COMMONWEALTH OF VIRGINIA
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT
DIVISION OF MINERAL RESOURCES
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GEOLOGY OF THE FORT DEFIANCE QUADRANGLE, VIRGINIA

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FORT DEFIANCE QUADRANGLE

EXPLANATION

UNIT CHARACTERISTICS

GEOLOGIC AND ECONOMIC FACTORS AFFECTING LAND MODIFICATION

QUATERNARY

al	Alluvium: *Flood-plain deposits of stratified, unconsolidated clay, silt, and sand with sand-and-gravel at base. Chert gravel at base and localized calcareous tufa (marl) deposits along streams draining carbonate rock terrane. Thickness: 0-20 feet (0-6 m).*	Level land adjacent to streams, which may be readily tilled or excavated, is subject to periodic flooding that limits its use to farm or recreational activities. Excavations are subject to sloughing and slumping. In areas where alluvial and gravel deposits overlie cavernous limestone or dolomite, rapid ground-water withdrawals may induce surface subsidence or collapse. Marl deposits have been used locally as a source of agricultural lime.
td	Terrace deposits: *Dissected remnants of unconsolidated, stratified, alluvial deposits of clay, silt, and sand with quartzite gravels at base. Chert gravel at base near streams draining carbonate rock terrane. Terrace deposits south of New Hope on rocks of the Beekmantown Group at mouth of many alluvial fans and residual accumulations of angular chert. Thickness: 0-20 feet (0-6 m).*	Level benches or flats near streams are generally above flood levels. Artificial cuts and excavations are subject to sloughing and slumping, and land is subject to subsidence or collapse where terrace deposits overlie cavernous limestone or dolomite.

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ta	Alkalic dikes: *Including nephaline syenite, teschenite, and teschenite-picrite. Thickness: 0-10 feet (0-3 m).*	Small, linear area of rocky land may be difficult to excavate locally.
td	Diabase dikes: *Dark greenish-gray to black diabase. Thickness: 0-10 feet (0-3 m).*	Dikes weather to large boulders and red clay near ground surface and may be difficult to excavate.

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Ombs, Omb, Omb	Martinsburg Formation (Omb): *s, dark-green, fine- to medium-grained, medium- to thick-bedded lithic sandstone with graded bedding, flute casts, groove casts, load casts, and rare chert and black-slate pebbles interbedded with dark-gray, laminated, thin-bedded calcareous argillite and black slate. Thickness undetermined. b, dark-gray to black, laminated, thin-bedded calcareous argillite with graded bedding and convolute folds interbedded with black calcareous slate. Thickness: 500-1,000 feet (152-305 m). c, black, very fine grained, thin-bedded calcareous slate with a few beds of argillite. Thickness: 100-200 feet (30-61 m).*	s—gently rolling to hilly upland has steep, V-shaped valleys along larger streams and rivers. Relatively shallow, well-drained, sandy or shaly soil with moderate-to-steep slopes is present. Erosion may be severe on slopes greater than 10 percent because of thin soil and rapid run-off of storm water. Artificial cuts and excavations may be unstable where bedding is undercut. Building sites are good on gentle slopes. Construction restrictions are imposed on the type and location of waste-disposal facilities in areas of shallow soil and rapid run-off of storm water. Ground water for domestic or limited farm use is generally available from wells less than 200 feet (61 m) deep. a and c—gently rolling open land has shallow soil and moderate slopes. Severe soil erosion can be expected on steep denuded slopes, particularly where slate is predominant. Construction restrictions are imposed on the type and location of waste-disposal facilities in areas of shallow soil, rapid run-off of storm water, clayey subsoil and solution channels in calcareous rock. Slope or excavations surface may require blasting to remove resistant ledges. Artificial cuts and excavations may be unstable where bedding or cleavage are undercut. This land is well suited for agriculture, particularly pastures. Water wells generally provide small yields from depths less than 150 feet (46 m). Ground water is moderately hard and may be slightly acidic or contain iron.
Oelt	Edinburg Formation: *Oelh (Liberty Hall), dark gray to black, fine-grained, thin- to thick- and massive-bedded, turbidite limestone with local convolute bedding and a few thin beds of black slate. Thickness: 450 feet (137 m). es, black, very fine grained, graptolitic calcareous slate at base locally. Thickness: 0-120 feet (0-36 m).*	A low, gently rolling land surface with low, discontinuous ridges has developed on limestone. The soil is shallow, locally cobbly, and subject to severe erosion as evidenced by large areas of exposed limestone ledges. Construction restrictions are imposed on type and location of waste-disposal facilities in areas of thin soil and solution channels and caves in the bedrock. Occurrence of bedrock pinnacles restrict a lot but very shallow excavations. Ground-water availability is fair to poor, and the water may be very hard.
Ol	Lincolnshire Formation and New Market Limestone: *Lincolnshire Formation—dark-gray, medium- to coarse-grained, bioclastic, fossiliferous, black chert bearing limestone with pink partings. Medium-gray, coarse-grained, bioclastic, fossiliferous, high-calcium limestone (Mnt.). New Market dove-gray, thick-bedded, massive, micritic, high-calcium limestone. Thickness: northwestern belt, 200-380 feet (61-116 m); southeastern belt, 0-160 feet (0-49 m).*	Gently rolling land surface with a few low, round hills and linear ridges has formed over well-drained, stony soil generally covered with deep, well-drained soil. Appreciable soil creep and severe erosion may occur in modified land areas on steep slopes, whereas on gentle slopes, the soil is generally stable. There is a great variation in thickness of the soil over short distances; clay subsoil has a moderately high shrink-swell potential. Common sinkhole and cave development, particularly in the limestone units, necessitates rerouting of choice in the determination of the type and location of waste-disposal facilities and other construction. Ground-water availability is good to fair, and the water is generally hard. The ground water in these carbonate rocks is susceptible to contamination from surface sources where sinkholes are present or where the soil is thin; contaminants induced into the sinkholes may be transmitted for considerable distances through solution channels and fractures in the rock. Obul, Obml, Obll, and Ceu —rock ledges are exposed in most areas and rockland (areas where ledges are less than 10 feet or 3 m apart) occurs locally on thick sequences of alternating limestone and dolomite. Obod and residual chert debris covers the rounded hills and lowlands underlain by siliceous dolomite. s, in Ccu and Ccou—deep residual, sandy soil, formed from thin, calcareous sandstone beds that commonly occur on linear ridge crests and slopes.
Obul, Obml, Obll, Obod, Obsl	Beekmantown Group: *Obul (upper limestone and dolomite unit), dove-gray, thin-bedded, ultrafine-grained limestone interbedded with light-gray, fine- to medium-grained, thick beds of laminated dolomite and a few thin beds of gray to tan shale and pink calcareous mudrock. Thickness: 350-400 feet (107-122 m). Obml (upper dolomite unit), light- to dark-gray, fine- to medium-grained, thick-bedded, laminated siliceous dolomite interbedded with coarse-grained locally brecciated siliceous dolomite with beds and nodules of black to tan chert. Thickness: 250-500 feet (76-152 m). Obml (middle limestone and dolomite unit), dark-gray, medium- to coarse-grained, fossiliferous, bioclastic limestone with algal structures, oolites, cross-lamination and flat-pebble conglomerate interbedded with limestone and dolomitic limestone with burrow structures, silty calcarenite, and laminated dolomite. Thickness: 400-500 feet (122-152 m). Obld (lower dolomite unit), massive, dark-gray, coarse-grained, locally brecciated, siliceous dolomite with thin, dark-gray chert beds, chert nodules, quartz veins and quartz crystal-lined vugs; interbedded with light- to dark-gray, fine- to medium-grained, massive to laminated siliceous dolomite. Thickness: 650-1,000 feet (198-305 m). Obll (lower limestone unit), dark-gray, fine-grained, thick-bedded limestone interbedded with light-gray, fine-grained, laminated dolomite in upper part; dark-gray, ultrafine-grained, limestone with black chert nodules, undulose laminations, burrow structures and flat pebble conglomerate in lower part. Thickness: 500-700 feet (152-213 m).*	Gently rolling land surface with a few low, round hills and linear ridges has formed over well-drained, stony soil generally covered with deep, well-drained soil. Appreciable soil creep and severe erosion may occur in modified land areas on steep slopes, whereas on gentle slopes, the soil is generally stable. There is a great variation in thickness of the soil over short distances; clay subsoil has a moderately high shrink-swell potential. Common sinkhole and cave development, particularly in the limestone units, necessitates rerouting of choice in the determination of the type and location of waste-disposal facilities and other construction. Ground-water availability is good to fair, and the water is generally hard. The ground water in these carbonate rocks is susceptible to contamination from surface sources where sinkholes are present or where the soil is thin; contaminants induced into the sinkholes may be transmitted for considerable distances through solution channels and fractures in the rock. Obul, Obml, Obll, and Ceu —rock ledges are exposed in most areas and rockland (areas where ledges are less than 10 feet or 3 m apart) occurs locally on thick sequences of alternating limestone and dolomite. Obod and residual chert debris covers the rounded hills and lowlands underlain by siliceous dolomite. s, in Ccu and Ccou—deep residual, sandy soil, formed from thin, calcareous sandstone beds that commonly occur on linear ridge crests and slopes.

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Ccou, Ccou, Ccou	Conococheague Formation: *Ccou (upper member), dark-gray, fine-grained limestone with algal structures alternating with flat-pebble limestone conglomerate, thin-bedded limestone with siliceous partings, laminated limestone and thin to thick-bedded, fine-grained, light-gray dolomite. s, thin (0-5 feet or 0-2 m) tan to brown, medium- to coarse-grained, cross-laminated quartz sandstone. Thickness: 1,200-1,800 feet (366-549 m). Ccol (lower member), light- to medium-gray, fine- to medium-grained, massive to laminated dolomite. Thickness: 800-1,000 feet (244-305 m). Ccu, interbedded limestone and dolomite with thin sandstone beds. Thickness: 1,200-1,500 feet (366-457 m).*	
Ceu	Elbrook Formation: *Ceu (upper member), medium- to dark-gray (orangish-yellow on weathered surface); fine- to medium-grained, medium- to thick-bedded, massive or laminated dolomite interbedded with thin, dark-gray, algal limestone, flat-pebble limestone conglomerate, platy dolomitic siltstone, and a few thin sandstone beds. Thickness: 1,600 feet (488 m).*	

Modified land: *Extensive cut and fill due to grading.*

x Sinkhole: *Area of known or potential sinkhole development, subsidence, and cave openings.*

79°00'
38°15'
57'30"
(MOUNT SIDNEY)
55'
1 890 000 FEET
78°52'30"
38°15'
210 000 FEET
12'30"
Mt Pisgah
Fort Defiance
Knightly
Verona
MIDDLE RIVER
MASSANUTTEN SYNCLINORIUM
Laurel Hill
CHRISTIANS CREEK
Barren Ridge
Hermitage
Middle River
Middlebrook
Deerfield
Churchville
Stuntown
Round Hill
Greenville
Arbrook
Lewis
Annex
Grottoes
Grist Creek
Mint Spring
Middle River
Jolivue
Laurel Run
Mint Spring