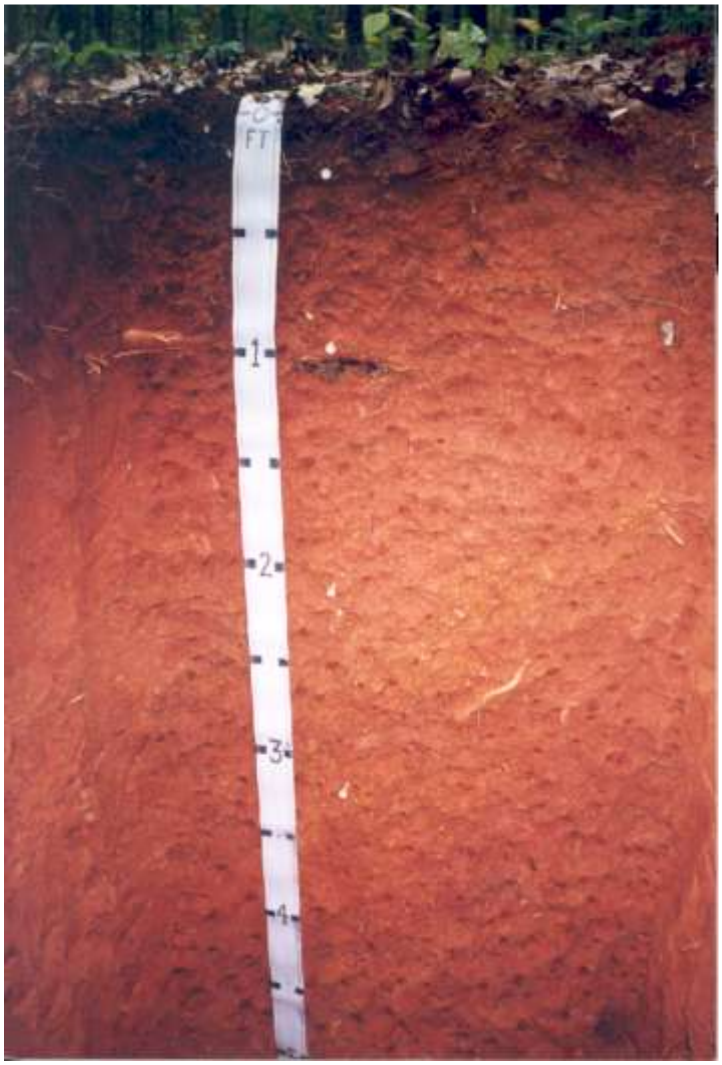
Interpretive Guide to the Type 1 Soils of Fauquier County, VA

6th Edition



Fauquier silt loam

"The history of every nation is eventually written in the way that it cares for its soil." **- Franklin D. Roosevelt**

Department of Community Development
County Soil Scientist Office
Fauquier County, VA
2008

INTERPRETIVE GUIDE TO THE TYPE 1 SOILS OF FAUQUIER COUNTY, VIRGINIA

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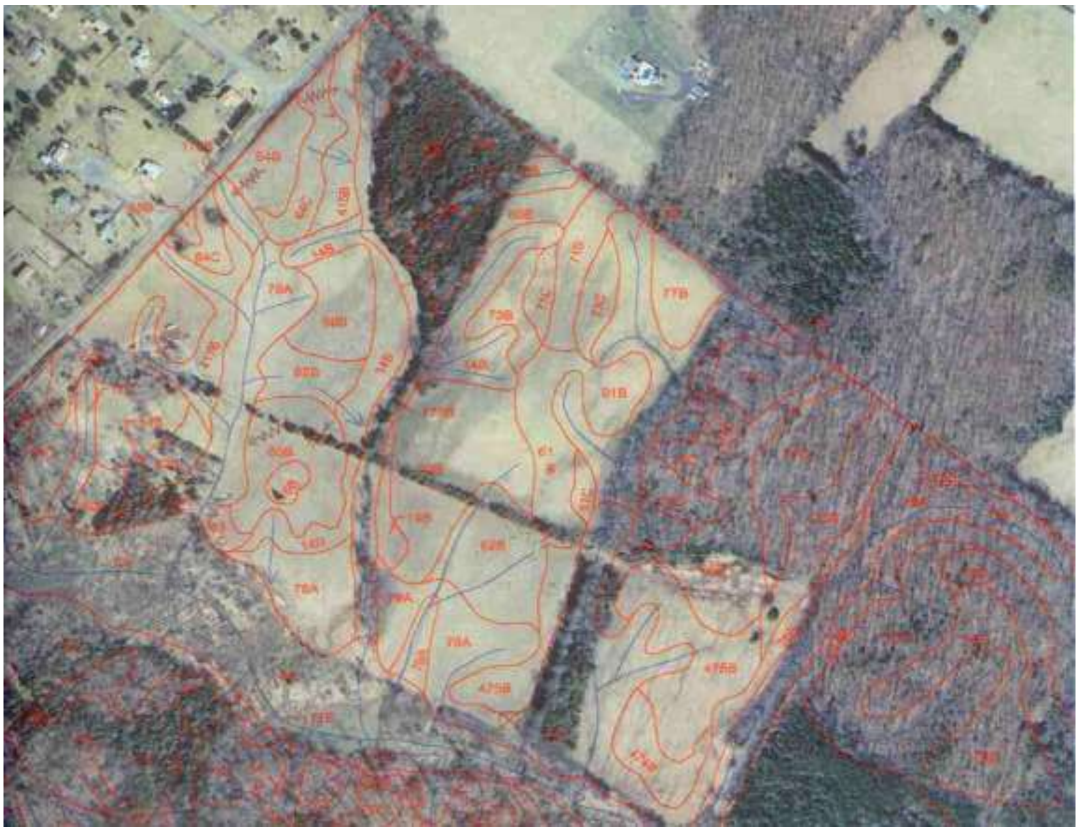

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Special Thanks to the Fauquier County Geographic Information System Office for their Assistance in Updating this Document and the Soil Maps

USE OF INFORMATION IN THIS GUIDE

ABOUT THIS GUIDE

This interpretive guide is only to be used in conjunction with Type 1 soil maps and Preliminary soil maps. Due to differences in mapping scale, map unit legends, and intensity of mapping this document should not be used with the Official Fauquier County, VA Soil Survey produced by the USDA Natural Resource Conservation Service (NRCS). If there are any questions concerning this document or questions about the Fauquier County Soil Survey, please contact our office at 540-422-8240.

HOW TO USE THIS INFORMATION

This material is **intended for planning purposes, as well as to alert the reader to the broad range of conditions, problems, and use potentials for each map unit.** A map unit (for example, "73B") is the county-wide sum of all map delineations (all the "73B" areas in the County). For most map units in Fauquier County, the individual series in a map unit name (for example, "Penn" soils in the 73B map units or "Purcellville" soils in the 23B map unit) may account for as little as 50% of the soils actually to be found in the map unit. The map unit potential use rating refers to the overall combination of soil properties and landscape conditions. Therefore, a map unit rated as having good potential for urban uses probably contains some areas that have much poorer potential. Conversely, a map unit rated as having poor potential for a designated use may contain areas with good potential for that use. In on-site investigations, work is completed with much greater detail and inclusions of good or problem soils are specifically identified.

The information in this guide will enable the user to determine the distribution and extent of various types of soil and the kinds of problems which may be anticipated.

HOW NOT TO USE THIS INFORMATION

The information in this guide is **not** intended to replace exploration for site specific design information. This guide is to act as a base for which future site investigations have to or may take place for a project (ex. A soil found on a type 1 soil map has a high shrink-swell potential would lead to a geotechnical evaluation for shrink-swell clays). It is **not** to substitute field investigations for drainfields or for jurisdictional wetlands.

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INTRODUCTION

Soil Survey Information

The original Soil Survey for Fauquier County was conducted in 1942-1944 by seven soil scientists working for the United States Department of Agriculture and the Virginia Agricultural Experiment Station. These maps were made by walking over the landscapes, boring auger holes where different soils were anticipated and drawing the soil lines on 1937 aerial photos which were at a scale of 1 inch = 1,320 feet. An experienced soil scientist could map 200 to 300 acres per day. These soil maps were published in 1956 at 1 inch = 1,760 feet. The maps were produced primarily for agricultural use and great emphasis was placed on surface features that affected tillage.

By the late 1980's, all available copies of the 1956 publication had been distributed. At the same time, the County was developing its Geographic Information System (GIS) and a need for updated soil information was prevalent. The first soils layer for the GIS was completed by using the 1956 published soil map (1 inch = 1,760 feet) and refitting the soil maps to the current Tax Map (1 inch = 400 feet). Since these soil maps had not been adjusted to fit the topography of the land (rectified), they had to be stretched to fit the County Tax Map base as well as possible. This first GIS soil layer consisted of soil line boundaries and labels. Many features that were on the original soil maps were not transferred to the GIS, (e.g. rock outcrops, springs, drainageways, cemeteries, schools, churches, etc.)

In a move to further update the GIS soil layer, the County Soil Scientist Office was established in 1989. Evaluations determined that the semi-corrected soil lines on the first layer would need to be adjusted to a rectified topographic base (1" = 400'). (This made the adjusted soil lines more accurate in that the ridgetop soils were positioned on the ridges and drainageway soils fit the proper landscape position.) In 1998 map adjustments were completed and was started to be used as the soils layer for the county. Even though adjustments to the maps were complete, work to the manuscript, the document that is the technical text that accompanies a soil survey was not complete. It wasn't until the spring of 2007 that the maps and manuscript information was approved and adopted by the USDA Natural Resource Conservation Service as the Official Fauquier County Soil Survey.

While the update to the manuscript and finalizing of the maps was being completed, a new type of soil mapping had begun in Fauquier County. Due to population growth in Northern Virginia there was pressure on Fauquier County for new development. Due to map scale issues the soil survey does not have enough accuracy to be effective for site specific development. Greater detailed site information was needed to help plan this infrastructure. The type 1 soil map was created to provide more detailed mapping of soils (1"= 400') to find site limitations (shrink-swell clays, high water table, shallowness to bedrock, hydric soils, etc.) and to be used as a greater pre-planning tool then the Soil Survey was able to provide. Since type 1 soil maps are of a greater scale and detail than the Soil Survey, more soil map units had to be created. New mapping units are created out of necessity in order to better describe soils, landforms and site conditions. This document contains the descriptions and interpretations of these new mapping units.

The updated soil survey and type 1 soil reports are designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and homeowners can use the reports to plan land use, select sites for construction, and identify special practices needed to insure proper waste disposal.

Conservationists can use the survey to help them understand, protect, and enhance the environment. The reports do **NOT** take the place of a specific on-site study, a lot-by-lot evaluation for septic tank drainfield areas or other on-site special use needs. It is, however, to be considered as an over all land-use planning tool.

The Type I Soil Mapping service is provided by the Fauquier County Soil Scientist Office, for a reasonable fee and is the greatest benefit if obtained before any type of urban or agricultural practices are planned. This would include subdivision of land (including administrative lots), industrial or commercial uses, and farm plans for special agricultural uses.

Copies of the updated soil survey maps for a specific parcel can be obtained through the Fauquier County GIS Office. Soil Survey maps can also be obtained on-line on the NRCS website (www.nrcs.usda.gov). Since Type 1 soil maps have only been completed on parcels that have been requested to be mapped only a small percentage of the entire county has been finished. To find out if your property or an adjacent property has had a Type 1 soils map completed or if you are interested in having your property mapped call the Soil Scientist Office at 540-341-8268.

GEOLOGIC SETTING

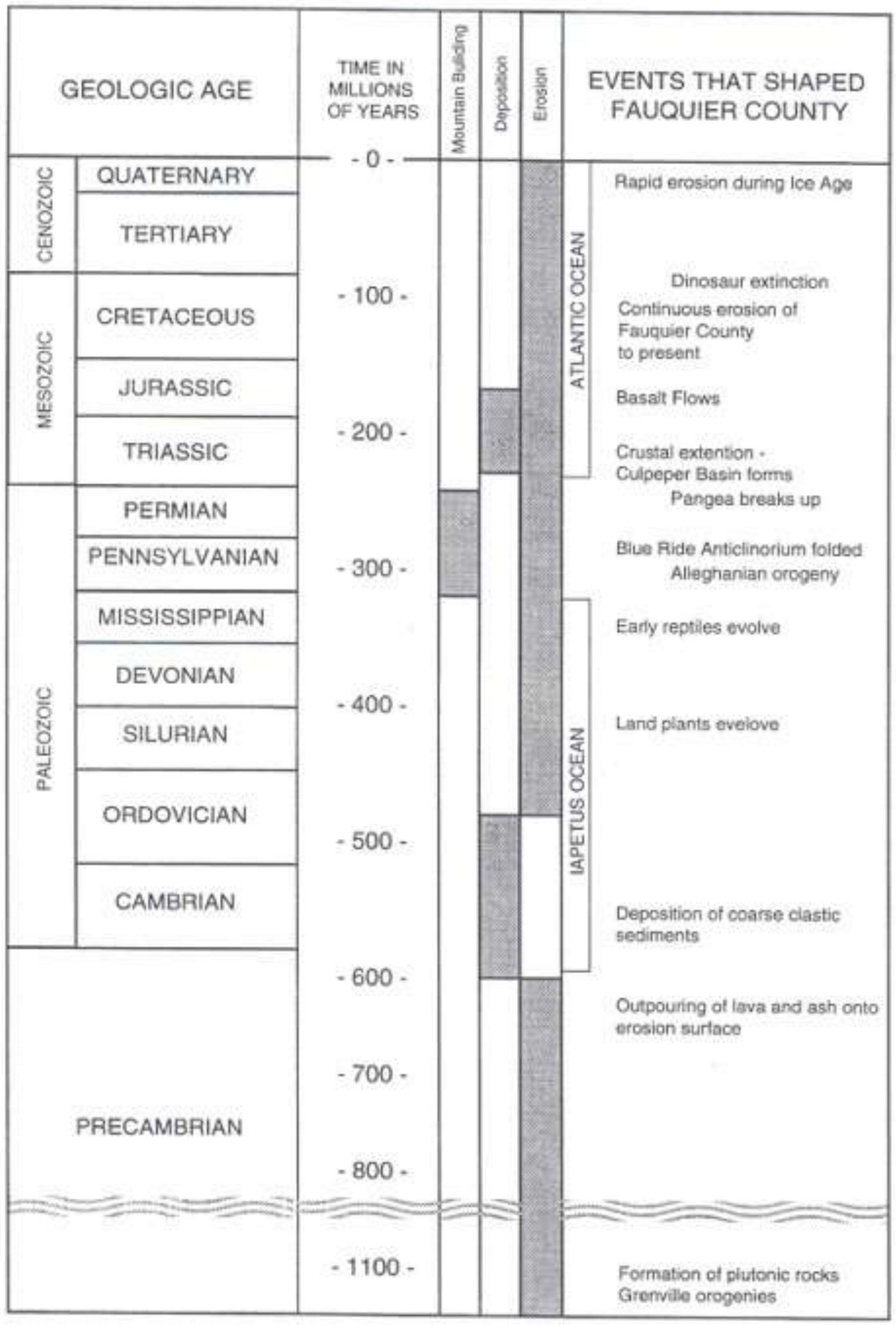
Fauquier County covers a geologically diverse area that manifests itself in a variety of unique and scenic landforms. An understanding of the geology of the County is vital to its continued economic prosperity and well-managed development. For example, study of the underlying geology is necessary to determine site suitability for septic systems as well as the need for slope stabilization.

Soils, in particular, derive their characteristics from local geological and climatological conditions. Depending on its particular characteristics and mineral composition, soil type will determine what crops will grow best as well as site suitability for various densities of land development. The type, permeability and porosity of the underlying rock also govern the availability and quality of groundwater.

The geology of the County has evolved over a long period of time, primarily through the geologic processes of plate tectonics and erosion. In brief, the North American Plate, of which Fauquier County belongs, has for hundreds of years collided with, separated from, and slid past other tectonic plates. Each time two or more plates collide, volcanic activity results and large rock formation are thrust and folded over one another. The resulting mountain forming process is referred to as an orogeny. After a time, collided plates or previously contiguous plates may rip apart and an ocean forms between them. More volcanic activity then takes place, filling shallow seas and covering the land with volcanic ash and debris and intruding surrounding rock with magma. During separation, jumbled slivers of the colliding continents are left as a testament to the collision. As volcanic activity subsides, the erosive processes of water and wind take hold and shape the landscape, forming river valleys, creating alluvial fans, and filling in low lying areas. Table 2.1 presents a geologic timeline for the formation of present day Fauquier County along with the associated events that helped shape it.

The County is divided into three geological provinces: the Blue Ridge Anticlinorium, the Culpeper Triassic Basin, and the Southern Piedmont Province. The Blue Ridge runs from the Blue Ridge Mountains to Pond Mountain and Baldwin Ridge. To the east of the Blue Ridge lies the Culpeper Triassic Basin. East of the Culpeper Triassic Basin lies the deeply weathered, rolling lands of the Piedmont Province. Each geologic formation has a unique geological history and has a distinctive landscape signature. Each area also consists of a different assortment of rocks and minerals, which are valuable resources to the County. Maps 2.2A, 2.2B, and 2.2C present a geological picture of the County which is divided between the geological provinces and their constituent formations.

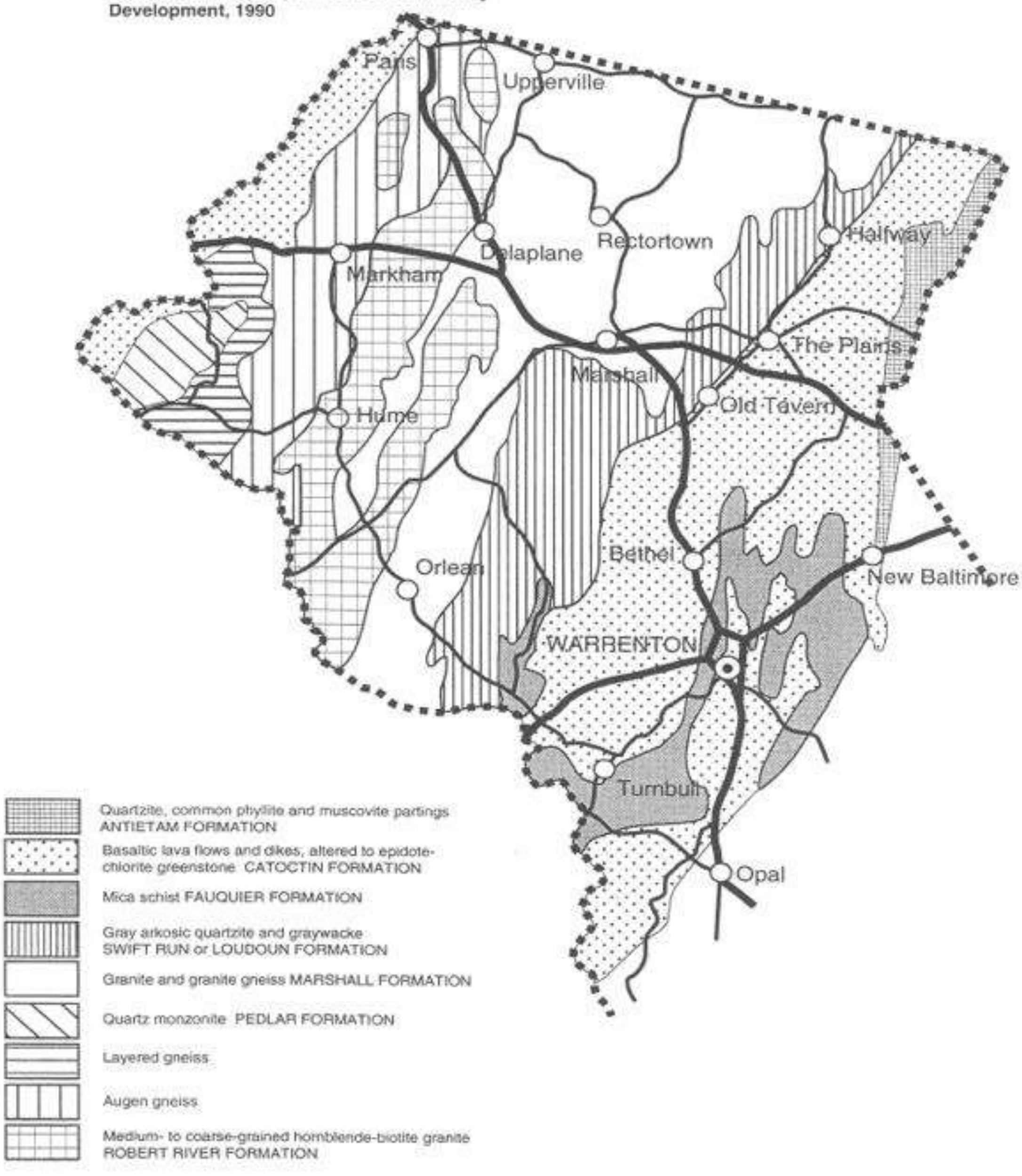
Table 2.1: Geologic Time Line and Events Shaping Fauquier County



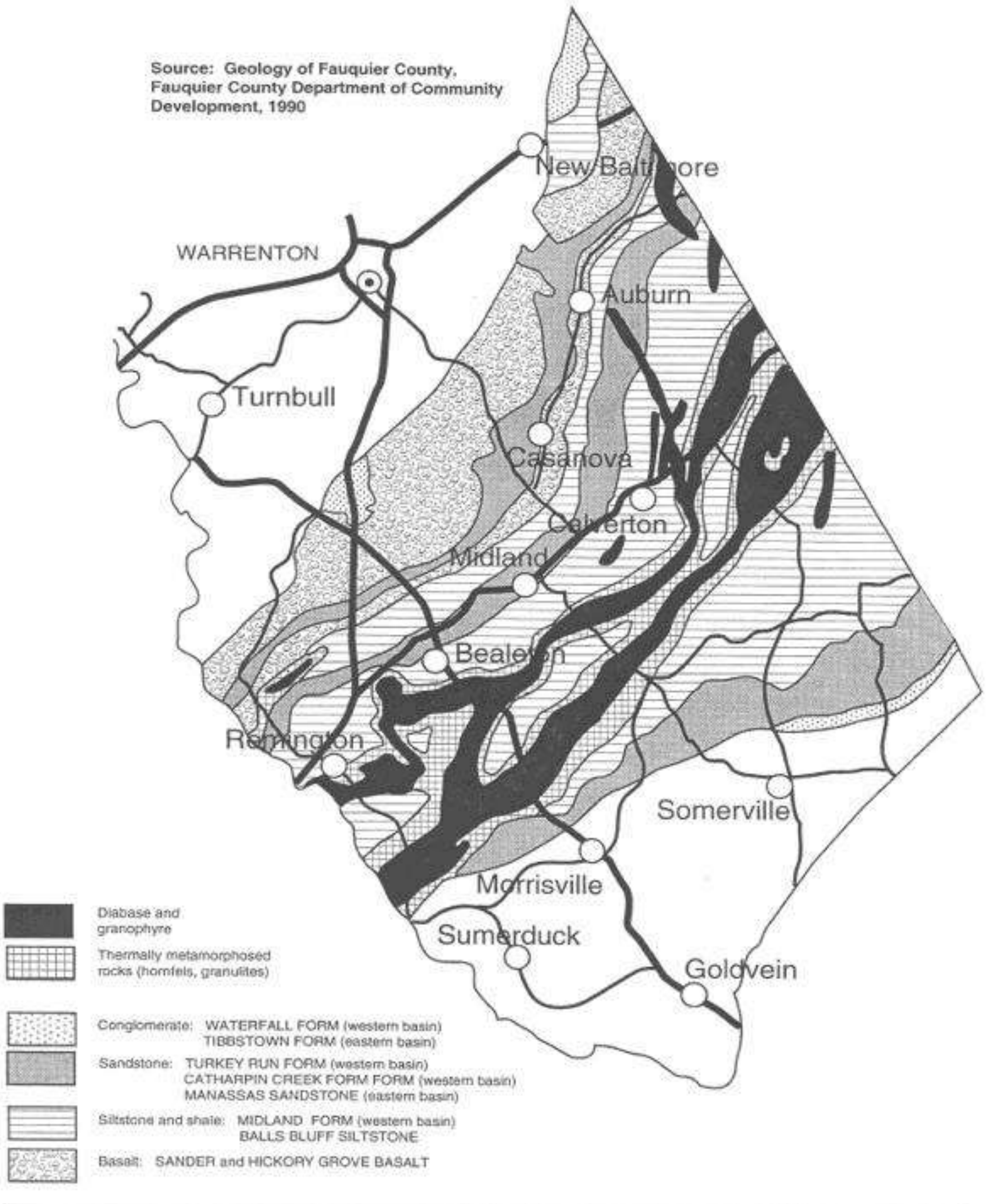
Source: "Geology of Fauquier County," Richard S. Joslyn, Fauquier Department of Community Development, August, 1990

General Geology Map: Blue Ridge Anticlinorium

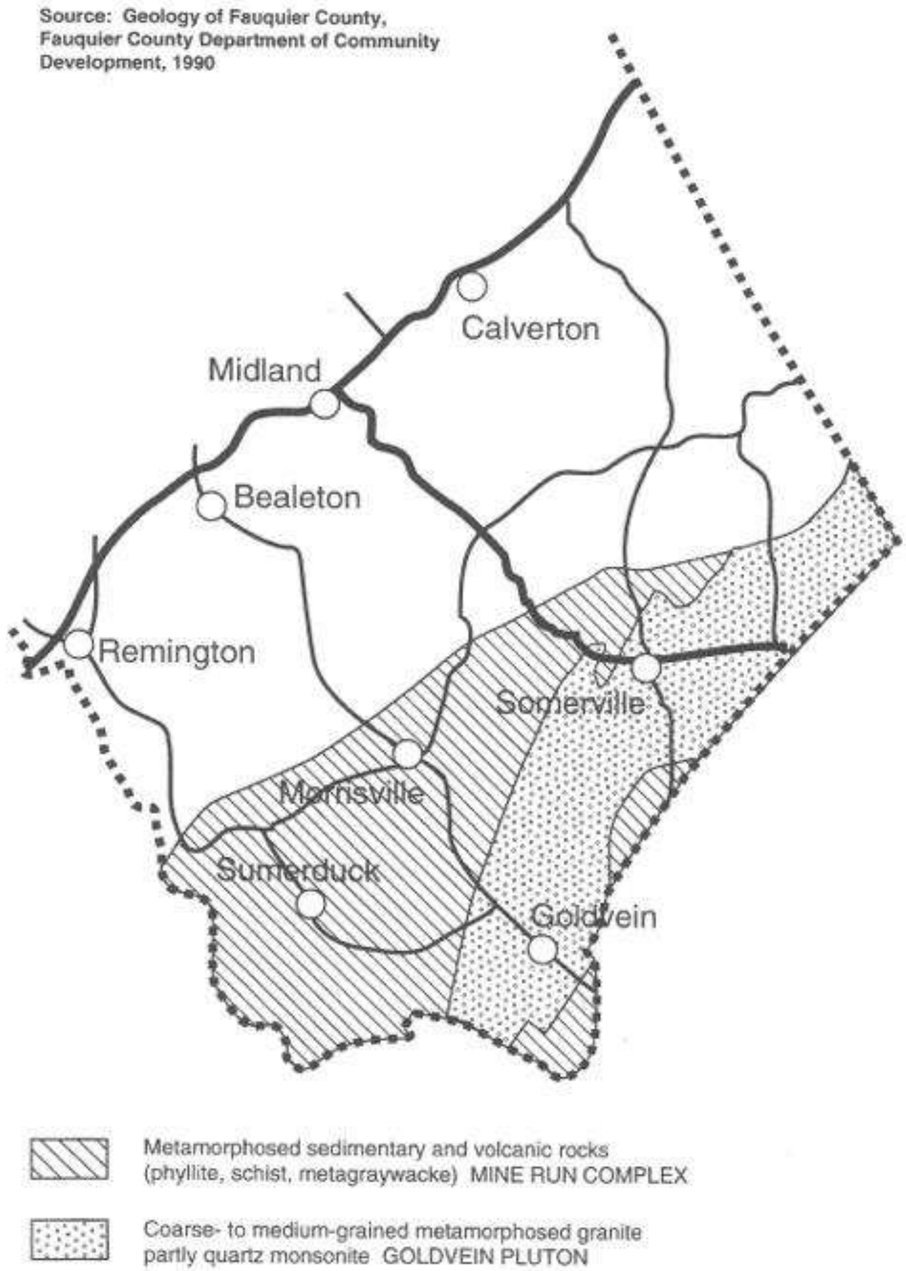
Source: Geology of Fauquier County, Fauquier County Department of Community Development, 1990



General Geology Map: Culpeper Basin



General Geology Map: Piedmont Province



MAP UNIT POTENTIAL

Soil properties and landscape features unique to a particular map unit can be used to describe that map unit's potential for certain generalized uses. The map unit potential ratings are used to indicate general information on soil and site properties for a single map unit.

The County Soil Scientists have developed map unit potential ratings and class criteria for the following generalized uses:

- General development using central water and sewer
- General development using septic tank drainfields
- Agriculture
- Forestry

These four map unit potential ratings allow for the comparison of the relative compatibility among a group of soil and site properties and a group of similar uses.

This guide contains use potentials for the four group names above, including definition of potential classes and problems associated with each class. Additionally, it defines the criteria for hydrologic soil groups for use in stormwater runoff calculations, and for hydric soils for use in wetland determinations.

This information is provided for use in conceptual planning and review, and as an organizational guide for site-specific investigations. The chief objective of map unit potential ratings for soils is to maximize the effective use of soil maps to spotlight potential soil problems for a variety of proposed uses. Additional soil information may be obtained from the County Soil Scientist.

MAP UNIT POTENTIAL FOR GENERAL DEVELOPMENT USING CENTRAL WATER AND CENTRAL SEWER

In this generalized land use, soil-map units were rated based on their effect on major engineering operations during land development projects. These include, but are not limited to, roads, foundations, basements, building slabs, shallow excavation, use of soil as controlled fill material, and erosion/sediment control.

GOOD POTENTIAL

These map units have soil and site properties generally considered good for general development on central water and sewer.

FAIR POTENTIAL

These map units have soil-related problems that can generally be corrected at low cost and effort.

Major problems in utilization of these map units are 1) the erodibility of the soil, and 2) the large quantity of earthwork required to land-level the high amount of relief. When they occur along major drainageways, filling and land disturbance provides the potential for serious erosion and sedimentation problems.

POOR POTENTIAL

These map units have major soil-related problems, many difficult to correct, requiring engineering solutions which may not always be satisfactory.

Serious erosion and sedimentation are major problems. Often, these map units occur too close to flowing streams to allow for adequate erosion and sedimentation control if the slopes are denuded. Much of the bedrock underlying these map units is fairly massive and may require substantial blasting during excavation. Many map units have essentially no soil material available for grading and/or landscaping and adequate vegetative restabilization is difficult. For most units, adequate bearing capacity can be obtained for individual houses in underlying rock material. If fill pads are used, adequate measures should be taken to remove boulders and large stones and to properly key the fill material into the residual material to prevent potential slippage problems. Soil material with low rock fragment content should be stockpiled for final grading.

Some map units have soils with low strength (high silt content), prolonged seasonal perched water tables, and high frost heave potential. Adequate bearing capacity can be obtained on underlying rock materials, usually at depths ranging from 30-50" below the surface. Drainage should be provided under slabs and around foundation. In some cases, underdrainage is desirable for roads. Frost heave problems can be avoided by using conventionally required footing depths.

VERY POOR POTENTIAL

These map units have serious soil-related problems, some not correctable, and others requiring extensive and costly engineering solutions which may be unsatisfactory.

Map units with high shrink-swell clayey subsoils are very difficult to grade, do not respond to tile drainage, cause foundation placed in subsoils to crack, and cause roads/pavements to break up and fail prematurely. In addition to the plasticity problems, there are also perched water tables above the clay pan. Plastic soil materials should be undercut and disposed of from any potential roadway. They should not be used as backfill (material against basement or foundation walls) or as fill under slabs. Surface drainage and underdrainage should be provided for structures and roads.

Map units with intermittent high water tables, which occur along small drainageways and concave uplands, are difficult to drain due to clayey subsoils and low relief. Basements constructed in these soils are generally wet and/or periodically flooded. These soils are very unstable when wet and have very low bearing capacities.

Map units which have stones and rock outcrops that occupy more than 35% of the soil surface may require considerable blasting for roads and foundations. Stones and boulders make compaction and fine grading difficult unless removed from fill materials under roads and houses. Removal of float rock more than 10" in diameter from soil material is difficult and costly, particularly in more plastic soils found in eastern Fauquier. Soil materials containing large stone should not be used as backfill over pipes or against foundation walls.

Map units on steep slopes are generally very shallow to rock. Any grading disturbance necessitates the placement of potentially unstable fills for building purposes and brings about serious erosion and sedimentation problems.

Where development is proposed on any map unit rated VERY POOR, a geotechnical study should be prepared to assess the soil conditions and make recommendations for design.

MAP UNIT POTENTIAL FOR INDIVIDUAL SEPTIC TANK DRAINFIELD SEWAGE DISPOSAL SYSTEMS

In this generalized land use, soil map units were rated based on the evaluation criteria for subsurface waste disposal and treatment systems found in the Sewage Handling and Disposal Regulations of the Virginia Department of Health. Judgements on specific sites for septic drainfields are deferred to the Fauquier County Health Department, who has sole responsibility for issuance or denial of permits.

GOOD POTENTIAL

These map units have a combination of soil and landscape properties that are most suitable for drainfield sites.

MARGINAL POTENTIAL

These map units have some favorable and some unfavorable soil and landscape properties. Conditions affecting use as drainfield sites are highly variable and predictability is low. Often these map units have soils which require additional soil studies, such as saturated hydraulic conductivity tests, for consideration before permit action.

POOR POTENTIAL

These map units have questionable and unfavorable soil properties and/or landscape positions. Predictability within map units is fairly accurate, although a satisfactory site may be found on map unit inclusions (soils outside the norm describe for the unit). The majorities of these map units are moderately deep soils over shale or crystalline rock, or are moderately well to somewhat poorly drained soils on nearly level uplands.

NOT SUITED

These map units have soil and/or landscape features that are generally considered unsuited for satisfactory drainfield use. These map units have highly accurate predictability. These map units include somewhat poorly to poorly drained colluviual soils (in swales and depressions), floodplains, soils with plastic shrink-swell (expanding clay) subsoils, and soils on greater than 25% slopes or very shallow to rock.

MAP UNIT POTENTIAL FOR AGRICULTURE

In this generalized land use, soil map units were rated for agriculture. The classes, defined below, indicate the most conservative use, although certainly not the sole use. Local conditions may strongly impact the use potential of an individual map unit.

PRIME CROPLAND

These map units have a combination of soil and landscape properties that make them highly suited for use as cropland. They have characteristics that require only basic conservation practices and short rotations. The soils in these map units generally have high inherent fertility, good water holding capacity, deep effective rooting zones, and are not subject to periodic flooding. This class also has good potential for use in grassland agriculture, forestry, and wildlife habitat.

SECONDARY CROPLAND

Map units in this class have soil properties or a combination of soil and site properties that limit their yield potential to marginal levels when used as cropland. Soils in these map units are best used in rotations including grassland agriculture. Some map units may require intensive conservation practices (such as tile drainage, diversions, surface water management, or strip cropping). Major features and properties include seasonal perched water tables, restrictive layers limiting rooting zones, stones which limit water holding capacity, tillage, seedbed preparation, and harvesting. This class also has good potential for use in grassland agriculture, forestry, or as wildlife habitat.

PRIME PASTURE

These map units are best suited for use as hay and pasture in grassland agriculture. Included in this class are map units with shallow soils, marginally steep slopes, and soils with drainage conditions not conducive to cropping. This class also has good potential for use in forestry or as wildlife habitat.

SECONDARY PASTURE

Map units in this class have soil properties or a combination of soil and site properties that limit their use as hay fields. Soils in this map unit are best used as permanent pasture. Major features and properties include steep slopes, large amount of stones and boulders, and seasonal high water tables, all of which affect use of mowing equipment. This class also has good potential for use in forestry or as wildlife habitat.

NOT SUITED

This class includes map units on very steep slopes, very shallow soils, substantial rock outcrop, or prolonged high water tables. The lands in these map units are best left undisturbed in their natural wooded environment for use in timber production and wildlife habitat due to difficulty of maintenance of grasslands. Many of these map units, particularly those on very steep slopes, are considered to be critical environmental areas as stream buffers. Other areas include very steep mountainside slopes and very wet landscapes. Although some map units within this class have been cleared, their best use is in woodland and as wildlife habitat.

MAP UNIT POTENTIAL FOR FORESTRY

The management of trees begins with an understanding of the soil on which they grow or are to be grown. Some soils are very productive in growing wood crops; others may barely support tree cover. Different tree species may vary in production on the same soil. The probability of seeding survival, the relative danger of erosion when cover is removed, the resistance of trees to windthrow, and problems with equipment use during harvesting are some of the management items that can be inferred from soils information. Soil maps may be extremely useful in preparing pre-harvest plans, in applying erosion control methods, measures or practices while harvesting and regenerating forests in Fauquier County.

In this generalized land use, soil map units were rated for their potential productivity under hardwood and pine forest types. Ratings were based on representative site indices.

For further information about species suitability and woodland management practices, contact the County Forester, Virginia Department of Forestry.

EROSION AND SEDIMENT CONTROL

Many of the soils of Fauquier County are highly erodible. Soils occurring on moderate to steep slopes are especially subject to erosion. It is very important that the presence of highly erodible soils be confirmed early, prior to any land disturbing activities. A thorough knowledge of the soils involved is essential to successful planning for erosion and sediment control. Highly erodible soils may not be considered in developing standard erosion and sedimentation control plans.

Soils containing high percentages of silts, fine sands, and mica have the highest erosion hazard. As the clay and organic matter content increases, the erosion hazard decreases because clay act as a binder for soil particles. Once clays are eroded, however, they are easily transported by runoff.

Erosion hazard ratings were developed for each soil-map unit, based on an adaptation of the Universal Soil Loss Equation under construction site conditions. The primary topographic considerations are slope steepness and slope length. Because of the effect of accumulated runoff, erosion potential is greater on long, steep slopes. The ratings are defined as:

0-7%	Slight erosion hazard
7-15%	Moderate erosion hazard
15-25%	High erosion hazard
>25%	Very high erosion hazard

Within these slope gradient ranges, the erosion hazard will become critical if the slope exceeds the following criteria:

0-7%	300 feet
7-15%	150 feet
>15%	75 feet

Hydrologic soil group classes are used in determining soil-land use conditions for estimating runoff in the Virginia Erosion and Sediment Control Handbook. The hydrologic class (A, B, C or D, listed below) is an indicator of the minimum rate of infiltration obtained for a bare soil after prolonged wetting. By using the hydrologic classification and the associated land use, runoff curve numbers can be selected. Runoff curve numbers are used for determining peak discharge and total volume of surface water runoff for given conditions.

- **A - Low Runoff Potential:** Soils having a high infiltration rate, even when thoroughly wetted, and consisting chiefly of deep, well to excessively drained sands or gravels.

- **B - Moderately Low Runoff Potential:** Soils having a moderate infiltration rate when thoroughly wetted, and consisting chiefly of moderately well to well drained soils with moderately fine to moderately coarse texture.

- **C - Moderately High Runoff Potential:** Soils having a slow infiltration rate when thoroughly wetted, and consisting chiefly of soils with a layer that impedes downward movement of water, or soils with moderately fine to fine texture.

- **D - High Runoff Potential:** Soils having a very slow infiltration rate when thoroughly wetted, and consisting of clay soils with a high swelling potential, soils with a permanent high water table, soils with a clay layer at or near the surface, and shallow soils over nearly impervious material.

HYDRIC SOILS

Wetlands are protected by various state laws and at the federal level by Section 404 of the Clean Water Act. Wetlands are defined as "those areas that are inundated or saturated by groundwater of a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (Federal Register, Vol. 42, p. 37128)". The U.S. Army Corps of Engineers (USACE) and Environmental Protection Agency (EPA) are responsible for making determinations of wetlands regulated under the Clean Water Act. A permit must be obtained from the USACE in many cases where construction is planned in wetlands.

Wetlands can occur in a wide range of conditions in Fauquier County; from bottomland forests that seem dry most of the year to permanent standing water. Hydric soils and wooded wetlands are mostly concentrated along or near streams. Scattered wet depressions in cleared fields, usually at low places or formed from spring seeps also are common. Swamps created by beaver dams are also included. Red maple, sycamore and other water-tolerant hardwoods dominate in bottomland forests. Scattered emergent (rushes, sedges, cattails) vegetation occurs in cleared fields and forest openings.

There are three basic criteria that must be met for an area to be classified as a wetland: 1.) hydric soils, 2.) hydrophytic (water-tolerant) plant species, and 3.) wetland hydrology.

- ❒ First, the area in question (size is NOT a consideration) must occur on a hydric soil or on that part of a non-hydric soil that is a hydric inclusion. A hydric soil is a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic (oxygen deficient) conditions in the upper part (Soil Conservation Service, 1987). Such soils usually support hydrophytic plants. If it is not a hydric soil, it can not be classified as a wetland.

The hydric soils shown on the Type I Soil Maps give a good indication of the extent and probability of wetlands. However, their presence on the soil map does not automatically mean that the site is a jurisdictional (USACE, EPA) wetland. Field identification should be undertaken to confirm the presence of wetlands. Further information on wetland delineation may be obtained from the County Soil Scientist.

Hydric soils that can be found on Type 1 soil maps are listed below:

- **4A** Hatboro silt loam; frequently flooded
- **6A** Bowmansville silt loam; frequently flooded
- **69A** Elbert silt loam
- **79A** Albano silt loam
- **110A** Mongle Variant silt loam
- **179A** Albano Variant silt loam
- **269A** Meetze very gravelly silt loam

The following soil map units **may** have hydric soil inclusions:

7A Bermudian silt loam, occasionally flooded
8A Codorus Variant loam, frequently flooded
9A Mongle loam, Very Stony
9B Mongle loam, Very Stony
10A Mongle loam
10B Mongle loam
11A Rohrersville loam, stony
12A Rohrersville loam
12B Rohrersville loam
13A Sumerduck loam
13B Sumerduck loam
14A Sowego loam
14B Sowego loam
14C Sowego loam
15A Seneca loam
15B Seneca loam
15C Seneca loam
16A Meadowville silt loam
16B Meadowville silt loam
16C Meadowville silt loam
17A Middleburg loam
17B Middleburg loam
17C Middleburg loam
38A Swampoodle loam
38B Swampoodle loam
59B Mongle loam, rubbly
59C Mongle loam, rubbly
62A Sycoline silt loam
67A Jackland and Haymarket silt loams
67B Jackland and Haymarket silt loams
68B Jackland and Haymarket silt loams, very stony
70A Mount Lucas loam
78A Dulles Silt loam
78B Dulles Silt loam
82B Scattersville loam, stony
82C Scattersville loam, stony
93A Delanco loam
93B Delanco loam
116B Meadowville silt loam, very stony
116C Meadowville silt loam, very stony
117B Middleburg loam, very stony
117C Middleburg loam, very stony
170A Mount Lucas Variant loam
170B Mount Lucas Variant loam
178A Dulles Variant silt loam
178B Dulles Variant silt loam
238A Belvoir loam
238B Belvoir loam
238C Belvoir loam
248B Fletcherville variant - Myersville Complex
270B Mount Lucas loam
370B Mount Lucas loam, extremely stony
413B Lignum Variant silt loam
413C Lignum Variant silt loam
438A Swampoodle Variant loam
438B Swampoodle Variant loam
493A Delanco Variant loam

PERMEABILTY VERSES SATURATED HYDRAULIC CONDUCTIVITY (K_{Sat})

Permeability is the qualitative estimate of how well water moves through a soil under saturated (all micro and macro pores contain water) conditions. Saturated Hydraulic Conductivity or K_{Sat} is the quantitative (measured) method for evaluating a soils ability to transmit water in saturated soil conditions under standard conditions of pressure, length and cross sectional area. Even though the terms "permeability" and "hydraulic conductivity" are different, they are used interchangeably and can cause confusion. Since saturated hydraulic conductivity is something that is measured instead of inferred, there are scientific instruments that are used to quantify it. Constant Head Permeameters are devices that are placed in the field for measuring K_{Sat} at a constant head of pressure that are used extensively by Soil Scientists to better understand water movement at specific depths in the soil profile. Because these instruments are used in the field, care must be taken to make sure that saturated conditions are met and that any conditions that may interfere or impact the measurements from the Permeameter be minimized as much as possible.

K_{Sat} Classes	Rates	
	micro meters/sec.	inches/hour
low	< 0.1	< 0.01417
Moderate	0.1 to 10	0.01417 to 1.417
High	> 10	> 1.417

Above are the classes used for K_{Sat} in this guide. In the Interpretive Guide Tables are lists of the K_{Sat} classes by soil layer (surface, subsurface, substratum, weathered bedrock, hard bedrock) for each map unit. K_{Sat} classes for weathered bedrock and/or hard bedrock will only be shown for soil map units that have bedrock at less then 5ft. from the surface.

A Soil Scientist is recording readings from a Constant Head Permeameter, used to measure saturated hydraulic conductivity (K_{sat}).

GLOSSARY OF TERMS USED IN THIS GUIDE

Alluvium	Sand, silt, clay, etc., deposited on land by flowing water.
Clay Pan	A dense, compacted layer in the subsoil having a much higher clay content than the overlaying material, from which it is separated by a sharply-defined boundary; formed by downward movement of clay or by synthesis of clay in place during soil formation. Clay pans are usually hard when dry, and very plastic and sticky when wet. Clays usually have high shrink-swell potential. Clay pans usually impede the downward movement of water and air, and the growth of plant roots.
Coarse Fragments	Rock or mineral particles greater than 2.0 mm in diameter, such as stones, gravels, or cobbles:

Rounded or Angular Fragments

Gravel	2mm - 3" diameter
Cobbles	3 - 10" diameter
Stones	10" - 2' diameter
Boulders	2' - 10' diameter

Flat on One Side or One Dimension Much Less Than The Other

Channers	2mm - 6" long
Flagstone	6 - 15" long
Stones	15" - 2' long
Boulders	more than 2' long

Colluvium	A deposit of rock fragments and soil material accumulated at the base of slopes as a result of gravitational action.
Depth (Soil)	Refers to depth below surface to a restrictive layer. This may be a fragipan, rock, or other material that roots cannot penetrate. Roots further than 4" apart, center to center, are not considered substantial penetration.

Very shallow	0 - 10" depth
Shallow	10 - 20" depth
Moderately Deep	20 - 40" depth
Deep	40 - 60" depth
Very Deep	more than 60" depth

Drainage (Soil)	An interpreted characteristic of a soil which is a function of slope runoff and permeability. Soil drainage classes used:

Well Drained	No indication of restricted drainage to 60"or more.
Moderately Well Drained	Depth to restricted drainage or water table 20-40" below surface.
Somewhat Poorly Drained	Depth to restricted drainage or water table 10-20" below surface.
Poorly Drained	Depth to restricted drainage or water table 0-10" below surface.

Erosion (Soil)	The wearing away of the land surface by running water, wind, ice, or other geologic agent; classes can be found as a number after the slope class on the map unit symbol (ex. 77C3). Classes recognized are:

Class 1	Less than 25% of the original soil surface has been removed. (If a map unit symbol does not have an Erosional Class number it is implied to have a Class 1)
Class 2	25-75% of the surface soil has been removed. May contain gullies.
Class 3	More than 75 percent of the soil surface has been removed. Usually many gullies occur.
Class 4	All of the original soil surface has been lost. Contains gullies.

Floodplain	The area along streams or drainageways that floods during heavy rainstorms.
Flooding Frequency	None – less than one time in 500 years Very rare – more than once in 500 years but less than once in 100 years Rare – one to five times in 100 years Occasional – 5 to 50 times in 100 years Frequent – greater than 50 times in 100 years
Fragipan	A natural subsurface horizon with high bulk density relative to the solum above; seeming cemented when dry, but when moist showing a moderate to weak brittleness. Can be an impermeable layer for roots and water movement.

Hydric Soil A soil that is saturated, flooded, or ponded long enough to be conducive for the formation of wetlands. Refer to the section that is titled Hydric Soils on pages 15 – 16.

K Factor An erodibility factor (K) used in the universal Soil Loss Equation to determine soil loss from an area over a period of time due to splash, sheet, and rill erosion. K Factors in Fauquier County range from 0.10 (lowest erodibility) to 0.43 (highest erodibility). Cohesiveness of soil particles varies with different layers of the same soil, causing varying K factors for different layers of the same soil, and varying degrees of erodibility for a given site.

K_{Sat} See **Saturated Hydraulic Conductivity** or the discussion on page 17.

Map Delineation A single area on a soil map depicted by soil boundary lines.

Map Unit The collective of all soil map delineations of the same type (i.e., 73B) for a survey area (County). Map units may contain one or more soils which may vary considerably in their characteristics and use potential.

Mottles Repetitive patches of soil color different from the matrix color. These colors are commonly lithochromic. (If differences in color are due to wet conditions see definition for **Redoximorphic Features**.)

Parent Material The material from which the soil has been formed or from which the soil is capable of being formed (Example: residuum, colluvium, alluvium).

Permeability (Soil) Is the general term describing the qualitative estimate of how well water moves through a soil under saturated conditions. Also see the definition for **Saturated Hydraulic Conductivity** or read the discussion on page 17.

Ponding Frequency **None** – less than one time in 500 years
Very rare – more than once in 500 years but less than once in 100 years
Rare – one to five times in 100 years
Occasional – 5 to 50 times in 100 years
Frequent – greater than 50 times in 100 years

Redoximorphic (Redox) Features Are color patterns in a soil due to loss (depletion) or gain (concentration) of pigment compared to the matrix color due to prolonged wetness. (If pigment colors are due to parent material or something other than wet conditions see definition for **Mottles**.)

Relief The difference in elevation between the high and low points in a land surface.

Residuum Unconsolidated and partially weathered mineral materials accumulated in place by the disintegration of consolidated rock.

River or Stream Terrace A landform in which the soils are formed from the deposition of alluvial sediments and is followed by the down-cutting by the stream. Over time in some situations multiple terraces can form and the terraces are left higher above the waterway that created it.

Saturated Hydraulic Conductivity (K_{Sat}) Is the quantitative measure of the rate at which water moves through soil under saturated conditions. K_{Sat} is measured in the field with a Constant Head Permeameter. See discussion on page 17.

Site Index The height to which a tree will grow in a "normal" stand in usual competition, but not overcrowded, at an age of 50 years. The higher the site index, the more productive the soils are.

Slope The angle at which land surfaces deviate from the horizontal, normally expressed in percentage. Slope classes can be found as the letter in the Map Unit Symbol (ex. 73B).

Slope Class	Slope Range	Slope Description
A	0 - 2%	Nearly level
B	2 - 7%	Gently sloping
C	7 - 15%	Strongly sloping
D	15 - 25%	Moderately steep
E	25 – 45%	Steep
F	45 – 65%	Very steep

Surface Topsoil or the upper most horizon of a soil profile. This layer contains the most organic material then any other layer in the soil profile.

Subsoil Subsurface layer in which maximum clay occurs above the **substratum**.

Substratum The zone of weathered rock material or other weathered parent material between the subsoil and hard rock.

Texture (Soil) The percent by weight of sand, silt and clay in a sample of soil. The texture receives a modifier if coarse fragments are present.

Triassic Basin Refers to a geologic province which formed approximately 200 million years ago (Triassic Age) and consists mainly of sedimentary rocks of conglomerate, sandstone, and siltstones that have been intruded by igneous rocks (Diabase and Basalt). Other terms for the Triassic Basin are the **Culpeper Basin** or the **Piedmont Lowlands**.

Water Table The level below which the soil pores and rock crevices are filled with water. Permanent water tables are commonly used as a source of water in wells. Perched water tables are seasonal and are caused by impermeable layers over which water builds up during wet seasons.

Wetlands To be defined as a wetland by the U.S. Army Corps of Engineers a site must contain all of the following: 1) hydric soils 2) hydrophytic vegetation 3) wetland hydrology. For a more complete description of wetlands refer to the section that is titled Hydric Soils**.**

SUMMARY TABLE OF SOIL CHARACTERISTICS AND USE POTENTIAL

The following table is a summary of soil characteristics as related to the potential suitability for various uses and the major problems associated with each kind of soil. This table arranges the soils numerically. **The number/letter combinations (i.e. 56D) on the soil map represent the soil map units.** Note that these data are brief and highlights only the main characteristics and problems. The table is set up into **<u>five</u>** general categories:

<u>Map Unit Symbol & Soil Name</u>: Contains the map unit symbol (ex. 1A, the letter in the map unit symbol represents the slope class), and the soil name. The soil name will describe the texture of the surface material and in some cases will be followed by a phase that describes some type of limitation with the map unit (ex. frequently flooded, very stony, severely eroded).

<u>Soil Description</u>: Describes the soil map unit and will contain information on depth and drainage classes, a general description of subsoil color, an explanation about where in the landscape the map unit is found, and the parent material which formed it. In some cases a darkened cell within the **Soil Description** block will contain important information about the map unit. Information in the darkened cell includes **Hydric Soils**, map units that **may have hydric soil inclusions**, and soils that **when disturbed can produce high acidity**.

<u>General Characteristics</u>:

SOIL FEATURES – This subcategory contains a quick guide to the soil map unit and features slope, depth to bedrock, depth to watertable, shrink-swell potential, bearing capacity, erosional hazard potential, K factors for surface and subsoil, and the Hydrologic group. If any of these categories are darkened, that means that there are limitations for use in the map unit.

K_{Sat} – Will describe the saturated hydraulic conductivity for each soil layer. For more discussion about saturated hydraulic conductivity see the chapter labeled **Permeability Verses Saturated Hydraulic Conductivity** on page 17.

<u>Land Potentials</u>: Describes land uses potentials for agriculture and forestry.

<u>Development Potential and Problems Using …</u> : This category gives a general class potential for how well a soil can be used for central water and central sewer and for conventional septic tank and drainfield. Along with the general rating of the soil it will give a list of what the limitations are for these uses. These ratings do not take the place of an on-site engineering study but are beneficial in planning further studies.

Some soil map units are complexes, a map unit that contains two soil types (ex. Tankerville – Purcellville Complex). Complexes occur where two soil types cannot be mapped separately. In cases where trying to find which shrink-swell potential, bearing capacity, erosional hazard potential, Hydrologic group or any other factor to use, assume the most limiting factors between the two soil types. If there are any questions about how to use complexes or any other part of this guide please contact our office 540-422-8240.