UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

VIENNA QUADRANGLE
VIRGINIA - MARYLAND
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey
Control by USGS, USC&GS, and USCE
Topography by photogrammetric methods from aerial photographs taken 1949. Field checked 1951. Revised from aerial photographs taken 1964. Field checked 1966
Polyconic projection. 1927 North American datum
10,000-foot grid based on Virginia coordinate system, north zone
1000-meter Universal Transverse Mercator grid ticks, zone 18, shown in blue
Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked
Red tint indicates areas in which only landmark buildings are shown

SCALE 1:24000
CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1966 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, WASHINGTON, D.C. 20242
AND VIRGINIA DIVISION OF MINERAL RESOURCES, CHARLOTTESVILLE, VIRGINIA 22903
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Surface Materials Map
VIENNA, VA.-MD.
1966

A.J. Froelich-1976

SPECIAL PRINTING
Contours and additional symbols omitted

Surface Materials of the Vienna Quadrangle, Virginia

by

A.J. Froelich

The surface materials of the Vienna quadrangle include artificial fill or disturbed ground; unconsolidated alluvial, upland gravel, and colluvial deposits of sand, gravel, silt, and clay; saprolite (weathered from bedrock); fresh bedrock; and soil (not mapped). Fresh rock outcrops comprise less than 10% of the total area, artificial fill or disturbed ground less than 1%, alluvium about 15%, upland gravel and colluvium about 2%, with the rest (about 72%) of the area being mantled by saprolite. Soil overlies most of the surface materials, but is not shown on this map (see Porter and others, 1963).

The Surface Materials map is based on unpublished and published geologic maps, soils maps, unpublished logs from water well and foundation borings, and new field work (see list of references). The scale of the map precludes its use for specific site evaluation, and its chief utility is for regional assessments and planning. The map is best used in conjunction with a geologic map (Bennison and Milton, 1954), and Thickness of Overburden map (Neuschel and Froelich, 1975).

Map Units

Unit 1 -- Artificial fill, and disturbed ground-
These materials are locally derived mixtures of soil, saprolite, rock, gravel, sand, and clay which have been moved a short distance from artificial cuts and borrow pits made during construction. Artificial fill has a wide range of properties. In general, it is less stable and has less bearing strength than the undisturbed parent material. It is readily eroded and provides a major source of sediment to streams until stabilized by vegetation and rip-rap.

Unit 2 -- Alluvium -- These deposits include stream-laid sand, silt, clay, gravel and boulders in modern floodplains. They are generally well stratified, poorly to fairly well sorted, micaceous, and consist predominantly of rounded quartz pebbles and rock material derived from nearby outcrops. Thick deposits, as in the Difficult Run floodplain, are natural water storage areas. Alluvial areas are generally poorly drained and subject to flooding.

Unit 3 -- Upland gravel deposits -- Thin dissected and weathered deposits of sand and gravel with clay and silt cover some upland areas. Some are nearly level stream terrace deposits that locally have thin beds of carbonaceous clay and silt interbedded with the sheet-like deposits of sand and gravel. Most of the pebbles and cobbles are subangular to rounded, fairly well sorted, composed of quartz and quartzite, with rare fragments of chert, red sandstone, and various crystalline rocks. Some areas contain impermeable hardpans and iron crusts. Similar unconsolidated poorly sorted deposits with higher proportions of angular quartz are present in many parts of the quadrangle; they are either moving slowly downhill in response to gravity (colluvium), or are residual (lag) deposits left when other material is removed by erosion or chemical solution.

Unit 4a, 4b, 4c, 4d, 4e, and 4f -- Saprolite

Saprolite is a residuum of soft, red-brown to gray, earthy, porous material derived by weathering and decomposition of crystalline rock; most of the constituent minerals other than quartz are altered to clays. Saprolite retains the structure and volume of the original rock, but density is commonly half that of the rock. As saprolite characteristics are directly related to parent bedrock, the saprolite is divided into 6 units (4a through 4f, see Explanation).

Unit 5, 5x, and 5z -- Bedrock

Hard fresh bedrock generally crops out along stream valley walls, but certain types crop out on bald upland surfaces; as mapped, bedrock may be covered by a veneer to as much as 10 feet (3m) of surface materials. Bedrock is divided into three units; 5 is metamorphic bedrock and quartz veins; 5x is diabase igneous bedrock, and 5z is consolidated Triassic sedimentary bedrock (sandstone, conglomerate, and siltstone).

Possible Uses of the Map

The Surface Materials map can be used to delineate the distribution and general physical characteristics of the unconsolidated deposits that underlie the soil zone and overlie fresh bedrock. By outlining materials with good or poor internal drainage, for example, areas that are suited or unsuitable for solid waste disposal or surface disposal of waste water can be delineated and compared with areas so defined by soils maps. From the Surface Materials map and the Thickness of Overburden map (Neuschel and Froelich, 1975), the volume of surficial material as well as its gross physical characteristics can be defined. If the Landforms map (Rogers, 1975) is superimposed on the Surface Materials map, areas of potential rock falls may be delineated by outlining steep slopes where jointed bedrock crops out.

EXPLANATION

1 — Artificial fill - heterogeneous mixture of soil, saprolite, rock, gravel, etc. that has usually been moved a short distance from artificial cuts or borrow pits; includes disturbed ground; highly variable, depending on source materials; commonly less stable and with less bearing and shear strength than undisturbed parent material; readily eroded unless stabilized.

2 — Alluvium - sand, gravel, silt, clay; in stream valleys; coarse fraction mainly quartz and quartzite; well bedded but usually fair to poorly sorted, micaceous; unconsolidated; usually less than 20 feet (6m) thick but as much as 30 feet (9m) in broad valleys of Difficult Run; subject to recurrent flooding.

3 — Upland gravel - cobbles, pebbles, boulders, sand, silt and clay; caps ridges, hills, terraces; coarse fraction predominantly quartz, quartzite and chert; poorly sorted, unconsolidated; usually less than 30 feet (9m) thick; includes colluvium and residual lag gravel.

4a, 4b, 4c, 4d, 4e, 4f — Saprolite - residual silty clay and weathered bedrock; firm and cohesive where undisturbed; ferruginous and porous, locally nearly impermeable; commonly micaceous with slightly weathered fragments, chips and core stones of unweathered bedrock and angular quartz; as much as 150 feet (50m) thick; mapped only where more than 10 feet (3m) thick. 4a, on phyllite and metasiltstone, gravelly, excessively- to well-drained; 4b, on pelitic and semipelitic schist, silty micaceous, well-drained; 4c, on impure quartzite (metagraywacke) sandy, well drained; 4d, on gneiss or granite, sandy, bouldery, well - drained; 4e, on mafic and ultramafic rock, clay-rich, poorly drained; 4f, on diabase, clay-rich, bouldery, poorly drained.

5, 5x, 5z — Bedrock - 5, crystalline metamorphic and quartz veins; 5x, diabase igneous, and 5z, consolidated sedimentary rock; fresh hard, and unaltered; locally overlain by as much as 10 feet (3m) of alluvium, regolith, residuum, saprolite and soils.

List of References

Bennison, A. P. and Milton, Charles, 1954, Preliminary geologic map of the Fairfax, Va. and part of the Seneca Md-Va. quadrangles: U. S. Geol. Survey open-file map, scale 1:62, 500.

Neuschel, S. K. and Froelich, A. J., 1975a, Contour map of the base of saprolite, Vienna quadrangle, Virginia and Maryland: U. S. Geol. Survey open-file map 75-519, scale 1:24,000.

Neuschel, S. K. and Froelich, A. J., 1975b, Thickness of overburden map, Vienna quadrangle, Virginia and Maryland: U. S. Geol. Survey open-file map 75-520, scale 1:24,000.

Porter, H. C., Derting, J. F., Elder, J. H., Henry, E. F., and Pendleton, R. F., 1963, Soil survey of Fairfax County, Virginia: U. S. Soil Conserv. Service, 103 p.

Rogers, H. G., 1975, Landforms map of the Vienna quadrangle, Virginia: U. S. Geol. Survey open-file map 75-598, scale 1:24,000.

U. S. Geological Survey, 1967, Engineering geology of the Northeast Corridor, Washington, D. C., to Boston, Massachusetts -- Coastal Plain and surficial deposits: U. S. Geol. Survey Misc. Geol. Inv. Map I-514-D, 8 sheets, scale 1:500,000.