

## Appendix A

# Regulatory Requirements All Silvicultural Operations, 401 KAR 5:026, 5:029, 5:030, and 5:031

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All operations must meet Kentucky water quality standards.

### **Activities Near High-quality Waters and Outstanding National Resources Waters, 401 KAR 5:029, 5:030, and 5:031**

Kentucky water quality standards (401 KAR 5:029) require the use of BMPs to protect high-quality waters and outstanding national resources waters listed in 401 KAR 5:030. In addition, outstanding resource waters that support federally listed threatened and endangered species require protection (see 401 KAR 5:031).

### **Activities Near Wild Rivers, KRS 146.200 et seq. and 401 KAR 4:100-140**

The Kentucky Wild Rivers Act and associated regulations give special protection to streams designated as “wild rivers,” including regulation of silvicultural activity. Before undertaking any silvicultural activity in a corridor of a designated wild river, the landowner or logger should contact the Wild Rivers Program of the Kentucky Division of Water for applicable regulations and instructions.

### **Debris in Floodplains, KRS 151.250**

The Kentucky Division of Water has authority over the placement of debris (including logging slash) in floodplains of perennial streams that have a drainage area larger than one-square mile. The Division of Water advises that as long as the BMPs for Streamside Management Zones and logging debris are followed, landowners and loggers will be considered in compliance with floodplain regulations that address debris. If these BMPs are not followed, the Kentucky Division of Water can institute enforcement proceedings.

### **Construction in Floodplains, KRS 151.250**

All structures (bridges, berms, or other construction that could obstruct flood flows) that are to be constructed in the floodplain of a perennial stream that drains more than one-square mile require a floodplain permit from the Kentucky Division of Water.

### **Filling or Draining of Wetlands, U.S. Clean Water Act, Section 404**

The U.S. Army Corps of Engineers regulates all filling or draining of wetlands, streams, lakes, or other bodies of water. Normal ongoing silvicultural activities, including building and maintaining forest roads, do not require individual permits, providing certain conditions are met, including adherence to the federal baseline BMPs for forest roads. For detailed information on the silvicultural exemption, contact the Kentucky Division of Forestry.

### **Activities around Sinkholes and Cave Entrances, KRS 433.870-433.875**

The Kentucky Cave Protection Act offers protection to any sinkhole, pit, karst window, and/or sinking stream that has an opening large enough for a person to enter a black zone. The Federal Cave Protection Act is used to manage nonrenewable cave resources on federal lands. Management techniques include buffer zones around sinkhole and cave entrances to provide food sources for cave life, regulate thermal variations, and prevent sedimentation. Extremely sensitive karst systems can include the entire recharge area as a buffer zone.

**Endangered Species in Caves, Federal Register 55:6184-6229 and 56:58804-58836**

The Kentucky State Nature Preserves Commission maintains the list of Kentucky plants and animals that are considered endangered, threatened, and of special concern. The U.S. Fish and Wildlife Service administers the federal Endangered Species Act of 1973, as amended in 1990, and the 1991 Candidate Review. Many species protected by these acts live in caves and can be threatened by pollutants entering sinkholes.

**Modified Sinkholes**

Any sinkhole that has been modified to receive additional storm water runoff can be classified as a Class V Underground Injection Control (UIC) Well, which must be registered and/or permitted by the U.S. Environmental Protection Agency Underground Injection Control Program.

**Cave Streams and Other Underground Surface Waters**

Kentucky surface water statutes and regulations have defined subterranean streams that flow underground and have discrete banks and channels, such as cave streams, as surface waters. Several karst groundwater basins in the Mammoth Cave National Park that extend well outside of the Park's boundary have been designated as Outstanding Resource Waters and receive the same special protection of species as the blind shrimp in Mammoth Cave.

**Karst Groundwater Basin Protection**

The federal and state Wellhead Protection Programs are developing karst groundwater basin protection plans for public water supplies that use karst springs or groundwater as their water source.

**Application of Sludge**

The application of some organic materials, such as sludge, can require a permit for compliance with federal and/or state regulations. For more information regarding permits required for the application of sludge, contact the Kentucky Division of Waste Management.

**Application of Pesticides**

Use only pesticides approved by the Environmental Protection Agency for use in Kentucky. Follow all pesticide label directions. Application of some chemicals can require applicator certification and/or licensing.

## Appendix B

# Kentucky Bodies of Water Designated as Coldwater Aquatic Habitats

The additional protection given to SMZs bordering Coldwater Aquatic Habitats, as described in the BMP guidelines for SMZs, extends only to the main stem of listed streams.

Body of Water	Zone	County
<b>Big Sandy River Basin</b>		
Paintsville Lake	Entire Reservoir	Johnson
<b>Little Sandy River Basin</b>		
Big Caney Creek	Source to Grayson Lake	Elliott
Big Sinking Creek	River Mile 6.0 to Little Sandy River	Carter
Laurel Creek	Source to Little Sandy River	Elliott
Greenbo Lake	Entire Reservoir	Greenup
<b>Licking River Basin</b>		
Craney Creek	Source to North Fork Licking River	Rowan/Morgan
Licking River	River Mile 176.8 (Cave Run Lake Dam) to River Mile 169.6 (U.S. Highway 60 bridge.)	Bath/Rowan
<b>Kentucky River Basin</b>		
Chimney Top Creek	Basin	Wolfe
Dix River	Herrington Lake Dam to Kentucky River	Garrard/Mercer
East Fork Indian Creek	Source to Indian Creek	Menifee
Gladie Creek	Basin	Menifee
Middle Fork Red River	Source to River Mile 10.6	Powell
Parched Corn Creek	Source to Red River	Wolfe
Swift Camp Creek	Source to Red River	Wolfe
Bert Combs Lake	Entire Reservoir	Clay
Fishpond Lake	Entire Reservoir	Letcher
Mill Creek Lake	Entire Reservoir	Wolfe
<b>Green River Basin</b>		
Beaver Dam Creek	Source to Green River	Edmonson
Buffalo Creek	Source to Green River (in Mammoth Cave National Park)	Edmonson
Lick Creek	Source to West Fork of Drakes Creek	Simpson
Lynn Camp Creek	Source to Green River	Hart
Underground River System	Mammoth Cave National Park Barren	Edmonson/Hart
	Turnhole Spring Basin	Edmonson/Barren
	Echo River Basin	Edmonson
	Pike Spring Basin	Edmonson
	Mile 205.7 Spring Basin	Hart
	McCoy Spring Basin	Hart
	Suds Spring Basin	Hart/Barren
Nolin River	River Mile 7.6 (Nolin Lake Dam) to Green River	Edmonson
Rough River	River Mile 89.3 (Rough River Dam) to River Mile 72.4	Ohio/Grayson
Roundstone Creek	Source to Kentucky Highway 1140 (River Mile 3.5)	Hart
Trammel Fork	Source to Kentucky Highway 31E (River Mile 23.6)	Warren

<b>Body of Water</b>	<b>Zone</b>	<b>County</b>
<b>Lower Cumberland River Basin</b>		
Casey Creek	Source to Little River	Trigg
Skinframe Creek	Source to Livingston Creek	Lyon
Sulphur Spring Creek	Source to Red River	Simpson
<b>Ohio River Basin</b>		
Doe Run Creek	Source to Kentucky Highway 1628 (River Mile 5.15)	Meade
Sinking Creek	Source to Kentucky Highway 259 (River Mile 4.0)	Breckinridge
<b>Upper Cumberland River Basin</b>		
Bad Branch	Basin	Letcher
Bark Camp Creek	Basin	Whitley
Beaver Creek	Basin	McCreary
Breeden's Creek	Basin	Harlan
Bunches Creek	Basin	Whitley
Cane Creek	Basin	Laurel
Cogur Fork	Basin	McCreary
Cumberland River	Lake Cumberland Dam (River Mile 460.9) to Kentucky Highway 90 bridge (River Mile 426.5)	Cumberland
Difficulty Creek	Basin	McCreary
Dogslaughter Creek	Basin	Whitley
Fugitt Creek	Basin	Harlan
Indian Creek	Source to Barren Fork	McCreary
Kelly Branch	Basin	Harlan
Laurel Creek	River Mile 9.0 to River Mile 3.4	McCreary
Looney Creek	Basin above River Mile 5.3	Harlan
Martin's Fork	Basin above River Mile 27.4	Harlan
Poor Fork Cumberland River	Basin above River Mile 742.7	Letcher
Razor Fork	Basin	Harlan
Rock Creek	Tennessee/Kentucky State Line (River Mile 21.9) to White Oak Creek	McCreary
Shillalah Creek	Source to Cumberland Gap National Historical Park Boundary	Bell
Sugar Run	Source to Cumberland Gap National Historical Park Boundary	Bell
Troublesome Creek	Basin	McCreary
White Oak Creek	Basin above River Mile 1.2 (includes Little White Oak Creek)	Laurel
Wood Creek	Wood Creek Lake Dam (River Mile 4.0) to Hazel Patch Creek	Laurel
Beulah (Tyner) Reservoir	Entire Reservoir	Jackson
Cannon Creek Lake	Entire Reservoir	Bell
Laurel River Lake	Entire Reservoir	Laurel
Wood Creek Lake	Entire Reservoir	Laurel

**Appendix C**

# Surface Waters Categorized as Outstanding National Resource Waters

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<b>Stream</b>	<b>Zone</b>	<b>County</b>
Red River	River Mile 68.6 to 49.2	Menifee/Wolfe
Underground River System	Within Mammoth Cave National Park Boundary	Edmonson/ Hart/ Barren
Big South Fork of Cumberland River	River Mile 55.2 to 45.0	McCreary

## Appendix D

# Surface Waters Categorized as Bodies of Water Whose Quality Exceeds That Necessary to Support Propagation of Fish, Shellfish, and Wildlife and Recreation in and on the Water

Stream	Zone	County
<b>Little Sandy River Basin</b>		
Arabs Fork*	Source to confluence with Clay Fork	Carter
Big Caney Creek*	Source to Grayson Lake	Elliot
Big Stinking Creek*	Source to River Mile 10.7	Carter
Laurel Creek*	Source to River Mile 7.6	Elliot
<b>Licking River Basin</b>		
Bucket Branch*	Source to confluence with North Fork of the Licking River	Morgan
Devils Fork*	Source to confluence with North Fork of the Licking River	Morgan
North Fork of Licking River*	Source to River Mile 13.0	Morgan
<b>Kentucky River Basin</b>		
Clear Creek*	Source to River Mile 4.1	Woodford
Clemons Fork*	Source to Buckhorn Creek	Breathitt
Coles Fork*	Source to Buckhorn Creek	Breathitt
Right Fork of Buffalo Creek*	Source to Buffalo Creek	Owsley
South Fork of Station Camp Creek*	Source to River Mile 5.3	Jackson
Station Camp Creek*	River Mile 22.3 to 19.0	Estill
Sturgeon Creek*	Source to River Mile 4.0	Lee
<b>Salt River Basin</b>		
Salt Lick Creek*	Source to River Mile 5.3	Marion
Wilson Creek*	Source to River Mile 12.2	Bullitt
<b>Green River Basin</b>		
Beaverdam Creek*	Source to River Mile 7.6	Edmonson
Gasper River*	Source to River Mile 32.3	Logan
Goose Creek*	Source to River Mile 5.6	Casey
Green River	River Mile 207.8 to 181.7	Edmonson
Russell Creek*	Source to River Mile 60.5	Adair
Trammel Fork*	River Mile 30.15 (Kentucky/Tennessee State line) to River Mile 19.4	Allen
<b>Lower Cumberland River Basin</b>		
Whippoorwill Creek*	Source to Red River	Logan
<b>Tennessee River Basin</b>		
Blood River*	River Mile 15.65 (KY/TN state line) to 15.1	Calloway
Soldier Creek*	River Mile 5.3 to 2.6	Marshall

Best Management Practices—APPENDIX D

<b>Stream</b>	<b>Zone</b>	<b>County</b>
<b>Tradewater River Basin</b>		
Sandlick Creek*	Source to River Mile 3.5	Christian
Tradewater River*	Source to River Mile 126.0	Christian
<b>Ohio River Basin</b>		
Yellowbank Creek*	Source to River Mile 4.4	Breckinridge
<b>Lakes and Reservoirs</b>		
Metropolis	Entire Lake	McCracken
Swan	Entire Lake	Ballard
<b>Mississippi River Basin (Main Stem and Minor Tributaries)</b>		
Murphy's Pond	Entire Pond and Preserve Area	Hickman
<b>Upper Cumberland River Basin</b>		
Bad Branch*	Source to confluence with Poor Fork of Cumberland River	Letcher
Bark Camp Creek*	Source to River Mile 2.6	Whitley
Buck Creek*	River Mile 62.6 to 28.9	Pulaski
Cane Creek*	Source to River Mile 7.0	Laurel
Cumberland River	River Mile 574.6 to 558.5 (Headwaters of Lake Cumberland)	McCreary/Whitley
Eagle Creek*	Source to River Mile 3.0	McCreary
Horse Lick Creek*	Source to River Mile 12.3	Jackson
Little South Fork of Cumberland River	River Mile 35.6 to 4.1	Wayne
Marsh Creek*	Source to River Mile 12.6	McCreary
Martins Fork of Cumberland River	River Mile 31.3 to 27.4	Harlan
Rock Creek	TN/KY State Line (River Mile 21.9) to White Oak Creek	McCreary
Rockcastle River	River Mile 24.4 to 8.5	Laurel/Pulaski
South Fork of Dog Slaughter Creek*	Source to Dog Slaughter Creek	Whitley

\* Bodies of water in the Kentucky Cabinet for Natural Resources and Environmental Protection reference reach network

## Appendix E

# Locations of Kentucky Wild Rivers

Body of Water	Zone	County
<b>Cumberland River Basin</b>		
Bad Branch	Headwaters to KY 932	Letcher
Big South Fork Cumberland River	TN State Line to Blue Heron (Mile 55.2 to Mile 45.0)	McCreary
Cumberland River	Summer Shoals to Lake Cumberland ( Mile 574.6 to Mile 558.5)	McCreary, Whitley
Little South Fork Cumberland River	KY 92 to Lake Cumberland (Mile 14.5 to Mile 4.1)	McCreary, Wayne
Martins Fork	Boundary of Cumberland Gap National Historic Park to KY 987 (Mile 31.3 to Mile 27.4)	Harlan
Rock Creek	TN State Line to White Oak Creek (Mile 21.9 to Mile 3.9)	McCreary
Rockcastle River	KY 1956 at Billows to Lake Cumberland	Rockcastle, Laurel, Pulaski
<b>Green River Basin</b>		
Green River	East boundary of Mammoth Cave National Park to Lock and Dam No. 6 at Brownsville (Mile 207.7 to Mile 181.7)	Edmonson, Hart
<b>Kentucky River Basin</b>		
Red River	KY 746 to Swift Camp Creek (Mile 68.6 to Mile 59.5)	Wolfe, Menifee

## Appendix F

# Glossary of Terms

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**Access road**

A temporary or permanent road over which timber is transported from a loading site to a public road. Also known as a haul road.

**Best management practices**

Effective, practical structural or nonstructural methods that prevent or reduce the movement of sediment, nutrients, pesticides, and other pollutants from the land to surface or groundwater, or that otherwise protect water quality from potential adverse effects of silvicultural activities.

**Buffer strip**

Area adjacent to a stream or other body of water where minimal management activity takes place in order to protect the stream or body of water from nonpoint source pollution.

**Buffer zone**

See buffer strip.

**Cable corridors**

Long, narrow paths used by yarders, primarily cable yarders, capable of vertical lift, to move felled trees or logs to a concentration point.

**Coldwater aquatic habitat**

Body of water that has characteristically cool water and is considered high-quality trout water by the Kentucky Division of Water.

**Concentrated logging slash**

The unwanted, unused, and generally unmerchantable accumulation of woody material, such as large limbs, tops, cull logs, and stumps, that remain as forest residue after timber harvesting.

**Control points**

Specific features in the topography that dictate or influence operations, commonly seeps, rock outcrops, or swamps.

**Cull**

Unusable portions of a tree due to damage, rot, sweep, or crook.

**Cut-and-fill**

Earth-moving process that entails excavating part of an area and using the excavated material for adjacent embankments or fill areas.

**Debris**

See concentrated logging slash.

**Deep water break (water bar)**

Deep, reverse grade water control structure used in the retirement of skid trails.

**Drainage structure**

Structure that acts as a water catchment and drainage channel on access roads and skid trails, including pipe culverts, open-faced culverts, and reverse-grade drainage structures.

**Drum chopping**

Process of crushing debris or breaking it apart in order to flatten residual trees and branches.

**Ephemeral channel**

A channel formed by water during or immediately after precipitation events as indicated by an absence of forest litter and exposure of mineral soil, which conveys surface water directly or indirectly to surface or subsurface streams.

**Felling**

The process of cutting down standing trees.

**Fill**

Earthen material that is excavated from one spot and used to “fill” another.

**Filter strip**

See buffer strip.

**Ford**

Submerged stream crossing where tread is reinforced to bear intended traffic.

**Forest buffer**

See buffer strip.

**Forwarder path**

A path or trail used by forwarders where felled trees or logs are fully supported and moved to a concentration point.

**Grade (gradient)**

The slope of a road or trail expressed as percentage of change in elevation per unit of distance traveled.

**Haul road**

See access road.

**Herbaceous**

Nonwoody vegetation.

**Infiltration**

The process by which water enters the soil.

**Inorganic debris**

Logging operation waste products, including hydraulic fluids, excess oil, and trash that can degrade water quality.

**Insloping**

To shape the road surface to cause drainage to flow toward the inside shoulder.

**Intermittent stream**

Stream that holds water during wet seasons of the year; denoted by a line of blue dashes on topographic maps.

**Karst**

Areas with limestone bedrock that are prone to have sinkholes and/or underground stream systems.

**Landing**

A place in or near the forest where logs are gathered for further processing or transport. The act of depositing a turn of logs into a landing or log deck.

**Log deck**

See landing.

**Logging debris (slash)**

The unwanted, unused, and generally unmerchantable accumulation of woody material, such as large limbs, tops, cull logs, and stumps, or other logging operation waste products, that remain as forest residue after timber harvesting.

**Logging road**

See access road.

**Merchantable**

Forest products suitable for marketing under local economic conditions. With respect to a single tree, it means the parts of the bole or stem suitable for sale.

**Nonpoint source pollution (pollutant)**

Pollution coming from numerous small sources over a wide geographic area.

**Organic debris**

Accumulation of leaves or woody debris, such as large limbs, tops, cull logs, and stumps.

**Outslope**

To shape the road surface to cause drainage to flow toward the outside shoulder.

**Overland flow**

The movement of water over the earth's surface.

**Overstory**

Composition of the dominant trees in a forest, which shade the understory and forest floor.

**Perennial stream**

A stream that holds water throughout the year; denoted by a solid blue line on topographic maps.

**Pesticides**

Chemicals, including insecticides, herbicides, fungicides, rodenticides, and nematocides, used to destroy, prevent, or control woody or herbaceous vegetation and forest pests.

**Planting slit**

A closed furrow produced by a mechanical tree planter.

**Primary skid trail**

A temporary, nonstructural pathway over forest soil used repeatedly to drag felled trees or logs to the landing, resulting in ground disturbance.

**Scarification**

The process of removing the forest floor or mixing it with the mineral soil by mechanical action preparatory to natural or direct seeding or the planting of tree seedlings.

**Scouring**

The stripping of periphyton and other plant and animal life from the stream bottom.

**Sediment**

Soil, sand, and mineral particles that have been eroded from the land and deposited into a water body.

**Sedimentation**

The process of sediments entering and settling to the bottom of a stream or other body of water.

**Shearing**

To shear or break off unmerchantable residual trees in order to flatten or reduce the material.

**Silvicultural activity**

Any activity, following accepted silvicultural principles, whereby the tree species constituting forests are tended, harvested, and replaced.

**Sinkhole**

Open or closed circular depressions in karst (limestone) areas where surface waters flow to join an underground drainage system.

**Sinking stream**

A stream that disappears from the surface and flows underground instead of draining into another aboveground body of water.

**Site preparation**

Practices used to prepare a site for planting or regenerating trees. These practices are used to reduce or eliminate unwanted and/or competing vegetation that would threaten the survival or proper development of planted tree seedlings.

**Skid or Skidding**

Short-distance moving of logs or felled trees from the stump to a point of loading.

**Skid trail**

A skid trail is a temporary pathway used to drag felled trees or logs to a landing or concentration point, resulting in duff (the partially decomposed organic material of the forest floor) and ground disturbance sufficient to cause erosion.

**Slough**

A slow-moving channel of water in or near a wetland.

**Streamside management zone (SMZ)**

A strip of land adjacent to either side of a stream or surrounding a lake or pond. These areas are carefully maintained and managed to protect water quality by filtering sediment, to provide shade to maintain water temperatures and to trap logging debris. They also provide wildlife travel lanes. Also referred to as a riparian area.

**Swallet**

A point where surface water leaves the surface and flows underground.

**Yards**

See landing.

**Water bar**

See deep water break.

**Wetland**

An area characterized by soils saturated with moisture during all or a significant portion of the year that supports a dominance of hydrophytes (plants adapted to primarily wet conditions).

**Winching**

The act of pulling felled trees or logs through the woods with a drum device located on the back of a skidder.

**Windrow**

Logging debris and unmerchantable woody vegetation that has been piled in rows to decompose or to be burned, or the act of constructing these piles.

## Appendix G

# Technical Assistance Providers: State Offices

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The application of BMPs in the field requires a certain amount of planning before initiating the forest activity. Considerable information is currently available from state and federal agencies. The following agencies are available for technical assistance in Kentucky and have representatives that operate on a local county level. Industrial and consulting foresters are also available for information and assistance.

Kentucky Division of Forestry  
627 Comanche Trail  
Frankfort, KY 40601  
(502) 564-4496

Natural Resources Conservation Service  
771 Corporate Drive, Suite 110  
Lexington, KY 40503  
(606) 224-7350

Kentucky Department of Fish and Wildlife Resources  
No. 1 Game Farm Road  
Frankfort, KY 40601  
(502) 564-3400

University of Kentucky  
Cooperative Extension Service  
College of Agriculture-Department of Forestry  
T.P. Cooper Bldg.  
Lexington, KY 40546-0073  
(606) 257-7596

Kentucky Division of Water  
14 Reilly Road  
Frankfort, KY 40601  
(502) 564-3410

### **Kentucky Division of Forestry District Offices**

**Northeastern District**  
Kentucky Division of Forestry  
749 West First Street  
Morehead, KY 40351  
(606) 784-7504

**Central District**  
Kentucky Division of Forestry  
P.O. Box 663  
Elizabethtown, KY 42702  
(502) 766-5010

**Southeastern District**  
Kentucky Division of Forestry  
P.O. Box 130  
Pineville, KY 40977  
(606) 337-3011

**South Central District**  
Kentucky Division of Forestry  
120 Gaines Drive  
Campbellsville, KY 42718  
(502) 465-5071

**Kentucky River District**  
Kentucky Division of Forestry  
P.O. Box 702  
Hazard, KY 41702  
(606) 435-6073

**Green River District**  
Kentucky Division of Forestry  
P.O. Box 465  
Madisonville, KY 42431  
(502) 824-7527

**Eastern District**  
Kentucky Division of Forestry  
P.O. Box 189  
Betsy Layne, KY 41605  
(606) 478-4495

**Western District**  
Kentucky Division of Forestry  
P.O. Box 349  
Mayfield, KY 42066  
(502) 247-3913

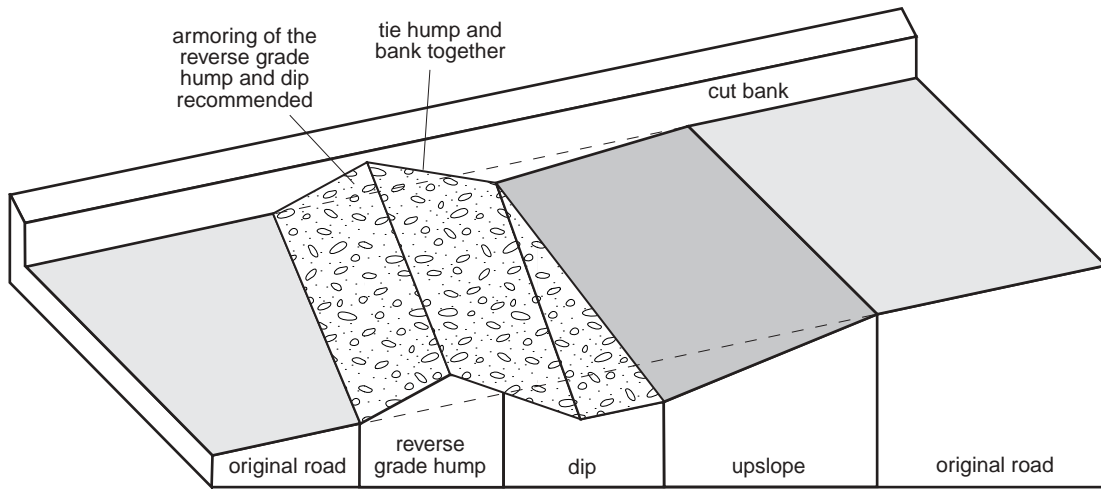
**Bluegrass District**  
Kentucky Division of Forestry  
P.O. Box 30  
Stamping Ground, KY 40379  
(502) 535-7741

## Appendix H

# Tables and Figures

### BMP No. 1—Access Roads, Skid Trails, and Landings

Figure 1-1. Typical Reverse Grade Structure



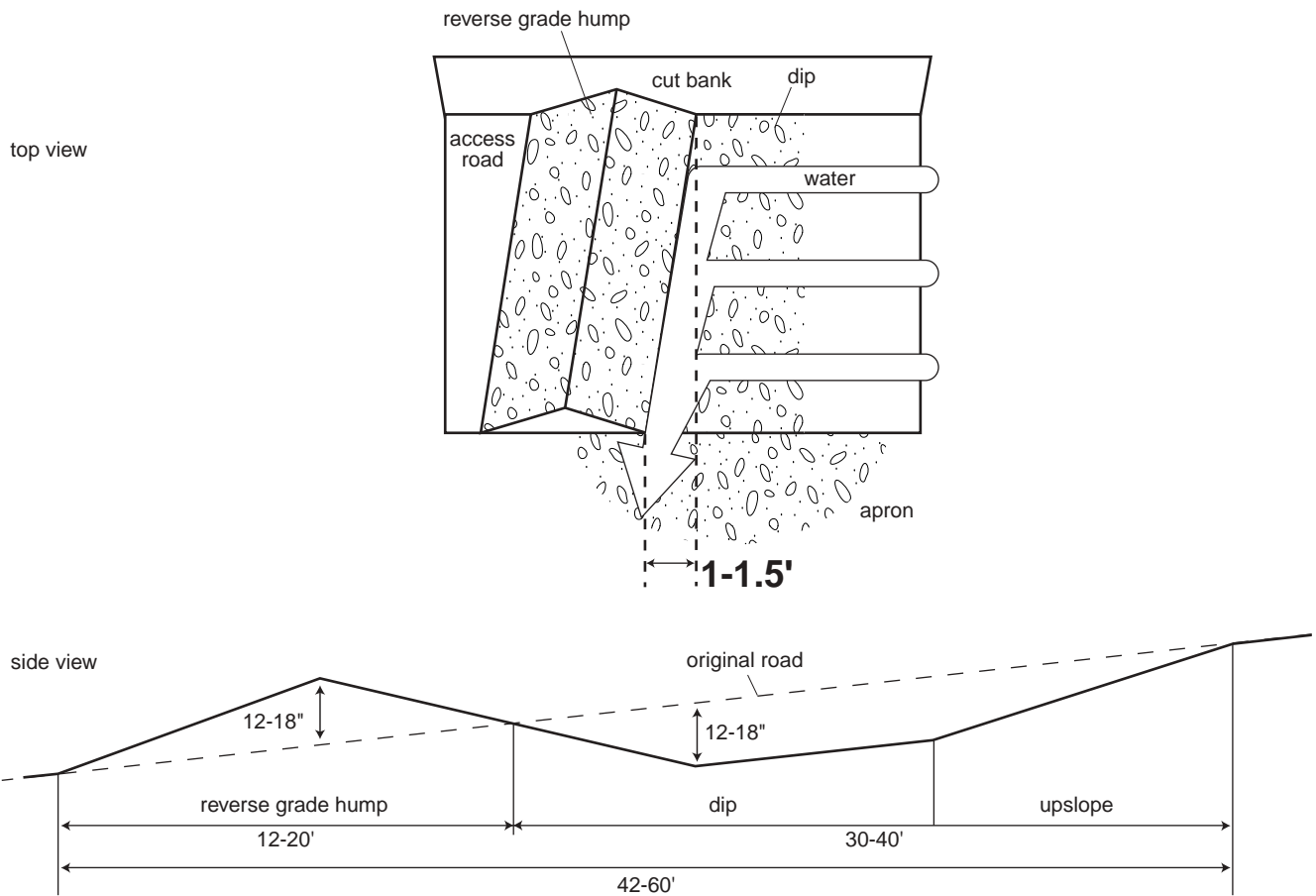
## BMP No. 1—Access Roads, Skid Trails, and Landings

**Table 1-1—Recommended Distances between Drainage Control Structures for Access Roads**

Road Grade (%)	Spacing (slope distance in feet)
2-5	300-500
6-10	200-300
11-15	100-200
16-18	100

Note: Deviations from these recommendations may be appropriate depending upon the nature of the road surface material and its tendency to erode.

**Figure 1-2. Reverse Grade Structure for Large Trucks.**



Note: These drawings are not drawn to scale.

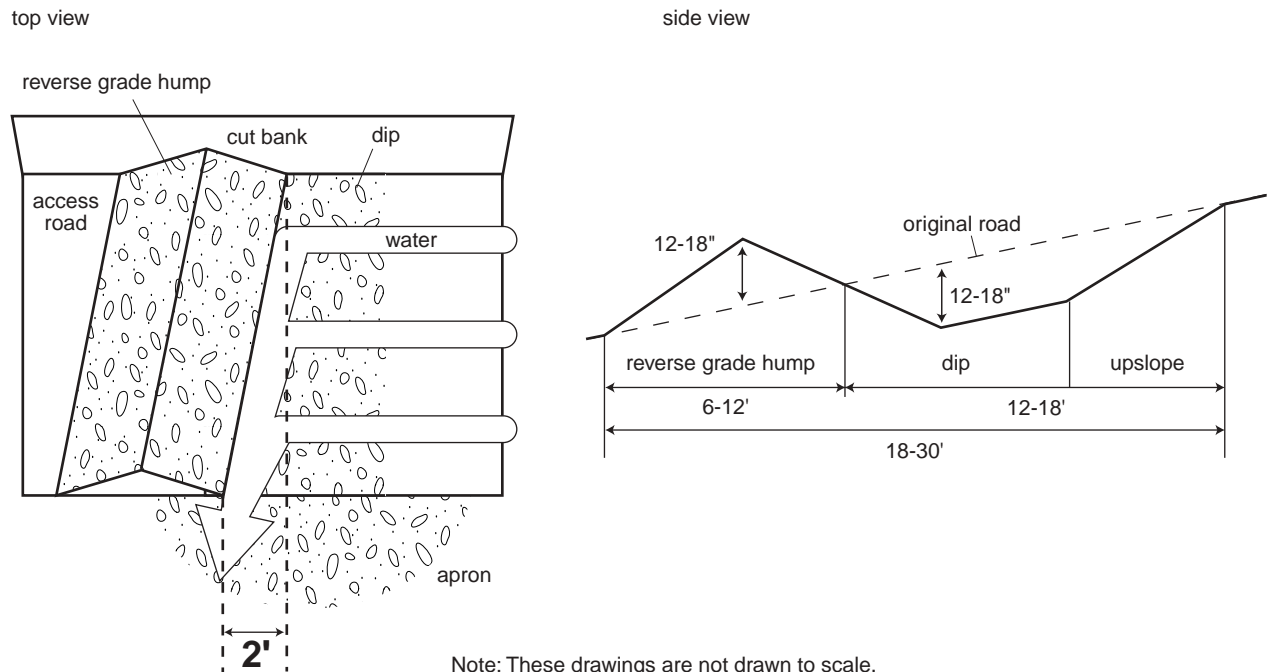
## BMP No. 1—Access Roads, Skid Trails, and Landings

**Table 1-1—Recommended Distances between Drainage Control Structures for Access Roads**

Road Grade (%)	Spacing (slope distance in feet)
2-5	300-500
6-10	200-300
11-15	100-200
16-18	100

Note: Deviations from these recommendations may be appropriate depending upon the nature of the road surface material and its tendency to erode.

**Figure 1-3. Reverse Grade Structure Used on Steeper Grades**



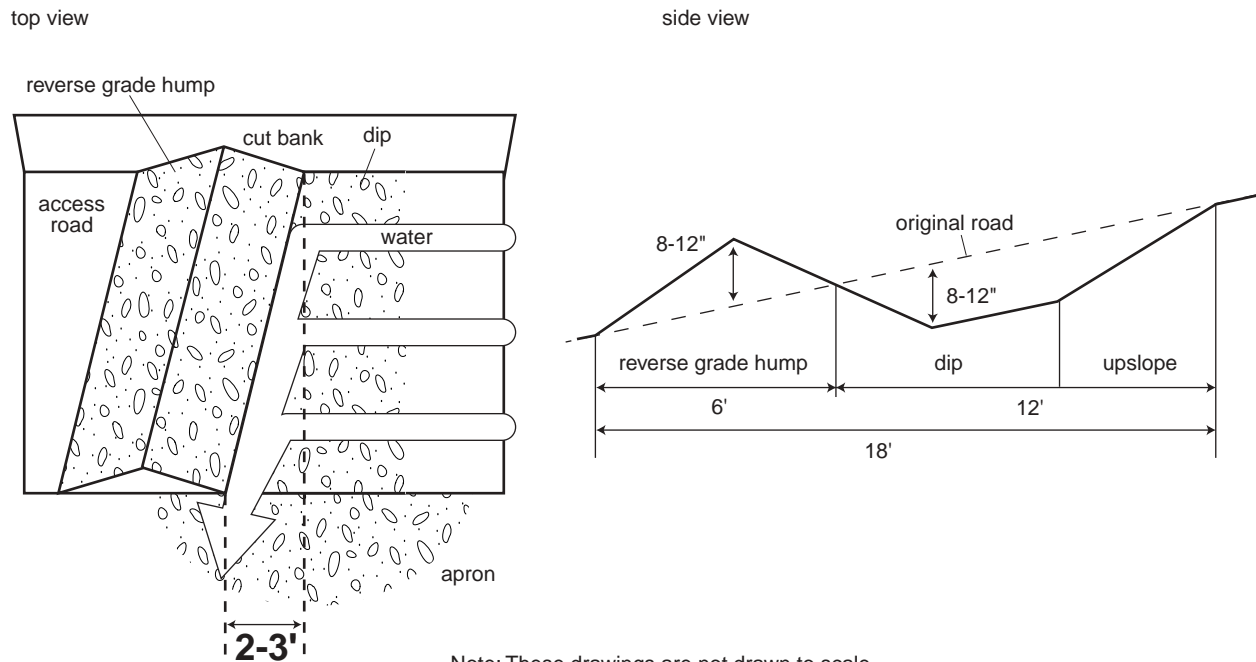
## BMP No. 1—Access Roads, Skid Trails, and Landings

**Table 1-1—Recommended Distances between Drainage Control Structures for Access Roads**

Road Grade (%)	Spacing (slope distance in feet)
2-5	300-500
6-10	200-300
11-15	100-200
16-18	100

Note: Deviations from these recommendations may be appropriate depending upon the nature of the road surface material and its tendency to erode.

**Figure 1-4. Reverse Grade Structure for Light Traffic (Water Break Structure)**



Note: These drawings are not drawn to scale.

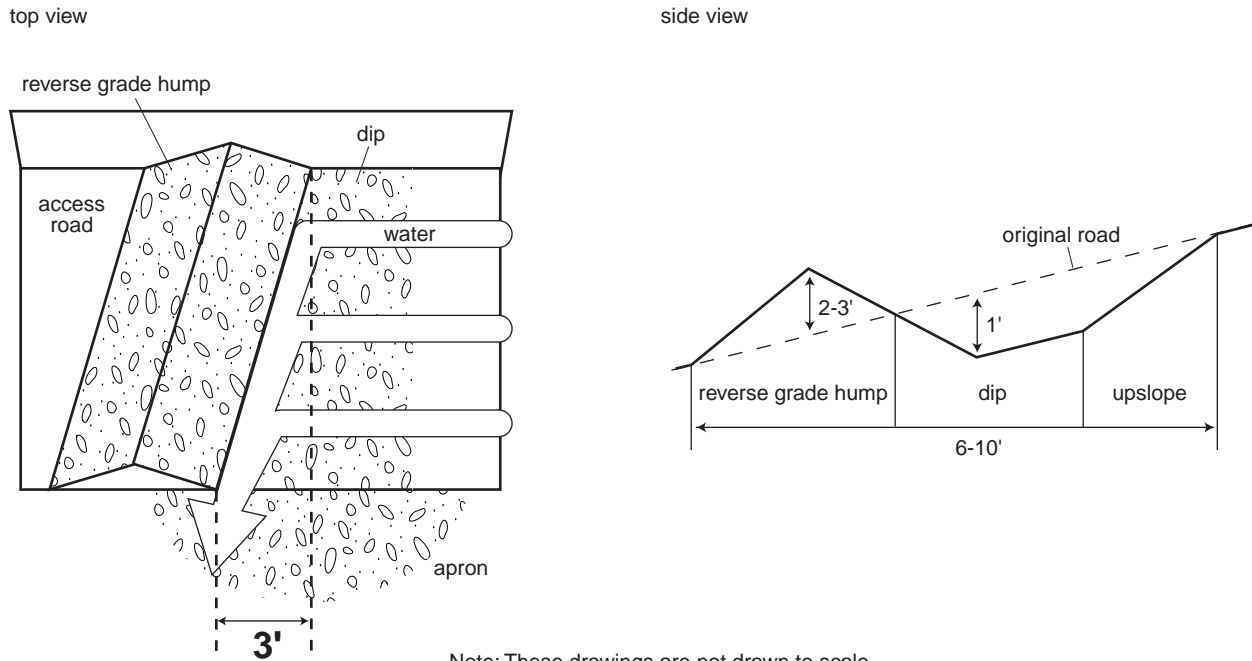
## BMP No. 1—Access Roads, Skid Trails, and Landings

**Table 1-2—Recommended Distances<sup>1</sup> between Water Bars for Retirement of Skid Trails**

Skid Trail Percent	Spacing (slope distance in feet)
1	400
2	245
5	125
10	78
15	58
20	47
25	40
30	35
35	32
40	29

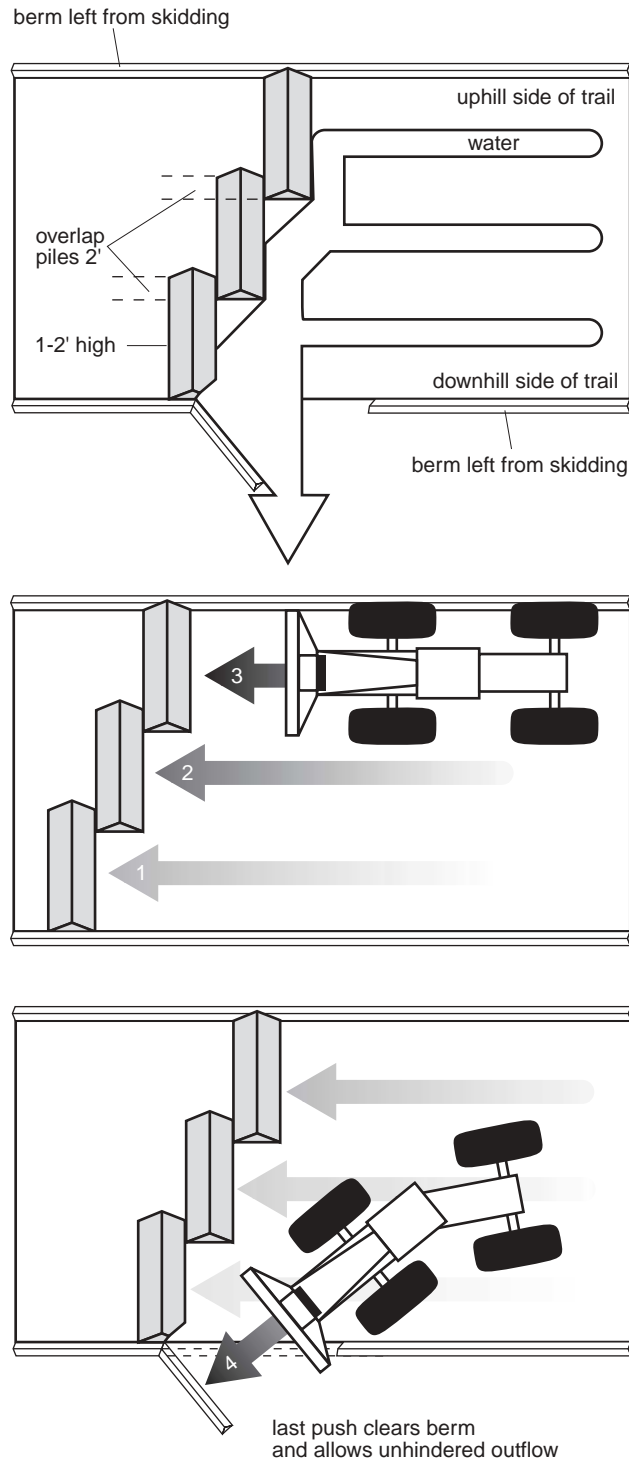
<sup>1</sup> Actual distance between water bars will depend upon the nature of the road surface material, its tendency to erode, and hydrologically active areas, such as seeps.

**Figure 1-5. Reverse Grade Structure for Skid Trail Retirement (Deep Water Break or Water Bar)**



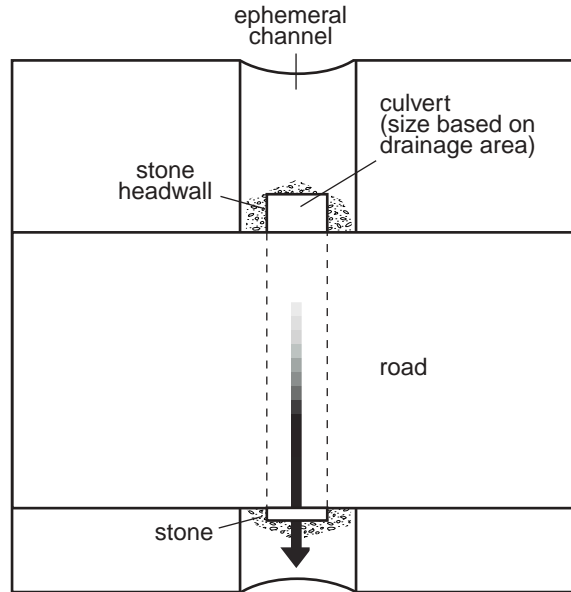
# BMP No. 1—Access Roads, Skid Trails, and Landings

Figure 1-6 Skidder Bar Construction.



## BMP No. 1—Access Roads, Skid Trails, and Landings

Figure 1-7. Closed Culvert in a Ephemeral Channel



# BMP No. 1—Access Roads, Skid Trails, and Landings

Figure 1-8. Closed Culverts for Road Drainage.

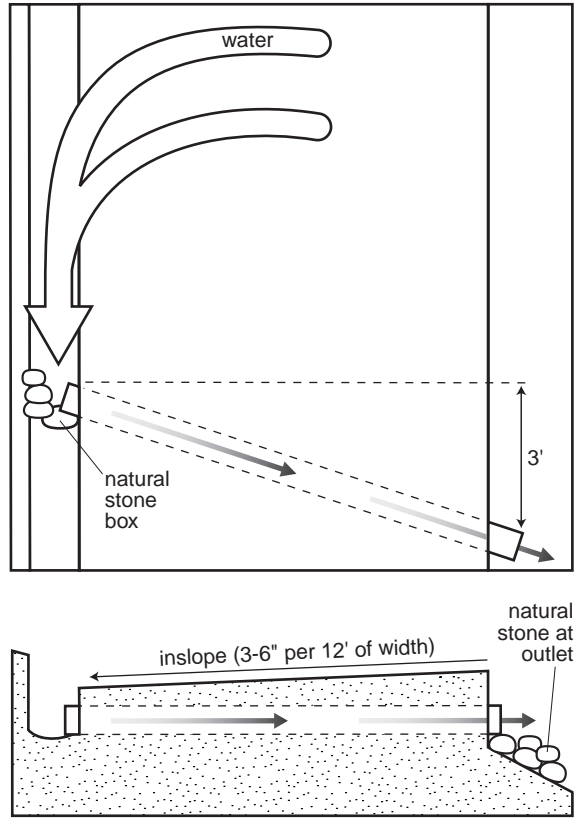
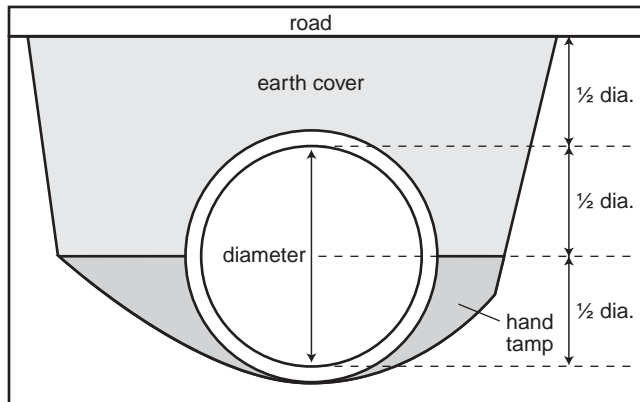
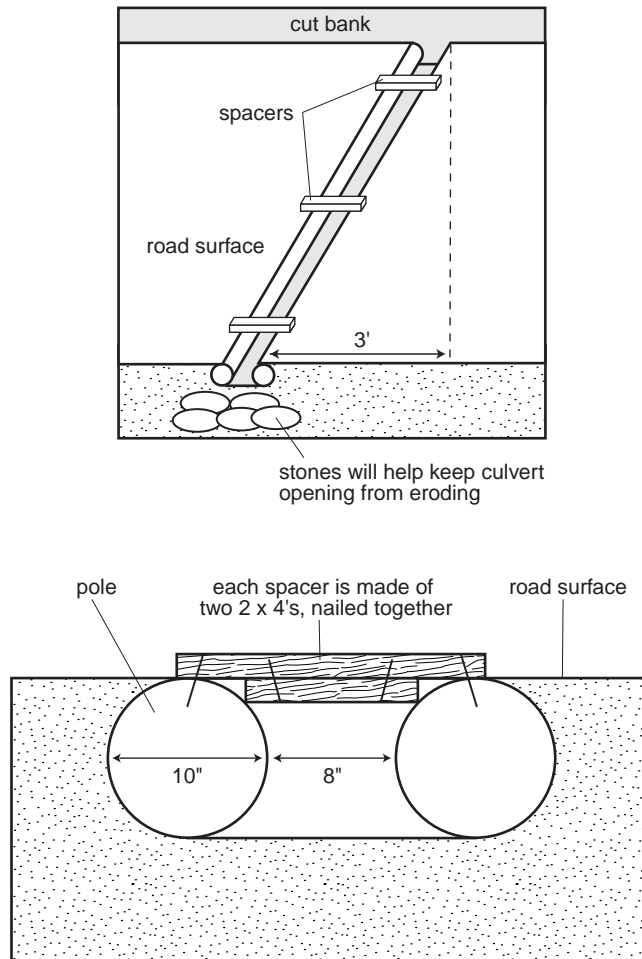


Figure 1-9. Cross-Sectional View of a Closed Culvert.



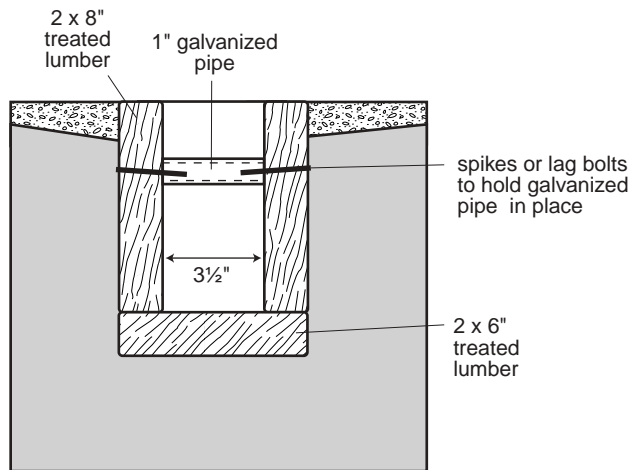
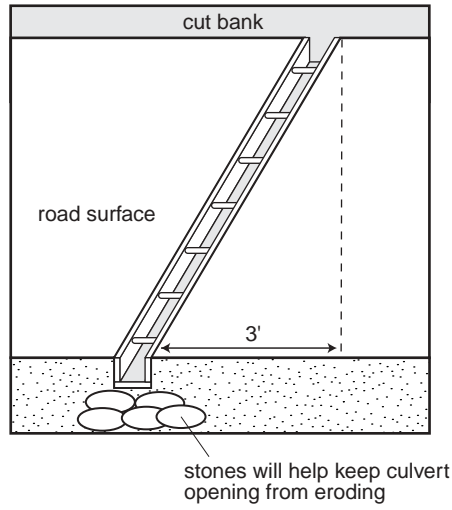
## BMP No. 1—Access Roads, Skid Trails, and Landings

Figure 1-10. Overhead View of Pole Culvert Showing Spacers



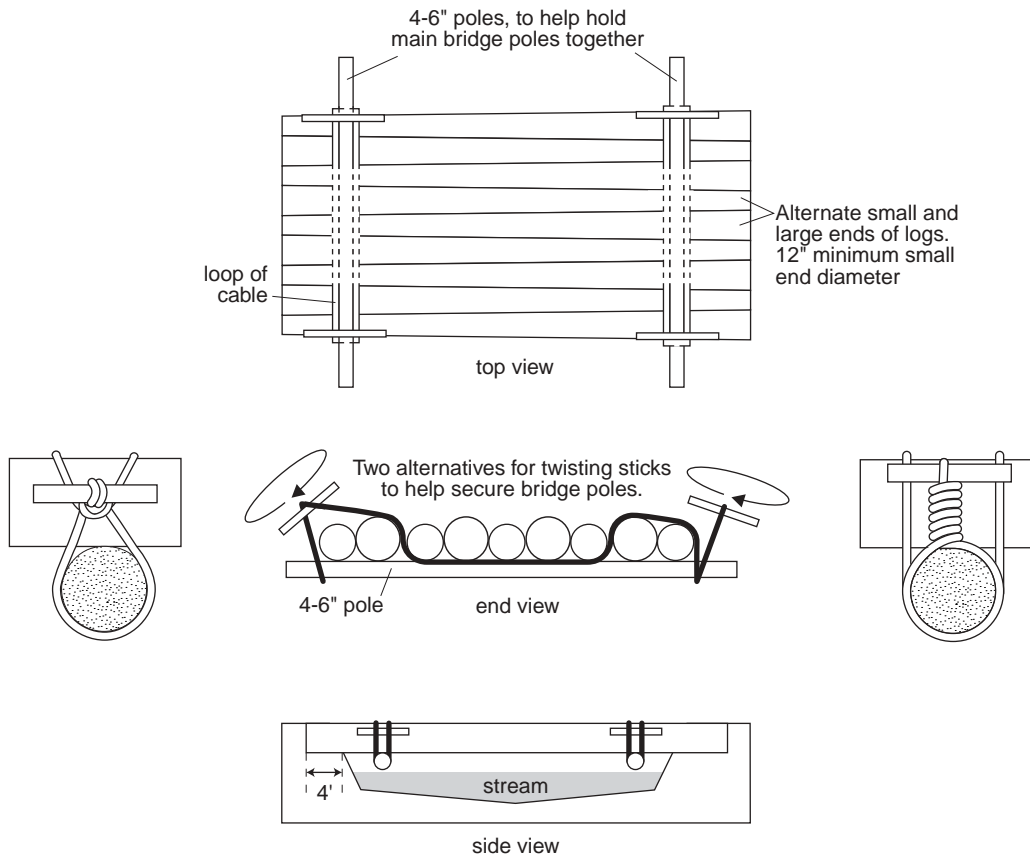
# BMP No. 1—Access Roads, Skid Trails, and Landings

Figure 1-11. Box Culvert



## BMP No. 1—Access Roads, Skid Trails, and Landings

Figure 1-12. Temporary Log Stringer Bridge



## BMP No. 2—Vegetative Establishment on Silviculturally Disturbed Areas

**Table 2-1—Mulching Materials, Rates, and Uses**

Mulch Material and Quality	Rate Per 1000 Sq. Ft.	Acre	Remarks
a. small grain straw, tall fescue straw or hay	75-100 lbs. (1½-2 bales)	1½ tons (60-80 bales)	Spread uniformly. Leave 10-20% of the area exposed. Subject to wind blowing unless left moist or tied down.
b. wood fiber cellulose air-dried, non-toxic, and no growth inhibiting substances	37-41 lbs.	1600-1800 lbs.	Apply with a hydro-mulcher. No tie-down is required. Packaged in 100 lb. bags.
c. tree bark air-dried, non-toxic and no growth inhibiting substances		6-12 tons	Resistant to wind blowing. Decomposes slowly.

See Appendix 1 in this BMP for determination of land area where mulching is needed.

**Table 2-7—Road and Trail Surface Area Determination for Fertilizer, Seed, Lime, and Mulch**

Road Length (feet)	Road Width (feet)				
	8	10	12	14	18
	acres				
<b>50</b>	.01	.01	.01	.02	.02
<b>100</b>	.02	.02	.03	.03	.04
<b>250</b>	.05	.06	.07	.08	.10
<b>500</b>	.09	.12	.14	.16	.21
<b>750</b>	.14	.17	.21	.24	.31
<b>1000</b>	.18	.24	.28	.32	.41
<b>1500</b>	.28	.34	.41	.48	.62
<b>2000</b>	.36	.48	.56	.64	.83
<b>5000</b>	.92	1.15	1.38	1.16	2.07
<b>5280</b>	.97	1.21	1.45	1.70	2.18

## BMP No. 2—Vegetative Establishment on Silviculturally Disturbed Areas

**Table 2-2—Temporary Cover Crop Species**

Species	Seeding Rates (lbs/ac/pls <sup>1</sup> )	Recommended Seeding Dates
<b>winter wheat</b> <sup>2</sup>	35	Oct. 15 - March 1
<b>grain rye</b>	35	Oct. 15 - March 1
<b>spring oats</b>	35	Oct. 15 - March 1
foxtail millet	12	May 1 - July 15
Japanese millet	15	May 1 - July 1
pearl millet	10	May 1 - July 1
annual ryegrass	5	Aug. 1 - Oct. 15
browntop millet	15	May 1 - July 1
cereal rye (Aroostook)	25	Sept. 15 - Oct. 15

1 pls: pure live seed (see Appendix 1 in this BMP).

2 Species in **boldface type** are primary recommendations.

**Table 2-3—Mixtures for Slopes Less than 10 Percent**

Species Mixture	Seeding Rates (lbs/ac/pls <sup>1</sup> )	Seeding Dates for Mixture <sup>2</sup>	Special Considerations
<b>a. orchard grass</b> <sup>3</sup>	8	Feb. 1 - May 1	
<b>red clover</b>	6	Aug. 1 - Oct. 15	
<b>b. orchard grass</b>	8	Feb. 1 - May 1	
<b>ladino clover</b>	2	Aug. 1 - Oct. 15	
c. timothy	4	Feb. 1 - May 1	
ladino clover	2	Aug. 1 - Oct. 15	
<b>d. orchard grass</b>	10	Feb. 1 - May 1	No fall planting due to lespedesa
<b>Kobe or Korean lespedesa</b>	10		
e. switch grass	1	May 1 - June 30	For open canopy conditions only. A good seed bed is required. No fall planting due to lespedesa.
big bluestem	2		
indiangrass	2		
red clover	4		
Korean lespedesa	5		
f. little bluestem	3	May 1 - June 30	No fall planting due to lespedesa
side-oats gramma	3		
Korean lespedesa	5		

1 pls: pure live seed (see Appendix 1).

2 the seeding dates were developed for the mixture and not the individual species. For example, it is recommended that mixture "a" be seeded between February 1 and May 1 or between August 1 and October 15.

3 Mixes in **boldface type** are primary recommendations.

## BMP No. 2—Vegetative Establishment on Silviculturally Disturbed Areas

**Table 2-4—Mixtures for Highly Erodible Areas (Areas Exceeding 10 Percent Slope)**

Species Mixture	Seeding Rates (lbs/ac/pls) <sup>1</sup>	Seeding Dates <sup>2</sup> for Mixture	Special Considerations
a. <b>Kentucky 31 fescue</b>	30	Feb. 1 - May 15 Aug. 1 - Oct. 15	High seedling and plant vigor on droughty, exposed sites. The endophyte-free fescue is more valuable for wildlife and is acceptable on lesser slopes.
<b>flatpea<sup>3</sup></b>	30		
b. <b>Kentucky 31 fescue</b>	30	Feb. 1 - May 15 Aug. 1 - Oct. 15	High seedling and plant vigor on droughty, exposed sites. The endophyte-free fescue is more valuable for wildlife and is acceptable on lesser slopes.
<b>birdsfoot trefoil</b>	10		
c. <b>creeping red fescue</b>	20	Feb. 1 - May 15 Aug. 1 - Oct. 15	<b>For use in shaded areas.</b>
<b>white clover</b>	2		
d. switch grass	8	May 1 - June 30	For open canopy conditions only. Switch grass is a native.
partridge pea	5		

1 pls: pure live seed (see Appendix 1).

2 the seeding dates were developed for the mixture and not the individual species. For example, it is recommended that mixture "a" be seeded between February 1 and May 1, or between August 1 and October 15.

3 Mixes in **boldface type** are primary recommendations.

## BMP No. 2—Vegetative Establishment on Silviculturally Disturbed Areas

**Table 2-5—Mixtures for Wet or Poorly Drained Areas**

Species Mixture	Seeding Rates (lbs/ac/pls) <sup>1</sup>	Seeding Dates <sup>2</sup>	Special Considerations
a. <b>redtop</b>	7	Feb. 15 - June 30	
<b>alsike clover or birdsfoot     trefoil<sup>3</sup></b>	6	Aug. 1 - Oct. 1	
b. switch grass	8	May 1 - June 30	For open canopy conditions only.
alsike clover or birdsfoot trefoil	6	Aug. 1 - Oct. 1	

1 pls: pure live seed (see Appendix 1).

2 the seeding dates were developed for the mixture and not the individual species. For example, it is recommended that mixture "a" be seeded between February 15 and June 30, or between August 1 and October 1.

3 Mixes in **bold face type** are primary recommendations.

**Table 2-6—Mixtures for Establishing Native Species**

Species Mixture	Seeding Rates (lbs/ac/pls) <sup>1</sup>	Seeding Dates <sup>2</sup>	Special Considerations
a. switch grass	2.0	May 1 - June 30	For open canopy conditions only.
indiangrass	2.0		
big bluestem	1.5		
little bluestem	1.5		
partridge pea	5.0		

1 pls: pure live seed (see Appendix 1).

2 the seeding dates were developed for the mixture and not the individual species. For example, it is recommended that mixture "a" be seeded between February 1 and May 1, or between August 1 and October 15.

## BMP No. 3—Streamside Management Zones

**Table 3-1—Summary of Streamside Management Zone Minimum Criteria**

Water Body Type	% Remaining Canopy Trees	Width of Trees (ft)	Distance to Disturbed Ground (ft)
<b>Perennial</b>			
WAH <sup>1</sup> < 15% slope	50	25	variable based on slope % <sup>3</sup>
WAH > 15% slope	50	55	variable based on slope % <sup>3</sup>
CAH <sup>2</sup>	75	60	variable based on slope % <sup>3</sup>
<b>Streams and sloughs in wetlands</b>	50	50	50
<b>Intermittent</b>	0	0	25/5/5 <sup>4</sup>

1 WAH: Warm-water aquatic habitat

2 CAH: Cold-water aquatic habitat

3 Refer to Table 3-2.

4 25/5/5: 25 feet distance on flat ground, which increases 5 feet for every 5 percent increase in slope (refer to Table 3-3).

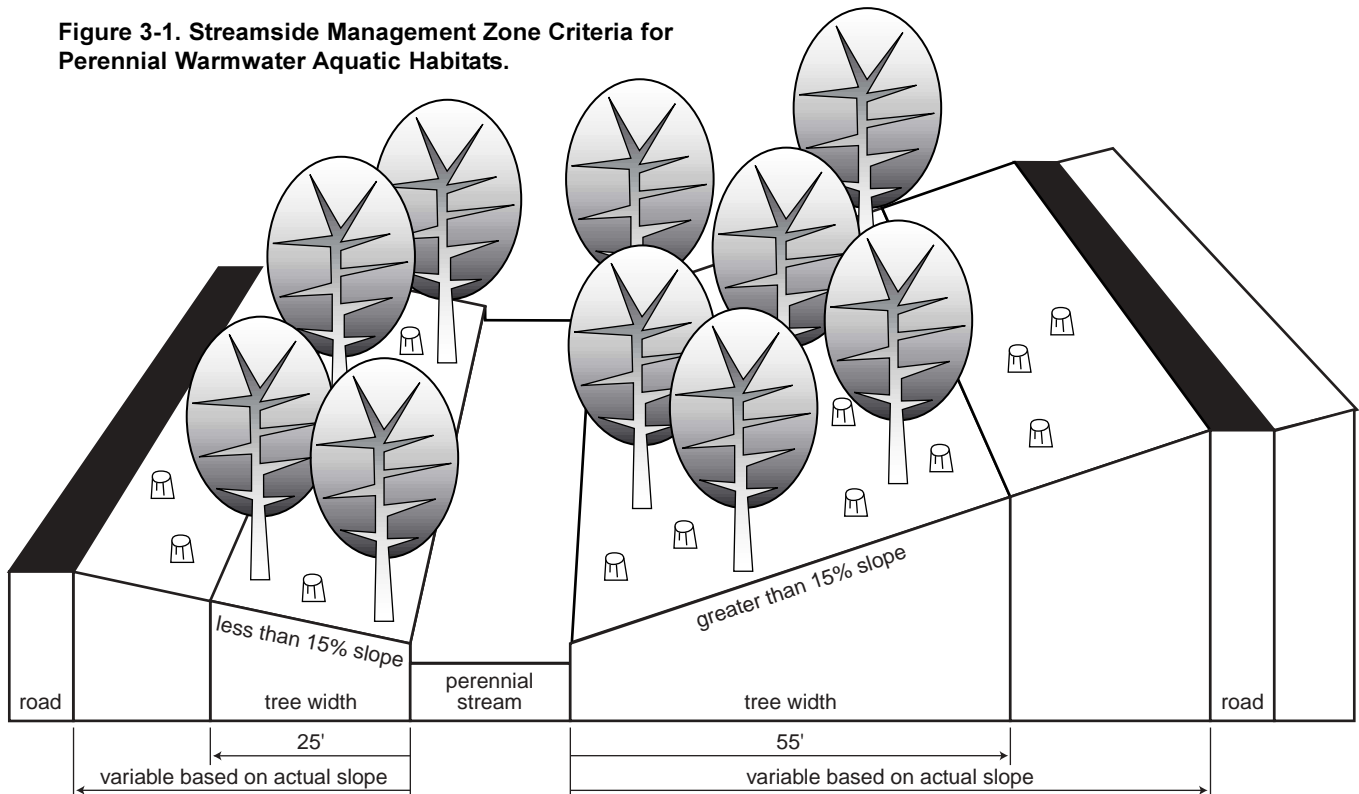
## BMP No. 3—Streamside Management Zones

**Table 3-2—Minimum Distances from Perennial Water Bodies to Roads, Trails, or Landings<sup>1</sup>**

Slope of Land (%) away from stream bank	Width of Zone (feet) away from stream bank
0	25
5	35
10	45
15	55
20	65
25	75
30	85
35	95
40	105
50	125
60	145
70	165

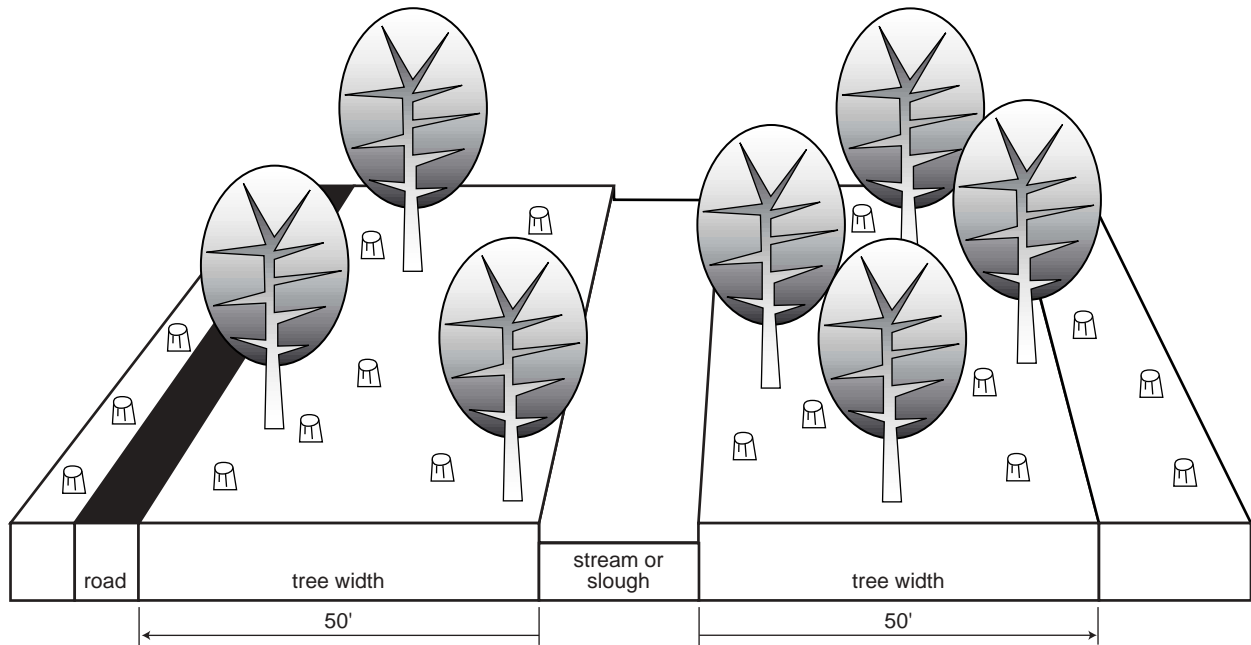
<sup>1</sup> Where minimum distances are not possible, roads, trails, and landings can be located at less than the recommended distances, but they should be constructed to protect water quality. In no case should stream beds be used as roads or for the skidding of logs except where the geology or other physical conditions of the site (rock walls, notches, or other limiting factors) leave no other alternatives for access or where road or skid trail placement in normally recommended locations is either impossible or will cause a higher degree of water quality degradation. If an exception due to physical site conditions is necessary, stream channels can be used as roads or for skidding only for the minimum distance required.

**Figure 3-1. Streamside Management Zone Criteria for Perennial Warmwater Aquatic Habitats.**



## BMP No. 3—Streamside Management Zones

Figure 3-2. Streamside Management Zone Criteria for Streams and Sloughs in Wetlands.



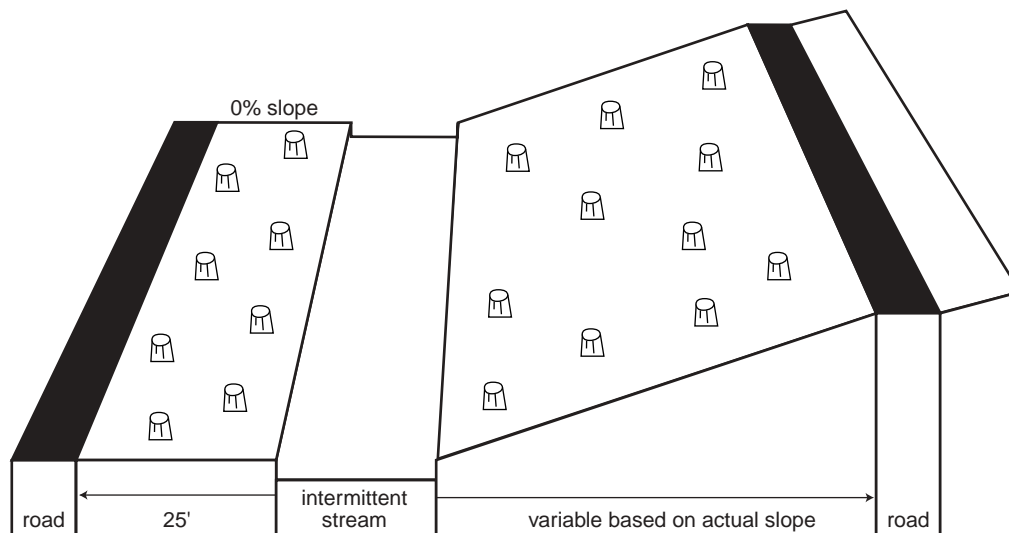
## BMP No. 3—Streamside Management Zones

**Table 3-3—Minimum Distances from Intermittent Streams to Roads, Trails, or Landings<sup>1</sup>**

Slope of Land (%) away from stream bank	Width of Zone (feet) away from stream bank
0	25
5	30
10	35
15	40
20	45
25	50
30	55
40 or higher	65

<sup>1</sup> Where minimum distances are not possible, roads, trails, and landings can be located at less than the recommended distances, but they should be constructed to protect water quality. In no case should stream beds be used as roads or for the skidding of logs except where the geology or other physical conditions of the site (rock walls, notches, or other limiting factors) leave no other alternatives for access or where road or skid trail placement in normally recommended locations is either impossible or will cause a higher degree of water quality degradation. If an exception due to physical site conditions is necessary, stream channels can be used as roads or for skidding only for the minimum distance required.

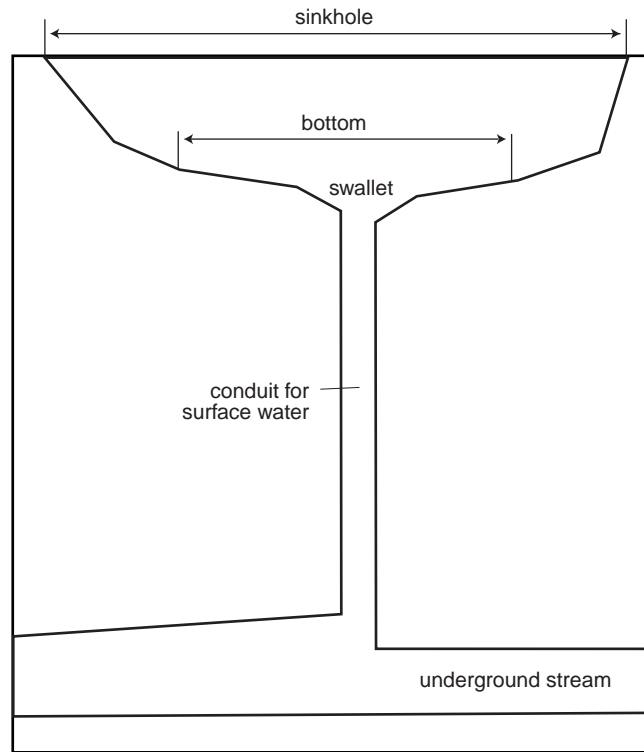
**Figure 3-3. Streamside Management Zone Criteria for Intermittent Streams.**



## BMP No. 4—Sinkholes

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Figure 4-1. Flow of Waters Through a Sinkhole.



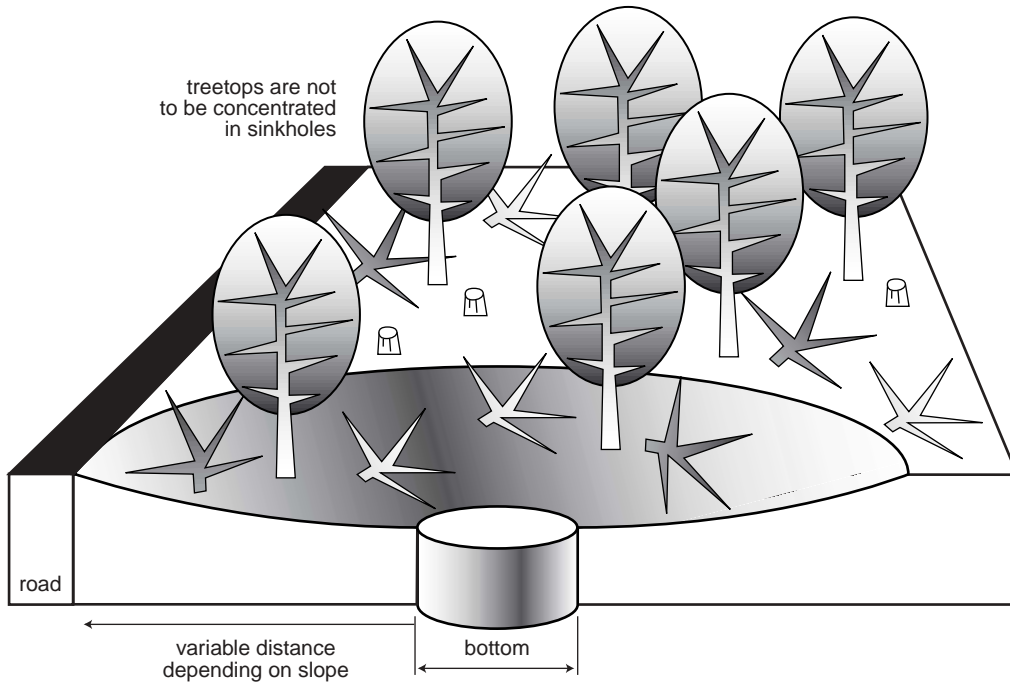
## BMP No. 4—Sinkholes

**Table 4-1—Minimum Distances from Silviculturally Disturbed Areas and the Point of Lowest Elevation or Open Swallet of a Sinkhole**

Slope of Land (%)	Distance (feet)
5	30
10	35
20	45
30	55
40 or higher	65

Note: this table corresponds to the recommended minimum distances for roads, trails, and landings from intermittent streams.)

**Figure 4-2. Specifications for Sinkhole BMP.**



## BMP No. 9—Site Preparation for Reforestation

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**Table 9-1—Site Preparation Methods Impacting Water Quality**

<b>Site Preparation Method</b>	<b>Hazard Level</b>
Herbicide injection	Little or no hazard
Clear felling with chain saw	Little or no hazard
Herbicide spraying	Has potential if BMP No. 8 “Application of Pesticides” not followed
Drum chopping	Medium potential
Drum chopping with burning	Medium potential
Shearing and windrowing	High potential
Disking	High potential

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