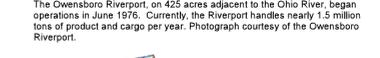
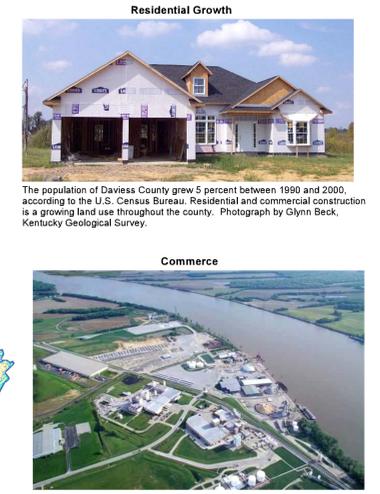


# Generalized Geologic Map for Land-Use Planning: Daviess County, Kentucky

E. Glynn Beck, David A. Williams, and Daniel I. Carey

**Acknowledgments**  
 Geology adapted from Solis (2002), Solis and Hettinger (2000), Solis and Terry (2000a-f), Solis and Venard (2002a-e), Tyra and Terry (2000), Tyra and Venard (2000a,b), and Venard and Solis (2000). Thanks to Clint Harby, Daviess County Agriculture and Natural Resources agent, and Mark Freer, Owensboro Riverport, for photographic assistance.

**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 827.2494. For more information, and to make custom maps of your local area, visit our Land-Use Planning Internet Mapping Web Site at [kgmap.uky.edu/website/kyplan/viewer.htm](http://kgmap.uky.edu/website/kyplan/viewer.htm).



**Geologic Hazards**  
 The most prominent geologic hazard for Daviess County is flooding. Areas underlain by alluvium, unit 1 on the map, are subject to regular flooding. Urban development often exacerbates flooding, and therefore potential flooding should always be considered in urban development plans. Areas of steep-walled drainage, such as that formed in terrain underlain by unit 4, are conducive to flash flooding, especially in developed areas. Flood information is available from the Kentucky Division of Water, Flood Plain Management Branch ([www.water.ky.gov/floods/](http://www.water.ky.gov/floods/)).

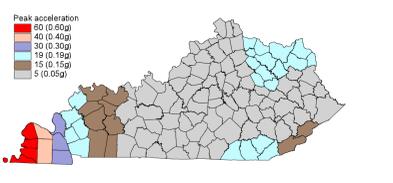
None of the faults in Daviess County are considered to be active; the proximity of active seismic zones, such as the New Madrid, Wabash, or East Tennessee, however, calls for precautions to be taken for earthquake damage mitigation. The presence of thick alluvium, which normally has a high water table, should also be treated with special concern, because of the possibility of augmented shaking and liquefaction during a strong earthquake. In addition, alluvium often contains high amounts of clay minerals, which can give soil a high shrink/swell capacity.

Steep slopes are present throughout the county, especially along streams in areas underlain by unit 4. Steep slopes can develop soil creep and landslides if not properly treated during development. Proper engineering techniques should be followed when developing on hillsides, and care should be taken not to affect property above and below a development site on a hillside.

Surface coal mine areas are prone to settling after reclamation, which may affect structural foundations and roads. Surface mine areas also lack soil structure, which inhibits the growth of vegetation during summer months. Abandoned deep and surface mine boundaries shown on the map are approximate and do not represent all the mining that has occurred in the county.

Soil piping, which may occur in various soil types, but particularly in alluvium and loess, produces small to large holes if left untreated. The only way to treat soil piping is to fill the holes with rock or soil to keep the holes from enlarging and to divert drainage from the area.

**Earthquake Hazard Information**  
 Peak ground acceleration at the top of rock that will probably occur in the next 500 years in Kentucky



Although we do not know when and where the next major earthquake will occur, we do know that an earthquake will cause damage. Severity depends on many factors, such as earthquake magnitude, the distance from the epicenter, and local geology. Information on earthquake effects is obtained by monitoring earthquakes and performing research. Such information is vital for earthquake hazard mitigation and risk reduction.

The most important information for seismic-hazard mitigation and risk reduction is ground-motion hazard. One way of predicting ground-motion hazard is by determining the peak ground acceleration (PGA) that may occur in a particular timeframe. The map above shows the PGA at the top of bedrock that will likely occur within the next 500 years in Kentucky (Street and others, 1996). It shows, as expected, that PGA would be greatest in far western Kentucky near the New Madrid Seismic Zone. Ground-motion hazard maps for the central United States and other areas are available from the U.S. Geological Survey. These maps are used to set general standards for mitigating damage. For example, maps produced by the USGS in 1996 were used to determine seismic design in building codes. For additional information about earthquake hazards, visit the Kentucky Geological Survey Web site at [www.uky.edu/KGS/geologic/hazards/geologic/hazards.html](http://www.uky.edu/KGS/geologic/hazards/geologic/hazards.html).

**Energy Resources**  
 Oil well pump jacks are located throughout Daviess County. Approximately 1,800 producing oil and gas wells have been completed in Daviess County. Photograph by Glynn Beck, Kentucky Geological Survey.



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Generally, groundwater is hard to very hard, and iron and salt may be present in objectionable amounts. In deep wells, groundwater is often too mineralized to use. For more information on groundwater resources in the county, see Carey and Stickey (2001).

- EXPLANATION**
- School
  - Aidit
  - Corporate boundary
  - Watershed divide
  - Water
  - Wetlands
  - Abandoned underground mines
  - Abandoned surface mine areas
  - Concealed fault
  - Fault
  - Projected fault
  - Gas well
  - Oil and gas well
  - Oil well
  - Enhanced recovery well
  - Mine shaft
- Water wells**
- Domestic
  - Industrial
  - Monitoring
  - Public
- 10-foot elevation contour interval

**Surface-Water Drainage**  
 Because of the large percentage of flat to gently sloping areas associated with the Ohio and Green Rivers, development, such as subdivisions, can cause flooding if proper drainage designs are not implemented as part of the planning and development process. Watersheds can also be impaired from improper sewage treatment and urban and industrial runoff.



**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. The term "rippable" means excavation with a ripper attachment on a bulldozer.

**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 life system laid in such a way that effluent from the septic tank is distributed with reasonable uniformity into the natural soil.

Residences—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 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.

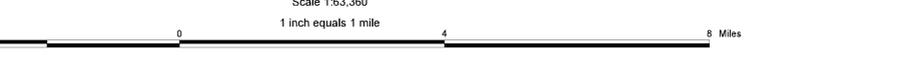
**Additional Planning Resources**  
 Listed below are Web sites for several agencies and organizations that may be of assistance with landuse planning issues in Daviess County:

[owensboro.com](http://owensboro.com)—Owensboro-Daviess County Chamber of Commerce  
[ca.uky.edu/daviess](http://ca.uky.edu/daviess)—University of Kentucky Cooperative Extension Service  
[www.gradi.org](http://www.gradi.org)—Green River Area Development District  
[www.thinkkentucky.com/eda/cmty/cw044](http://www.thinkkentucky.com/eda/cmty/cw044)—Kentucky Economic Development Information System  
[www.uky.edu/KentuckyAtlas/21059.html](http://www.uky.edu/KentuckyAtlas/21059.html)—Kentucky Atlas and Gazetteer  
[quickfacts.census.gov/qft/states/21/21059.html](http://quickfacts.census.gov/qft/states/21/21059.html)—U.S. Census data  
[web.uky.edu/download/kgsp/plan.htm](http://web.uky.edu/download/kgsp/plan.htm)—Planning information from the Kentucky Geological Survey

## Planning Guidance by Rock Unit

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	Reservoir Embankments	Underground Utilities
1. Alluvium	Fair to good foundation material. Easily excavated.	Refer to soil report (Cox, 1974).	Refer to soil report (Cox, 1974).	Refer to soil report (Cox, 1974).	Refer to soil report (Cox, 1974).	Refer to soil report (Cox, 1974).	Refer to soil report (Cox, 1974).	Refer to soil report (Cox, 1974).	Refer to soil report (Cox, 1974).	Refer to soil report (Cox, 1974).	Refer to soil report (Cox, 1974).
2. Loess	Fair to good foundation material. Easily excavated.	Slight to moderate limitations. Variable thickness and permeability.	Severe limitations. Shallow water table may be present.	No limitations.	No limitations.	No limitations.	No limitations.	No limitations.	Slight limitations.	Slight limitations.	No limitations.
3. Shale, siltstone, sandstone, limestone, coal, and underclay*	Fair to good foundation material. Difficult excavation.	Severe limitations. This soil and impermeable rock.	Severe to moderate limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes.**	Severe limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes.**	Moderate limitations. Rock excavation. Steep slopes.	Severe limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes.**	Severe limitations. Steep slopes.	Slight to moderate limitations.	Slight limitations. Reservoir might leak where rocks are fractured.**	Severe limitations.	Moderate limitations. Highly variable amount of rock and earth excavation.
4. Chert gravel	Fair to good foundation material. Easily excavated.	Slight to moderate limitations. Variable thickness and permeability.	Severe limitations. Shallow water table may be present.	No limitations.	No limitations.	No limitations.	No limitations.	No limitations.	Severe limitations. Leaky reservoir material.	Severe limitations. Leaky reservoir.	Slight to moderate limitations. Variable material.

\*This unit may be overlain by loess.  
 \*\*Coal beds and underclays should not be used for foundations or reservoir embankments because of the presence of expanding pyrite in coal and underclays and the weakness of underclay when it becomes wet.



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 Public Information Center  
 859.257.3896  
 877.776.7827 (toll free)  
 View the KGS World Wide Web site at:  
[www.uky.edu/ugs](http://www.uky.edu/ugs)

