor - f, w, b	
27	Chantilly - Sycoline - Kelly complex*	IVA	D	0.49	0.49	2	0.06 to 0.6	0.5 to >6	≥2	poor - p, r, s, c	poor - p, c, s, r	poor - r, s, c, p	high	poor - p, b, c	As**
28	Clover silt loam	I	B	0.24	0.24	5	0.6 to 2	>6	10 to 15	good	good	good	low	fair - c	
29	Codorus silt loam	III	C	0.32	0.32	5	0.6 to 2	0.8 to 2.0	10 to 20	poor - w, f	poor - f, w	poor - w, f	low	poor - f, w, b	As**
30	Codorus and Hatboro soils*	III	D	0.37	0.37	4	0.6 to 2	0.0 to 2.0	8 to 20	poor - w, f	poor - f, w	poor - w, f	low	poor - f, w, b	As**
31	Danripple gravelly loam	II	C	0.24	0.24	4	0.6 to 2	3.3 to 6.6	>5	marginal - w	marginal - w	poor - w	medium	marginal - b, w	
32	Delanco loam	III	C	0.28	0.28	5	0.2 to 0.6	2 to 3.3	>5	marginal - w	poor - w, s, c	poor - w	medium	poor - w, b, c	
33	Downer loamy sand	I	B	0.10	0.15	5	6 to 20	>6	50 to 500	good	marginal - i	good	low	good	
34	Dulles silt loam	III	D	0.43	0.43	3	0.06 to 0.6	1.0 to 2.5	5	poor - p, c, s, r	poor - p, s, c, r	poor - r, p ,s ,c	medium	poor -w, b, c	As**
35	Elbert silt loam	III	D	0.43	0.43	3	0.06 to 0.2	0 to 1.5	3 to 15	poor - f, p, s, c, r	poor - f, p s, c, r	poor - r, p, s, c, f	low	poor - p, c, b	Hyd, As**
36	Elkton silt loam	III	C/D	0.43	0.43	4	0.06 to 0.2	0.0 to 1.0	>200	poor - w, s	poor - f, w, s, c	poor - w, s	low	poor - w, b, c	Hyd
37	Elsinboro loam	III	B	0.32	0.43	5	0.6 to 2	>6	>6	poor - f	poor - f	marginal - f	medium	fair - f	
38	Fairfax loam	I	B	0.28	0.28	4	0.6 to 2.0	>6	10 to 100	good	fair - c	good	medium	fair - c	

Soil Number	Soil Name[1]	Soil Problem Class[2]	Soil Hydrologic Group[3]	Soil Erosion Factor[4] Surface K	Soil Erosion Factor[4] Critical K	Soil Erosion Factor[4] T (tons/acre-year)	Subsoil Permeability Rate[5] (in/hr)	Depth to Water Table[6] (ft)	Depth to Hard Bedrock[7] (ft)	Soil Drainage[8]	Suitability for Septic Drainfields[9]	Suitability for Infiltration Trenches[10]	Erosion Potential[11]	Foundation Support[12]	Other Notes[13]
39	Glenelg silt loam	I	B	0.37	0.37	5	0.6 to 2.0	> 6	5 to 100	good	good	good	high	good	As**
40	Grist Mill sandy loam	IVB	D	0.24	0.24	5	0.06 to 0.2	2.0 to >6	>20	fair - s	poor - s	marginal - s	medium	fair - c, b	
41	Grist Mill - Downer complex*	IVB	D	0.24	0.24	5	0.06 to 20	2.0 to >6	>20	good	marginal - i	good	low	good	
42	Grist Mill - Elkton complex*	IVA	D	0.43	0.43	4	0.06 to 0.2	0.0 to >6	>20	poor - w, s	poor - f, w, s, c	poor - w, s	low	poor - w, b, c	Hyd
43	Grist Mill - Gunston complex*	IVA	D	0.37	0.37	5	0.06 to 0.2	0.7 to >6	>20	poor - w, s	poor - w, c, s	poor - w, s	low	poor - w, b, c	
44	Grist Mill - Honga complex*	IVA	D	0.24	0.28	2	0.00 to 0.6	0.0 to >6	>20	poor - f, w, s	poor - f, w	poor - w, f	low	poor - f, w, b	Hyd
45	Grist Mill - Matapeake complex*	IVB	D	0.49	0.49	4	0.06 to 2.0	2.0 to >6	>20	good	good	good	low	good	
46	Grist Mill - Mattapex complex*	IVB	D	0.43	0.43	4	0.06 to 2.0	2.0 to >6	>20	poor - w, s	poor - w	poor - w	low	marginal - w, b	
47	Grist Mill - Woodstown complex*	IVA	D	0.24	0.28	4	0.06 to 6.0	1.5 to >6	>20	poor - w, s	poor - w, s	poor - w, s	low	marginal - w, b	
48	Gunston silt loam	III	D	0.37	0.37	5	0.06 to 0.2	0.7 to 2.5	>20	poor - w, s	poor - w, c, s	poor - w, s	low	poor - w, b, c	
49	Hatboro silt loam	III	D	0.37	0.37	4	0.2 to 0.6	0.0 to 1.5	8 to 20	poor - f, w	poor - f, w	poor - w, f	low	poor - f, w, b	Hyd
50	Hattontown silt loam	IVB	D	0.43	0.43	5	0.06 to 0.2	2.0 to >6	>5	fair - s	poor - c, s	poor - s	medium	marginal - c, b	As**
51	Hattontown - Elbert complex*	IVA	D	0.43	0.43	3	0.06 to 0.2	0.0 to >6	≥3	poor - f, p, s, c, r	poor - f, p, s, c, r	poor - r, p, s, c, f	low	poor - p, c, b	Hyd, As**
52	Hattontown - Haymarket complex*	IVA	D	0.43	0.43	4	0.06 to 0.6	2.0 to >6	>5	fair - c, s	marginal - c, s	fair - c	medium	poor - c, b	As
53	Hattontown - Jackland complex*	IVA	D	0.43	0.43	3	0.00 to 0.2	0.8 to >6	>5	poor - p, c, s	poor - p, c, s	poor - c, p, s	low	poor - p, c, b	
54	Hattontown - Jackland - Haymarket complex*	IVA	D	0.43	0.43	3	0.00 to 0.6	0.8 to >6	>5	poor - p, c, s	poor - p, c, s	poor - c, p, s	medium	poor - p, c, b	As**
55	Hattontown - Kelly complex*	IVA	D	0.49	0.49	3	0.02 to 0.2	0.5 to >6	≥3.5	poor - p, r, s, c	poor - p, c, s, r	poor - r, s, c, p	high	poor - p, c, b	As**
56	Hattontown - Orange complex*	IVA	D	0.43	0.43	3	0.06 to 0.2	1.5 to >6	≥4	poor - p, r, s, c	poor - p, c, s, r	poor - p, c, r, s	medium	poor - p, c, b	As
57	Hattontown - Orange complex, very stony*	IVA	D	0.43	0.43	3	0.06 to 0.2	1.5 to >6	≥4	poor - p, r, s, c	poor - p, c, s, r	poor - p, c, r, s	high	poor - p, c, b	As
59	Haymarket silt loam	III	D	0.37	0.43	4	0.2 to 0.6	>6	>5	fair - c	marginal - c, s	fair - c	medium	poor - c, b	As
60	Honga peat	III	D	NA	0.28	2	0.00 to 0.6	0	>20	poor - f, w	poor - f, w	poor - w, f	NA	poor - f, w, b	Hyd
61	Huntington silt loam	III	B	0.43	0.43	5	0.6 to 2.0	>6	>6	poor - f	poor - f	marginal - f	low	fair - f	
62	Jackland silt loam	III	D	0.32	0.32	3	0.00 to 0.06	0.8 to 1.7	>5	poor - p, c, s	poor - p, c, s	poor - c, p, s	low	poor - p, c, b	
63	Jackland and Haymarket soils*	III	D	0.37	0.43	3	0.00 to 0.6	0.8 to >6	>5	poor - p, c, s	poor - p, c, s	poor - c, p, s	medium	poor - p, c, b	As**
64	Jackland and Haymarket soils, very stony*	III	D	0.37	0.43	3	0.00 to 0.6	0.8 to >6	>5	poor - p, c, s	poor - p, c, s	poor - c, p, s	medium	poor - p, c, b	As**
65	Kelly silt loam	III	D	0.49	0.49	3	0.02 to 0.2	0.5 to 2.5	3.5 to 5	poor - p, r, s, c	poor - p, c, s, r	poor - r, s, c, p	medium	poor - p, c, b	
66	Kingstowne sandy clay loam	IVB	D	0.15	0.15	5	0.06 to 0.2	2.0 to >6	>20	fair - s	poor - s	marginal - s	medium	fair - c, b	
67	Kingstowne - Beltsville complex*	IVB	D	0.37	0.37	3	0.06 to 0.2	1.5 to >6	>20	marginal - p, s	poor - p, s	marginal - p, s	low	fair - p	
68	Kingstowne - Danripple complex*	IVB	D	0.24	0.24	4	0.06 to 2	3.3 to >6	>5	marginal - w, s	marginal - w, s	poor - w	medium	marginal - w, b	As**
69	Kingstowne - Elsinboro complex*	IVA	D	0.32	0.43	5	0.06 to 2	2.0 to >6	>6	poor - f, s	poor - f, s	marginal - f	medium	fair - f	
70	Kingstowne - Sassafras complex*	IVB	D	0.28	0.28	5	0.06 to 2	2.0 to >6	>20	good	good	good	low	good	
71	Kingstowne - Sassafras - Marumsco complex*	IVA	D	0.32	0.32	5	0.06 to 2	1.0 to >6	>20	poor - p, c, s	poor - p, u, c, s	poor - p, c, u, s	high	poor - u, p, c, b	US
72	Kingstowne - Sassafras - Neabsco complex*	IVB	D	0.32	0.32	5	0.06 to 2.0	1.2 to >6	>20	marginal - p, s	poor - p, s	marginal - p, s	low	fair - p	
73	Lindside silt loam	IVA	C	0.32	0.37	5	0.2 to 2.0	1.5 to 3	>10	poor - f, w	poor - w, f	poor - w, f	low	poor - f, w, b	
74	Lunt - Marumsco complex*	III	C	0.32	0.32	4	0.06 to 2.0	1 to > 6	>50	poor - p, c, s	poor - p, u, c, s	poor - p, c, u	medium	poor - u, p, c, b	US
75	Manassas silt loam	II	B	0.37	0.37	4	0.6 to 6.0	2 to 3.3	>5	poor - w	poor - w	marginal - w	medium	marginal - w, b	As**
76	Matapeake silt loam	I	B	0.49	0.49	4	0.2 to 2.0	> 6	>200	good	good	good	medium	good	
77	Mattapex loam	II	C	0.43	0.43	4	0.2 to 2.0	2.0 to 3.0	>200	poor - w	poor - w	poor - w	medium	marginal - w, b	
78	Meadowville loam	II	B	0.28	0.28	3	0.6 to 6.0	3.4 to >6	>6	marginal - w	marginal - w	marginal - w	medium	fair - w, b	As**
79	Nathalie gravelly loam	I	B	0.15	0.28	4	0.6 to 2.0	>6	10 to 75	good	fair - c	good	high	fair - c	
80	Nestoria channery silt loam	I	C/D	0.24	0.24	1	0.06 to 2.0	>6	1.5	fair - r	poor - r	poor - r	high	good	As**

Soil Number	Soil Name[1]	Soil Problem Class[2]	Soil Hydrologic Group[3]	Soil Erosion Factor[4] Surface K	Soil Erosion Factor[4] Critical K	Soil Erosion Factor[4] T (tons/acre-year)	Subsoil Permeability Rate[5] (in/hr)	Depth to Water Table[6] (ft)	Depth to Hard Bedrock[7] (ft)	Soil Drainage[8]	Suitability for Septic Drainfields[9]	Suitability for Infiltration Trenches[10]	Erosion Potential[11]	Foundation Support[12]	Other Notes[13]
81	Oatlands loam	I	B	0.24	0.24	2	0.2 to 0.6	>6	3	fair - r	poor - r	marginal - r	low	good	
82	Orange silt loam	III	D	0.28	0.28	3	0.06 to 0.2	1.5 to 2.5	4 to 6	poor - p, c, r, s	poor - p, c, s, r	poor - p, c, r, s	medium	poor - p, c, b	As
83	Orange silt loam, very stony	III	D	0.28	0.28	3	0.06 to 0.2	1.5 to 2.5	4 to 6	poor - p, c, r, s	poor - p, c, s, r	poor - p, c, r, s	high	poor - p, c, b	As
84	Panorama loam	I	B	0.43	0.43	4	0.06 to 0.2	>6	4 to 5	fair - r	fair - r	fair - r	medium	good	As**
85	Penn silt loam	I	C	0.32	0.32	3	0.2 to 2.0	> 6	3	fair - r	poor - r	poor - r	medium	good	As**
86	Pits, gravel	IVA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
87	Rhodhiss sandy loam	I	B	0.28	0.32	3	0.6 to 6.0	>6	>6	good	good	good	medium	fair - c	
88	Rhodhiss - Rock Outcrop complex	I	B	0.28	0.32	3	0.6 to 6.0	>6	0 to >6	good	poor - r	poor - r	medium	fair - c	As**
89	Rowland silt loam	III	C	0.37	0.37	4	0.2 to 2.0	2.0 to 3.3	>5	poor - f, w	poor - f, w	poor - f, w	low	poor - f, w, b	As**
90	Sassafras sandy loam	I	B	0.28	0.28	5	0.2 to 2.0	> 6	>50	good	good	good	medium	good	
91	Sassafras - Marumsco complex*	III	C	0.32	0.32	5	0.06 to 2.0	1 to > 6	>50	poor - p, c, s	poor - p, u, c, s	poor - p, c, u	high	poor - u, p, c, b	US
92	Sassafras - Neabsco complex*	II	D	0.32	0.32	5	0.06 to 2.0	1.2 to > 6	>50	marginal - p, s	poor - p, s	marginal - p, s	medium	fair - p	
93	Sumerduck loam	II	C	0.32	0.32	4	0.2 to 0.6	2.0 to 3.3	>6	poor - w	poor - w, s	poor - w	medium	marginal - w, b	As**
94	Sycoline - Kelly complex*	III	D	0.49	0.49	2	0.02 to 0.6	0.5 to 2.5	2 to 5	poor - p, r, s, c	poor - p, c, s, r	poor - r, s, c, p	high	poor - p, c, b	
95	Urban Land	IVB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	As**
96	Urban Land - Barkers Crossroads complex	IVB	D	0.32	0.32	5	0.06 to 0.2	>6	>5	fair - s	poor - s	marginal -s	medium	fair - c, b	
97	Urban Land - Chantilly complex	IVB	D	0.32	0.32	5	0.06 to 0.2	2.0 to >6	>5	fair - s	poor - s	marginal -s	high	fair - c, b	As**
98	Urban Land - Grist Mill complex	IVB	D	0.24	0.24	5	0.06 to 0.2	2.0 to >6	>20	fair - s	poor - s	marginal - s	medium	fair - c, b	
99	Urban Land - Hattontown complex	IVB	D	0.43	0.43	5	0.06 to 0.2	2.0 to >6	>5	fair - s	poor - s, c	poor - s	medium	marginal - c, b	As**
100	Urabn Land - Kingstowne complex	IVB	D	0.15	0.15	5	0.06 to 0.2	2.0 to >6	>20	fair - s	poor - s	marginal - s	medium	fair - c, b	
101	Urban Land - Wheaton complex	IVB	D	0.32	0.32	5	0.06 to 0.2	>6	>5	fair - s	poor - s	marginal - s	high	good	As**
102	Wheaton loam	IVB	D	0.32	0.32	5	0.06 to 0.2	>6	>5	fair - s	poor - s	marginal - s	high	good	As**
103	Wheaton - Codorus complex*	IVA	D	0.32	0.32	5	0.06 to 2	0.8 to >6	>5	poor - f, w, s	poor - f, w, s	poor - w, f	low	poor - f, w, b	As**
104	Whaton - Fairfax complex*	IVB	D	0.32	0.32	4	0.06 to 2.0	>6	>5	good	fair - c, s	good	high	fair - c	
105	Wheaton - Glenelg complex*	IVB	D	0.37	0.37	5	0.06 to 2.0	>6	>5	good	good	good	high	good	As**
106	Wheaton - Hatboro complex*	IVA	D	0.37	0.37	4	0.06 to 0.6	0.0 to >6	>5	poor - f, w, s	poor - w, f, s	poor - w, f	low	poor - f, w, b	Hyd
107	Wheaton - Meadowville complex*	IVB	D	0.32	0.32	3	0.06 to 6.0	3.4 to >6	>5	marginal - w, s	marginal - w, s	marginal - w	medium	fair - w, b	As**
108	Wheaton - Sumerduck complex*	IVB	D	0.32	0.32	4	0.06 to 0.6	2.0 to >6	>5	poor - w, s	poor - w, s	poor - w	medium	marginal - w, b	As**
109	Woodstown sandy loam	IVA	C	0.24	0.28	4	0.2 to 6.0	1.5 to 3.5	50 to 300	poor - w	poor - w	poor - w, s	medium	marginal - w, b	
W	Water	III	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	Landfill & Quarry	IVA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	

EXPLANATION OF RATINGS, FOOTNOTES AND SOIL DESCRIPTIONS FOUND IN THE TABLE ENTITLED *SELECTED PROPERTIES AND RATINGS OF SOILS IN FAIRFAX COUNTY*

KEY TO RATINGS

good	No significant problems expected
fair	Minor potential problems affecting design or construction
marginal	Significant problems that must be considered in design and construction
poor	Major problems that must be addressed during the design and construction to ensure satisfactory performance of structures
b	Low bearing values for foundation support
c	Clays with moderate to high shrink-swell potential often having slow to very slow permeability rates
f	Flooding hazard following storm events
p	Perched groundwater above restrictive soil or rock layers
r	Shallow depth to bedrock
s	Slow permeability rates
u	Potentially unstable slopes from massive slope failure or slope creep
w	High seasonal groundwater tables in drainage way or low lying areas
i	Insufficient filtering capacity (septic ratings only)
As	Soils mapped over asbestos bedrock (see page 20)
As**	Small portion of soils mapped over asbestos bedrock (see page 20)
Hyd	Hydric soils (see page 20)
US	Unstable slopes (see page 21)

FOOTNOTES FOR
SELECTED PROPERTIES AND RATINGS OF SOILS IN FAIRFAX COUNTY

[1]SOIL NAMES

Soil names are taken from the NRCS Soil Survey of Fairfax County, Virginia, issued January 2008. Soil names were formulated using the USDA Natural Resources Conservation Service's *Soil Taxonomy: 2nd Ed.*

[*]COMPLEXES AND ASSOCIATIONS

Complexes and associations have two or more soils included in the same map unit. Complexes consist of soils that are intertwined in the natural landscape and could not be mapped separately at the scale of the current soil survey, for instance Soil 105 is the Wheaton-Glenelg Complex. Associations consist of soils that could be mapped separately at the scale surveyed, but have overriding limitations that make their suitability and ratings virtually identical, for instance Soil 30 is an association of both the Codorus and Hatboro soils.

[2]SOIL PROBLEM CLASS

Based on the severity of problems associated with these soils and the potential difficulty of analyzing and correcting those problems, the 108 units of soils are grouped into 4 classes: I, II, III and IV. These class designations serve as a guide to determine if and what type of geotechnical engineering study is required for site development.

Class I Soils

Class I soils are undisturbed natural soils that typically have few characteristics that would adversely affect building foundations or surrounding land. Class I soils consist of Soil Numbers 11, 28, 33, 38, 39, 76, 79, 80, 81, 84, 85, 87, 88 and 90. A geotechnical investigation is advised but not required as a condition of site or grading plan approval.

The submission of a geotechnical report is typically not required under the following circumstances:

- The building footprint is more than 25 feet from any Class III or IV problem soil. The 25-foot margin allows for errors in soil mapping. If the building footprint is within 25 feet, a report is required unless waived by the Director.
- All proposed construction is in Class I and Class II soils and there is no grading activity in problem soils. If the proposed construction is partially located in a problem soil, especially Class III or IV soils, submission of a geotechnical report is required unless waived by the Director.
- There are no buildings with more than 3 stories, mat foundations, deep foundations, deep excavations, sheeting and shoring, or retaining walls over 6 feet high. On a case-by-case basis, any report that is prepared may be submitted with the building plans after site or grading plan approval.

For site, grading, subdivision or construction plans, the following items must be addressed in the plan:

- foundation drain details for proposed below-grade walls,
- yard or overlot drainage,
- construction notes for fill placement (acceptable material specification, lift thickness, density testing, frequency of testing and construction inspection notes as shown in PFM §§ 4-0502.1 and 4-0502.2),
- excavation safety and
- impact on adjoining properties.

Class II Soils

Class II soils are undisturbed natural soils that typically have shallow water tables or restrictive soil layers. Class II soils consist of Soil Numbers 2, 7, 9, 31, 75, 77, 78, 92 and 93. A geotechnical investigation is strongly advised but not required as a condition of site or grading plan approval.

The submission of a geotechnical report is typically not required under the following circumstances:

- The building footprint is more than 25 feet from any Class III or IV problem soil. The 25-foot margin allows for errors in soil mapping. If the building footprint is within 25 feet, a report is required unless waived by the Director.
- All proposed construction is within Class I and Class II soils and there is no grading activity in any problem soils. If the proposed construction is partially located in a problem soil, especially Class III or IV soils, submission of a geotechnical report is required unless waived by the Director.
- There are no buildings with more than 3 stories, mat foundations, deep foundations, deep excavations, sheeting and shoring, or retaining walls over 6 feet high. On a case-by-case basis, any report that is prepared may be submitted with the building plans after site or grading plan approval.

For site, grading, subdivision or construction plans, the following items must be addressed in the plan:

- groundwater problems are addressed with appropriate foundation drains and backfill on proposed below-grade walls,
- yard or overlot drainage,
- construction notes for fill placement (acceptable material, lift thickness, density testing, frequency of testing, construction inspection notes as shown in PFM §§ 4-0502.1 and 4-0502.2),
- excavation safety and
- impact on adjoining properties.

Class III Soils
Class III soils are undisturbed natural soils that have characteristics such as high shrink/swell potential, landslide susceptibility, high compressibility, low bearing strength, and shallow water tables, which may result in poor drainage, building settlement, unstable slopes, etc. Class III soils consist of Soil Numbers 1, 8, 10, 29, 30, 32, 34, 35, 36, 37, 48, 49, 59, 60, 61, 62, 63, 64, 65, 74, 82, 83, 89, 91, 94 and 109. The soil types or conditions included in this group are: 1) Cretaceous-age Potomac Group Clays (mapped as Marumsco soils and/or "marine clay"), 2) other soils containing high shrink-swell clays, 3) soils with a seasonal high water table at or near the surface for prolonged periods and low bearing strength (poor foundation support) and 4) alluvial or floodplain soils. A detailed geotechnical investigation and report are required.

Geotechnical problems must be addressed with adequate engineering evaluations and designs prior to development. A geotechnical report, prepared according to the geotechnical guidelines of PFM Chapter 4 and the Virginia Uniform Statewide Building Code (USBC) is mandatory for all construction and grading within these problem soil areas. The engineering evaluation and report shall be submitted for approval and the recommendations incorporated into the grading plans as requirements prior to plan approval. Construction inspections and certifications are required from the engineer of record.

Class IV Soils
Class IV soils are soils that have been disturbed or altered as a result of grading or construction resulting in soils with variable characteristics. Class IV soils are divided into two groups, IVA and IVB.

Class IVA Soils
Class IVA soils are disturbed soils that were originally Class III soils and consist of Soil Numbers 13, 15, 17, 20, 21, 26, 27, 42, 43, 44, 47, 51, 52, 53, 54, 55, 56, 57, 69, 71, 73, 86, 103 and 106. Landfill and quarry areas are also grouped here. A detailed geotechnical investigation and report are required.

Geotechnical problems must be addressed with adequate engineering evaluations and designs prior to development. A geotechnical report, prepared according to the geotechnical guidelines of PFM Chapter 4 and the Virginia Uniform Statewide Building Code (USBC) is mandatory for all construction and grading within these problem soil areas. The engineering evaluation and report shall be submitted for approval and the recommendations incorporated into the grading plans as requirements prior to plan approval. Construction inspections and certifications are required from the engineer of record.

Class IVB Soils
Class IVB soils are disturbed soils that were originally Class I or II soils, and consist of Soil Numbers 3, 4, 5, 6, 12, 14, 16, 18, 19, 22, 23, 24, 25, 40, 41, 45, 46, 50, 66, 67, 68, 70, 72, 95, 96, 97, 98, 99, 100, 101, 102, 104, 105, 107 and 108.

A limited geotechnical investigation is required in the form of a letter report to be incorporated into the first submission of the site, subdivision, grading or construction plans. The information placed on the plans will consist of soil strength tests (e.g. SPT boring logs) and construction notes addressing identified problems and other requirements for construction such as those identified under Class II soils. For example, the letter report should be based on knowledge of the previous site disturbance, proposed construction, site grades, floor elevations, etc. Borings shall extend through any fill to depths below the proposed footing elevation. Standard engineering practice is a depth that is 2 to 3 times the width of the proposed footing. Depending on the issues identified during the review of the plan (i.e., depth of existing fill, proposed construction, recommended foundation and slab support, stability of slopes, the need for referral to the Geotechnical Review Board), a detailed geotechnical report submitted separately may be required prior to the second submission of the site or grading plans. It is therefore advised that a comprehensive geotechnical report be obtained for these soils earlier in the process.

For non-bonded lot grading plans where proposed residential dwellings are to be located on properties containing Class IVB soils, a geotechnical investigation and report will not be required if a certification is provided stating that all eight of the items below are met. The certification must be signed and sealed by a professional authorized by the state to provide such information and incorporated into the plans. The certification form is available with DPWES's General Land Use and Development forms on the county website. The eight items are listed below:

1. Problem Class III or Class IVA soils are not mapped on the property.
2. The project does not require sheeting and shoring, retaining walls over 6 feet high, pile foundations, geopiers, mat foundations or ground modification such as dynamic compaction, stone columns, vibra compaction, chemical stabilization, etc.
3. Geotechnical reports are not required under any other county regulation or building codes.
4. The maximum depth of existing disturbed land on the property is less than 5 feet.
5. The footings and floor slabs will be supported on competent natural soils.
6. The existing slopes on the property are not steeper than 3:1(horizontal:vertical). If existing slopes are steeper than 3:1, the county's geotechnical review engineer shall be contacted. Evaluation of the slopes may be required, depending on the proposed house location.
7. The structure is located at least 15 feet from the top of any 3:1 (horizontal: vertical) or steeper slope and the influence zone of house footings does not intercept with any slope. The influence zone of a footing is defined as the area beneath a 45-degree line extending outward and downward from footing exterior edge.
8. The foundation drain details are included on the plans.

Geotechnical Report Requirements Summary

The geotechnical report requirements are summarized in the table below where NRQ stands for not required and REQ stands for required:

SOIL PROBLEM CLASS	I	II	III	IVA	IVB
Geotechnical Investigation	1	2	REQ	REQ	REQ
Geotechnical Report	NRQ	NRQ	REQ	REQ	3
Geotechnical Specification on Plans, 4	REQ	REQ	REQ	REQ	REQ

Key:

1. Advised, but not required.
2. Strongly advised, but not required.
3. Results of geotechnical investigation are required on the first submission of site and subdivision plans. For non-bonded lot grading plans where the proposed residential dwellings are to be located on properties containing Class IVB soils, the certification referenced in PFM § 4-0205.2.3 shall be incorporated into plans.
4. For Class I soils see PFM § 4-0202.3. For Class II soils see PFM § 4-0203.3. For Class III and Class IV soils, report recommendations must be stated as requirements in specifications.

The installation of linear structures such as storm sewer or sanitary sewer lines, usually do not require submission of a geotechnical report. Notes addressing placement of backfill and OSHA excavation requirements are sufficient in most cases. The only exception would be in cases where such construction activity might trigger movement in adjoining slopes. Cutting of existing steep slopes in slide prone areas (Marumsco or "Marine Clay" areas) requires slope stability analysis and submission of geotechnical report prior to plan approval or permit issuance. Additions to residential structures and minor commercial buildings exempt from site or grading plan submission requirements only require an engineered foundation design submitted with building permit application.

A note on dams: Geotechnical report submission requirements for projects involving dams/impoundments regulated by the county can be found in PFM § 6-1605.
A geotechnical engineer must be consulted for site-specific investigations.

[3]HYDROLOGIC SOIL GROUP

Soils hydrologic groups have been defined by the USDA Soil Conservation Service. Soils are assigned to one of four groups based on the potential for producing runoff. Soils in Group A have a high infiltration rate even when wet and, therefore, have a low runoff potential. Soils in Group D have a slow infiltration rate due to shallow impermeable layer of bedrock or a permanent high water table near the surface and, therefore, have a high runoff potential.

[4]SOIL EROSION FACTORS

The K factor is an indicator of the susceptibility of the soil to sheet and rill erosion. K factors were determined using the soil erodibility nomograph in the National Soils Handbook (USDA Soils Conservation Service 1983) and are specific to the soils of Fairfax County. The K factor may vary for each layer within the soil. The surface K factor refers to erodibility of the undisturbed soil surface. The critical K factor is the maximum soil erodibility that can be expected during construction activities.

The T factor represents the maximum tolerable rate of annual soil erosion, in tons per acre, that will permit sustainable vegetative growth. The T factor is the soil loss tolerance variable used in the universal soil loss equation. Criteria defined in the National Soils Handbook (USDA Soils Conservation Service 1983) were used to determine T factors for each soil type.

[5]SUBSOIL PERMEABILITY

Permeability refers to the quality that enables air and water to move through the soil. Permeability is expressed as a rate, in inches per hour, in which water moves downward through the soil. Subsurface permeability refers to the permeability of the least permeable subsurface layer.

[6]WATER TABLE

The seasonal high water table is defined as the highest level of a saturated zone of a soil during most years. This depth is given as average, in feet, for each soil layer. A perched seasonal high water table is one in which a dense soil layer restricts water movement through the soil creating saturated zone above the dense layer. The dense layer and underlying layers may remain unsaturated.

[7]DEPTH TO BEDROCK

The depth to hard bedrock is defined as the depth at which rock can no longer be excavated with a backhoe, small ripper or a grader. Blasting or special equipment is typically necessary for excavation below this depth. The range given for each soil is typical for that soil type, however, some exceptions may be encountered in each type.

[8]SOIL DRAINAGE

Soil conditions that affect drainage around yards, crawl spaces and basements include depth to seasonal high water table, permeability, landscape position and potential for flooding. Soils with a "poor" rating have a seasonal high water table at or near the surface, permeable layers with slow infiltration rates or are subject to frequent flooding. A "good" rating refers to permeable soils with a seasonal water table well below the ground surface.

[9]SUITABILITY FOR SEPTIC DRAINFIELDS

Suitability for septic drainfields and infiltration trenches is based on depth to seasonal high water table, bedrock or other restrictive layer, slope, landscape position, flooding potential and permeability. These general ratings should be used for preliminary planning and evaluation. Site evaluations are necessary to determine actual soil conditions and suitability. The Health Department should be contacted for the requirements.

[10]BEST MANAGEMENT PRACTICES (BMP) INFILTRATION TRENCHES

Suitability for infiltration trenches used for storm water control is based on depth to seasonal high water table, bedrock or other restrictive layer, slope, landscape position, flooding potential and permeability. These general ratings should be used for preliminary planning and evaluation only. Site evaluations are necessary to determine actual soil conditions and suitability. Technical guidance in planning and designing BMP infiltration trenches can be found in the Northern Virginia BMP Handbook. The Handbook is available online at: http://www.novaregion.org/DocumentView.asp?DID=1679. Soil testing guidelines for infiltration facilities may be found in § 4-0700 of the Public Facilities Manual.

[11]EROSION POTENTIAL

Erosion potential applies to soils under construction site conditions. Erodibility is affected by texture (relative proportion of sand, silt and clay), rock content, permeability, structure and slope (either natural or man-made)

Low	Soils are not highly erodible except on steep unprotected cuts. Erosion of less than 0.05 inches from sheet-flow runoff can be expected on unprotected soils during a severe storm.
Moderate	Soils are moderately erodible on B slopes and highly erodible on C slopes or greater. Erosion of 0.05 to 0.25 inches from sheet-flow runoff plus rill and shallow gully erosion can be expected on unprotected soils during a severe storm.
High	Soils which are highly erodible even on B slopes. Soil loss in excess of 0.25 inches from sheet-flow runoff erosion and the formation of numerous gullies can be expected on unprotected soils in a severe storm.

[12]FOUNDATION SUPPORT

Foundation support ratings are based on empirical observations and experience. Unstable slopes, soft or compressible soils with low bearing values, high shrink-swell clays, high seasonal water tables, and flooding potential will adversely affect foundation support. In some problem soils shallow bedrock may provide high bearing values, however, the bedrock may not to be continuous or may require blasting for the foundation subgrade.

[13]OTHER NOTES

As -- Bedrock With Naturally Occurring Asbestos

These soils occur within a geologic formation known as the Piney Branch Complex, locally known as greenstone. Naturally occurring asbestos minerals, predominantly actinolite and tremolite, are known to occur in this formation. Excavations in bedrock or earth moving activities within this formation may expose these minerals to the atmosphere allowing the fibers to become airborne.

As**-- In almost all cases these soils are not considered to be asbestos-containing soils, but a portion of the map units of this soil type is mapped on top of asbestos-containing parent material. This portion is generally very small. It is necessary to check the county's soils map to see if the area of interest falls within asbestos-containing material.

Areas that may contain naturally occurring asbestos soils are depicted on County Tax Map Grids available on the Fairfax County Health Department website at http://www.fairfaxcounty.gov/hd/chs/natural-asb.htm. Special precautions regarding these soils or fill originating from these soils are required by the Occupational Safety and Health Regulations (OSHA), available at www.osha.gov/SLTC/asbestos/index.html, and enforced by the Virginia Department of Labor and Industry. Personnel working in or around this geologic area should be alerted to this potential health risk. For construction activities in this area dust control and worker protection measures must be implemented. Special Guidance has been issued by the U.S. Environmental Protection Agency (EPA) at http://www.epa.gov/asbestos/.

The Environmental Health Division of the Fairfax County Health Department (703-246-2444) may be contacted for additional information.

Hyd -- Hydric Soils

Soils labeled “Hyd” are predominantly hydric soils. Hydric soils are saturated, flooded, or ponded long enough during the growing season to develop anaerobic (oxygen-deprived) conditions in the upper soil. Not every hydric soil is labeled as such in the table; the soil descriptions in this document should also be consulted.

Hydric soils are one of 3 criteria used to delineate wetlands. According to the Federal Manual for Identifying and Delineating Jurisdictional Wetlands, a jurisdictional wetland has 3 essential characteristics: (1) wetland hydrology (where soils are inundated or saturated with water for prolonged periods during the growing season), (2) hydrophytic vegetation (where plants have adapted to withstand saturated conditions) and (3) hydric soils.

Non-tidal wetlands are regulated under Section 404 of the Clean Water Act. The U.S. Army Corps of Engineers and the EPA are responsible for making determinations of wetlands regulated under the Clean Water Act. A permit must be obtained from the Corps of Engineers in many cases where construction is planned in wetlands.

The presence of hydric soils on the Fairfax County Soil Identification Maps provides a good indication of the extent and probability of wetlands, but does not necessarily mean that the site is a jurisdictional wetland. Other wetland criteria may not be present or small areas of non-hydric soils may be included in the hydric soil mapping units. A detailed site evaluation is necessary to confirm the presence of, and delineate the extent of, wetlands.

US -- Unstable Slopes

Soil types noted as "US" are susceptible to instability on natural slopes. Slope movement may be accelerated by construction activities. Slope stability analyses must be performed using acceptable engineering methods.

Slope stability refers to long-term, or permanent, stability of the original ground. For most soils the maximum final slope should not be steeper than 3:1 (horizontal:vertical). The soils noted as "US" generally require permanent slopes of 5:1 or flatter where marine clays and Lunt-Marumsco Complex are present. Fill slopes require engineering designs and compaction to ensure long-term stability.

Temporary slopes such as in excavations or trenches must be designed in accordance with OSHA standards.

SOIL MAP UNIT DESCRIPTIONS

(1) Albano – This soil consists of silty and clayey alluvium over weathered bedrock. The soil is poorly drained with the water table at or near the surface during much of the year. The soil occurs on almost perfectly flat areas in and around drainage ways in the Triassic Basin. The subsoil can contain plastic clays with moderate shrink-swell capacities. Bedrock is found 3½ to 5 feet below the surface. Soil strength may be poor because of wetness and plastic clays. Septic drainfields and infiltration trenches are poorly suited because of the high water table and shallow bedrock. Hydric soils, which include non-tidal wetlands, occur extensively in this mapping unit. Basements below existing grade are not recommended.

(2) Ashburn – This soil occurs on broad level and gently sloping uplands of the Triassic Basin. Silty alluvium overlies weathered shale, sandstone and siltstone bedrock. Bedrock is found 3 to 5 feet below the surface. Water perches on top of the bedrock forming a seasonal high water table at 1½ to 2½ feet below the surface. The wet soil can be soft, so foundations often extend to bedrock. Waterproofing and foundation drains are often necessary to prevent wet basements. Grading and subsurface drains may be necessary to eliminate wet yards. Suitability for septic drainfields and infiltration trenches is poor because the perched water table and shallow bedrock. Use of the bedrock in engineered fill, road embankment or trench backfill is limited due to rapid disintegration. For deep-rooted landscaping plants, top soil may be needed to increase the rooting depth.

(3) Barkers Crossroads – This soil consists of sand, silt and clay weathered from granite bedrock that has been mixed, graded and compacted during development and construction. Characteristics of the soil can be quite variable depending on what materials were mixed in during construction. The subsoil is generally loam but can range from sandy loam to clay. The soil has been compacted resulting in high strength and slow permeability. The soil is well drained and bedrock is found at depths greater than 5 feet. In most cases, foundation support is suitable assuming that the soil is well compacted and contains few clays. Because of the slow permeability, suitability for septic drainfields is poor and marginal for infiltration trenches. Grading and subsurface drains may be needed to eliminate wet yards caused by the slow permeability. This soil is found in developed areas of the Piedmont with granite bedrock.

(4) Barkers Crossroads-Nathalie Complex – This complex is a mixture of the development-disturbed Barkers Crossroads soil and the natural Nathalie soil. The complex occurs in areas of the Piedmont with granite bedrock that have been developed but retain a good portion of undisturbed soil. Barkers Crossroads soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Nathalie soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (3) Barkers Crossroads and (79) Nathalie.

(5) Barkers Crossroads-Rhodhiss Complex – This complex is a mixture of the development-disturbed Barkers Crossroads soil and the natural Rhodhiss soil. The complex occurs in areas of the Piedmont with granite bedrock that have been developed but retain a good portion of undisturbed soil. Barkers Crossroads soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Rhodhiss soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (3) Barkers Crossroads and (87) Rhodhiss.

(6) Barkers Crossroads-Rhodhiss-Rock Outcrop Complex - This soil is a mixture of the development-disturbed Barkers Crossroads soil, the natural Rhodhiss soil and naturally occurring outcrops of granite bedrock. The complex occurs in areas of the Piedmont with granite bedrock that have been developed but retain a good portion of undisturbed soil. This complex is mostly limited to areas on, or adjacent to, steep hillsides bordering the floodplains of larger streams. Barkers Crossroads soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Rhodhiss soil will be found under older vegetation in ungraded back and front yards and common areas. Rock outcrops will be found on the steepest hill slopes. Thin, rocky Rhodhiss-like soil will be mixed in with the rock outcrops. The outcrops are difficult to use for any development because of the slope and rockiness. For a description of the two soils that make up this map unit, please see (3) Barkers Crossroads and (88) Rhodhiss-Rock Outcrop complex.

(7) Beltsville - This gravelly and silty soil occurs on hilltops in the Coastal Plain and on old Coastal Plain terraces. A naturally occurring dense layer is encountered at depths of 2 to 2½ feet. The depth to hard bedrock is typically greater than 50 feet. Permeability of the dense layer is very slow, resulting in a perched seasonal high water table 1½ to 2½ feet below the surface. Foundation support is typically good with proper drainage. Foundation drains and waterproofing are necessary to prevent wet basements. Grading and subsurface drainage is usually required to eliminate wet yards. Septic drainfields are poorly suited and infiltration trenches are marginally suited because of slow permeability and the perched water table.

(8) Bermudian – This soil consists of silty and clayey alluvial sediments eroded from sandstone, siltstone and shale. It typically occurs at higher elevations within the floodplains of the Triassic Basin and is subject to flooding. The soil is well drained. The depth to hard bedrock is greater than 6 feet. Permeability is moderate. Foundation support is fair because of flooding. Occasional flooding makes the soil poorly suited for development.

(9) Birdsboro - This soil, occurring on low terraces along Bull Run, consists of predominantly old silty and clayey alluvium. Low areas are very close to the floodplain. The seasonal high water table is 2 to 4 feet below the surface. Depth to red shale or sandstone bedrock is generally from 7 to 20 feet, but may be shallower in some places. Permeability is moderately slow. Foundation support may be poor because of soft soil and seasonal saturation. Foundation drains (both exterior and interior) and waterproofing are needed to prevent wet basements. Grading and subsurface drainage are often required to eliminate wet yards. Suitability for septic drainfields and infiltration trenches is poor due to the water table and potential flooding. Use of the bedrock as engineered fill, road embankment or trench backfill is limited due to rapid disintegration.

(10) Bowmansville – This soil consists of silt and clay alluvium over gravelly and sandy alluvium eroded from sandstones, siltstones and shale. This soil occurs in large floodplains of the Triassic Basin and is subject to flooding. The seasonal high water table is 0 to 1 foot below the surface. The depth to hard bedrock is greater than 6 feet. Foundation support may be poor because of soft soil and seasonal saturation. Basements below existing grade are not recommended because of potential severe wetness problems. Suitability for septic drainfields and infiltration trenches is poor because of wetness and flooding potential. Bowmansville is predominantly hydric and may contain potential non-tidal wetlands.

(11) Catlett - This silty and very gravelly soil occurs on hilltops and sideslopes underlain by gray baked sandstone and shale (hornfels). The depth to bedrock is generally 1 to 3 feet below the surface. Soil permeability is moderate, but drainage may be restricted by bedrock. Foundation support is generally good, but excavation can be difficult because of the shallow bedrock. Grading and subsurface drainage may be needed to prevent wet yards. Suitability for septic drainfields and infiltration trenches is poor because of shallow bedrock. Use of this bedrock as engineered fill, road embankment or trench backfill is limited due to rapid weathering. Added topsoil may be needed in shallow areas to provide adequate rooting depths for deeper-rooted landscape plants.

(12) Chantilly – This dark red soil consists of sand, silt and clay weathered from sedimentary bedrock of the Triassic Basin that has been mixed, graded and compacted during development and construction. Characteristics of the soil can be quite variable depending on what materials were mixed in during construction. The subsoil is generally loam but can range from sandy loam to clay. The soil has been compacted, resulting in high strength and slow permeability. The soil is well drained and bedrock is found at depths greater than 5 feet. In most cases, foundation support is suitable, assuming that the soil is well compacted and contains few clays. Because of the slow permeability, suitability for septic drainfields is poor and for infiltration trenches is marginal. Grading and subsurface drains may be needed to eliminate wet yards caused by the slow permeability. This soil is found in developed areas of the Triassic Basin with sandstone, siltstone and shale bedrock.

(13) Chantilly-Albano Complex - This complex is a mixture of the development-disturbed Chantilly soil and the natural Albano soil. The complex occurs in areas of the Triassic Basin with sedimentary shale, sandstone and siltstone bedrock that have been developed but retain a good portion of undisturbed soil. Chantilly soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Albano soil will be found in low-lying undisturbed areas around drainage ways. For a description of the two soils that make up this map unit, please see (12) Chantilly and (1) Albano.

(14) Chantilly-Ashburn Complex - This complex is a mixture of the development-disturbed Chantilly soil and the natural Ashburn soil. The complex occurs in areas of the Triassic Basin with sedimentary shale, sandstone and siltstone bedrock that have been developed, but retain a good portion of undisturbed soil. Chantilly soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Ashburn soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (12) Chantilly and (2) Ashburn.

(15) Chantilly-Bermudian Complex - This complex is a mixture of the development-disturbed Chantilly soil and the natural Bermudian soil. The complex occurs near floodplains in areas of the Triassic Basin with sedimentary shale, sandstone and siltstone bedrock that have been developed but retain a good portion of undisturbed soil. Chantilly soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Bermudian soil will be found along undisturbed areas within the border of the floodplain. For a description of the two soils that make up this map unit, please see (12) Chantilly and (8) Bermudian.

(16) Chantilly-Birdsboro Complex - This complex is a mixture of the development-disturbed Chantilly soil and the natural Birdsboro soil. The complex occurs near the Bull Run floodplain in areas of the Triassic Basin with sedimentary shale, sandstone and siltstone bedrock that have been developed, but retain a good portion of undisturbed soil. Chantilly soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Birdsboro soil will be found in undisturbed areas adjacent to the floodplain. For a description of the two soils that make up this map unit, please see (12) Chantilly and (9) Birdsboro.

(17) Chantilly-Bowmansville Complex - This complex is a mixture of the development-disturbed Chantilly soil and the natural Bowmansville soil. The complex occurs near floodplains in the areas of the Triassic Basin with sedimentary shale, sandstone and siltstone bedrock that have been developed, but retain a good portion of undisturbed soil. Chantilly soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Bowmansville soil will be found along undisturbed areas within the border of the floodplain. For a description of the two soils that make up this map unit, please see (12) Chantilly and (10) Bowmansville.

(18) Chantilly-Catlett Complex - This complex is a mixture of the development-disturbed Chantilly soil and the natural Catlett soil. The complex occurs in areas of the Triassic Basin with sedimentary shale and sandstone and metamorphic hornfels bedrock that have been developed but retain a good portion of undisturbed soil. Chantilly soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Catlett soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (12) Chantilly and (11) Catlett.

(19) Chantilly-Clover Complex - This complex is a mixture of the development-disturbed Chantilly soil and the natural Clover soil. The complex occurs in areas of the Triassic Basin with sedimentary shale, sandstone and siltstone bedrock that have been developed but retain a good portion of undisturbed soil. Chantilly soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Clover soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (12) Chantilly and (28) Clover.

(20) Chantilly-Delanco Complex - This complex is a mixture of the development-disturbed Chantilly soil and the natural Delanco soil. The complex occurs near drainage ways and on stream terraces in areas of the Triassic Basin with sedimentary shale, sandstone and siltstone bedrock that have been developed but retain a good portion of undisturbed soil. Chantilly soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Delanco soil will be found in undisturbed areas near drainageways. For a description of the two soils that make up this map unit, please see (12) Chantilly and (32) Delanco.

(21) Chantilly-Dulles Complex - This complex is a mixture of the development-disturbed Chantilly soil and the natural Dulles soil. The complex occurs in areas of the Triassic Basin with sedimentary shale, sandstone and siltstone bedrock that have been developed but retain a good portion of undisturbed soil. Chantilly soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Dulles soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (12) Chantilly and (34) Dulles.

(22) Chantilly-Manassas Complex - This complex is a mixture of the development-disturbed Chantilly soil and the natural Manassas soil. The complex occurs along small drainage ways in areas of the Triassic Basin with sedimentary shale, sandstone and siltstone bedrock that have been developed but retain a good portion of undisturbed soil. Chantilly soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Manassas soil will be found along undisturbed areas around drainage ways. For a description of the two soils that make up this map unit, please see (12) Chantilly and (75) Manassas.

(23) Chantilly-Montalto Complex - This complex is a mixture of the development-disturbed Chantilly soil and the natural Montalto soil. The complex occurs in areas of the Triassic Basin with sedimentary shale and sandstone and igneous diabase bedrock that have been developed, but retain a good portion of undisturbed soil. Chantilly soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Montalto soil will be found under older vegetation in ungraded back and front yards and common areas. Montalto soil is made of clayey materials weathered from diabase, diorite or similar igneous rock. Hard bedrock is found at depths between 5 and 12 feet. The soil is well drained. Moderately plastic clays are present, but foundation support is generally good especially if the foundation can be sunk below the clay layer to the coarser soil or bedrock below. Suitability for septic drainfields is marginal because of the plastic clays and slow permeability. Suitability for infiltration trenches is fair because of potentially shallow bedrock. For a description of Chantilly, please see (12) above.

(24) Chantilly-Nestoria Complex - This complex is a mixture of the development-disturbed Chantilly soil and the natural Nestoria soil. The complex occurs in areas of the Triassic Basin with sedimentary shale, sandstone and siltstone bedrock that have been developed but retain a good portion of undisturbed soil. Chantilly soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Nestoria soil will be found under older vegetation on undisturbed slopes with slopes often exceeding 25%. For a description of the two soils that make up this map unit, please see (12) Chantilly and (80) Nestoria.

(25) Chantilly-Penn Complex - This complex is a mixture of the development-disturbed Chantilly soil and the natural Penn soil. The complex occurs in areas of the Triassic Basin with sedimentary shale, sandstone and siltstone bedrock that have been developed but retain a good portion of undisturbed soil. Chantilly soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Penn soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (12) Chantilly and (85) Penn.

(26) Chantilly-Rowland Complex - This complex is a mixture of the development-disturbed Chantilly soil and the natural Rowland soil. The complex occurs near floodplains in areas of the Triassic Basin with sedimentary shale, sandstone and siltstone bedrock that have been developed but retain a good portion of undisturbed soil. Chantilly soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Rowland soil will be found along undisturbed areas within the border of the floodplain. For a description of the two soils that make up this map unit, please see (12) Chantilly and (89) Rowland.

(27) Chantilly-Sycoline-Kelly Complex - This complex is a mixture of the development-disturbed Chantilly soil and the natural Sycoline and Kelly soils. The complex occurs in areas of the Triassic Basin with sedimentary shale and sandstone and metamorphic hornfels bedrock that have been developed but retain a good portion of undisturbed soil. Chantilly soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Sycoline and Kelly soils will be found under older vegetation in ungraded back and front yards and common areas. For a description of the soils that make up this map unit, please see (12) Chantilly, (65) Kelly and (94) Sycoline-Kelly Complex.

(28) Clover – This soil occurs on hilltops and sideslopes along the eastern edge of the Triassic Basin. Bedrock consists of relatively thin deposits of sandstone conglomerates mixed with schist materials. The loamy surface and clayey subsurface contains rounded and angular gravel. Depth to rock is between 10 and 15 feet. Moderately plastic clays are present in the subsoil, but foundation support is generally favorable if the foundation is anchored below the clay layers. The soil is well drained and well suited for septic drainfields and infiltration trenches.

(29) Codorus – This soil consists of silty and loamy alluvium eroded from schist, granite and gneiss. This soil occurs in the piedmont on floodplains and terraces adjacent to active stream channels and is subject to flooding. The seasonal high water table between ½ to 2 feet below the surface. Depth to hard bedrock ranges from 10 to 20 feet below the surface. Foundation support is poor because of soft soil, seasonal saturation and flooding. Basements below existing grade are not recommended because of potential severe wetness problems. Suitability for septic drainfields and infiltration trenches is poor because of wetness and flooding. Hydric soils are likely to occur in small low-lying areas.

(30) Codorus and Hatboro - This channel-dissected soil grouping occurs in floodplains and drainageways of the Piedmont and Coastal Plain, and is susceptible to flooding. Soil material is mainly silty and loamy, but stratified layers of sand and gravels are not uncommon. The seasonal high water table varies between 0 and 2 feet below the surface. Depth to hard bedrock ranges from 6 to 30 feet below the surface. Permeability is variable. Foundation support is poor because of soft soil, seasonal saturation and flooding. Septic drainfields and infiltration trenches are poorly suited because of wetness and flooding potential. Stream bank erosion within these soils may result in undercutting of embankments on adjacent properties. Hydric soils, which may include non-tidal wetlands, occur within this mapping unit.

(31) Danripple – This soil forms in old alluvium on flat stream terraces near the border of the Piedmont and Coastal Plain. The topsoil is often gravelly and the subsoil is clay. The seasonal high water table can be as high as 40 inches below the surface. Depth to bedrock is greater than 5 feet. The high water table combined with the moderately plastic clays of the subsoil causes foundation support to be marginal. Foundation drains (both exterior and interior) and waterproofing are needed to ensure dry basements. Suitability for septic drainfields is marginal and for infiltration trenches is poor because of the seasonal high water table. Surface grading and subsurface drainage may be necessary to prevent wet yards.

(32) Delanco – This soil occurs in old alluvium along flat stream terraces and concave landscapes around drainageways along the border of the Triassic Basin and Piedmont Upland. The topsoil is loamy and the clay content increases with depth. Moderately plastic clays occur in the subsoil. Small waterworn gravels can be common throughout the soil, but are not always present. The seasonal high water table is about 2 feet below the surface. Depth to bedrock is greater than 5 feet. The foundation support may be poor because of the high water table, soft soils and plastic clays. Suitability for septic drainfields and infiltration trenches is also poor. Foundation drains (both exterior and interior) are needed to ensure dry basements. Surface grading and subsurface drainage may be necessary to prevent wet yards.

(33) Downer – This soil occurs on nearly level landscapes in the lower Coastal Plain typically around Mason Neck. Soil materials range from sandy loams to sands. Depth to bedrock is between 50 and 500 feet. Permeability is rapid and the soil is well drained. The soil provides adequate support for foundations and is suitable for most urban and residential uses. The suitability for septic drainfields can be marginal because the permeability is too fast to provide acceptable treatment.

(34) Dulles – This silty to clayey soil occurs in drainageways and at the bottom of slopes of the Triassic Basin and is underlain by sandstone, siltstone and shale. Slowly permeable plastic clays exist in the subsoil. Depth to weathered bedrock is typically 40 inches. Depth to hard, unweathered bedrock is typically 5 feet. A perched water table forms atop the bedrock and clays about 1 foot below the surface. Foundation support may be poor because of soft plastic soil and seasonal saturation. Basements below existing grade are not recommended because of potential wetness problems. Engineered drainage is often needed to eliminate wet yards. Septic drainfields and infiltration trenches are poorly suited because of slow permeability, high water table and shallow bedrock. The bedrock disintegrates rapidly limiting its use in engineered fill, road embankment and trench backfill.

(35) Elbert - This wet, plastic soil occurs in drainageways and at the bottom of slopes of the Triassic Basin in materials derived from weathered diabase bedrock and alluvium. Slowly permeable plastic clay subsoil occurs between 1 and 4 feet below the surface. The seasonal high water table perches atop the clay between 0 to 1½ feet below the surface. The depth to bedrock varies between 3 and 15 feet below the surface. Foundation footings must extend below the soft plastic clays, generally to bedrock, to ensure competent building support. Basements below existing grade are not recommended because of potential severe wetness problems. Engineered drainage designs are often required to eliminate wet yards. Septic drainfields and infiltration trenches are poorly suited because of wetness, slow permeability and shallow depth to bedrock. Elbert is predominantly hydric and may contain potential non tidal wetlands.

(36) Elkton - This wet soil occurs on nearly level landscapes in low elevation area of the Coastal Plain. The lowest areas of this soil, near larger streams, are within the floodplain. Silty and clayey layers overlie stratified sandy material deep in the subsoil. Organic strata (peat and muck) may be encountered in some areas. The clays typically have a moderate shrink-swell potential that has resulted in foundation damage on some existing residential dwellings. The seasonal high water table is between 0 and 1 foot below the surface; long duration puddles are common. Depth to bedrock is greater than 200 feet. Permeability is slow to very slow. Foundation support may be poor because of soft soils, plastic clay and seasonal saturation. Basements below existing grade are not recommended because of potential severe wetness problems. Engineered drainage designs are often required to eliminate wet yards. Suitability for septic drainfields and infiltration trenches is poor because of wetness and slow permeability. Elkton is predominantly hydric and may contain potential non tidal wetlands.

(37) Elsinboro – This loamy and clayey soil occurs on old stream terraces of the Piedmont and consists of old alluvium. It is subject to rare, but brief, flooding. It is well drained and the depth to bedrock is greater than 6 feet. Suitability for foundation support is fair because of the flooding. Flooding makes the soil poorly suited for septic drainfields and infiltration trenches. Surface grading and subsurface drainage are needed to prevent wet yards.

(38) Fairfax - This Piedmont upland soil consists of a capping of silty old alluvium over silty and sandy soil materials weathered from the underlying bedrock. Bedrock is typically micaceous schist and phyllite. The alluvium capping materials ranges from ½ to 3 feet thick and contains rounded waterworn pebbles. The subsoil can be quite clayey, but the clays are only slightly plastic. The soil is well drained. Depth to hard bedrock is between 10 and 100 feet below the surface. Foundation support is typically good for small buildings (i.e., 3 stories or less). Suitability for septic drainfields is fair because the high clay content of the subsoil could cause slow permeability. Infiltration trenches are well suited for this soil. Because of a high mica content in the layers below the alluvium capping, the soil tends to "fluff" up when disturbed and is difficult to compact requiring engineering designs for use as structural fill. This soil is suitable for septic drainfields and infiltration trenches.

(39) Glenelg - This Piedmont soil occurs extensively on hilltops and sideslopes underlain by micaceous schist and phyllite. Silts and clays overlie silty and sandy decomposed rock. Depth to hard bedrock ranges between 5 and 100 feet below the surface. Permeability is generally adequate for all purposes. Foundation support for small buildings (i.e., 3 stories or less) is typically suitable. Because of a high mica content, the soil tends to "fluff" up when disturbed and is difficult to compact requiring engineering designs for use as structural fill. This soil is suitable for septic drainfields and infiltration trenches. Glenelg is highly susceptible to erosion.

(40) Grist Mill - This soil consists of sandy, silty and clayey sediments of the Coastal Plain that have been mixed, graded and compacted during development and construction. Characteristics of the soil can be quite variable depending on what materials were mixed in during construction. The subsoil is generally a clay loam, but can range from sandy loam to clay. The soil has been compacted, resulting in high strength and slow permeability. The soil is well drained and depth to bedrock is greater than 20 feet below the surface. In most cases, foundation support is suitable assuming that the soil is well compacted and contains few clays. Because of the slow permeability, suitability for septic drainfields is poor and for infiltration trenches is marginal. Grading and subsurface drains may be needed to eliminate wet yards caused by the slow permeability. This soil is found in low elevation developed areas of the Coastal Plain.

(41) Grist Mill-Downer Complex - This complex is a mixture of the development-disturbed Grist Mill soil and the natural Downer soil. The complex occurs in low elevation areas of the Coastal Plain that have been developed but retain a good portion of undisturbed soil. Grist Mill soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Downer soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (40) Grist Mill and (33) Downer.

(42) Grist Mill-Elkton Complex - This complex is a mixture of the development-disturbed Grist Mill soil and the natural Elkton soil. The complex occurs in low elevation areas of the Coastal Plain that have been developed but retain a good portion of undisturbed soil. Grist Mill soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Elkton soil will be found under older vegetation in ungraded back and front yards and common areas. The area of Elkton soil will be wet and may contain wetland plants. For a description of the two soils that make up this map unit, please see (40) Grist Mill and (36) Elkton.

(43) Grist Mill-Gunston Complex - This complex is a mixture of the development-disturbed Grist Mill soil and the natural Gunston soil. The complex occurs in areas of Mason Neck that have been developed but retain a good portion of undisturbed soil. Grist Mill soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Gunston soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (40) Grist Mill and (48) Gunston.

(44) Grist Mill-Honga Complex - This complex is a mixture of the development-disturbed Grist Mill soil and the natural Honga soil. The complex occurs in marshy areas of the Coastal Plain that have been developed but retain a good portion of undisturbed soil. Grist Mill soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Honga soil will be in the wetlands bordering large tidal streams and the bays and shoreline of the Potomac River. For a description of the two soils that make up this map unit, please see (40) Grist Mill and (60) Honga.

(45) Grist Mill-Matapeake Complex - This complex is a mixture of the development-disturbed Grist Mill soil and the natural Matapeake soil. The complex occurs in low elevation areas of the Coastal Plain that have been developed but retain a good portion of undisturbed soil. Grist Mill soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Matapeake soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (40) Grist Mill and (76) Matapeake.

(46) Grist Mill-Mattapex Complex - This complex is a mixture of the development-disturbed Grist Mill soil and the natural Mattapex soil. The complex occurs in low elevation areas of the Coastal Plain that have been developed but retain a good portion of undisturbed soil. Grist Mill soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Mattapex soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (40) Grist Mill and (77) Mattapex.

(47) Grist Mill-Woodstown Complex - This complex is a mixture of the development-disturbed Grist Mill soil and the natural Woodstown soil. The complex occurs in low elevation areas of the Coastal Plain that have been developed but retain a good portion of undisturbed soil. Grist Mill soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Woodstown soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (40) Grist Mill and (109) Woodstown.

(48) Gunston – This silty and clayey soil occurs on flat portions of the Coastal Plain in Mason Neck. The topsoil is typically grey silt loam while the subsoil consists of deep moderately plastic clays. Bedrock is greater than 20 feet below the surface. The seasonal high water table ranges from 10 inches to 2½ feet below the surface. Foundation support is poor because of the high water table, soft soil and plastic clays. Extensive foundation drains (both exterior and interior), waterproofing and surface grading are necessary to prevent wet basements. Suitability for septic tanks and infiltration trenches is poor because of the high water table and slow permeability. Surface grading and subsurface drainage are needed to prevent wet yards.

(49) Hatboro - Soils consist of loamy alluvium eroded from schist, granite and gneiss. This soil occurs within floodplains of the Piedmont and Coastal Plain and is subject to flooding. The seasonal high water table is between 0 and 1½ feet below the surface. Depth to hard bedrock ranges between 8 and 20 feet below the surface. Foundation support may be poor because of soft soils, seasonal saturation and flooding. Basements below existing grade are not recommended because of potential severe wetness problems. Suitability for septic drainfields and infiltration trenches is poor because of the high water table and flooding potential. Hatboro is predominantly hydric and may contain non tidal wetlands.

(50) Hattontown - This soil consists of sandy, silty and clayey sediments from areas of the Triassic Basin and Piedmont with igneous bedrock such as diabase. The soil materials have been mixed, graded and compacted during development and construction. The areas of the county where this soil is found tend to have naturally high percentages of plastic clays. As a result, Hattontown tends to have a higher percentage of plastic clays than other development-disturbed soils, but characteristics are highly variable depending on what materials were mixed in during construction. The subsoil is generally clay but can range to sandy loam. The soil has been compacted resulting in higher strength and slow permeability. The soil is well drained and depth to bedrock is greater than 5 feet below the surface. Foundation support is marginal because of the clay content, but this suitability is very site specific. Suitability for septic drainfields and infiltration trenches is poor because of slow permeability. Grading and subsurface drains may be needed to eliminate wet yards caused by the slow permeability. Fibrous asbestos minerals may occur in areas of greenstone bedrock. These fibers may become airborne during excavation and blasting operations. Worker protection and dust control measures are required in such instances. Please refer to the soils map to identify affected areas.

(51) Hattontown-Elbert Complex - This complex is a mixture of the development-disturbed Hattontown soil and the natural Elbert soil. The complex occurs in areas of the Piedmont Upland and Triassic Basin with igneous bedrock that have been developed, but retain a good portion of undisturbed soil. Hattontown soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Elbert soil will be found in undisturbed low-lying areas in and around drainageways. The area of Elbert soil will frequently be wet and may contain wetland plants. For a description of the two soils that make up this map unit, please see (50) Hattontown and (35) Elbert.

(52) Hattontown-Haymarket Complex - This complex is a mixture of the development-disturbed Hattontown soil and the natural Haymarket soil. The complex occurs in areas of the Piedmont Upland and Triassic Basin with igneous bedrock that have been developed but retain a good portion of undisturbed soil. Hattontown soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Haymarket soil will be found under older vegetation in ungraded back and front yards and common areas. Fibrous asbestos minerals may occur in areas of greenstone bedrock. These fibers may become airborne during excavation and blasting operations. Worker protection and dust control measures are required in such instances. Please refer to the soils map to identify affected areas. For a description of the two soils that make up this map unit, please see (50) Hattontown and (59) Haymarket.

(53) Hattontown-Jackland Complex - This soil is a mixture of the development-disturbed Hattontown soil and the natural Haymarket soil. The complex occurs in areas of the Piedmont Upland and Triassic Basin with igneous bedrock that have been developed but retain a good portion of undisturbed soil. Hattontown soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Haymarket soil will be found under older vegetation in ungraded back and front yards and common areas. Small areas of Jackland may contain naturally occurring asbestos. Fibrous asbestos minerals may occur in the areas of greenstone bedrock. These fibers may become airborne during excavation and blasting operations. Worker protection and dust control measures are required in such instances. Please refer to the soils map to identify affected areas. For a description of the two soils that make up this map unit, please see (50) Hattontown and (62) Jackland.

(54) Hattontown-Jackland-Haymarket Complex - This complex is a mixture of the development-disturbed Hattontown soil and the natural Haymarket and Jackland soils. The complex occurs in areas of the Piedmont Upland and Triassic Basin with igneous bedrock that have been developed but retain a good portion of undisturbed soil. Hattontown soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Haymarket and Jackland soils will be found under older vegetation in ungraded back and front yards and common areas. Fibrous asbestos minerals may occur in areas of greenstone bedrock. These fibers may become airborne during excavation and blasting operations. Worker protection and dust control measures are required in such instances. Please refer to the soils map to identify affected areas. For a description of the soils that make up this map unit, please see (50) Hattontown, (59) Haymarket, and (62) Jackland.

(55) Hattontown-Kelly Complex - This complex is a mixture of the development-disturbed Hattontown soil and the natural Kelly soil. The complex occurs in areas of the Piedmont Upland and Triassic Basin with igneous bedrock that have been developed but retain a good portion of undisturbed soil. Hattontown soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Kelly soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (50) Hattontown and (65) Kelly.

(56) Hattontown-Orange Complex - This complex is a mixture of the development-disturbed Hattontown soil and the natural Orange soil. The complex occurs in areas of the Piedmont Upland and Triassic Basin with igneous bedrock that have been developed but retain a good portion of undisturbed soil. Hattontown soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Orange soil will be found under older vegetation in ungraded back and front yards and common areas. Fibrous asbestos minerals may occur in the greenstone bedrock. These fibers may become airborne during excavation and blasting operations. Worker protection and dust control measures are required in such instances. Please refer to the soils map to identify affected areas. For a description of the two soils that make up this map unit, please see (50) Hattontown and (82) Orange.

(57) Hattontown-Orange Complex, Very Stony
This complex is a mixture of the development-disturbed Hattontown soil and the very stony phase of the natural Orange soil. The complex occurs in areas of the Piedmont Upland and Triassic Basin with igneous bedrock that have been developed but retain a good portion of undisturbed soil. Hattontown soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Orange soil, in its very stony phase, will be found under older vegetation in ungraded back and front yards and common areas.. Fibrous asbestos minerals may occur in the greenstone bedrock. These fibers may become airborne during excavation and blasting operations. Worker protection and dust control measures are required in such instances. Please refer to the soils map to identify affected areas. For a description of the two soils that make up this map unit, please see (50) Hattontown and (83) Orange, Very Stony.

(59) Haymarket – This soil occurs on broad flat, uplands of the Piedmont and Triassic Basin in areas of igneous bedrock. A thick, highly plastic clay layer occurs in the subsoil. Above and below the clay layer the soil is loamy. Depth to bedrock is greater than 5 feet. The soil is well drained. Foundation support may be poor because of the highly plastic clays. Foundations footings should extend below the plastic clay layer to the loamy material below. Suitability for septic drainfields is marginal because of the plastic clays and slow permeability. Suitability for infiltration trenches is fair. Fibrous asbestos minerals may occur in the greenstone bedrock. These fibers may become airborne during excavation and blasting operations. Worker protection and dust control measures are required in such instances. Please refer to the soils map to identify affected areas.

(60) Honga – This soil occurs in tidal wetlands along the mouths of large streams and the shoreline of the Potomac. It consists of 1 to 2 feet of peaty organic material atop stratified silts and clays. Honga is frequently flooded and the water table is at the surface. Suitability for all uses is poor because of saturation, flooding and soft soil.

(61) Huntington - This soil occurs on the first bottom floodplains adjacent to the Potomac River in the northern part of the county and is subject to flooding. A silty surface overlies stratified alluvial sediments. The soil is well drained. Depth to hard bedrock is greater than 6 feet. Foundation support is fair because of flooding. Foundation drains (both exterior and interior) and waterproofing are needed to prevent wet basements. Suitability for septic drainfields is poor and for infiltration trenches is marginal because of flooding.

(62) Jackland – This soil occurs on broad flat uplands of the Piedmont and Triassic Basin in areas of igneous bedrock. A silty surface layer overlies a thick, sticky and highly plastic clay layer. Loamy material lies below the clay. A perched water table forms on top of the clay between 10 inches and 2 feet below the surface. Permeability is very slow. Foundation support may be poor because of the plastic clay and perched water table. Foundation footers should be anchored below the clay layer. Foundation drains and waterproofing are needed to ensure dry basements. Suitability for septic drainfields and infiltrations trenches is poor because of the slow permeability and high water table. This soil was formerly mapped as Iredell. Fibrous asbestos minerals may occur in the bedrock. These fibers may become airborne during excavation and blasting operations. Worker protection and dust control measures are required in such instances. Please refer to the soils map to identify affected areas.

(63) Jackland and Haymarket - This soil grouping occurs on broad flat uplands of the Piedmont and Triassic Basin in areas of igneous bedrock. A silty surface layer overlies a thick, sticky plastic clay layer. Loamy material lies below the clay. Depth to the water table varies, but in spots a perched water table forms on top of the clay between 10 inches and 2 feet below the surface. Permeability is very slow. Foundation support may be poor because of the plastic clay and potential perched water table. Foundation footers should be anchored below the clay layer. Foundation drains and waterproofing are needed to ensure dry basements. Suitability for septic drainfields and infiltrations trenches is poor because of the slow permeability and high water table. Jackland was formerly mapped as Iredell. Fibrous asbestos minerals may occur in the greenstone bedrock. These fibers may become airborne during excavation and blasting operations. Worker protection and dust control measures are required in such instances. Please refer to the soils map to identify affected areas.

(64) Jackland and Haymarket, Very Stony - This soil grouping occurs on broad flat uplands of the Piedmont and Triassic Basin in areas of igneous bedrock. A silty surface layer overlies a thick, sticky plastic clay layer. Loamy material lies below the clay. Depth to the water table varies, but in spots a perched water table forms on top of the clay between 10 inches and 2 feet below the surface. Numerous surface and shallow subsurface boulders may be present. Permeability is very slow. Foundation support may be poor because of the plastic clay and potential perched water table. Foundation footers should be anchored below the clay layer. Foundation drains and waterproofing are needed to ensure dry basements. Suitability for septic drainfields and infiltrations trenches is poor because of the slow permeability and high water table. Jackland was formerly mapped as Iredell. Fibrous asbestos minerals may occur in the greenstone bedrock. These fibers may become airborne during excavation and blasting operations. Worker protection and dust control measures are required in such instances. Please refer to the soils map to identify affected areas.

(65) Kelly - The silty and clayey soil occurs on hilltops and sideslopes of the Triassic Basin underlain by diabase and baked shale and sandstone. A plastic clay layer between 1 and 3 feet thick overlies bedrock. A seasonal high water table, 1½ to 2½ feet below the surface perches on top of the plastic clay. Depth to bedrock is between 3½ to 5 feet. Permeability is moderately slow. Foundation support is poor in the plastic subsoil. Foundation footings should be extended below the clay to the bedrock. Foundation drains and waterproofing are necessary to prevent wet basements. Grading and subsurface drainage are needed to prevent wet yards. Septic drainfields and infiltration trenches are poorly suited because of plastic clays, high water table and shallow bedrock. The bedrock disintegrates rapidly limiting its use in engineered fill, road embankments and trench backfill.

(66) Kingstowne - This soil consists of sandy, silty and clayey sediments of the Coastal Plain that have been mixed, graded and compacted during development and construction. Characteristics of the soil can be quite variable depending on what materials were mixed in during construction. The subsoil is generally a clay loam but can range from sandy loam to clay. Waterworn pebbles may be found throughout the soil. The soil has been compacted, resulting in high strength and slow permeability. The soil is well drained and depth to bedrock is greater than 20 feet. In most cases, foundation support is suitable assuming that the soil is well compacted and contains few clays. Because of the slow permeability, suitability for septic drainfields is poor and it is marginally suitability for infiltration trenches. Grading and subsurface drains may be needed to eliminate wet yards caused by the slow permeability. This soil is found in higher elevation developed areas of the Coastal Plain.

(67) Kingstowne-Beltsville Complex - This complex is a mixture of the development-disturbed Kingstowne soil and the natural Beltsville soil. The complex occurs in higher elevation areas of the Coastal Plain that have been developed but retain a good portion of undisturbed soil. Kingstowne soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Beltsville soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (66) Kingstowne and (7) Beltsville.

(68) Kingstowne-Danripple Complex - This complex is a mixture of the development-disturbed Kingstowne soil and the natural Danripple soil. The complex occurs in higher elevation areas of the Coastal Plain that have been developed but retain a good portion of undisturbed soil. Kingstowne soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Danripple soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (66) Kingstowne and (31) Danripple.

(69) Kingstowne-Elsinboro Complex - This complex is a mixture of the development-disturbed Kingstowne soil and the natural Elsinboro soil. The complex occurs in higher elevation areas of the Coastal Plain that have been developed but retain a good portion of undisturbed soil. Kingstowne soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Elsinboro soil will be found near drainageways in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (66) Kingstowne and (37) Elsinboro.

(70) Kingstowne-Sassafras Complex - This complex is a mixture of the development-disturbed Kingstowne soil and the natural Sassafras soil. The complex occurs in higher elevation areas of the Coastal Plain that have been developed but retain a good portion of undisturbed soil. Kingstowne soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Sassafras soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (66) Kingstowne and (90) Sassafras.

(71) Kingstowne-Sassafras-Marumsco Complex - This complex is a mixture of the development-disturbed Kingstowne soil and the natural Sassafras and Marumsco soils. The complex occurs along the slopes between high and low elevation areas of the Coastal Plain that have been developed, but retain a good portion of undisturbed soil. Kingstowne soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Sassafras and Marumsco soils will be found on un-graded, sloping back and front yards and common areas. Sassafras-Marumsco complex contains Marine Clay and is highly problematic. For a description of the soils that make up this map unit, please see (66) Kingstowne and (91) Sassafras-Marumsco Complex.

(72) Kingstowne-Sassafras-Neabsco Complex - This complex is a mixture of the development-disturbed Kingstowne soil and the natural Sassafras and Neabsco soils. The complex occurs in higher elevation areas of the Coastal Plain that have been developed but retain a good portion of undisturbed soil. Kingstowne soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Sassafras and Neabsco soils will be found under older vegetation in ungraded back and front yards and common areas. For a description of the soils that make up this map unit, please see (66) Kingstowne and (92) Sassafras-Neabsco Complex.

(73) Lindside - This soil occurs on the first bottom floodplains adjacent to the Potomac River, and is subject to flooding. Silty sediments overlie silty clay alluvium. The seasonal high water table is between 1½ and 3 feet below the surface. Depth to hard bedrock is greater than 10 feet. Permeability is moderately slow. Foundation support may be poor because of soft soils, seasonal saturation and flooding. Extensive foundation drains and waterproofing are needed to prevent wet basement problems. Surface grading and subsurface drains are needed to prevent wet yards. Suitability for septic drainfields and infiltration trenches is poor because of the water table and flooding potential.

(74) Lunt-Marumsco Complex – This highly stratified clayey and sandy soil complex occurs on hilly areas of the Coastal Plain. A thick layer of highly plastic Marine Clay occurs in the subsoil. Sandy and loamy layers exist at the surface and below the clay layer. In places, a perched water table will form on top of the clay between 1 and 1½ feet below the surface and will sometimes reach the surface as a spring. The plastic clays and high water table can lead to serious slope instability and landslides. Foundation support is poor. Intensive geotechnical investigation is needed before any construction can commence. Suitability for septic drainfields and infiltration trenches is poor because of the perched water table, slow permeability and unstable slopes.

(75) Manassas – This soil consists of sandy, silty and clayey materials eroded from sandstone and shale. It occurs in drainageways in the Triassic Basin. The seasonal high water table is between 2 and 3½ feet below the surface. Depth to hard bedrock is greater than 5 feet. Permeability is moderate. Foundation support may be marginal because of soft soil and the high water table. Foundation drains and waterproofing are necessary to prevent wet basements. Surface grading and subsurface drainage are often required to eliminate wet yards. Suitability for septic drainfields is poor and for infiltration trenches is marginal because of the high water table.

(76) Matapeake - This soil occurs on broad uplands in silty and sandy sediments of the lower Coastal Plain. A silty surface layer overlies sandier bottom layers. Depth to bedrock is typically greater than 200 feet. The water table is generally greater than 6 feet from the surface. Foundation support is generally favorable. Suitability for septic drainfields and infiltration trenches is good.

(77) Mattapex - This soil occurs on uplands in sand, silt, and clay sediments of the lower Coastal Plain. Loams and clay loams overlie very sandy layers. The seasonal high water table is between 2 and 3 feet below the surface. Depth to hard bedrock is typically greater than 200 feet. Foundation support may be marginal because of occasional soft soil and seasonal saturation. Foundation drains and waterproofing are needed to prevent wet basements. Grading and subsurface drainage are often necessary to eliminate wet yards. Suitability for septic drainfields and infiltration trenches is poor because of the high water table.

(78) Meadowville - This soil occurs in drainageways and the bottom of slopes of the Piedmont over micaceous schist and phyllite bedrock. Silt and clay loam alluvium overlies silty and sandy decomposed rock. Depth to the seasonal high water table ranges between 3½ and 6½ feet. Depth to hard bedrock is greater than 6 feet. Foundation support is fair because of soft soil and seasonal saturation. Foundation drains (both exterior and interior) and waterproofing are necessary to prevent wet basements. Grading is required to eliminate wet yards. Suitability for septic drainfields and infiltration trenches is marginal because of the high water table.

(79) Nathalie - This soil, derived from granite, occurs on hilltops and sideslopes of the Piedmont. Loams and clays overlie sandy and clayey decomposed rock. Sticky clays may occur within the subsoil. Quartz gravels are common throughout. The soil is well drained. Depth to hard bedrock ranges between 10 and 75 feet. The soil typically provides favorable support for small buildings (i.e., 3 stories or less), but it is best to sink the footer below the clay layer. The clay subsoil is difficult to compact and move when wet. Nathalie is generally well suited for septic drainfields and infiltration trenches, but deep installation (i.e., greater than 6 feet) may be required because of sticky clay in the subsoil. Nathalie is highly susceptible to erosion.

(80) Nestoria – This thin silty soil occurs on steep slopes within the Triassic Basin. It is formed from weathered siltstone and fine grained sandstone. Bedrock is typically 1½ feet below the surface. All soil layers are silty and contain increasing amounts of gravels with depth. Nestoria is well drained. Foundation support is good, but excavation can be difficult because of the shallow bedrock. Suitability for septic drainfields and infiltration trenches is poor because of the depth to bedrock.

(81) Oatlands - This thin loamy soil occurs on moderately sloping uplands of the Triassic Basin. It is formed from weathered sandstone and conglomerate. The soil is well drained. Bedrock is typically 3 feet below the surface. Gravels are common throughout the soil especially right above the bedrock. Foundation support is good, but excavation can be difficult because of the shallow bedrock. Suitability for septic drainfields is poor and for infiltration trenches is marginal because of the depth to bedrock.

(82) Orange - This plastic clay soil occurs on hilltops and sideslopes over greenstone bedrock in the Piedmont and Triassic Basin. A thin silty surface overlies a plastic clay subsoil. The plastic clay, generally 1- to 2-feet thick often extends to bedrock. A perched seasonal water table, resulting from the slow permeability of the subsoil and underlying bedrock, is between 1½ and 2½ feet below the surface. Depth to hard bedrock ranges between 4 and 6 feet. Foundation support is poor because of the plastic clays, soft soil and high water table but can be improved by sinking the footings down to bedrock. Foundation drains, grading and waterproofing are necessary to prevent wet basements and crawl spaces. Grading and subsurface drainage may be needed to eliminate wet yards. Suitability for septic drainfields and infiltration trenches is poor because of the plastic clays, perched water table and shallow depth to bedrock. Deep basements and excavations may require blasting. Fibrous asbestos minerals may occur in the greenstone bedrock. These fibers may become airborne during excavation and blasting operations. Worker protection and dust control measures are required in such instances. Please refer to the soils map to identify affected areas.

(83) Orange, Very Stony - This plastic clay soil occurs on hilltops and sideslopes over greenstone bedrock in the Piedmont and Triassic Basin. Numerous surface and shallow subsurface boulders may be present. A thin, silty surface overlies a plastic clay subsoil. The plastic clay, generally 1- to 2-feet thick, often extends to bedrock. A perched seasonal water table, resulting from the slow permeability of the subsoil and underlying bedrock, is between 1½ and 2½ feet below the surface. Depth to hard bedrock ranges between 4 and 6 feet. Foundation support is poor because of the plastic clays, soft soil and a high water table, but can be improved by sinking the footings down to bedrock. Foundation drains, grading and waterproofing are necessary to prevent wet basements and crawl spaces. Grading and subsurface drainage may be needed to eliminate wet yards. Suitability for septic drainfields and infiltration trenches is poor because of the plastic clays, perched water table and shallow depth to bedrock. Deep basements and excavations may require blasting. Fibrous asbestos minerals may occur in the greenstone bedrock. These fibers may become airborne during excavation and blasting operations. Worker protection and dust control measures are required in such instances. Please refer to the soils map to identify affected areas.

(84) Panorama – This silty and clayey soil forms on gently sloping uplands of the Triassic Basin. Silt loam topsoil overlies silty clay loam subsoils. Depth to siltstone and sandstone bedrock is between 4 and 5 feet. Panorama is well drained. Foundation support is good, but excavation can be difficult because of the shallow bedrock. Suitability for septic drainfields and infiltration trenches is fair because of the somewhat shallow bedrock. The bedrock disintegrates rapidly limiting its use in engineered fill, road embankments or trench backfill.

(85) Penn - This silty soil occurs on hilltops and sideslopes of the Triassic Basin over red sandstone and shale. Depth to bedrock is 3 feet. Permeability is moderate to moderately rapid, but may be restricted by unfractured bedrock. Foundation support is good, but excavation can be difficult because of the shallow bedrock. If water perches on the bedrock, grading and drainage may be needed to prevent wet yards. Suitability for septic drainfields and infiltration trenches is poor because of the shallow rock. The bedrock disintegrates rapidly, limiting its use in engineered fill, road embankments or trench backfill. Topsoil may be needed to increase rooting depths for lawns, trees and landscape plants.

(86) Pits, Gravel – This non-soil feature consists of active and relict pits used to extract construction gravel. They are clustered in higher elevation areas of the Coastal Plain where the soil naturally has an abundance of waterworn pebbles. This unit is unrated.

(87) Rhodhiss – This soil consists of sandy and clayey soil over sandy decomposed granite bedrock. It occurs in the Piedmont on gentle to steep side slopes. Rhodhiss is well drained and bedrock is greater than 6 feet from the surface. Gravels of quartz are common throughout. Foundation support is generally good. Suitability for both septic drainfields and infiltration trenches is also good.

(88) Rhodhiss-Rock Outcrop Complex - This soil consists of sandy and clayey Rhodhiss soil mixed in with outcrops of granite bedrock. It occurs in the Piedmont mainly on steep side slopes. Outcrops and boulders occupy 15 to 40 percent of the soil surface. Bedrock can be found from the surface to more than 6 feet deep. Foundation support is good, but excavation can be very difficult due to the rock outcrops and slope. Blasting is often necessary. Septic drainfields and infiltration trenches are poorly suited due to the rockiness and shallow depth to bedrock.

(89) Rowland – This soil consists of silty alluvium eroded from sandstone, siltstone and shale. This soil occurs on middle-level floodplain elevations in the Triassic Basin and is subject to flooding. The seasonal high water table is between 2 and 3 feet below the surface. Depth to hard bedrock is greater than 5 feet. Foundation support may be poor because of soft soil, seasonal saturation and flooding. Foundation drains and waterproofing are needed to prevent wet basement problems. Suitability for septic drainfields and infiltration trenches is poor because of the water table and flooding potential.

(90) Sassafras - This soil occurs on hilltops and sideslopes in sandy, clayey and gravelly Coastal Plain sediments. The upper 5 feet consists of predominantly sandy and sandy clay loam materials. Waterworn pebbles are common. Depth to hard bedrock is greater than 50 feet. The soil typically provides adequate support for small buildings (i.e., 3 stories or less). Suitability for septic drainfields and infiltration trenches is good.

(91) Sassafras-Marumsco Complex – This soil complex occurs along steeper slopes separating the high elevation and low elevation areas of the Coastal Plain and along slopes bordering larger Coastal Plain streams. This complex was formerly referred to as Marine Clay. Dry, sandy and gravelly Sassafras material is stratified with layers of thick, highly plastic marine clays. Water perches on top of the clay layers and springs can form where the clay strata come to the surface. Depth to the perched water table is variable depending on the specific stratification. This soil is highly variable. Unstable slopes can lead to serious land slippage or landslides. Depth to bedrock is greater than 50 feet. Foundation support is poor because of the potential perched water table, unstable slopes and plastic clays. Intensive geotechnical analysis is needed before construction commences. Suitability for septic drainfields and infiltration trenches is poor because of the high water table, plastic clays and unstable slopes.

(92) Sassafras-Neabsco Complex - This complex occurs on flat uplands in sandy, clayey and gravelly sediments of the Coastal Plain. A naturally occurring dense layer occurs in Neabsco soil at depths between 2 and 2½ feet. Depth to hard bedrock is typically greater than 50 feet. Permeability of the dense layer is very slow resulting in a perched seasonal high water table between 1½ and to 2½ feet below the surface. Foundation support is typically good with proper drainage. In areas with a perched water table, foundation drains and waterproofing are necessary to prevent wet basements. Grading and subsurface drainage may be required to eliminate wet yards. Septic drainfields are poorly suited and infiltration trenches are marginally suited because of slow permeability and the perched water table.

(93) Sumerduck – This soil consists of silty and clayey alluvium eroded from micaceous bedrock. It occurs along drainageways of the Piedmont. The seasonal high water table is between 2 and 3½ feet below the surface. Depth to bedrock is greater than 6 feet. Foundation support is marginal because of the high water table. Foundation drains and waterproofing are needed to ensure dry basements. Grading and subsurface drainage may be needed to eliminate wet yards. Septic drainfields are poorly suited because of the high water table and slow permeability and infiltration trenches are marginally suited because of the high water table.

(94) Sycoline-Kelly Complex – This soil complex occurs on moderately sloping uplands of the Triassic Basin over hornfels and diabase bedrock. In places, a thick layer of plastic clay occurs in the subsoil over bedrock. Depth to bedrock ranges between 2 and 5 feet. A perched seasonal high water table can form on top of the plastic clay and shallow bedrock can be found between ½ and 2½ feet below the surface. Permeability, especially where clays are present, is slow. Foundation support is poor because of the perched water table and plastic clays. Foundation footers should be anchored below the clay layer in bedrock Foundation drains are necessary to avoid wet basements. Surface grading and subsurface drains may be necessary to eliminate wet yards. Suitability for septic drainfields and infiltration trenches is poor because of the water table, slow permeability and shallow bedrock.

(95) Urban Land – This unit consists entirely of man-made surfaces such as pavement, concrete or rooftop. Urban land is impervious and will not infiltrate stormwater. All precipitation landing on Urban Land will be converted to runoff. Urban Land units lie atop development disturbed soils. Ratings for this unit are not provided.

(96) Urban Land-Barkers Crossroads Complex – This complex is a mixture of impervious man-made materials that comprise Urban Land and the development disturbed Barkers Crossroads soil. It occurs in very densely developed areas of the Piedmont with granite bedrock. Most of the surface area is covered by impervious paving and rooftop but significant areas of graded and compacted soils exist. The permeability of this complex is highly reduced by the impervious surfaces and the densely compacted Barkers Crossroads soil. Most of the precipitation that falls on this complex will be converted to runoff. For a description of the soils that make up this map unit, please see (3) Barkers Crossroads and (95) Urban Land.

(97) Urban Land-Chantilly Complex - This complex is a mixture of impervious man-made materials that comprise Urban Land and the development disturbed Chantilly soil. It occurs in very densely developed areas of the Triassic Basin with shale, sandstone and siltstone bedrock. Most of the surface area is covered by impervious paving and rooftop but significant areas of graded and compacted soils exist. The permeability of this complex is highly reduced by the impervious surfaces and the densely compacted Chantilly soil. Most of the precipitation that falls on this complex will be converted to runoff. For a description of the soils that make up this map unit, please see (12) Chantilly and (95) Urban Land.

(98) Urban Land-Grist Mill Complex - This complex is a mixture of impervious man-made materials that comprise Urban Land and the development disturbed Grist Mill soil.

It occurs in very densely developed, low elevation areas of the Coastal Plain. Most of the surface area is covered by impervious paving and rooftop, but significant areas of graded and compacted soils exist. The permeability of this complex is highly reduced by the impervious surfaces and the densely compacted Grist Mill soil. Most of the precipitation that falls on this complex will be converted to runoff. For a description of the soils that make up this map unit, please see (40) Grist Mill and (95) Urban Land.

(99) Urban Land-Hattontown Complex - This soil is a mixture of impervious man-made materials that comprise Urban Land and the development disturbed Hattontown soil. It occurs in very densely developed areas of the Triassic Basin and Piedmont with igneous bedrock. Most of the surface area is covered by impervious paving and rooftop, but significant areas of graded and compacted soils exist. The permeability of this complex is highly reduced by the impervious surfaces and the densely compacted Hattontown soil. Most of the precipitation that falls on this complex will be converted to runoff. For a description of the soils that make up this map unit, please see (50) Hattontown and (95) Urban Land.

(100) Urban Land-Kingstowne Complex - This complex is a mixture of impervious man-made materials that comprise Urban Land and the development disturbed Kingstowne soil. It occurs in very densely developed, high-elevation areas of the Coastal Plain. Most of the surface area is covered by impervious paving and rooftop, but significant areas of graded and compacted soils exist. The permeability of this complex is highly reduced by the impervious surfaces and the densely compacted Kingstowne soil. Most of the precipitation that falls on this complex will be converted to runoff. For a description of the soils that make up this map unit, please see (66) Kingstowne and (95) Urban Land.

(101) Urban Land-Wheaton Complex - This complex is a mixture of impervious man-made materials that comprise Urban Land and the development disturbed Wheaton soil. It occurs in very densely developed areas of the Triassic Basin with shale, sandstone and siltstone bedrock. Most of the surface area is covered by impervious paving and rooftop, but significant areas of graded and compacted soils exist. The permeability of this complex is highly reduced by the impervious surfaces and the densely compacted Wheaton soil. Most of the precipitation that falls on this complex will be converted to runoff. For a description of the soils that make up this map unit, please see (102) Wheaton and (95) Urban Land.

(102) Wheaton - This loamy soil consists of sand, silt and clay weathered from granite bedrock that has been mixed, graded and compacted during development and construction. Characteristics of the soil can be quite variable depending on what materials were mixed in during construction. The subsoil is generally loam, but can range from sandy loam to clay loam. The soil has been compacted, resulting in high strength and slow permeability. The soil is well drained and the depth to bedrock is greater than 5 feet. In nearly all cases, foundation support is good assuming that the soil is well compacted and contains few clays. Because of the slow permeability, suitability for septic drainfields is poor and suitability for infiltration trenches is marginal.

Grading and subsurface drains may be needed to eliminate wet yards caused by the slow permeability. This soil is found in developed areas of the Piedmont with micaceous schist and phyllite bedrock.

(103) Wheaton-Codorus Complex - This complex is a mixture of the development-disturbed Wheaton soil and the natural Codorus soil. The complex occurs near floodplains in the areas of the Piedmont with micaceous schist and phyllite bedrock that have been developed, but retain a good portion of undisturbed soil. Wheaton soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Codorus soil will be found along undisturbed areas within the border of the floodplain. For a description of the two soils that make up this map unit, please see (102) Wheaton and (29) Codorus.

(104) Wheaton-Fairfax Complex - This complex is a mixture of the development-disturbed Wheaton soil and the natural Fairfax soil. The complex occurs in upland areas of the Piedmont that have been developed but retain a good portion of undisturbed soil. The pre-development geology consisted of a capping of alluvium over decomposed micaceous schist and phyllite bedrock. Wheaton soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Fairfax soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (102) Wheaton and (38) Fairfax.

(105) Wheaton-Glenelg Complex - This complex is a mixture of the development-disturbed Wheaton soil and the natural Glenelg soil. The complex occurs in upland areas of the Piedmont with micaceous schist and phyllite bedrock that have been developed but retain a good portion of undisturbed soil. Wheaton soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Glenelg soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (102) Wheaton and (39) Glenelg.

(106) Wheaton-Hatboro Complex - This complex is a mixture of the development-disturbed Wheaton soil and the natural Hatboro soil. The complex occurs near floodplains in the areas of the Piedmont with micaceous schist and phyllite bedrock that have been developed but retain a good portion of undisturbed soil. Wheaton soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Hatboro soil will be found along undisturbed areas within the border of the floodplain. For a description of the two soils that make up this map unit, please see (102) Wheaton and (49) Hatboro.

(107) Wheaton-Meadowville - This complex is a mixture of the development-disturbed Wheaton soil and the natural Meadowville soil. The complex occurs near floodplains in the areas of the Piedmont with micaceous schist and phyllite bedrock that have been developed, but retain a good portion of undisturbed soil. Wheaton soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas.

Meadowville soil will be found along undisturbed areas within and just outside of the floodplain. For a description of the two soils that make up this map unit, please see (102) Wheaton and (78) Meadowville.

(108) Wheaton-Sumerduck - This complex is a mixture of the development-disturbed Wheaton soil and the natural Sumerduck soil. The complex occurs near floodplains in the areas of the Piedmont with micaceous schist and phyllite bedrock that have been developed, but retain a good portion of undisturbed soil. Wheaton soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Sumerduck soil will be found along undisturbed areas within the border of the floodplain. For a description of the two soils that make up this map unit, please see (102) Wheaton and (93) Sumerduck.

(109) Woodstown - This soil occurs in sandy sediments on nearly level landscapes in the lower Coastal Plain. Soil materials are primarily sandy loams to sandy clay loams. The seasonal high water table is between 1½ and 3½ feet below the surface. Depth to hard bedrock ranges from 50 to more than 300 feet. Permeability is moderately rapid in the surface and moderately slow in the subsurface. Foundation support may be marginal because of soft soil and seasonal saturation. Foundation drains and waterproofing are necessary to prevent wet basements and crawl spaces. Grading and subsurface drainage may be needed to eliminate wet yards. Suitability for septic drainfields and infiltration trenches is poor because of the seasonal water table.

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