

Montgomery County Courthouse at Mount Sterling

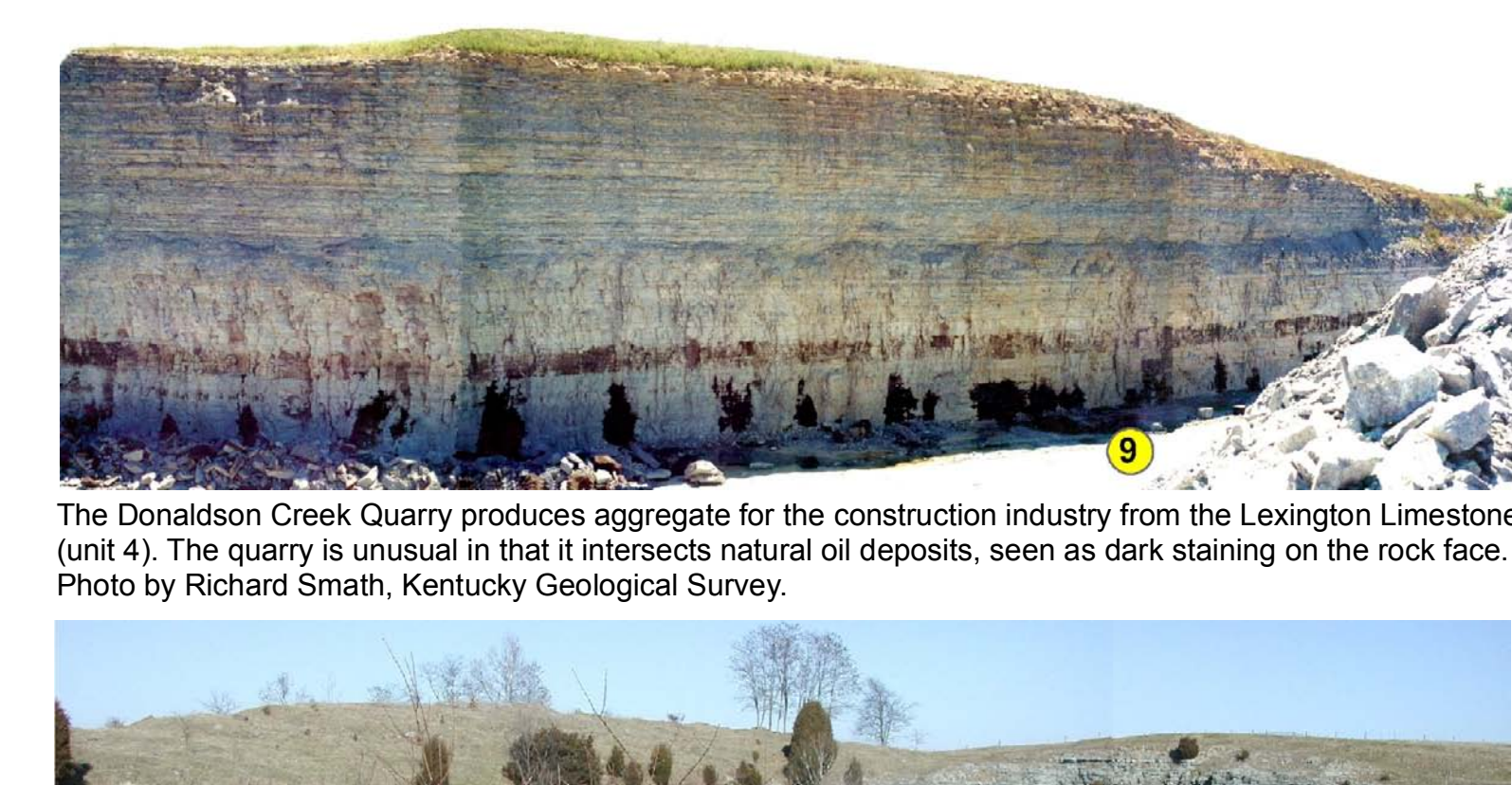


Montgomery County, an area of 199 square miles in the Outer Bluegrass and Knobs Regions, was formed in 1797. The 2005 population of 24,092 was 6.8 percent greater than the 2000 population. The highest elevation, 1,447 feet, is on Westbrook Mountain near the county line about 4.5 miles south of Camargo. The lowest elevation, 707 feet, is the point where Copperas Creek leaves the county at the Montgomery-Clark-Powell boundary. Photo by Dan Carey, Kentucky Geological Survey.

Mapped Surface Faults

Faults are common geologic structures across Kentucky, and have been mapped in many of the commonwealth's counties. The faults shown on this map represent seismic activity that occurred several million years ago at the latest. There has been no activity along these faults in recorded history. Seismic risk associated with these faults is very low. Faults may be associated with increased fracturing of bedrock in the immediately adjacent area. This fracturing may influence slope stability and groundwater flow in limited areas.

Mineral Resources



The Donaldson Creek Quarry produces aggregate for the construction industry from the Lexington Limestone (unit 4). The quarry is unusual in that it intersects natural outcrops, seen as dark staining on the rock face. Photo by Richard Smith, Kentucky Geological Survey.

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Planning Guidance by Rock Unit Type

Table with 10 columns: Rock Unit, Foundation and Excavation, Septic System, Residence and Basement, Highways and Streets, Access Roads, Light Industry and Malls, Intensive Recreation, Extensive Recreation, Reservoir Areas, Reservoir Embankments, Underground Utilities. Rows include Clay, silt, sand, and gravel (alluvium); Siltstone, shale, and limestone; Limestone, shale; Limestone/dolomite; Black shale; Shale and limestone/dolomite; Shale; and Shale, siltstone, and limestone.

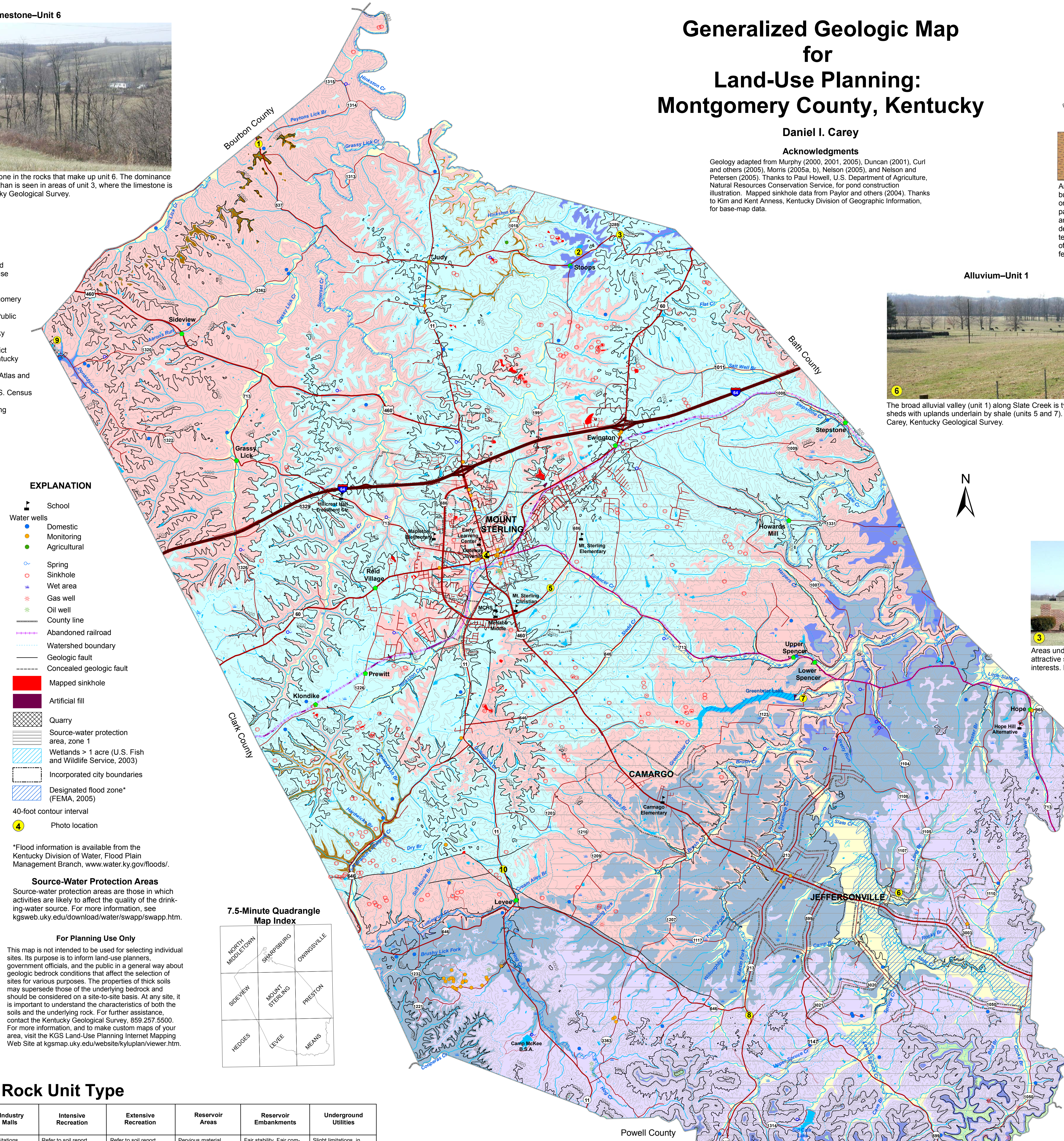
*Shales and clays in these units may shrink during dry periods and swell during wet periods, and cause cracking of foundations. On hillsides, especially where seeps and springs are present, they can also be susceptible to landslides.

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

Daniel I. Carey

Acknowledgments

Geology adapted from Murphy (2000, 2001, 2005), Duncan (2001), Curt and others (2005), Morris (2005a, b), Nelson (2005), and Nelson and Petersen (2005). Thanks to Paul Howell, U.S. Department of Agriculture, Natural Resources Conservation Service, for pond construction illustration. Mapped sinkhole data from Fayor and others (2004). Thanks to Kim and Kent Arness, Kentucky Division of Geographic Information, for base-map data.

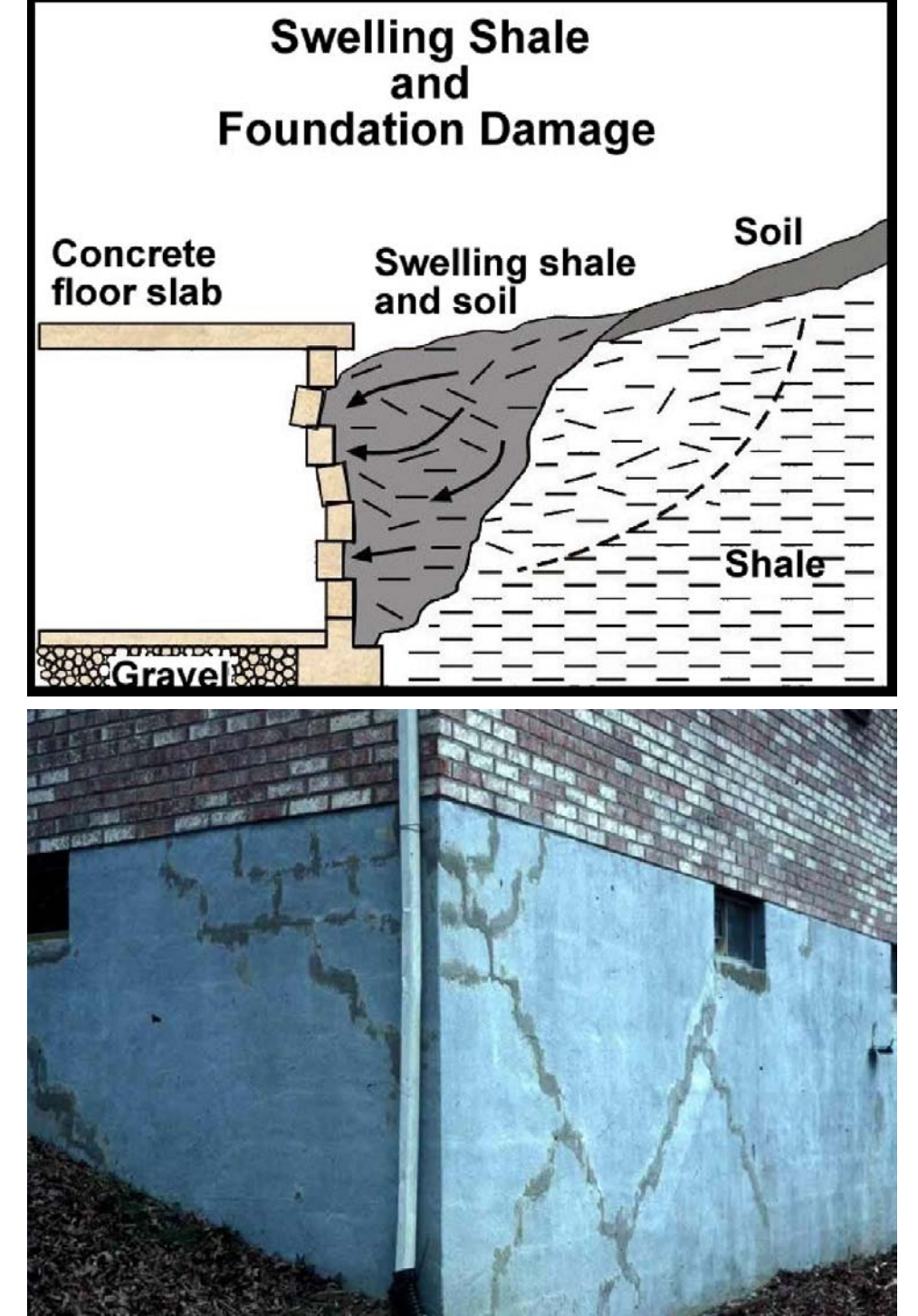


Swelling and Shrinking Shales

A problem of some concern in this area is the swelling of some of the clays and shales. Expanding shale can cause backfill to swell and concrete to crack and crumble. It can heave the foundation, the slab, and interior partitions resting on it, and damage upper floors and interior partitions. This phenomenon has been responsible for extensive damage to schools, homes, and businesses in Kentucky. During times of drought, these same shales may shrink, causing foundations to drop. Anyone planning construction on these shales should seek professional advice from a geologist or engineer familiar with the problem.



An uplifting experience that will not be appreciated! Left: All is well in this newly built home until water from percolation, drains, lawn sprinklers, leaking sewers, or water mains soaks swelling soil beneath the foundation. Right: With time, expanding soils exert several tons per square foot of pressure on the foundation and shallow pilings. Without remedial measures, the house will actually become deformed, and shatter masonry and windows. Remedies vary from mere maintenance that keeps drainage away from the house to expensive reconstruction of foundations. Prior site planning that takes geology into account is always preferable to dealing with problems after a structure is built. From AIPG (1993).



Some shales and the soils derived from them swell when exposed to water or air. These swelling shales and soils can have severe impacts on building foundations and other structures (e.g., bridges, dams, roads). Photo by John Kiefer, Kentucky Geological Survey.

Alluvium—Unit 1



The broad alluvial valley (unit 1) along Slate Creek is typical of watersheds with uplands underlain by shale (units 5 and 7). Photo by Dan Carey, Kentucky Geological Survey.

Limestone and Shale—Unit 3



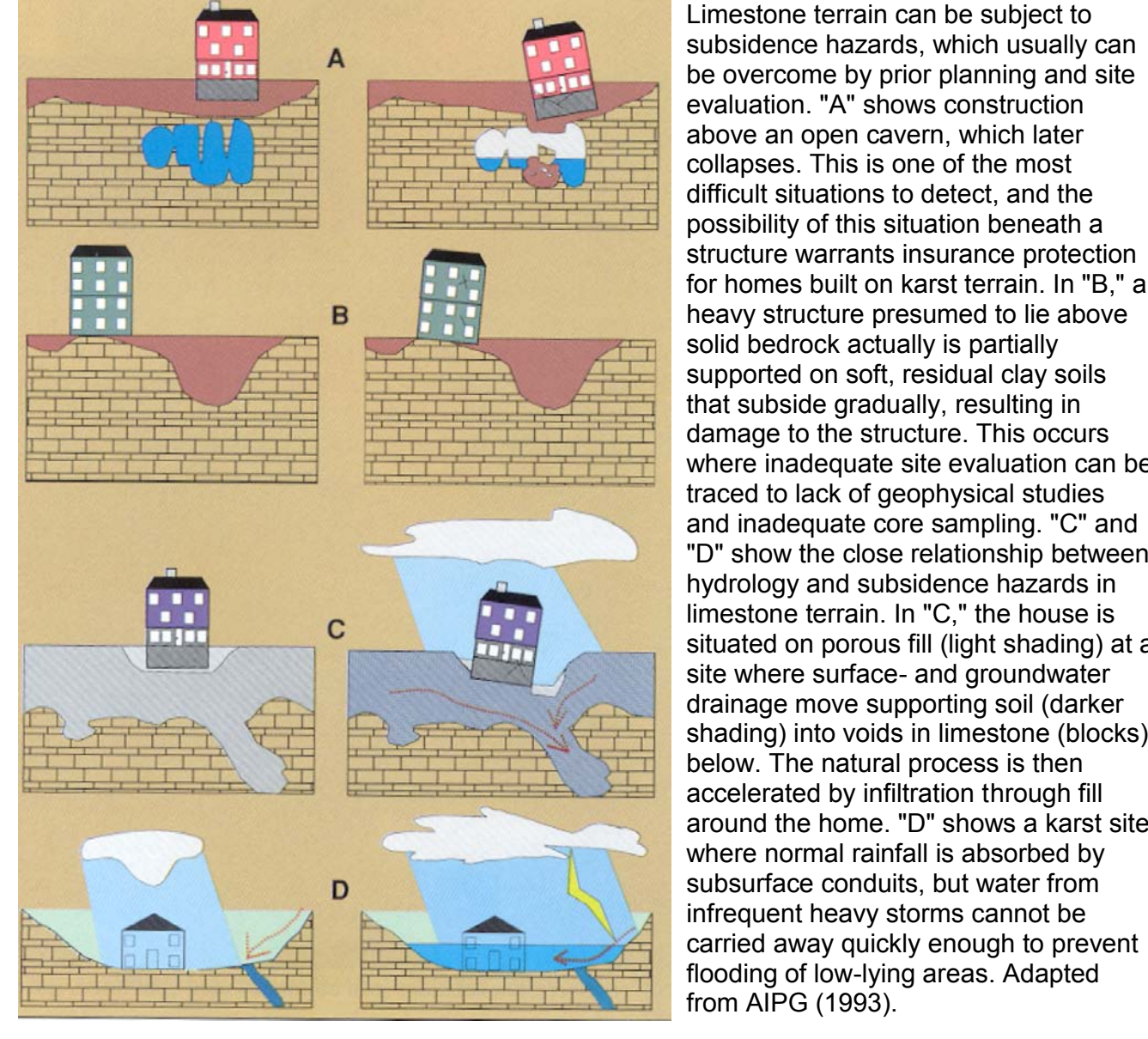
Limestone and shale of unit 3 are seen in this roadcut along Ky. 646. As the shale content increases, the terrain becomes hillier. Photo by Dan Carey, Kentucky Geological Survey.

Rural Residential Development



Areas underlain by limestone and shale (unit 3) provide soils for agriculture and attractive sites for development. Thoughtful planning can minimize conflicting interests. Photo by Dan Carey, Kentucky Geological Survey.

Construction on Karst



Some shales and the soils derived from them swell when exposed to water or air. These swelling shales and soils can have severe impacts on building foundations and other structures (e.g., bridges, dams, roads). Photo by John Kiefer, Kentucky Geological Survey.

Shale: Unit 7



Shale of unit 7 (Nancy Member of the Borden Formation) is exposed in this roadcut. Photo by Dan Carey, Kentucky Geological Survey.

Water Resources



Lubnegud Creek flows over limestone of unit 3 near Ky. 11. Montgomery County is blessed with an abundance of water. Ninety-five percent of Montgomery Counties are served by public water. Slate Creek is the primary raw water source. Photo by Dan Carey, Kentucky Geological Survey.

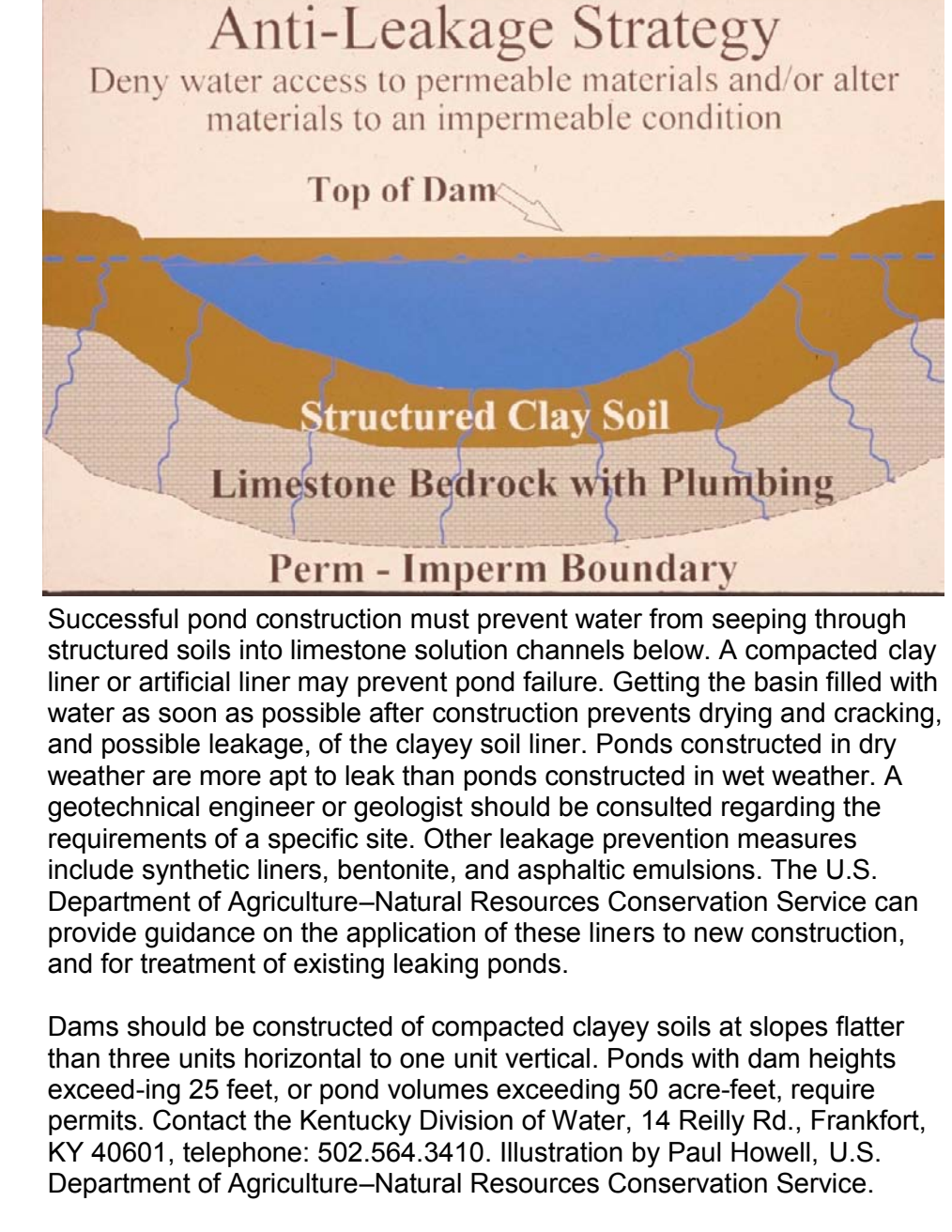
Radon

Radon gas can be a local problem, in some areas exceeding the U.S. Environmental Protection Agency's maximum recommended limit of 4 picocuries per liter. The shales of unit 5 and limestones of unit 4 in particular may contain high levels of uranium or radium, parent materials for radon gas. 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, and the remedy may simply be additional ventilation of the home.

Radon Risk If You've Never Smoked (U.S. Environmental Protection Agency, 2005)

Table comparing radon risk (pCi/L) to the risk of cancer and radon exposure compared to smoking. Columns include Radon Level, Risk of cancer, and What to Do.

Pond Construction



Successful pond construction must prevent water from seeping through the structured soils beneath the embankment. A compacted bentonite liner or artificial liner may prevent pond failure. Getting the basin filled with water as soon as possible after construction prevents drying and cracking, and provides guidance on the application of these liners to new construction and for treatment of existing leaking ponds.

Groundwater

Some wells located in the major creek valleys will produce enough water for a domestic supply, except during dry weather. In upland areas (80 percent of the county), most drilled wells will not produce enough water for a dependable domestic supply, unless they are drilled along drainage lines, in which case they may produce enough water except during dry weather. Throughout the county, groundwater is hard or very hard and may contain salt or hydrogen sulfide, especially at depths greater than 100 feet. For more information on groundwater in the county, see Carey and Stickney (2004).

The 66-acre Greenbrier Creek Reservoir provides water to the city of Mount Sterling and is one of several fishing lakes in the county. Photo 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 and in which cuts and fills are made in hilly topography, and considerable work is often preparing subgrades and bases below 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 would normally need footings in solid rock, and the rock would need to be core drilled to determine the presence of caverns, cracks, etc.
EXTENSIVE RECREATION—Athletic fields, stadiums, etc., require permits. Contact the Kentucky Division of Water, 14 Riley Rd., Frankfort, KY 40601, telephone: 502.564.3410. Illustration by Paul Howell, U.S. Department of Agriculture-Natural Resources Conservation Service.

Black Shale—Unit 5



The black shale (New Albany) of unit 5 is seen in this roadcut along Ky. 213. Photo by Dan Carey, Kentucky Geological Survey.

Geology of Kentucky

