Kentucky Geological Survey
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UNIVERSITY OF KENTUCKY, LEXINGTON

MAP AND CHART 178
Series XII, 2007

Generalized Geologic Map for Land-Use Planning: Floyd County, Kentucky

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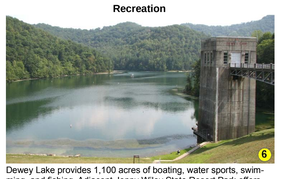
Floyd County Courthouse at Prestonsburg

Floyd County, 394 square miles in the Eastern Kentucky Coal Field, was formed in 1800. Communities are located in valleys along Levisa Fork and its tributaries. The highest elevation, 2,320 feet, is near the junction of Floyd, Knott, and Pike Counties. The lowest elevation, 580 feet, is where Levisa Fork leaves the county. The 2006 population of 42,208 was 0.5 percent smaller than that of 2000. Photo by Dan Carey, Kentucky Geological Survey.

Recreation

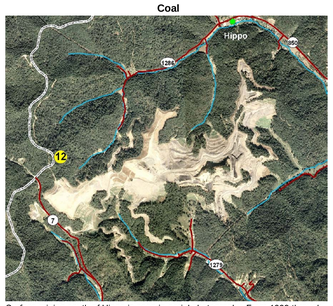


Dewey Lake provides 1,100 acres of boating, water sports, swimming, and fishing. Adjacent Jenny Wiley State Resort Park offers swimming, hiking, camping, disc golf, elk viewing, cabins, and meeting facilities. Photo by Dan Carey, Kentucky Geological Survey.

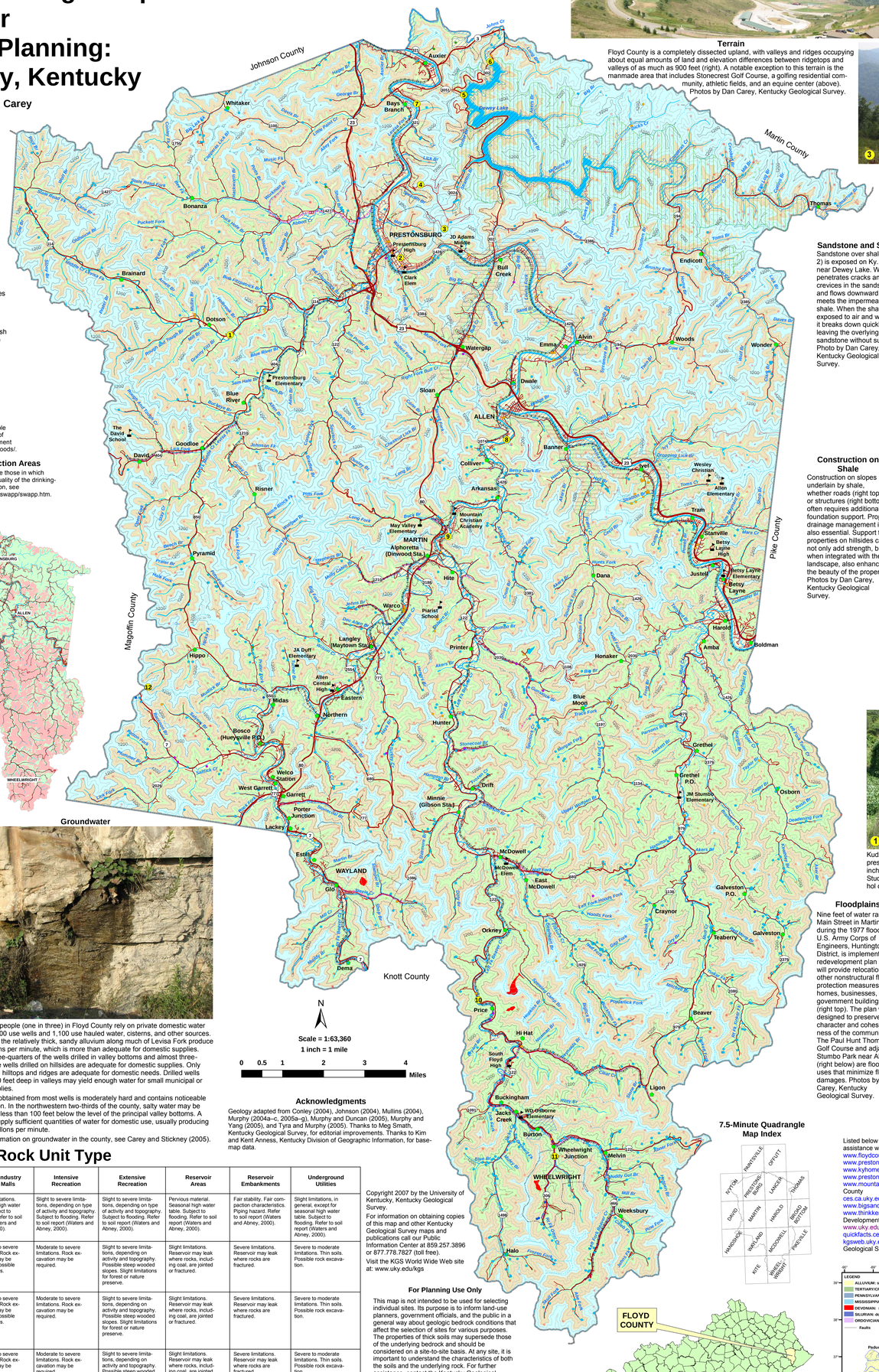
Wheelwright

Wheelwright, a unique community of slightly over 1,000 residents, is undergoing revitalization. In the 1930's, Inland Steel turned Wheelwright into a model coal camp, with a golf course, swimming pool, bowling alley, strong schools, and modern facilities. Following its sale in 1966, the town declined. Former and current residents are now working to develop a museum and tourist, education, and business facilities to restore the town.

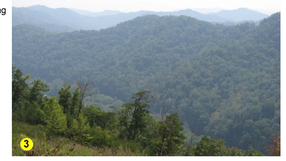
Coal



Surface mining south of Hippo is seen in aerial photography. From 1889 through 2004, Floyd County produced 460 million tons of coal, 355 million by underground mining. In 2004, production from surface mines was nearly double that of underground mines. Photo by the U.S. Department of Agriculture, Farm Services Administration, National Agricultural Imagery Program (2004).



Terrain



Floyd County is a completely dissected upland, with valleys and ridges occupying about equal amounts of land and elevation differences between ridgetops and valleys of as much as 900 feet (right). A notable exception to this terrain is the manmade area that includes Stonecrest Golf Course, a golfing residential community, athletic fields, and an equine center (above). Photos by Dan Carey, Kentucky Geological Survey.

Landslides

Hillside construction can cause earth movements if not properly planned. Photos by Paul Howell, U.S. Department of Agriculture, Natural Resources Conservation Service.

EXPLANATION

- School
- Gas well
- Oil well
- Enhanced recovery well

Water wells
- Domestic
- Industrial
- Monitoring
- Public
- Livestock
- Spring

- County line
- Watershed boundary
- Railroad
- Abandoned railroad
- Incorporated city boundaries
- Artificial fill
- Public lands
- Wetlands > 1 acre (U.S. Fish and Wildlife Service, 2003)
- Source-water protection area, zone 1
- Designated flood zone* (FEMA, 2005)
- Mine dump or spoil

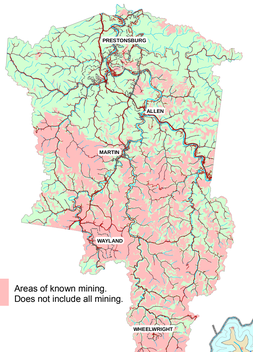
200-foot contour interval

(4) Photo location

*Flood information is available from the Kentucky Division of Water, Flood Plain Management Branch, www.water.ky.gov/floods/.

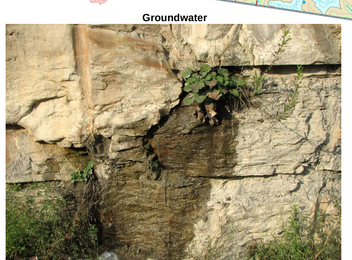
Source-Water Protection Areas

Source-water protection areas are those in which activities are likely to affect the quality of the drinking-water source. For more information, see kgsweb.uky.edu/download/water/swapp/swapp.htm.



Areas of known mining. Does not include all mining.

Groundwater



About 13,700 people (one in three) in Floyd County rely on private domestic water supplies: 12,600 use wells and 1,100 use hauled water, cisterns, and other sources. Some wells in the relatively thick, sandy alluvium along much of Levisa Fork produce 20 to 25 gallons per minute, which is more than adequate for domestic supplies. More than three-quarters of the wells drilled in valley bottoms and almost three-quarters of the wells drilled on hillsides are adequate for domestic supplies. Only some wells on hilltops and ridges are adequate for domestic needs. Drilled wells more than 200 feet deep in valleys may yield enough water for small municipal or industrial supplies.

Groundwater obtained from most wells is moderately hard and contains noticeable amounts of iron. In the northwestern two-thirds of the county, salty water may be found in wells less than 100 feet below the level of the principal valley bottoms. A few springs supply sufficient quantities of water for domestic use, usually producing less than 5 gallons per minute.

For more information on groundwater in the county, see Carey and Stickney (2005).

N

Scale = 1:63,360
1 inch = 1 mile

0 0.5 1 2 3 4 Miles

Acknowledgments

Geology adapted from Conley (2004), Johnson (2004), Mullins (2004), Murphy (2004a–c, 2005a–g), Murphy and Duncan (2005), Murphy and Yang (2005), and Tyra and Murphy (2006). Thanks to Meg Smath, Kentucky Geological Survey, for editorial improvements. Thanks to Kim and Kent Anness, Kentucky Division of Geographic Information, for base-map data.

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Visit the KGS World Wide Web site at: www.uky.edu/kgs

For Planning Use Only

This map is not intended to be used for selecting individual sites. Its purpose is to inform land-use planners, government officials, and the public in a general way about geologic bedrock conditions that affect the selection of sites for various purposes. The properties of thick soils may supersede those of the underlying bedrock and should be considered on a site-to-site basis. At any site, it is important to understand the characteristics of both the soils and the underlying rock. For further assistance, contact the Kentucky Geological Survey, 859.257.5500. For more information, visit the KGS Community Development Planning Web Site at kgsweb.uky.edu/download/kgsplanning.htm.

7.5-Minute Quadrangle Map Index

FLOYD COUNTY

Sandstone and Shale

Sandstone over shale (unit 2) is exposed on Ky. 302 near Dewey Lake. Water penetrates cracks and crevices in the sandstone and flows downward until it meets the impermeable shale. When the shale is exposed to air and water, it breaks down quickly, leaving the overlying sandstone without support. Photo by Dan Carey, Kentucky Geological Survey.

Construction on Shale

Construction on slopes underlain by shale, whether roads (right top) or structures (right bottom) often requires additional foundation support. Proper drainage management is also essential. Support for properties on hillsides can not only add strength, but, when integrated with the landscape, also enhance the beauty of the property. Photos by Dan Carey, Kentucky Geological Survey.

Kudzu

Kudzu, an invasive species from East Asia (Jap. Kuzu) grows to impressive displays throughout southeastern Kentucky. It can grow 12 inches in a day, or 60 feet in a season. The nonwoody parts are edible. Studies have shown that kudzu can reduce both hangovers and alcohol cravings. Photo by Dan Carey, Kentucky Geological Survey.

Floodplains

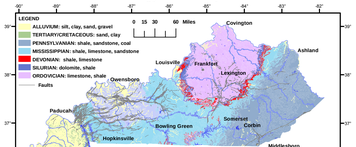
Nine feet of water ran on Main Street in Martin during the 1977 flood. The U.S. Army Corps of Engineers, Huntington District, is implementing a redevelopment plan that will provide relocation and other nonstructural flood protection measures for homes, businesses, and government buildings (right top). The plan was designed to preserve the character and cohesiveness of the community. The Paul Hunt Thompson Golf Course and adjacent Stumbo Park near Allen (right below) are floodplain uses that minimize flood damages. Photos by Dan Carey, Kentucky Geological Survey.

Additional Resources

Listed below are Web sites for several agencies and organizations that may be of assistance with land-use planning issues in Floyd County.

www.floydcountyky.com Floyd County Chamber of Commerce
www.prestonsburgkentucky.com City of Prestonsburg
www.kyhometown.com/prestonsburg Prestonsburg and Floyd County
www.prestonsburgky.org Prestonsburg Convention and Visitors Bureau
www.mountaintravelguide.com/Kentucky/Floyd/Floyd.htm Mountain Travel Guide, Floyd County
ces.ca.uky.edu/Floyd/ University of Kentucky Cooperative Extension Service
www.bigsandy.org/ Big Sandy Area Development District
www.thinkkentucky.com/EDIS/cmnty/index.aspx?cw=057 Kentucky Economic Development Information System
www.uky.edu/KentuckyAtlas/21071.html Kentucky Atlas and Gazetteer, Floyd County
quickfacts.census.gov/qfd/states/21/21071.html U.S. Census data
kgsweb.uky.edu/download/kgsplanning.htm Planning information from the Kentucky Geological Survey

Geology of Kentucky



Learn more about Kentucky geology at www.uky.edu/KGS/geoky/

Landslides

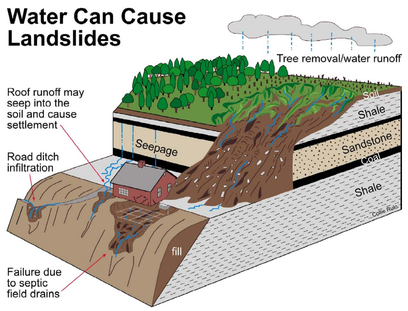
Virtually all units containing shale on slopes are subject to landslides. Shales will break down and weather rapidly when exposed to air and water. Gravity is the main driving force, but water nearly always plays a critical role by adding weight and lubricating the shale. Cutting into or overloading a slope with structures and fill can also be major contributing factors. The failure of the slope may be rapid, but more commonly is a slow, almost imperceptible movement, called creep, of a few inches per year. Whether rapid or slow, the end results and damage are similar and costly: broken plumbing, cracked walls and foundations, cracked streets and sidewalks, and commonly, total loss of the structures.

Precautions include taking care of all surface-water runoff by making certain that all runoff from roofs, gutters, patios, sidewalks, and driveways is carried well away from and not toward the house; diverting drainage from areas sloping toward the house; cutting into natural slopes as little as possible and avoiding the use of fill; and trying to place the foundation of the structure on undisturbed bedrock. When in doubt, consult an engineering geologist or a geotechnical engineer.

What Are the Factors That Cause Landslides?

Many factors contribute to landslides. The most common in eastern Kentucky are:

1. Steep slopes: Avoid when choosing a building site.
2. Water: Slope stability decreases as water moves into the soil. Springs, seeps, roof runoff, gutter downspouts, septic systems, and site grading that cause ponding or runoff are sources of water that often contribute to landslides.
3. Changing the natural slope by creating a level area where none previously existed.
4. Poor site selection for roads and driveways.
5. Improper placement of fill material.
6. Removal of trees and other vegetation: Site construction often results in the elimination of trees and other vegetation. Plants, especially trees, help remove water and stabilize the soil with their extensive root systems.

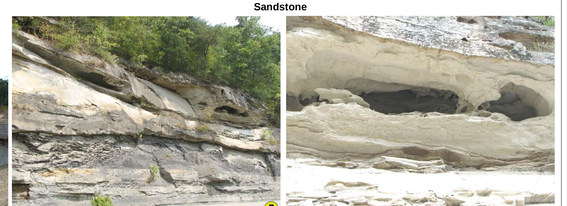


What Are Some Ways to Prevent Landslides?

1. Seek professional assistance prior to construction.
2. Proper site selection: Some sloping areas are naturally prone to landslides. Inspect the site for springs, seeps, and other wet areas that might indicate water problems. Take note of unusual cracks or bulges at the soil surface. These are typical signs of soil movement that may lead to slope failure. Also be aware of geologically sensitive areas where landslides are more likely to occur.
3. Alter the natural slope of the building site as little as possible during construction. Never remove soil from the toe or bottom of the slope or add soil to the top of the slope. Landslides are less likely to occur on sites where disturbance has been minimized. Seek professional assistance before earth moving begins.
4. Remove as few trees and other vegetation as possible. Trees develop extensive root systems that are very useful in slope stabilization. Trees also remove large amounts of groundwater. Trees and other permanent vegetative covers should be established as rapidly as possible and maintained to reduce soil erosion and landslide potential.
5. Household water disposal system: Seek professional assistance in selecting the appropriate type and location of your septic system. Septic systems located in fill material can saturate soil and contribute to landslides.
6. Proper water disposal: Allowing surface waters to saturate the sloping soil is the most common cause of landslides in eastern Kentucky. Properly located diversion channels are helpful in redirecting runoff away from areas disturbed during construction. Runoff should be channeled and water from roofs and downspouts piped to stable areas at the bottom of the slope.

(From U.S. Department of Agriculture, Natural Resources Conservation Service, no date)

Sandstone



This roadcut on Ky. 321 exposes a calcareous sandstone layer containing unusually high levels of calcium carbonate. Water dissolves the calcium carbonate to form caverns within the rock in a process similar to the formation of caves in limestone karst regions. Photos by Dan Carey, Kentucky Geological Survey.

LAND-USE PLANNING TABLE DEFINITIONS

FOUNDATION AND EXCAVATION

The terms "earth" and "rock" excavation are used in the engineering sense; earth can be excavated by hand tools, whereas rock requires heavy equipment or blasting to remove.

LIMITATIONS

Slight—A slight limitation is one that commonly requires some corrective measure but can be overcome without a great deal of difficulty or expense.

Moderate—A moderate limitation is one that can normally be overcome but the difficulty and expense are great enough that completing the project is commonly a question of feasibility.

Severe—A severe limitation is one that is difficult to overcome and commonly is not feasible because of the expense involved.

LAND USES

Septic tank disposal system—A septic tank disposal system consists of a septic tank and a filter field. The filter field is a subsurface tile system laid in such a way that effluent from the septic tank is distributed with reasonable uniformity into the soil.

Residences—Ratings are made for residences with basements because the degree of limitation is dependent upon ease and required depth of excavation. For example, excavation in limestone has greater limitation than excavation in shale for a house with a basement.

Highways and streets—Refers to paved roads in which cuts and fills are made in hilly topography, and considerable work is done preparing subgrades and bases before the surface is applied.

Access roads—These are low-cost roads, driveways, etc., usually surfaced with crushed stone or a thin layer of blacktop. A minimum of cuts and fills are made, little work is done preparing a subgrade, and generally only a thin base is used. The degree of limitation is based on year-around use and would be less severe if not used during the winter and early spring. Some types of recreation areas would not be used during these seasons.

Light industry and malls—Ratings are based on developments having structures or equivalent load limit requirements of three stories or less, and large paved areas for parking lots. Structures with greater load limit requirements would normally need footings in solid rock, and the rock would need to be core drilled to determine the presence of caverns, cracks, etc.

Intensive recreation—Athletic fields, stadiums, etc.

Extensive recreation—Camp sites, picnic areas, parks, etc.

Reservoir areas—The floor of the area where the water is impounded. Ratings are based on the permeability of the rock.

Reservoir embankments—The rocks are rated on limitations for embankment material.

Underground utilities—Included in this group are sanitary sewers, storm sewers, water mains, and other pipes that require fairly deep trenches.

Planning Guidance by Rock Unit Type

Rock Unit	Foundation and Excavation	Septic System	Residence with Basement	Highways and Streets	Access Roads	Light Industry and Malls	Intensive Recreation	Extensive Recreation	Reservoir Areas	Reservoir Embankments	Underground Utilities
1. Clay, silt, sand, and gravel (alluvium)	Fair foundation material; easy to excavate. Seasonal high water table. Subject to flooding. Refer to soil report (Waters and Abney, 2000).	Severe limitations. Seasonal high water table. Subject to flooding. Refer to soil report (Waters and Abney, 2000).	Severe limitations. Seasonal high water table. Subject to flooding. Refer to soil report (Waters and Abney, 2000).	Severe limitations. Seasonal high water table. Subject to flooding. Refer to soil report (Waters and Abney, 2000).	Severe limitations. Seasonal high water table. Subject to flooding. Refer to soil report (Waters and Abney, 2000).	Severe limitations. Seasonal high water table. Subject to flooding. Refer to soil report (Waters and Abney, 2000).	Slight to severe limitations, depending on type of activity and topography. Subject to flooding. Refer to soil report (Waters and Abney, 2000).	Slight to severe limitations, depending on type of activity and topography. Subject to flooding. Refer to soil report (Waters and Abney, 2000).	Pervious material. Seasonal high water table. Subject to flooding. Refer to soil report (Waters and Abney, 2000).	Fair stability. Fair compaction characteristics. Piping hazard. Refer to soil report (Waters and Abney, 2000).	Slight limitations, in general, except for seasonal high water table. Subject to flooding. Refer to soil report (Waters and Abney, 2000).
2. Sandstone, siltstone, shale, coal, limestone	Fair to good foundation material; difficult to excavate. Possible low strength associated with shales, coals, and underclays. Possibility of underground coal-mine voids.	Severe limitations. Thin soils and impermeable rock associated with shales.	Severe to moderate limitations. Rock excavation may be required. Possible steep slopes.	Moderate to severe limitations. Rock excavation may be required. Possible steep slopes.	Moderate to severe limitations. Rock excavation may be required. Possible steep slopes.	Moderate to severe limitations. Rock excavation may be required. Possible steep slopes.	Moderate to severe limitations. Rock excavation may be required.	Slight to severe limitations, depending on activity and topography. Possible steep wooded slopes. Slight limitations for forest or nature preserve.	Slight limitations. Reservoir may leak where rocks, including coal, are jointed or fractured.	Severe limitations. Reservoir may leak where rocks are fractured.	Severe to moderate limitations. Thin soils. Possible rock excavation.
3. Sandstone, siltstone, coal	Fair to good foundation material; difficult to excavate. Possible low strength associated with coals and underclays. Possibility of underground coal-mine voids.	Severe limitations. Thin soils and impermeable rock.	Severe to moderate limitations. Rock excavation may be required. Possible steep slopes.	Moderate to severe limitations. Rock excavation may be required. Possible steep slopes.	Moderate to severe limitations. Rock excavation may be required. Possible steep slopes.	Moderate to severe limitations. Rock excavation may be required. Possible steep slopes.	Moderate to severe limitations. Rock excavation may be required.	Slight to severe limitations, depending on activity and topography. Possible steep wooded slopes. Slight limitations for forest or nature preserve.	Slight limitations. Reservoir may leak where rocks, including coal, are jointed or fractured.	Severe limitations. Reservoir may leak where rocks are fractured.	Severe to moderate limitations. Thin soils. Possible rock excavation.
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