BASE MAP ADAPTED FROM U.S. GEOLOGICAL SURVEY NATIONAL MAP, 2013: TOPOGRAPHIC MAPS OF THE ALEXANDRIA, VA-DC-MD AND ANNANDALE, VA 7.5-MINUTE QUADRANGLES, NAD 1983

MAP LOCATION

SCALE 1:12,000

1 .5 0 KILOMETERS 1 2

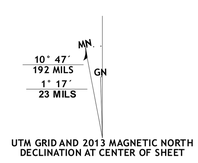
1000 0 METERS 1000 2000

1 .5 0 1

MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

FEET



UTM GRID AND 2013 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

THIS MAP WAS COMPILED AND PUBLISHED BY THE CITY OF ALEXANDRIA, VIRGINIA USING DATA BELIEVED TO BE ACCURATE; HOWEVER, A MARGIN OF ERROR IS INHERENT IN ALL MAPS. THIS MAP IS PROVIDED "AS-IS" AND THE CITY DISCLAIMS ALL WARRANTIES, UCC, AND OTHERWISE, EXPRESS OR IMPLIED, INCLUDING WARRANTIES AS TO THE ACCURACY OF THE MAP AND SUITABILITY FOR A PARTICULAR PURPOSE. THIS MAP IS INTENDED FOR USE ONLY AT THE PUBLISHED SCALE. A DETAILED ANALYSIS OF A SPECIFIC SITE MAY DIFFER FROM THIS MAP.

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

DESCRIPTION OF THE MAP

The modern Alexandria landscape is the product of fluvial depositional and erosional processes that began in the late Tertiary or earlier, and have continued essentially uninterrupted to the present day. Major landforms include a prominent series of river terraces that descend step-wise from the highest parts of the landscape to the lowest (inset 1). All of the terraces were deposited by the Potomac River (or a precursor stream) and its tributaries. The ages of the terraces cannot be directly determined in the map area, but their deposition is thought to span a roughly 10 million year interval from the middle or late Miocene to the late Pleistocene. The highest terraces in the map area—the Beverley Hills, Chinquapin Village, Dowden, Seminary, and Mount Pleasant terraces—are characterized by intense weathering profiles and deep ultisols suggestive of considerable age; their counterparts in adjacent parts of northern Virginia (Drake and Froelich, 1986; 1997; Froelich, 1985), the District of Columbia (Fleming and others, 1994), and Maryland (McCartan, 1989a and b; Glaser, 2003) are generally considered to be of late Miocene through Pliocene age. In contrast, the massive Old Town terrace—one of the lowest and most extensive terraces in the map area—almost certainly was deposited during the late Pleistocene (circa 150,000-15,000 ybp), based on detailed geochronology of presumably correlative deposits in the Hybla Valley just south of the map area (Litwin and others, 2013). A variety of much smaller intermediate terraces fall within this broad age spectrum.

All but the lowest terraces are extensively dissected by erosion, a process that was undoubtedly accelerated by repeated sea-level lowering and rapid climate changes during multiple Pleistocene glaciations. Late Pleistocene erosion has completely stripped off the terrace sediments at many places, exposing the underlying early Cretaceous Potomac Formation in many ravines and hillsides, as well as the early Paleozoic bedrock in Holmes Run Gorge. Rapid stream incision, coupled with locally unstable Potomac Formation sediments, has led to many oversteepened slopes characterized by a host of slope processes and deposits, notably landslides and thick colluvium in a variety of forms.

Plate 5 depicts the distributions of rocks and unconsolidated deposits found at the surface within the map area, and their relation to major landforms (inset 2). The major terraces are given informal, local names because it is not clear how the terraces mapped here relate to the inconsistently applied "T1–T2-T3, etc" scheme shown on published geologic maps of surrounding areas. Several types of slope deposits and younger alluvial deposits are also depicted on the map. In general, colluvium and related slope deposits are mapped where they are thick enough to dominate or strongly influence the soil profile or slope morphology; however, these deposits are shown in a somewhat schematic way in order to also depict the distribution of the underlying Potomac Formation and bedrock units on hillsides. This approach is necessary because virtually the entire landscape in excess of 2% slope is nearly completely covered by debris fans of one kind or another, as most ravine bottoms are by alluvium and colluvium. A more complete account of the map units and the landscapes they occur in can be found in "Plate 5 Surficial Geology-Expanded Explanation".

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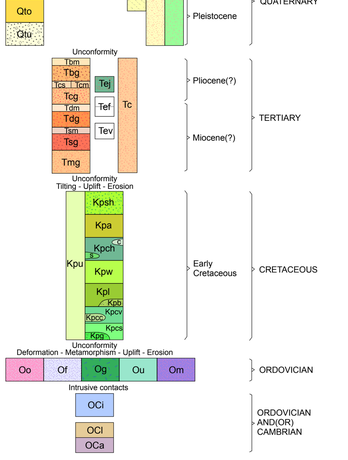
CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Artificial fill and modified land—Artificial fill and modified land are widespread in the city and range from small cut-and-fills for structures and roads, to massive emplacements of fill for infrastructure and extensive areas formerly mined for sand and gravel. The fill material varies widely, commonly including some combination of sand, gravel, clay, topsoil, and construction debris. Only major areas of artificial fill and modified land are shown on the map, chiefly large embankments, old gravel pits, important filled wetlands, and significant buried ravines. These areas are indicated with a light transparent overlay to permit the underlying pre-settlement geology to be shown. Areas of fill and disturbed ground are ubiquitous on the Old Town terrace and in the Cameron Valley; these, and many other smaller disturbed areas elsewhere, are mostly omitted from the map

Pre-settlement courses of Cameron, Holmes, and Four Mile Runs—Locally evidenced in the field by dry channels and swales, but obscured in most places by urbanization and artificial fill. Position largely deduced from historical records, the distributions of alluvial sediments and landforms, and the 1917 USGS topographic map of Washington and vicinity

PLEISTOCENE-RECENT STREAM DEPOSITS

Recent alluvium—Laterally and vertically variable deposits of boulders, gravel, sand, and mud along the floodways of most streams. The sand- and coarse silt-sized fractions are commonly micaceous. Along lower Cameron Run and the Potomac River, this map unit also includes a few low-lying stream terraces of probable Recent age. Arcuate dashed lines and arrows denote high-quality, ecologically significant point bars and remnant oxbow - natural levee systems, respectively, along Holmes Run

Recent estuarine deposits—Chiefly silt and clay with layers of peat and muck, locally interbedded with sand and gravel near the mouths of Four Mile Run and Cameron Runs. Deposited in the historical estuaries of Four Mile Run and Hunting Creek, now almost entirely filled

Recent swamp deposits—Chiefly organic silt and clay in low-lying swales and backswamp areas that adjoin major streams, and whose mouths are or may have been dammed in the past by coarse alluvial deposits. Closely associated with units Qt and Qto

Alluvial fans (late Pleistocene and Holocene)—Chiefly gravel, sand, and loamy material. Localized at the mouths of some of the larger ravines, where they debouch onto the flatter terraces and valley bottoms of major streams. Some fans are steep fronted and truncated by valley incision, whereas others grade smoothly into the lowland surfaces in front of them, indicating that the fans are of different ages

Stream terraces (late Pleistocene and Holocene)—Typically coarse cobble gravel below, grading up into sand, silt, and clay, sometimes in repetitive alluvial cycles. In the lower parts of major drainages where the Old Town terrace (Qto, below) is well expressed, unit Qt encompasses the lowest set(s) of stream terraces within and bordering the major portion of the modern 100-year floodplain and is mainly of Holocene age. In the upstream reaches where the Old Town terrace is not present or distinguishable, unit Qt occupies a range of positions and may be much older

Old Town terrace (late Pleistocene)—Sand, gravel, and silty clay, with organic layers. Geotechnical borings beneath Old Town, Del Ray, and Potomac Yards show the terrace to consist of repetitive, broadly fining-up deposits, gravelly in their lower parts, grading up through sand and muddy sand into mud, and locally separated by prominent organic horizons. In the same area, the modern surface of the terrace above an elevation of about 30-35 feet is composed chiefly of stratified silt and clay (Qto-c); elsewhere, it is mostly medium to coarse sand (Qto). Total thickness approaches 125 feet beneath the Old Town waterfront, but decreases to the south and is greatly grades to the main Old Town terrace, and composed mostly of gravel and sand, was mapped for several miles up Cameron Valley and its tributaries, and in the lowermost reaches of Four Mile Run. The Old Town terrace is broadly correlative with the deposits described by Litwin and others (2013) in the Hybla Valley, and was deposited between ~150,000 and 15,000 years ago, i.e., during the Wisconsin, Sangamon, and latest Illinoian stages

High-level terrace remnants (early(?) to late Pleistocene)—Gravel and sand, deeply weathered. Gravelly terrace remnants are found at widely divergent elevations and positions along the valley walls of most of the major drainages, especially Cameron and Holmes Runs. Some of these remnants still preserve relatively level terrace surfaces, but others are small scraps of moderately sloping, severely eroded gravel, and some may simply represent a gravel lag or colluvium. They generally occur in higher landscape positions than the Old Town terrace, and are thus older; probably pre-Illinoian

TERTIARY-RECENT SLOPE DEPOSITS AND ASSOCIATIONS

Slope deposits consist of boulders, cobbles, and pebbles embedded in an oxidized, fine- to coarse-grained matrix composed of variable proportions of sand, silt, and clay, plus rinds where bedrock exhibit a pronounced fragipan. Prominent terrace remnants located on either side of Chinquapin Hollow at an elevation of 165-170 feet, and capped by identical clayey silt, are probably parts of the same terrace on the downthrown side of the Fort Williams fault

Fort Ward escarpment (Pliocene?)—Consists of two distinct sections. The more robust southern section separates the Seminary and Chinquapin Village terraces and is developed on the Arell clay. The northern section separates the Dowden and Chinquapin Village terraces in the Lucky Run drainage north of Shirley Highway. It consists of small, isolated erosional remnants developed on the Lincolnia silty clay member; the northernmost and largest remnant, in the Claremont neighborhood of Arlington County, follows the contact between the Lincolnia and the Cameron Valley sand

Dowden terrace (Miocene?)—Mostly gravel and cobbles in a bright orange loamy matrix (Tdg). The most extensive of the upland terraces, with an average surface elevation of 240-250 feet, locally approaching 260 feet at a few places. Base elevation varies widely but is most commonly between 225 and 230 feet. Thickness generally 30-35 feet, but exceeds 60 feet in the vicinity of the red arrow near Shirley Highway, which appears to mark a deep channel. Parts of the terrace surface are capped by heavy silt loam (Tdm) a few feet thick, with several poorly-drained swales and small swamps

Varsity Park escarpment (Miocene?)—Separates the Seminary and Dowden terraces. Developed on Arell clay, with a relatively gentle, short slope and persistent cover of colluvial gravel

Seminary terrace (Miocene?)—Composed chiefly of interbedded coarse, red, clayey sand and medium-coarse gravel in a matrix of red-brown heavy loam (Tsg), but the highest part is capped by heavy silt loam (Tsm) that locally exceeds 10 feet in thickness and is very poorly drained. Underlies a broad upland plain centered on the Episcopal Seminary, and forms the summit of the Alexandria highlands, with an average surface elevation of 265-275 feet. Base of the terrace ranges from 225-250 feet and is mostly at or above 240 feet. The adjacent 230-ft terrace remnant along Quaker Lane south of Seminary Road is interpreted to be the down-faulted southern extension of the Seminary terrace, based on strong similarity of the sediments and apparent offset of the terrace base by as much as 25-30 feet across the fault

Mount Pleasant terrace (Miocene?)—Intensely weathered, reddish-brown cobble gravel mapped as "Tt2" on the Annandale Quadrangle by Drake and Froelich (1986). Occurs as isolated, dissected remnants at elevations between 350 and 400 feet north and west of Mount Pleasant. Correlative with unit T4 on the Washington West Quadrangle, which forms the Wisconsin Avenue Ridge - Washington, DC's highest landmass. Thickness generally 30 feet or less. Not associated with any known escarpment(s) in the map area.

TERTIARY UPLAND TERRACES

Four major upland terraces deposited by the ancestral Potomac River (and remnants of a fifth in Fairfax County) are present in the map area. In Alexandria, the terraces are separated by a series of conspicuous stream-cut escarpments. Each escarpment was cut when the river occupied the terrace at its base. Large parts of all of the terraces and escarpments have been completely eroded away, but significant segments still remain in the interior portions of the upland landscape, away from ravines rejuvenated by late Pleistocene incision. The terraces consist mostly of coarse, strongly weathered sand and gravel; their undissected surfaces resemble alluvial plains and are locally capped by sheets of massive silt loam; soil profiles typically exhibit well developed fragipans. The escarpments are short, gently to moderately sloping, with relief ranging from 25 to 75+ feet. They are developed chiefly on the Potomac Formation, which is close to the surface and controls the soil profile at most places, but they are locally veneered by several feet of high-level colluvium, especially in concave places on the hillside. Map units are differentiated by relative position in the landscape and weathering, and escarpments also by the member of the Potomac Formation on which they are developed (indicated by the corresponding color). The ages cited below are speculative and are based on those of correlative terraces in the Washington West Quadrangle (Fleming and others, 1994).

Beverley Hills terrace (Pliocene?)—Bulk of terrace is coarse cobble gravel in a weathered matrix of yellowish-orange loam (Tbg); locally contains boulders up to 5 feet long, especially near base. Zones of loamy sand without gravel are reported in boreholes. The highest and least dissected terrace surfaces are commonly capped by several feet of silt loam (Tbm). This terrace forms a series of isolated, strongly dissected erosional remnants. Surface altitude ranges from 145 to 160 feet, while the base of the terrace ranges from 130 to 145 feet. Maximum known thickness is less than 25 feet

Jefferson Park escarpment (Pliocene?)—Separates the Chinquapin Village and Beverley Hills terraces. Developed chiefly on fine sandy clay of the Chinquapin Hollow member of the Potomac Formation (Kpch), and is moderately stable. Far southeastern end is developed on the Arell clay member (Kpa) and is complicated by faulting, dissection by modern streams, and thick colluvium

Chinquapin Village terrace (Pliocene?)—Mostly cobbles and pebbles in a matrix of orange loam (Tcg). Much of this terrace is a flat to gently sloping, poorly drained landscape. Typical surface elevations range from 185 to 205 feet, with the base being between 170 and 190 feet. Average thickness about 25 feet. Has distinct areas capped by dark, clayey silt (Tcm) and brown loamy sand (Tcs) up to 10 feet thick. Silt areas are concentrated along the inboard edge of the terrace and commonly marked by relict swamp vegetation within a poorly drained landscape; sandy areas exhibit a pronounced fragipan. Prominent terrace remnants located on either side of Chinquapin Hollow at an elevation of 165-170 feet, and capped by identical clayey silt, are probably parts of the same terrace on the downthrown side of the Fort Williams fault

Lincolnia silty clay—Massive to slabby-bedded silty clay and clayey silt, moderately sandy in many places. Color typically light green-gray or blue-gray where fresh and red-brown where weathered; commonly mottled near the water table. Clay fraction dominated by expandable lattice types. Small to medium sized lenses and channel-like bodies of fine to medium arkosic sand are common near contacts with the Winkler and Cameron Valley sand members. Thickness typically 50-60 feet, but exceeds 100 feet beneath parts of Lincolnia. Fine, wavy laminations and sandy partings occasionally present in slabby-bedded units. The Lincolnia silty clay appears to be in a large scale lateral facies relationship with the upper part of the Cameron Valley sand (Kpcv, below), and was probably deposited as overbank sediment on a broad, stable floodplain. The **Barcroft diamicton** (Kpb) occurs discontinuously at or near the base of the Lincolnia silty clay. It contains pebbles, cobbles, and boulders up to 18 inches long embedded in a dense, massive to crudely layered, red-brown to green-gray clayey to loamy matrix with incipient soil horizonation and organic layers. Clasts include vein quartz, sandstone, and skolithos-bearing quartzites; some are faceted, pitted, and resemble ventifacts. Maximum observed thickness is about 18 feet

Cameron Valley sand—Lower part of unit (Kpcs) consists chiefly of medium, clayey, arkosic sand and weakly-cemented sandstone that is commonly micaceous close to the bedrock surface. Large-scale trough and planar cross beds are ubiquitous and show east to southeast current vectors; thin, disrupted silt and clay beds and associated clay clasts are locally prominent. Bodies of gravelly sand (Kpcg) interbedded with thin to moderately thick, light colored silty clay beds are also found in the lower part of the unit. Upper part of unit (Kpcv) is closely associated with the Cameron Run and Four Mile Run bedrock valleys and consists of large, thick bodies of medium to locally coarse, arkosic channel sands interbedded with increasing numbers of silty-clay bodies of various sizes upward in the section. Large, map-scale plugs of silty clay (Kpcc) occur near the base of the unit along Four Mile Run and at several horizons in the upper part. The maximum thickness of the Cameron Valley sand is about 200 feet and occurs over parts of the Cameron Run and Four Mile Run bedrock valleys

Potomac Formation, undivided—Mapped by Drake and others, 1979, in portions of Arlington and Fairfax Counties

Undifferentiated sand (Kps) and **silty clay** (Kpc)—Mapped during this study in Clermont Woods Park in Fairfax County

POTOMAC FORMATION (EARLY CRETACEOUS)

The Potomac Formation crops out or is within 30 feet of the surface at most places in the map area west of the Old Town terrace, except where removed by erosion. It is divided into informal local members and sub-members based on the dominant sedimentary features of each unit. All of these units were deposited in channels, floodplains, oxbow lakes, and point bars associated with a large river system. Clayey units tend to be more resistant to erosion than sandy ones; they typically are fractured and high in expandable clay minerals, producing steep, unstable slopes, in contrast to longer, and commonly gentler and more stable slopes on sandy strata

Shooters Hill gravel—Medium-coarse, light brown, clayey, feldspathic sand, commonly with abundant granules and pea gravel. Known only from a few small, slumped outcrops and shallow borings near Shooters Hill, where it forms a thin (<30 ft) erosional remnant beneath the Beverley Hills terrace. Overlies the Arell clay on a local erosional unconformity

Arell clay—Massive lacustrine clay, commonly mottled in green and reddish-brown tones in outcrop. Brownish-gray to blue-gray below the water table. Typically very stiff to hard, with abundant fractures and a high content of expandable-lattice clay minerals. Forms steep bluffs and hillsides with many prehistoric and modern landslide scars. Exposed thickness about 150 feet. Unconformably overlies and truncates all other members except the Shooters Hill gravel, but may be in a lateral facies relationship to parts of the Chinquapin Hollow fine sandy clay. Probably deposited in a large oxbow lake

Chinquapin Hollow fine sandy clay—Fine to very fine sandy clay, sandy and clayey silt, organic silt, and clayey fine sand, locally with lignite layers, wood, and leaf impressions. Rarely contains thin layers of fine gravel and granule sands. The main lithologies are closely interbedded in predominantly fining-upwards local sequences at scales ranging from a few inches to several feet. Green and brown color banding, or variegation, is prominent in most exposures. Expandable lattice clay minerals comprise nearly 100% of the clay fraction. Contains scattered, larger bodies of massive silty clay with low sand content (c) and fine to medium clayey sand (s), which are seldom mappable over any great distance. Unit probably represents a large point bar; minimum thickness is 120 feet. Appears to unconformably overlie the Winkler sand, Lincolnia silty clay, and parts of the Cameron Valley sand based on the map pattern, but field relations are obscure

Winkler sand—Medium to coarse, yellowish brown, trough crossbedded arkosic to quartzose sand, locally pebbly. Feldspar in arkose is commonly weathered into clay. Forms a complex of tabular to channel-like bodies in the Lincolnia silty clay, concentrated in a northeast-trending belt centered on Shirley Highway. Thickness typically 30-50 feet but locally exceeds 100 feet near Shirley Highway. Apparently deposited in a northeast-flowing channel system on the Lincolnia floodplain

Lincolnia silty clay—Massive to slabby-bedded silty clay and clayey silt, moderately sandy in many places. Color typically light green-gray or blue-gray where fresh and red-brown where weathered; commonly mottled near the water table. Clay fraction dominated by expandable lattice types. Small to medium sized lenses and channel-like bodies of fine to medium arkosic sand are common near contacts with the Winkler and Cameron Valley sand members. Thickness typically 50-60 feet, but exceeds 100 feet beneath parts of Lincolnia. Fine, wavy laminations and sandy partings occasionally present in slabby-bedded units. The Lincolnia silty clay appears to be in a large scale lateral facies relationship with the upper part of the Cameron Valley sand (Kpcv, below), and was probably deposited as overbank sediment on a broad, stable floodplain. The **Barcroft diamicton** (Kpb) occurs discontinuously at or near the base of the Lincolnia silty clay. It contains pebbles, cobbles, and boulders up to 18 inches long embedded in a dense, massive to crudely layered, red-brown to green-gray clayey to loamy matrix with incipient soil horizonation and organic layers. Clasts include vein quartz, sandstone, and skolithos-bearing quartzites; some are faceted, pitted, and resemble ventifacts. Maximum observed thickness is about 18 feet

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Potomac Formation, undivided—Mapped by Drake and others, 1979, in portions of Arlington and Fairfax Counties

Undifferentiated sand (Kps) and **silty clay** (Kpc)—Mapped during this study in Clermont Woods Park in Fairfax County

CRYSTALLINE BEDROCK AND SAPROLITE

Fresh, hard bedrock crops out chiefly near the active floodway of Holmes Run gorge and along parts of Turkeycock and Indian Runs, where stream action routinely strips off soil. The bedrock on hillsides and in the bottoms of most tributary ravines is partially to entirely weathered into saprolite, a soft, clayey to loamy-textured residual material that still retains recognizable textures and structures of the original rock, but is only about half as dense

Occoquon Granite (early Ordovician)— Coarse-grained, well-foliated, light gray muscovite-biotite monzogranite. Along Holmes Run, the granite intrudes all the other rock units and is folded with the enclosing wallrocks
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Falls Church Tonalite (early Ordovician)—Medium to coarse-grained, dark gray, massive to well foliated hornblende-biotite tonalite. Some outcrops contain many xenoliths of gabbro and amphibolite

Quartz gabbro (early Ordovician?)—Medium to coarse-grained, dark green, red-weathering, augite-hornblende-quartz gabbro, locally metamorphosed to a well-foliated, black amphibolite.

Soapstone and talc schist (early Ordovician?)—Poorly exposed body of massive to schistose, medium green ultramafic rock composed of talc, chlorite, anthophyllite, and quartz. Lies along the western edge of and is probably related to the much larger gabbro body at Barcroft Woods

Muscovite monzogranite (early Ordovician?)—Fine- to medium-grained, well-foliated, pinkish-white muscovite monzogranite. Crops out just west of the city limits in Holmes Run Gorge, where it intrudes the Indian Run Formation, and is itself intruded by small bodies of Occoquon Granite

Indian Run Formation (Cambrian(?) and early Ordovician). Medium-grained metadiamictite containing scattered quartz lumps and dark biotite schist "wafers", along with sparse inclusions of Lake Barcroft Metasandstone, Accotink Schist, felsic metavolcanic rocks, and mafic and ultramafic rocks, set in a gray, massive to foliated, quartzofeldspathic matrix with variable amounts of mica and garnet

Annandale Group (Cambrian and/or early Ordovician). OCl–Lake Barcroft Metasandstone: fine-grained, light gray, meta-arenite and quartz-rich metagraywacke. Within the city limits it forms a swarm of large xenoliths in Occoquon Granite upstream of Shirley Highway, and occurs as thin beds within Accotink Schist in Dyke Marsh, Belle View, and Natural Area. Much larger bodies elsewhere in Fairfax County. OCa–Accotink Schist: medium- to coarse-grained, gray-brown, garnetiferous muscovite-biotite schist. Forms thin, highly folded screens or roof pendants in Occoquon Granite and Falls Church Tonalite between Holmes Run and the head of Rynex Natural Area

Structure Symbols

Contact. Approximately located; dotted where concealed

Faults. Dotted where concealed, queried where uncertain

Paleozoic strike-slip fault in bedrock. Arrows indicate sense of displacement

Reverse fault, inferred. U/D indicates upthrown and downthrown sides

Small fault seen in outcrop by Drake and others (1979), showing dip in degrees. U/D indicates upthrown and downthrown sides, where known

Small reverse or thrust fault seen in Potomac Formation outcrop, showing dip in degrees. U/D indicates upthrown and downthrown sides

Planar Structures

Strike and dip of beds

Strike and dip of metamorphic foliation of indeterminate age

Strike and dip of transposition foliation in stratified rocks

Strike and dip of igneous flow foliation in Falls Church tonalite

Strike and dip of first-generation bedding schistosity

Strike and dip of second generation schistosity

Strike and dip of mylonitic foliation in ductile fault zones

Shear zone observed in outcrop: mylonite and phyllonite; Q - quartz veins intruded along shear zone

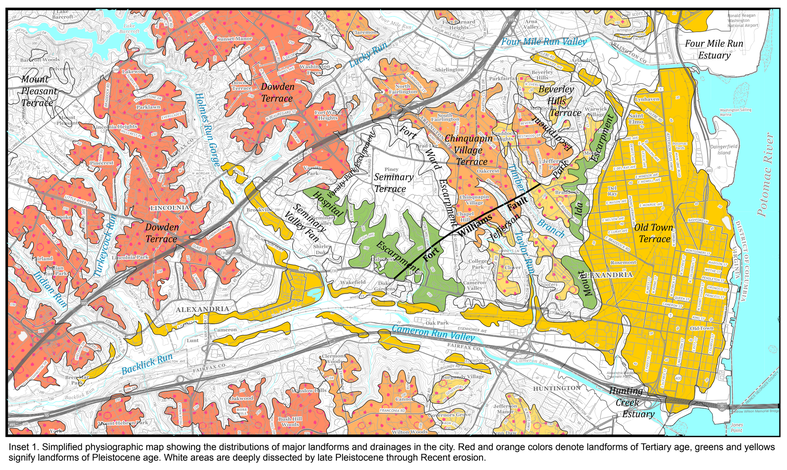
Strike and dip of joints

Linear Structures (may be combined with planar structures)

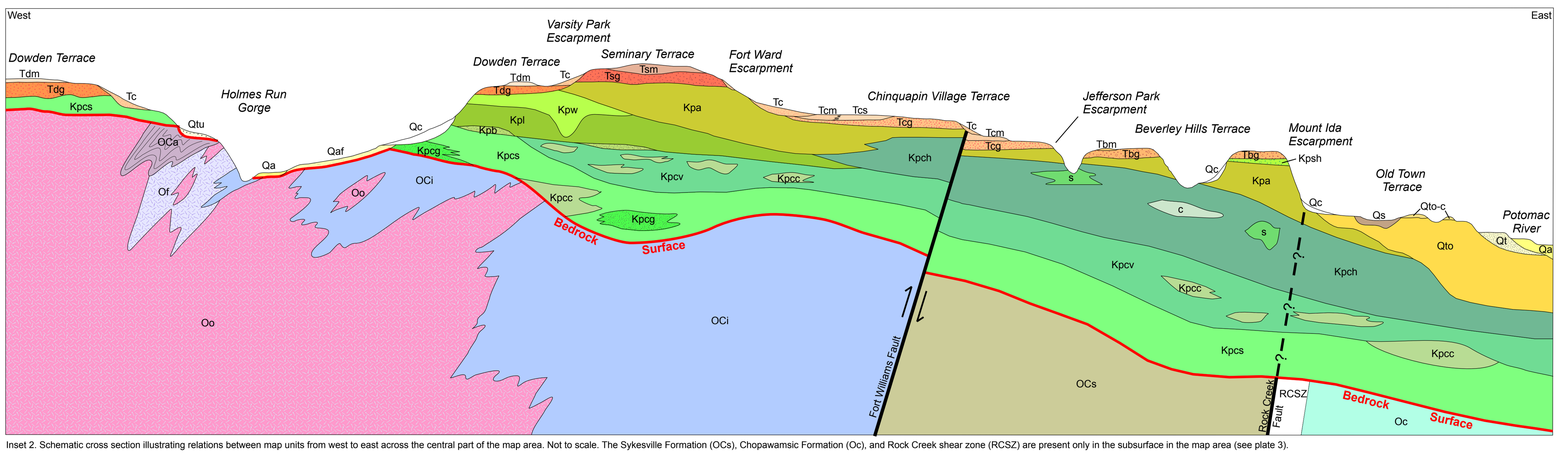
Bearing and plunge of mineral lineation

Small anticline seen in outcrop, showing crestline and direction of plunge

Dominant dip azimuth of cross beds observed in sand and gravel exposures. Longer symbols are exposures with a greater number of visible cross beds



Inset 1. Simplified physiographic map showing the distributions of major landforms and drainages in the city. Red and orange colors denote landforms of Tertiary age, greens and yellows signify landforms of Pleistocene age. White areas are deeply dissected by late Pleistocene through Recent erosion.



Inset 2. Schematic cross section illustrating relations between map units from west to east across the central part of the map area. Not to scale. The Sykesville Formation (OCs), Chopawamsic Formation (Oc), and Rock Creek shear zone (RCSZ) are present only in the subsurface in the map area (see plate 3).

GEOLOGIC MAP OF THE CITY OF ALEXANDRIA, VIRGINIA AND VICINITY, SHOWING SURFICIAL GEOLOGY, LANDFORMS, AND MAJOR AREAS OF ARTIFICIALLY MODIFIED LAND

By Anthony H. Fleming, 2015