

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

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### Acknowledgments

Bedrock mapping adapted from Solis, M.P., and Terry, J. (2000a-h), Solis, M.P., and Venard, E. (2000a-d), Terry, J., and Solis, M.P. (2000), and Tyra, M.A., and Terry, J. (2000). Thanks to the Henderson County Historical Society for providing historic flood photographs.

### Groundwater Availability

The alluvium along the Ohio River is the best source of groundwater in the county. In northern Henderson County, nearly all drilled wells from depths of less than 100 feet in the alluvium of the Ohio River Valley are adequate for domestic use; most wells yield more than 50 gallons per minute, and some wells as much as 1,000 gallons per minute. In the southern and central parts of Henderson County, most wells that penetrate sandstones at depths less than 300 feet are adequate for a domestic supply. In the highlands of the eastern part of the county, and in western Henderson County in the area around Smith Mills, only a few wells yield enough water for a domestic supply. Generally, groundwater is hard to very hard, and iron and salt may be present in objectionable amounts. Often, groundwater becomes saltier with depth. For more information on groundwater resources in the county, see Carey and Stickney (2001).



### Cypress Swamp

This cypress swamp, located just north of the John James Audubon State Park, is an example of how varied the ecology is in Henderson County. The swamp lies within the Wabash-Ohio floodplains, which covers northern Henderson County along the Ohio River (Woods and others, 2002). Photo by Glynn Beck, Kentucky Geological Survey.



### Soil Piping

"Soil piping" is a term used to describe the removal of soil by subsurface water. When the soil is removed, small to large holes form, which may occur along forest paths, as seen in the above photo. Photo by Glynn Beck, Kentucky Geological Survey.



### Oil Well Pump Jack

This pump jack is located in the Ohio River floodplain and is constructed on stilts to avoid flooding, which is common during the spring months. Approximately 3,000 productive oil and gas wells have been completed in Henderson County. Photo by Glynn Beck, Kentucky Geological Survey.

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### Definitions

#### FOUNDATION AND EXCAVATION

The terms "soil" and "rock" excavation are used in the engineering areas; earth can be excavated by hand tools, whereas rock requires heavy equipment or blasting to remove. The term "piping" means excavation by the action of water on a soil.

#### 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 natural soil.  
Residence-Ratings are made for residences with and without 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 crushed stone. A minimum of soil and grading work is done preparing a subgrade, and generally only a thin layer of gravel is used. The degree of limitation is based on year-round 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 presence of cave, 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.

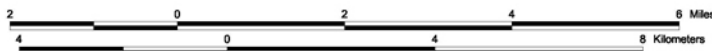
### EXPLANATION

- Urban services boundary
- Watershed divide
- 10-foot elevation contour interval
- Chert gravel
- Water
- Abandoned underground mines
- Abandoned surface mine areas
- Concealed faults
- Gas well
- Oil or oil and gas well
- Class II injection well
- Mine shaft

Planning Guidance by Rock Unit Type									
Rock Unit	Foundation and Excavation	Septic Tank Disposal System	Residence with Basement	Highways and Streets	Access Roads	Light Industry and Malls	Intensive Recreation	Extensive Recreation	Reservoir Areas
1. Alluvium	Fair to good foundation material. Easily excavated.	Fair to good foundation material. Easily excavated.	Fair to good foundation material. Easily excavated.	Fair to good foundation material. Easily excavated.	Fair to good foundation material. Easily excavated.	Fair to good foundation material. Easily excavated.	Fair to good foundation material. Easily excavated.	Fair to good foundation material. Easily excavated.	Fair to good foundation material. Easily excavated.
2. Lenses	Fair to good foundation material. Easily excavated.	Fair to good foundation material. Easily excavated.	Fair to good foundation material. Easily excavated.	Fair to good foundation material. Easily excavated.	Fair to good foundation material. Easily excavated.	Fair to good foundation material. Easily excavated.	Fair to good foundation material. Easily excavated.	Fair to good foundation material. Easily excavated.	Fair to good foundation material. Easily excavated.
3. Sandstones, shales, limestone, coal, and underlying	Fair to good foundation material. Difficult excavation.	Fair to good foundation material. Difficult excavation.	Fair to good foundation material. Difficult excavation.	Fair to good foundation material. Difficult excavation.	Fair to good foundation material. Difficult excavation.	Fair to good foundation material. Difficult excavation.	Fair to good foundation material. Difficult excavation.	Fair to good foundation material. Difficult excavation.	Fair to good foundation material. Difficult excavation.
4. Siltstones, sandstones, shales, and coal	Fair to good foundation material. Difficult excavation.	Fair to good foundation material. Difficult excavation.	Fair to good foundation material. Difficult excavation.	Fair to good foundation material. Difficult excavation.	Fair to good foundation material. Difficult excavation.	Fair to good foundation material. Difficult excavation.	Fair to good foundation material. Difficult excavation.	Fair to good foundation material. Difficult excavation.	Fair to good foundation material. Difficult excavation.



Scale 1:63,360



### 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 supercede 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, Western Kentucky Office, 1401 Corporate Drive, Henderson, KY 42420, phone 270.827.3414 or 877.3404.

Figure 4-3  
General Geology Map  
for Land Use Planning  
Henderson, KY



MAP AND CHART 75  
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### Ohio River and CSX Railroad Bridge

The Ohio River and the CSX railroad system are two major modes of transportation used by industry in Henderson County. This photo was taken just south of the boat ramp in downtown Henderson. Photo by Glynn Beck, Kentucky Geological Survey.



Flood at Beals Station and Railroad Crossing on January 30, 1937. Photo courtesy of the Henderson County Historical Society.



Same location on February 11, 1937. The white building in the background was Edger Simmons's store. This building is still in use today as Cagney's store in Beals. Photo courtesy of the Henderson County Historical Society.



### Flat Lowlands and Rolling Uplands

Flat lowlands and rolling uplands are the two dominant physiographic features in Henderson County. This photo illustrates the physiographic changes that are common in Henderson County. Flat lowlands, on the right side of the photo, are associated with Ohio River flood deposits. The lowlands are used extensively for cropland. Because of seasonal flooding, land use on these lowlands may be restricted. Rolling uplands, on the left side of the photo, are associated with eroded loess deposits and are used for cropland, pastureland, and residential and commercial development. Photo by Glynn Beck, Kentucky Geological Survey.

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