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

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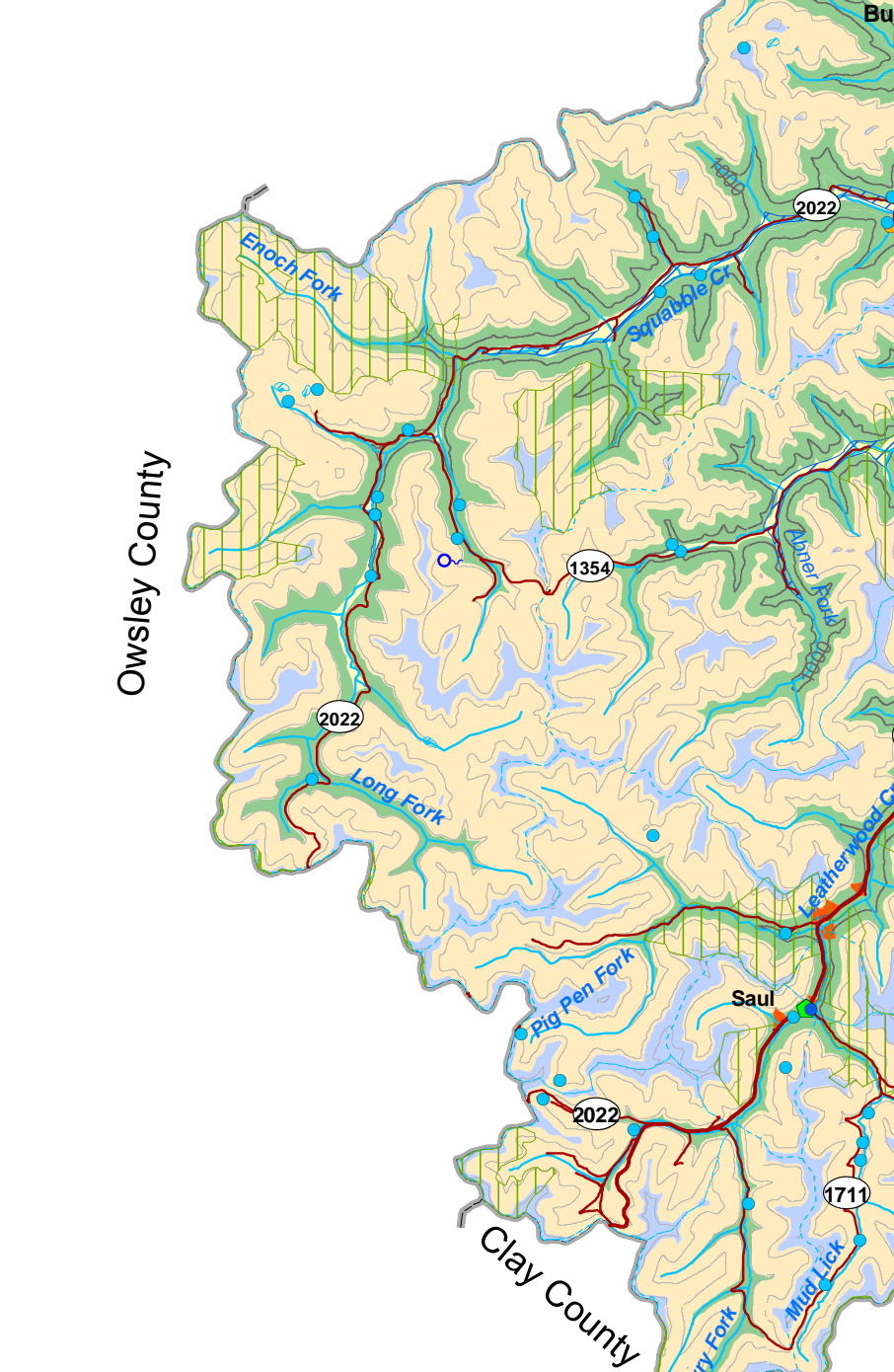
Generalized Geologic Map for Land-Use Planning: Perry County, Kentucky

Bart Davidson, Steven E. Webb, and Daniel I. Carey

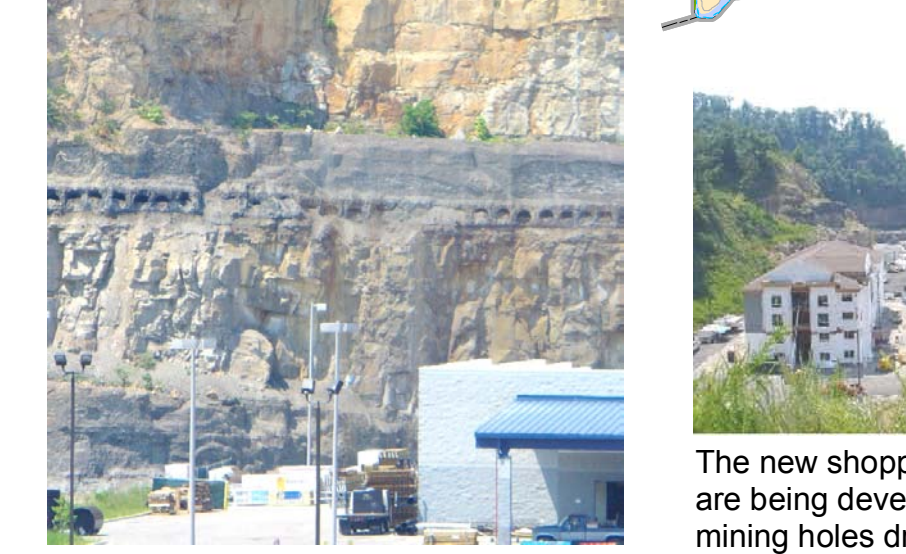
Acknowledgments

Geology adapted from Sparks (2003), Andrews and others (2005a, b), Cordova and others (2005), Morris and others (2005a-h), and Sparks and others (2005a-e). Thanks to Kim and Kent Anness, Kentucky Division of Geographic Information, for base-map data.

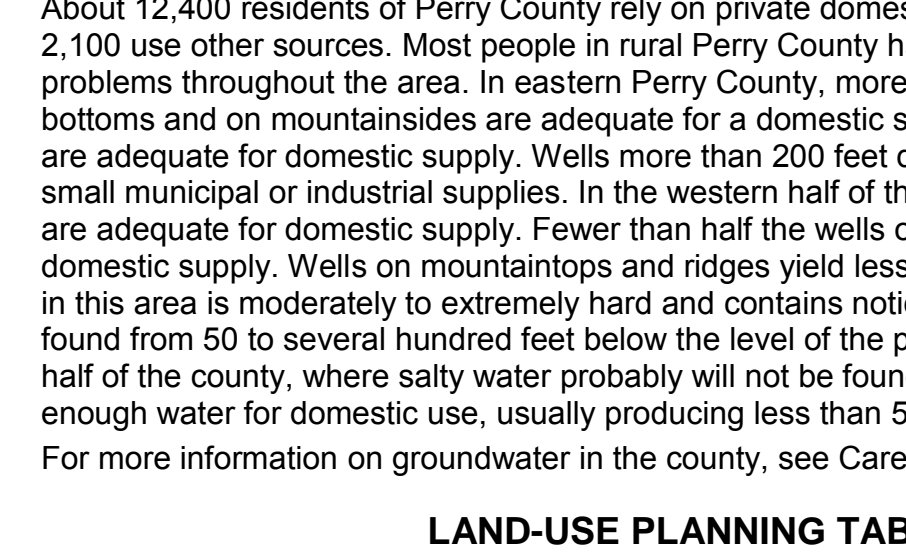
Perry County, an area of 342 square miles in the Eastern Kentucky Coal Field, was formed in 1821. Hazard, the county seat, did not officially receive its name (after Oliver Hazard Perry) until 1824. The 2008 county population of 29,836 was 1.5 percent greater than that of 2000. The highest elevation, 2,520 feet, is about 1.5 miles southwest of Tifford near the Letcher County line. The lowest elevation, 750 feet, is where the Middle Fork of the Kentucky River leaves the county. Coal mining continues to be the major industry. The courthouse is at right center in front of the Justice Center. Photo by Bart Davidson, Kentucky Geological Survey.



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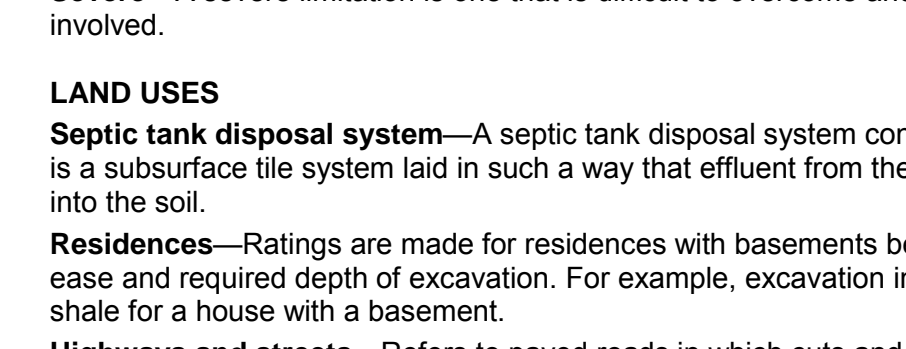
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Post-Mine Land Uses

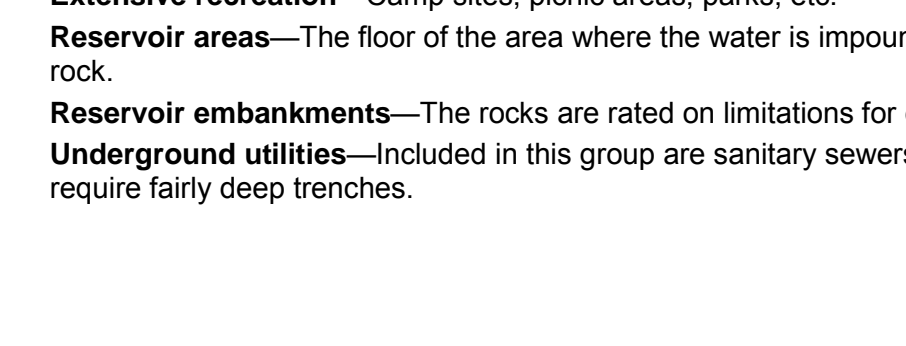
The Perry County airport (right), built on a reclaimed mountaintop-removal mine near Ky. 15, is an excellent example of post-mining land use. Aerial photo (2004) from the U.S. Department of Agriculture, Farm Services Administration, National Agriculture Imagery Program.



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Development on Reclaimed Mine Land

The new shopping mall along Ky. 80 in Hazard is directly in front of a surface coal mine. Many former coal-mine benches such as this are being developed in Perry County, some for residential use and others for commercial use. The inset (left) shows previous auger mining holes drilled into a coal bed behind the Lowe's building. Photos by Bart Davidson, Kentucky Geological Survey.



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Groundwater

About 12,400 residents of Perry County rely on private domestic water supplies: 10,300 use wells, and 2,100 use other sources. Most people in rural Perry County have drilled wells. Iron and sulfur are common problems throughout the area. In eastern Perry County, more than three-quarters of the wells drilled in valley bottoms and on mountainsides are adequate for a domestic supply. Some wells on ridges and mountaintops are adequate for domestic supply. Wells more than 200 feet deep in valleys may yield enough water for small municipal or industrial supplies. In the western half of the county, most wells drilled in valley bottoms are adequate for domestic supply. Fewer than half the wells on hillsides are adequate for a modern domestic supply. Wells on mountaintops and ridges yield less water. Water obtained from most drilled wells in this area is moderately to extremely hard and contains noticeable amounts of iron. Salty water may be found from 50 to several hundred feet below the level of the principal valley bottoms, except in the eastern half of the county, where salty water probably will not be found shallower than 200 feet. A few springs supply enough water for domestic use, usually producing less than 5 gallons per minute.

For more information on groundwater in the county, see Carey and Slickney (2004).

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 egress 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 (Hayes, 1982).	Severe limitations. Seasonal high water table. Subject to flooding. Refer to soil report (Hayes, 1982).	Severe limitations. Seasonal high water table. Subject to flooding. Refer to soil report (Hayes, 1982).	Severe limitations. Seasonal high water table. Subject to flooding. Refer to soil report (Hayes, 1982).	Severe limitations. Seasonal high water table. Subject to flooding. Refer to soil report (Hayes, 1982).	Severe limitations. Seasonal high water table. Subject to flooding. Refer to soil report (Hayes, 1982).	Slight to severe limitations, depending on type of activity and topography. Subject to flooding. Refer to soil report (Hayes, 1982).	Slight to severe limitations, depending on type of activity and topography. Subject to flooding. Refer to soil report (Hayes, 1982).	Perennial material. Seasonal high water table. Subject to flooding. Refer to soil report (Hayes, 1982).	Fair stability. Fair compaction characteristics. Piping hazard. Refer to soil report (Hayes, 1982).	Slight limitations, in general, except for seasonal high water table. Possible rock excavation.
2. Sandstone, siltstone, and coal	Fair to good foundation material. Difficult to excavate. Possible low strength associated with coals and underlays. 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 type of activity and topography. Possible steep wooded slopes. Slight limitations for forest or nature preserve.	Slight limitations. Reservoir may leak where rocks are fractured.	Severe limitations. Reservoir may leak where rocks are fractured.	Severe to moderate limitations. Thin soils. Possible rock excavation.
3. Sandstone, siltstone, shale, and coal	Fair to good foundation material. Difficult to excavate. Possible low strength associated with shales, sparse coals, and underlays. 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 type of activity and topography. Possible steep wooded slopes. Slight limitations for forest or nature preserve.	Slight limitations. Reservoir may leak where rocks are fractured.	Severe limitations. Reservoir may leak where rocks are fractured.	Severe to moderate limitations. Thin soils. Possible rock excavation.
4. Sandstone, siltstone, shale (sparse coal)	Fair to good foundation material. Difficult to excavate. Possible low strength associated with shales, sparse coals, and underlays.	Severe limitations. Thin soils and impermeable rock associated with shales.	Severe to moderate limitations. Rock excavation may be required.	Moderate to severe limitations. Rock excavation may be required.	Moderate to severe limitations. Rock excavation may be required.	Moderate to severe limitations. Rock excavation may be required.	Moderate to severe limitations. Rock excavation may be required.	Slight to severe limitations, depending on type of activity and topography. Possible steep wooded slopes. Slight limitations for forest or nature preserve.	Slight limitations. Reservoir may leak where rocks are fractured.	Severe limitations. Reservoir may leak where rocks are fractured.	Severe to moderate limitations. Thin soils. Possible rock excavation.

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, 859.227.5500. For more information, visit the KGS Community Development Planning Web Site at kgsweb.uky.edu/download/kgsplanning.htm.

Additional Resources

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

www.kyhomelov.com/hazard/ Hazard/Perry County

www.ky.edu/Perry/ University of Kentucky Cooperative Extension Service

www.krcd.org/ Kentucky River Area Development District

www.thinkkentucky.com/eds/cmty/cow/104/ Kentucky Economic Development Information System

www.uky.edu/KentuckyAtlas21193.htm Kentucky Atlas and Gazetteer, Perry County

quickfacts.census.gov/qd/states/21/21193.html U.S. Census data

kgsweb.uky.edu/download/kgsplanning.htm Planning information from the Kentucky Geological Survey

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For information on obtaining copies of this map and other Kentucky Geological Survey maps and publications call our Public Information Center at 859.227.3869.

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

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

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