

Types of Landslides

Creep

curved tree trunks, board fences tilted and pulled apart

Depth

tension cracks, tilted pavement, tilted guard rails and utility poles

colluvium soil

loose formation

Translational Slide

debris pile at toe

slide surface

loose bedrock

accumulation zone or toe

Rotational Slide

accumulation zone or toe

slide surface

unconsolidated colluvium, drift, soil, or alluvium

slide surface

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Cost is increased if built structures are damaged, require stabilization, or additional structures must be added to resolve the problem.

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Creep

Although technically not a landslide, creep is a process of soil (less than 18 inches thick) moving downslope under the influence of gravity. Signs include curved tree trunks, tilted utility poles, and leaning walls. Creep may be a precursor to a landslide or be underlain by an existing landslide. Careful examination is needed by a geologist or geotechnical engineer to differentiate between landsliding and creep.

Translational Slide

Occurs at a depth of 6 feet or less, where a solid sheet of ground has moved downhill after becoming too wet and unable to hold itself in place. Movement can be rapid. Often the bedrock layer is exposed at the top of the slide. Costs can range from moderate to expensive for cleanup, stabilization, and prevention of future slides.

Rotational Slide

Occurs at a depth greater than 6 feet, where the ground has moved downhill along a concave (or bowl-shaped) surface. At the bottom of the landslide, material has rotated up and out in the form of a hump or bulge. At the top of the slide, a scarp may be exposed and the ground may be sunken. These landslides are difficult to stabilize and expensive to remediate.

The Hillside Trust is a 501(c)3 non-profit organization dedicated to the thoughtful use and preservation of our region’s hillsides. It accomplishes this through a three-part mission of research and education, advocacy of responsible land use, and land conservation. Since 1976, The Hillside Trust has served the Greater Cincinnati, Northern Kentucky and Southeastern Indiana region.

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Identifying Landslides

in the Greater Cincinnati Area
a Landowner’s Guide



Columbia Parkway



Route 8

Greater Cincinnati's Unstable Geology

Between 12,000 years and two million years ago, glaciers covered what we now identify as the Greater Cincinnati region, including Northern Kentucky, Southwestern Ohio, and Southeastern Indiana. These glaciers dammed north-flowing streams resulting in massive lakes that collected fine layers of silt and clay (lake clays). When the glaciers receded, we were left with our present-day landscape that includes numerous hillsides and valleys.

The majority of Greater Cincinnati's hillsides consist of an underlying layer of bedrock approximately 200 feet thick, made up of 80% shale and 20% limestone. When shale is exposed to air and water, it quickly breaks

down into an unstable material known as colluvium. Colluvium can range from several feet to 50 feet in thickness, and it is highly susceptible to erosion and landsliding. Some of the region's valleys contain lake clays. These clays are associated with landslides that can occur on the gentlest of slopes.

The instability of Greater Cincinnati's hillsides becomes more problematic due to excessive periods of precipitation, and construction methods that fail to address the underlying geology. Annually, the Greater Cincinnati region experiences millions of dollars in damages from landsliding, making it one of the more landslide susceptible areas in the country.

What to Look for In Your Neighborhood



- 1) Tilted trees, poles, and walls: a clear sign of ground movement, whether it is creep or something more significant like a landslide.
- 2) North-flowing stream valleys: often consist of failure-prone clays, which can result in landslides on the most gentle of slopes.



- 3) Steep slopes: as the steepness of a slope increases, its stability decreases.
- 4) Patterns of cracks in ground or pavement, or repeated patching: can be an indicator of shrinking and swelling clays, the beginning of a landslide, or a sign of a pre-existing landslide.



- 5) Slopes with abandoned development: evidence of old retaining walls, building foundations, or closed roadways on a hillside may indicate that abandonment was a result of unstable slopes and prior landsliding.
- 6) Land adjacent to streams: outside bends of rivers and creeks are often undercut by erosion and are subject to fluctuating water levels, resulting in destabilization of adjacent land.



What to Look for On Your Property



- 1) Cracks in buildings, roadways, or the landscape that align or form a pattern may be a precursor to, or indicate, ground movement.
- 2) Breaks and cracks in pipes or water lines or sewer lines: can indicate a slope is moving or is about to move. In addition, water that empties onto a slope from downspouts, drains, or large paved surface areas like parking lots, can either contribute to landsliding or can accelerate existing landslides.



- 3) Bumpy, undulating, stair-step or irregular topography: often are representative of unstable ground, and indicative of an older landslide that is still susceptible to movement.
- 4) Scarps: sharp breaks and misaligned ground, patches of bare earth, uneven pavement separated by noticeable gaps, bowl-shaped depressions on a slope, or breaks in the ground that run parallel to the ridge top of a slope often represent past or present landslide features.



East Price Hill

What Can I Do?

If you own hillside property:

- Make sure all surface and sub-surface water from drains, downspouts, or paved surface areas does not empty onto a slope.
- Do not dump yard waste or construction debris onto a slope.
- Do not excavate or remove the bottom of a slope without consulting a geologist or a geotechnical engineer.
- Do not remove trees or ground cover from hillsides, the roots of which help bind the soil and add stability to shallow soil profiles.

If you are planning to buy or develop hillside property:

- In the City of Cincinnati, consult with the Planning Department regarding its Hillside Overlay Districts. These districts were established, in part, to delineate steep hillside areas that require special care and attention.
- In the surrounding counties of Greater Cincinnati and Northern Kentucky, consult your local County Soil and Water Conservation District Office.
- Additionally, you may want to hire a geologist or a geotechnical engineer to walk both the property and surrounding properties to note any signs of slope irregularities that may reveal existing or pre-existing landslides.

If you believe you have a problem, consult with local authorities:

- Boone and Kenton Counties Soil and Water Conservation.....859-586-7903
- Campbell County Soil and Water Conservation.....859-635-9587
- City of Cincinnati Office of Geotechnical Engineering.....513-352-5278
- Clermont County Soil and Water Conservation.....513-732-7075
- Dearborn County Soil and Water Conservation.....812-926-2406
- Hamilton County Soil and Water Conservation.....513-772-7645