

Kentucky Erosion Prevention and Sediment Control Guide

A guide to preventing erosion and controlling sediment from construction activities in Kentucky

Protecting Slopes to Prevent Gullies

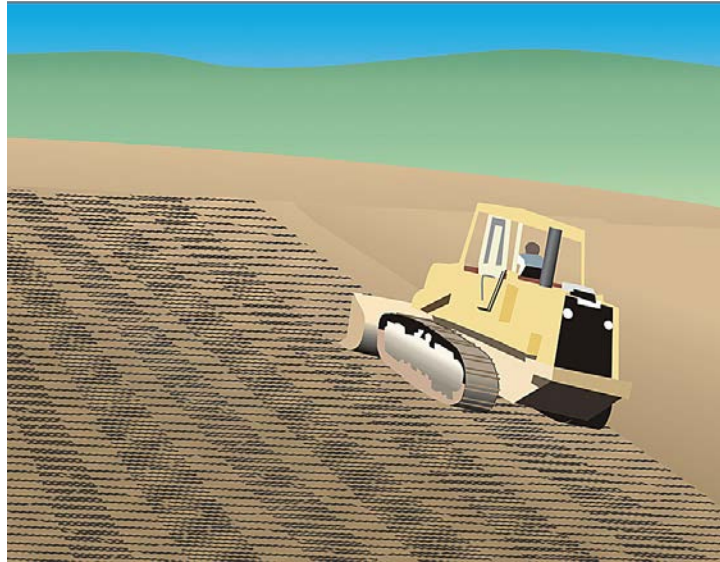
Slopes – especially long ones – must be protected to prevent sheet, rill, and gully erosion. Slopes are stabilized immediately after grading work is completed. Seeding and mulching provide the best and cheapest protection. Erosion control blankets or turf reinforcement mats are needed on most slopes greater than 3:1.

Approximate slope conversions

Percent	Slope ratio	Degrees
100%	1:1	45°
50%	2:1	27°
33%	3:1	18°
25%	4:1	14°
10%	10:1	6°

Assessing slopes and soils

Steeper slopes (3:1 or steeper) require more protection than flatter slopes. Slopes with highly erodible soils (silty soils) need more protection than those with less erodible soils (sands and gravels). Also, long slopes (greater than 50 feet) are at greater risk for erosion than short slopes.



Tread-track slopes up and down hill to improve stability.

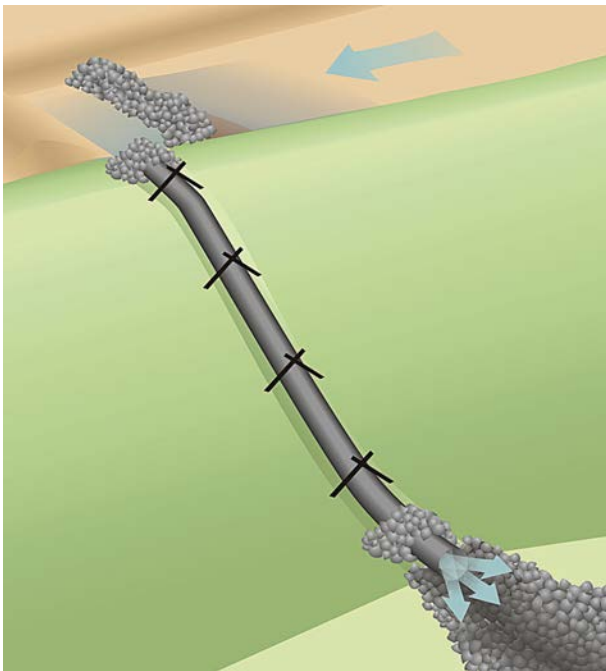
Slope protection basics

Protecting slopes from erosion requires several actions that must be taken together. No single approach will be successful, especially if the slope is long, steep, or has highly erodible soils. Use one or more of the following actions to reduce erosion on slopes:

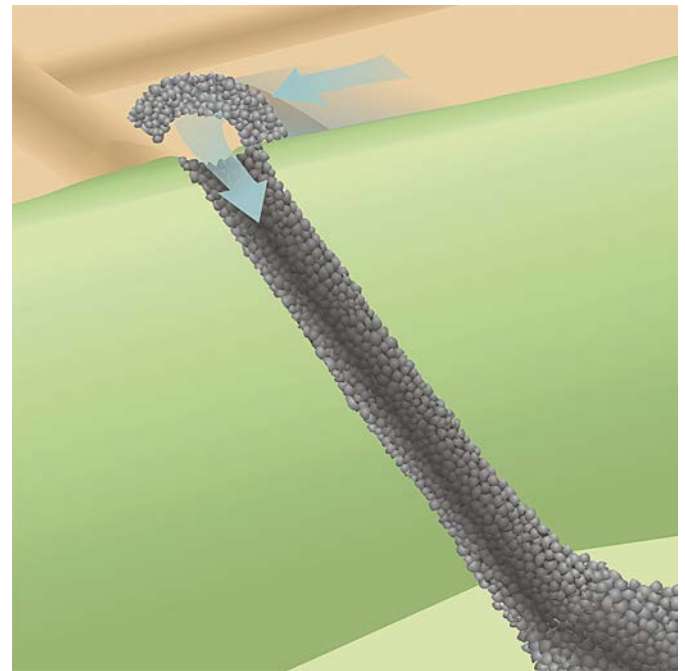
- Divert upland runoff – Install a berm or channel above the slope to divert upland rain runoff around the bare soil area. See [Diverting Upland Runoff](#) for details.
- Control slope runoff – If slopes are broken up into benches or steps, runoff can be collected and diverted along berms or in channels to pipe or open channel slope drains with stable outlets.
- Till seedbed or condition the soil – Dozer tracks up and down slopes help hold soil in place and lengthen the runoff flow path down the slope. See table below for information on how the condition of the soil surface (compacted, tracked, etc.) can increase or decrease erosion.
- Seed and mulch – The best and cheapest protection by far. See [Protecting Soils with Seed](#), and [Protecting Soil with Mulch or Other Products](#) for details on seed types, application rates, and mulch, blanket, and mat products.
- Silt fence or other barrier – These should be installed at the toe of the slope or slightly away from the toe, and every 75 to 125 feet apart on long slopes. Fiber rolls installed on the contour work very well in breaking up flows on long slopes.
- Retaining wall – Extremely steep slopes can be leveled out and shortened into two or more steps or benches by installing retaining walls of rock, brick, block, wood, logs, or other material. If rock layers are present along the slope, use these to establish firm benches in a stair-step pattern.
- Blankets, mats or armoring – Slopes exceeding 3:1 with highly erodible soils must be protected with erosion control blankets, turf reinforcement mats, or other products such as hydraulic soil binders or bonded fiber matrices. Rock mulch and lined downdrain channels might be needed on steep slopes to control gullyng.

Soil condition versus erosion

If the soil is:	Erosion will be:
Compacted and smooth	30 percent more
Tracks across slopes	20 percent more
Tracks up and down slopes	10 percent less
Rough and irregular	10 percent less
Rough and loose to 12" deep	20 percent less



Temporary downdrain using plastic pipe. Stake down securely, and install where heavy flows need to be transported down highly erodible slopes. Note silt check dam in front of inlet.



Temporary or permanent downdrain using geotextile underliner and riprap. All slope drains must have flow dissipaters at the outlet to absorb high energy discharges, and silt checks at the inlet until grass is established.



Steep, long slopes need blankets or mats. Install blankets and mats up and down long slopes. For channels below slopes, install horizontally. Don't forget to apply seed, lime, and fertilizer (if used) before installing blanket.

Chemical soil stabilizers and hydraulic mulch

Anionic polyacrylamide (PAM) and other chemical soil binders and stabilizers have been proven effective in controlling erosion on slopes. Do not use these products within 25 feet of natural waterways. Follow manufacturer recommendations regarding mixing and application. Keep equipment off treated areas.

Note that this protection is only temporary – repeat applications or seeding and mulching or other action is still needed for permanent slope protection. Bonded fiber matrices and other hydraulic mulch products applied after seeding or with seed in the mix can provide permanent protection if mixed and applied properly. Apply 1 to 2 tons per acre; follow manufacturer's directions.



Treatment of a slope with polyacrylamide spray



Good coverage with straw mat on slope and rock at the bottom. Make sure to properly anchor straw mat at the top of the slope.



Good installation of straw mat, but incomplete seeding has led to slippage. However, there is appropriate redundancy and the properly installed silt fence down slope has prevented silt from leaving the site.



Good use of a berm to slow erosion but tracking is wrong direction. Equipment should tread track up and down hill to improve stability.



Very good application of rock lined downdrain channel to carry water down slope face. Use filter fabric under rock. Install multiple drains at appropriate spacing where flows are heavy. Install flow dissipaters at outlet to absorb energy of the discharge.



Very good use of 20-inch plastic slope drain pipes to convey water from roadway to lower channel. Note staking and rock anchoring at bottom of temporary slope drain pipes.



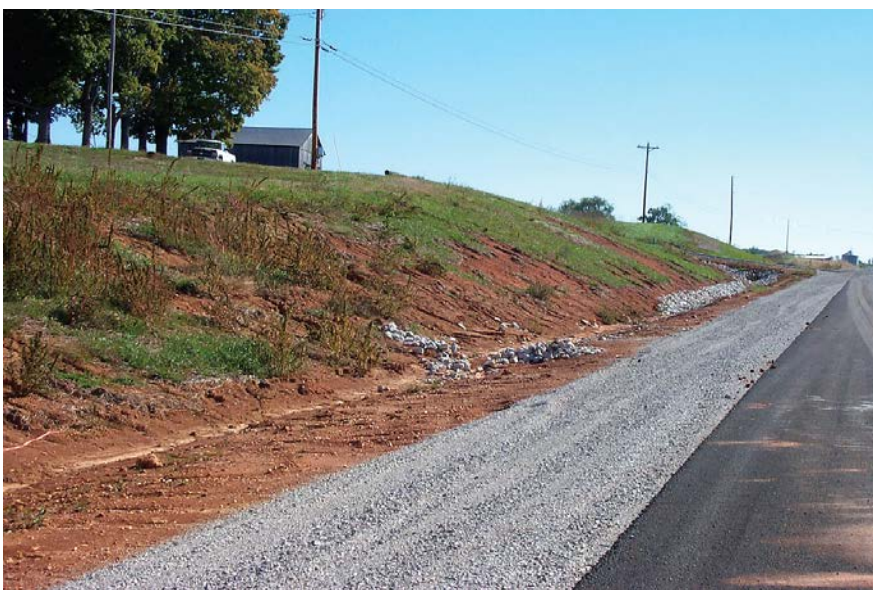
Good use of retaining wall. Notice that the area of erosion that required regrading was only in the cut in the wall. Good placement of redundant silt fence to protect the stream.



Good use of rock-filled, stacked gabion baskets to protect steep slope. Soil and bark mulch can be used in or over gabions and planted with live willow or hardwood cuttings to reduce “hardened” look.



Very poor slope protection. For best results, prepare soil and apply seed with mulch or blanket immediately after reaching final grade.



Poor slope protection. Seed has washed away—blankets or mats should have been used. Channel lining is poor. Silt check dam has washed out; more silt checks are needed.

Resources

[EPA Chemical Stabilization](#)

[EPA Compost Blankets](#)

[EPA Soil Retention](#)

[EPA Temporary Slope Drains](#)

[EPA Riprap](#)