

**Geologic Hazards**  
Faults are common geologic structures across Kentucky, and have been mapped in many of the Commonwealth's counties. The faults shown on this map are part of the Pennyrite Fault System, which is not considered to be active. Earthquake damage in Edmonson County is still a possibility, however.

Soil creep, slumps, and landslides along steep slopes may occur from erosion or ground motion associated with a strong earthquake. Areas associated with alluvium (Unit 1) are subject to liquefaction during a strong earthquake. These areas are also subject to flooding.

Soils derived from alluvium deposits may have a moderate to high shrink-swell capacity, which may affect structural foundations and roads.

**Tar-Sands in Western Kentucky**  
Investigations by the Kentucky Geological Survey have confirmed that major tar-sand resources are present in western Kentucky (Noger, 1999). In-place resources are calculated to be in excess of 3 billion barrels. The principal formations that contain tar-sand deposits (also referred to as asphaltic sandstones, heavy-oil deposits, or bitumen-impregnated sandstones) are the KYrock, Bee Springs, Tar Springs, Hardinsburg, and Big City Sandstones. Some of these may occur in Logan, Warren, Butler, Edmonson, Hart, Grayson, Breckinridge, and Harlan counties. In Edmonson County, tar-sands are present in unit 5. Photo by Randy Bruner.

**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 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 827.3404. For more information, and to make contact maps of your local area, visit our Land-Use Planning Internet Mapping Web Site at [kgsmap.uky.edu/web/kykylp/interviewer.htm](http://kgsmap.uky.edu/web/kykylp/interviewer.htm).

Bedrock mapping was adapted from Davidson (2002), Mullins (2002 a-c), Thompson (2002 a-c), and Toth (2002 a-d). Sinkhole data were provided by R.L. Paylor, L.J. Flores, M.J. Caudill, and J.C. Currans. Thanks to Dan Shockey, County Extension Agent, and Patricia Hull, U.S. Army Corps of Engineers, for help with photographs. Thanks also to Richard McGhee, Groundwater Branch, Kentucky Division of Water; Paul Howell, U.S. Department of Agriculture-Natural Resources Conservation Service; and Jim Currans, Kentucky Geological Survey, for photographs and illustrations. Thanks to Richard Smith, Kentucky Geological Survey, for information on tar-sands.

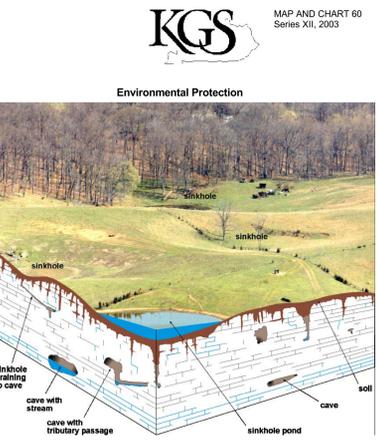
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# Generalized Geologic Map for Land-Use Planning: Edmonson County, Kentucky

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**Karst**  
The term "karst" refers to a landscape characterized by sinkholes, springs, sinking streams (streams that disappear underground), and underground drainage through solution-enlarged conduits or caves. Karst landscapes form when slightly acidic water from rain and snow-melt seeps through soil cover into fractured and soluble bedrock (usually limestone, dolomite, or gypsum).

Sinkholes are depressions on the land surface where water drains underground. Usually circular and often funnel-shaped, they range in size from a few feet to hundreds of feet in diameter. Springs occur when water emerges from underground to become surface water. Caves are solution-enlarged fractures or conduits that are large enough for a person to enter.



**Major Construction**  
An understanding of the geology of an area can help prevent costly construction failures. Constructing this road in Warren County with a different alignment might have prevented the damage caused by the subsequent sinkhole collapse. (Photos above and below courtesy of Richard McGhee, Groundwater Branch, Kentucky Division of Water.)



**Radon**  
Radon gas can be a local problem, although it is not widely distributed in Kentucky in amounts above the U.S. Environmental Protection Agency's maximum recommended limit of 4 picocuries per liter. Some areas of Unit 7 may contain high levels of uranium or radium, parent materials for radon gas. Several limestones in the state contain apatite, a phosphate mineral. Uranium is sometimes part of the apatite crystal structure, and when the limestone weathers away the phosphates containing uranium can become concentrated in the soil and ultimately give rise to high levels of radon. A few areas of moderately high radon concentrations are known in the sinkhole plain in the southeastern part of the county, ranging from 4 to less than 52 picocuries per liter. Homes in these areas should be tested for radon, but the homeowner should keep in mind that the threat to health results from relatively high levels of exposure over long periods of time, and the remedy may simply be additional ventilation of the home.

**COMPARATIVE RISK CHART FOR RADON LEVELS**

Radon Level (pCi/L)	Estimated Fall Lung Cancer/1000	Comparable Exposure Levels	Comparable Risk Estimate
200	440-770	1000 times average outdoor level	More than 60 times non-smoker level
100	270-430	500 times average outdoor level	Four pack/day smoker for 20,000 cigarettes
40	120-360	200 times average outdoor level	Two pack/day smoker
20	60-210	100 times average outdoor level	One pack/day smoker
4	13-50	10 times average outdoor level	Five times non-smoker risk
2	7-30	Average indoor level	Non-smoker risk of lung cancer
0.2	1-3	Average outdoor level	Average outdoor level

The EPA recommends action be taken if indoor levels exceed 4 picocuries per liter, which is 10 times the average outdoor level. Some EPA representatives believe the action level should be lowered to 2 picocuries per liter; other scientists dissent and claim the risks estimated in this chart are already much too high for low levels of radon. The action level in European countries is set at 10 picocuries per liter. Note that this chart is only an estimate; it is not based upon any scientific result from a study of a large population meeting the listed criteria. (From the U.S. Environmental Protection Agency.)

**Pond Construction**  
Successful pond construction must prevent water from seeping through structured soils into limestone solution channels below. A compacted clay liner, or artificial liner, may prevent pond failure. Coating the basin filled with water as soon as possible after construction prevents drying and cracking, and possible leakage, of the clayey soil liner. Ponds constructed in dry weather are more apt to leak than ponds constructed in wet weather. (Illustration and discussion by Paul Howell, USDA-NRCS.)

**Anti-Leakage Strategy**  
Deny water access to permeable materials and/or alter materials to an impermeable condition

**Top of Dam**

**Structured Clay Soil**

**Limestone Bedrock with Plumbing**

**Perm - Imperm Boundary**

**Top of Dam**  
Successful pond construction must prevent water from seeping through structured soils into limestone solution channels below. A compacted clay liner, or artificial liner, may prevent pond failure. Coating the basin filled with water as soon as possible after construction prevents drying and cracking, and possible leakage, of the clayey soil liner. Ponds constructed in dry weather are more apt to leak than ponds constructed in wet weather. (Illustration and discussion by Paul Howell, USDA-NRCS.)

**Flood Protection**  
This levee was constructed to control flooding along the Big Reedy Creek drainage in Edmonson County.



**Mammoth Cave National Park**  
Mammoth Cave National Park, established in 1941, receives approximately 1.7 million visitors per year. The park is home to Mammoth Cave, which is the longest surveyed cave system in the world, with over 350 miles of passages. Approximately 45,713 acres of the park's 52,830 acres are located in Edmonson County.

Houchens Ferry is one of two ferries in Mammoth Cave National Park. Both ferries transport vehicles across the Green River, which is a major drinking-water source for Edmonson County.



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

<http://www.edmonsoncounty.com>—Edmonson County Chamber of Commerce  
<http://www.uky.edu/edmonson>—University of Kentucky Cooperative Extension Service  
<http://www.bradley.org/>—Barren River Area Development District  
<http://www.thinkkentucky.com/eds/cmty/cov022/>—Kentucky Economic Development Information System  
[www.uky.edu/KentuckyAtlas/1061.html](http://www.uky.edu/KentuckyAtlas/1061.html)—Kentucky Atlas and Gazetteer  
<http://censusfacts.uky.edu/states/21/1061.html>—U.S. Census data  
[kgsweb.uky.edu/download/kgsplanning.htm](http://kgsweb.uky.edu/download/kgsplanning.htm)—Planning information from the Kentucky Geological Survey

## 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 Mills	Intensive Recreation	Extensive Recreation	Reservoir Areas	Embankments	Underground Utilities
1. Alluvium	Fair to good foundation material. Easily excavated.	Refer to soil report (Michals, 2001).	Refer to soil report (Michals, 2001).	No limitations.	No limitations.	Refer to soil report (Michals, 2001).	Refer to soil report (Michals, 2001).	Refer to soil report (Michals, 2001).	Refer to soil report (Michals, 2001).	Refer to soil report (Michals, 2001).	Refer to soil report (Michals, 2001).
2. Terrace deposits (silt, sand, and gravel)	Fair to good foundation material on hillside. Poor foundation material on hillside. Poor stability and permeability.	Slight to moderate limitations. Variable bedrock and permeability.	Moderate to severe limitations.	No limitations.	No limitations.	Refer to soil report (Michals, 2001).	Refer to soil report (Michals, 2001).	Refer to soil report (Michals, 2001).	Moderate to severe limitations.	Moderate to severe limitations.	No limitations.
3. Shale, sandstone, limestone, and conglomerate	Severe limitations; thin soils and impervious rock.	Severe to moderate limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes along major drainage.	Severe limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes along major drainage.	Severe limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes.	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.	Severe limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes.	Slight to moderate limitations. Steep to moderate slopes. Swelling clays may be present.	Refer to soil report (Michals, 2001).	Severe limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes.	Moderate limitations. High variable amount of rock and earth excavation.
4. Sandstone, shale, and limestone	Fair to good foundation; thin soils and impervious rock.	Severe to moderate limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes along major drainage.	Severe 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; locally, upper few feet may be ripable. Steep slopes.	Severe 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.	Slight to moderate limitations. Steep slopes.	Refer to soil report (Michals, 2001).	Severe limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes.	Moderate limitations. High variable amount of rock and earth excavation.
5. Sandstone	Fair to good foundation; thin soils and impervious rock.	Severe limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes along major drainage.	Severe 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; locally, upper few feet may be ripable. Steep slopes.	Severe 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.	Slight to moderate limitations. Steep slopes.	Moderate limitations. Permeable rock.	Severe limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes.	Moderate limitations. High variable amount of rock and earth excavation.
6. Limestone and shale	Fair to good foundation; thin soils and impervious rock.	Severe limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes along major drainage.	Moderate limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes along major drainage.	Minor limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes along major drainage.	Minor 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.	Severe limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes.	Slight limitations. Steep slopes.	Slight 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. High variable amount of rock and earth excavation.
7. Limestone	Excellent foundation; thin soils and impervious rock.	Severe limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes along major drainage.	Severe to moderate limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes.	Slight limitations. Local drainage problems from seeps or springs. Steep slopes.	Slight limitations. Local drainage problems from seeps or springs. Steep slopes.	Slight to moderate limitations. Rock excavation; locally, upper few feet may be ripable. Steep slopes.	No limitations.	No limitations.	Slight limitations. Severe weather rock; locally, upper few feet may be ripable. Steep slopes.	Severe 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.

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[www.uky.edu/kgs](http://www.uky.edu/kgs)

