Surface Materials Map of the Herndon Quadrangle, Virginia

by

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Six major surface material units are present; these include artificial fill or disturbed ground, alluvial sand and gravel, residual lag gravel and colluvial deposits, residuum, saprolite, and bedrock. Residuum and saprolite comprise about 32 percent of the surficial material, lag gravel and colluvium 6 percent, artificial fill and disturbed ground 11 percent, and alluvium 6 percent. Bedrock overlain by a residual veneer forms the rest of the surficial materials. As shown in Table 1, the surficial materials are intricately related to the underlying parent bedrock. Relatively thin soils, which overlie much of the surficial deposits, are not shown on the map.

Data from unpublished and published geologic and soil maps, as well as unpublished water well logs furnished by Fairfax Co. Health Dept., were used to supplement new field studies in defining the map units.

This map should be used with the Thickness of Overburden map (Nelson, 1976c) and the Geologic map (Eggleton, 1976). The map is generalized and should only be used for regional planning, not for specific site evaluation.

Units 6a, 6b, 6c, 6d, 6e, 6f, 6g, 6h - Bedrock -- Eight bedrock divisions are shown on the map (see Explanation). Overburden, as much as 10 feet (3 m) thick, covers the bedrock but it is commonly much less, and fresh outcrops are common. Most of the bedrock is Triassic sedimentary or igneous rock; older crystalline rocks crop out in a small area in the northeastern part of the map.

The most important rock type exposed is diabase. It is extensively quarried and supplies most construction needs for crushed stone in Northern Virginia. Diabase underlies approximately 24 percent of the quadrangle, including those areas where it is covered by a veneer of readily removed saprolite. Bedrock is generally poorly drained except for 6c and 6e which are locally well drained.

Possible uses of the map

This map delineates bedrock at or near the surface and the unconsolidated deposits between the soil zone and fresh bedrock according to their general physical characteristics. Internally well and poorly drained areas that are suited or unsuited for solid waste and waste water disposal can be outlined and compared with areas so defined by soils maps. Used with the Overburden Thickness map (Nelson, 1976), surface material volumes and their general physical characteristics can be defined. Used with the Landforms map (Rogers, 1975) and the Structural Features map (Nelson, 1976) areas susceptible to potential rock falls can be outlined where jointed bedrock crops out along steep slopes.

Saprolite - Residual silty clay and weathered metamorphic or igneous bedrock; firm and cohesive where undisturbed; locally ferruginous and porous, commonly micaceous, contains chips and core stones of unweathered bedrock. Saprolite divided accroding to its parent rock; 5a, derived from diabase; this saprolite commonly contains clays that swell when wet and is very unstable; 5b, derived from schist; 5c, derived from thermally altered schist adjacent to diabase.

Bedrock - Includes Triassic sedimentary rocks and igneous rock (diabase), and older Paleozoic-Precambrian(?) crystalline rocks. 6a, siltstone and calcareous siltstone and sandstone; 6b, thermally altered siltstone, calcareous siltstone and sandstone; 6c, arkosic sandstone coarse to fine-grained, and siltstone; 6d, thermally altered arkosic sandstone and siltstone; 6e, conglomerate and interbedded sandstone and siltstone; 6f, diabase and associated igneous rock; 6g, schist; 6h, thermally altered schist.

Map Units

Unit 1 - Artificial fill and disturbed ground -- Fill is a soil, saprolite, sand, gravel, clay, and rock mixture which has been moved into its present position from nearby cuts and disturbed ground. Generally fill is less stable and has less bearing strength than undisturbed parent material. It is easily eroded, and until stabilized by vegetation and rip rap, provides a source of sediment to streams. Thickness is variable but is commonly less than 10 feet (3 m).

Unit 2 - Alluvium -- Stream-laid sand, silt, clay, gravel, and cobbles form alluvial deposits in modern flood plains; they are poorly sorted, and moderately well stratified. The sand and coarse size components are principally rounded to subrounded grains and pebbles of quartz, feldspar, and rock fragments derived from nearby outcrops. The thickest alluvial deposits, as much as 20 feet (6 m), occur in Broad Run, and parts of Cub Run, where they may have high capacities for groundwater storage. Alluviated valleys are generally poorly drained and subject to flooding.

Unit 3 - Residual lag gravels and colluvium -- A thin sand and gravel cover with a high silty and clay matrix blankets upland areas along the eastern part of the quadrangle. These lag gravels and colluvial deposits are weathered. Lag gravels are residual deposits left after other material is removed by erosion and chemical weathering; colluvium forms when gravity moves loose earth materials down hill. Angular to subangular quartz and sandstone with minor siltstone and crystalline rock fragments form most of the rock constituents; they are rudely stratified and generally poorly sorted.

Lag gravels and colluvium form a thin moderately well drained blanket that seldom is more than 6-7 feet thick (2 m), commonly they are 1-2 feet (1/2 m) thick or less. Colluvium is widely dispersed on hill slopes, but much of it could not be delineated at the map scale.

Units 4a, 4b, 4c, 4d, and 4e - Residuum -- Five different residuum types (4a-4e, see Explanation) are shown on the map. Residuum is a soft, generally dark red, earthy to clay-rich weathered residual rock debris. It essentially forms in situ when sedimentary rocks are chemically weathered and soluable rock constituents removed. This material forms a variably thick, fairly well drained overburden covering its partly weathered parent bedrock; it ranges from 0-50 feet (0-15 m) thick, but is mostly between 5-15 feet (1.5-4.5 m); it is rarely more than 25 feet (7.5 m) thick. Only deposits greather than 10 feet (3 m) thick are shown; thinner residuum veneers are included with bedrock.

Units 5a, 5b, and 5c - Saprolite -- Three saprolite types (5a-c, see Explanation) are shown on the map. Saprolite is a soft, micaceous, clay-rich, yellowish-brown to brownish-red earthy material derived from chemically weathered crystalline rocks. This material retains the parent rocks structure, texture, and volume, but the density is about half that of fresh rock. The saprolite is poorly drained (5a & 5c) to well drained (5b). Individual saprolites vary since their characterisitcs are dependent upon the parent rock; therefore, two adjacent but dissimilar crystalline rock units will yield different saprolite types.

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Residuum and Saprolite	4a	4b	4c	4d	4e	5a	5b	5c
Bedrock	6a	6b	6c	6d	6e	6f	6g	6h

Table 1

Relations of parent bedrock to overlying residual deposits and saprolite, Herndon Quadrangle, Va.

EXPLANATION

Artificial fill or disturbed ground - Heterogeneous mixture of soil, gravel, residuum, saprolite, and rock; usually moved a short distance from quarries, artificial cuts or borrow pits; includes graded and/or disturbed ground; highly variable, depending on source materials; less stable, has less bearing shear strength than undisturbed parent material; readily eroded unless stabilized.

Alluvium - Mixtures of silt, clay, and some sand and gravel; stratified but poorly sorted. Estimated to be less than 20 feet (6 m) maximum thickness.

Lag gravels and colluvium - Heterogeneous, poorly sorted mixture of angular to subrounded quartz, sandstone, siltstone, and some crystalline rock fragments. Matrix has high silt and clay content locally; unconsolidated, but high clay content in some places makes gravels firm, cohesive, and difficult to work.

Residuum - Generally soft earthy clay-rich, weathered rock debris resting on partly weathered sedimentary and thermally altered bedrock. Forms in situ and contains fragments of parent rock in clayey or silty matrix. Residuum is classified according to its parent rock; 4a, derived from siltstone, calcareous siltstone, and sandstone, mostly from western half of quadrangle; 4b, derived from thermally altered siltstone, calcareous siltstone, and sandstone occurring adjacent to diabase bodies; 4c, derived from fine to coarse-grained arkosic sandstone and some siltstone, mostly occurring in eastern half of quadrangle; 4d, derived from thermally metamorphosed sandstone and siltstone adjacent to diabase bodies; 4e, derived from conglomerate in eastern part of quadrangle.