

Application of BMPs: Forest Roads

Forest roads represent the single greatest potential for severe, long term erosion and sedimentation from forestry activities. The nature of roads generally involves maintaining a “bare soil” condition on the road surface and periodic maintenance of both the surface and any associated ditches.

Permanent access roads are often accompanied by permanent drainage ditches or other drainage structures designed to transport stormwater. Serious road deterioration can result if ditch or drainage structure capacity is exceeded during storm events. This can lead to flooding of the road and surrounding area, scouring of the road and ditch surface, blowing out of roads and culverts, all of which may ultimately result in sediment delivery into streams or other waterbodies. To properly design, build, drain and maintain forest roads, the following BMPs are provided.

BMPs for Forest Roads

Road Planning

- Carefully plan the location and the desired drainage features before construction, using soil survey maps, topographic maps and aerial photographs.
- Plan construction activities for dry periods.
- New road construction is not permitted within the Special Management Zone, except for stream crossings.
- Minimize stream and wetland crossings. Roads will be less costly to build and maintain, equipment “down time” will be reduced and the water resource will be protected.

Road Construction

- Avoid construction operations during wet conditions - If possible, complete construction several months before heavy usage. This will reduce surface scour and decrease sediment transport.
- Balance cuts and fills to maximize use of local material and to maximize roadbed stability.
- To reduce both road costs and disturbed surface area, minimize the road width consistent with the anticipated type and amount of traffic.
- For fill road construction, keep road shoulders at a gentle slope to minimize erosion and accelerate revegetation.
- Stabilize road banks and critical road segments using mulch, seed and fertilizer, or other methods to keep the road from washing and to keep sediment out of streams (Appendix 6).

Road Drainage

- Drain road systems using culverts, cross ditches, turnouts, etc., to encourage long term stability, reduce maintenance, and protect water quality (Appendices 7, 8, and 9).





- Where applicable, use practices such as turnouts or ditch plugs, to reduce the volume and velocity of ditch flow.
- All road drainage practices that divert ditch flow or road surface runoff, must direct such flow onto vegetated areas where it can be adequately dispersed - do not direct ditch flow or road runoff into streams, lakes or other waterbodies.
- Use cross-drain culverts on roads where there is a need to direct ditch flow from one side of a road to the other, underneath the road surface.
- Use cross-ditches on roads where there is a need to channel ditch or road surface drainage from one side of the road to the other, over the surface of the road.
- Base the size of the culvert or cross-ditch on the road ditch size, type and slope of the road and the expected volume of water to be handled during storm events.
- Use water turnouts to periodically turn ditch flow out and away from the road, and onto an adjacent vegetated area for dispersal of road runoff and sediment. Vegetated areas used for water turnouts must be adequate in size and have sufficient ground cover to assimilate discharges.
- Use broad base dips on permanent roads for dispersion of road surface drainage in the absence of road ditches - the use of a broad base dip provides exceptional drainage and virtually unlimited trafficability. This road drainage practice is best suited for new road construction and on especially critical road segments designed for all-weather traffic and heavy use.
- Use water bars for temporary access roads, firelines and skid trails, where a physical barrier is needed to disrupt and disperse runoff and sediment. Since water bars vary from 1 - 3 feet in height, they are generally not suitable for high speed or heavy traffic loads, but can be used to effectively close a road to vehicular traffic.

Road Maintenance

- All drainage structures should be periodically checked and maintained, especially following excessive rainfall events. If signs of sediment and/or turbid discharges are present, take immediate corrective actions for any problem.
- Ditches and culverts should be kept free of major obstructions and ditches should be allowed to revegetate as much as is practicable.

- Close or restrict traffic on roads whenever possible - this will allow roads to stabilize and revegetate.
- Seeding and fertilizing, mulching or otherwise stabilizing critical segments of temporary and permanent roads will accelerate revegetation, ensure road utility in the future and protect nearby watercourses. Seeding rates and types are listed in Appendix 6.

Note: *Spacing recommendations for cross-drain culverts, cross-drain ditches, water turnouts, broad base dips and water bars have been computed for a wide range of road slopes and are provided in Appendix 7. Appendix 8 provides illustrations of the design and installation for each of these drainage practices.*





Application of BMPs: Stream Crossings

Stream crossings represent the point at which a forest road or skid trail comes in contact with a waterbody. Consequently, some type of planned crossing is necessary to protect water quality. Careful consideration should be given to determining the type of crossing to be used, and in constructing the project. The principal objectives of a stream crossing are to provide a dry surface crossing even during periods of stormflow, and to provide adequate conveyance of flow beneath the road fill **so that impounding of flow does not occur**. BMPs for stream crossings are provided below.

BMPs for Stream Crossings

In General

- Minimize the number of crossings on a given stream, and cross streams perpendicular to the flow at the most narrow section. This minimizes the area of disturbance and simplifies construction.
- Any erodible fill material or other areas normally exposed to flowing water should be stabilized with rip-rap, vegetation or other appropriate material following construction.
- Avoid planning construction of crossings for wet periods - avoid construction during high water conditions.

Culverts

The use of a culvert is the most common method for constructing stream crossings associated with forestry activities. Culverts are well suited for crossing both perennial and intermittent streams as well as other wet areas. However, several other types of stream crossings are also well suited for forestry related stream crossings under certain conditions.

- Place culverts in a section of the stream channel that is relatively straight and free from curves, meandering or major obstructions.
- Place the bottom of the culvert at the same elevation as the bottom of the stream, and at approximately the same slope.
- Keep the height of the entire structure (culvert plus fill) as low as possible to reduce the potential for impounding large areas of water.
- Use a culvert diameter that is sufficient to carry the normal flow expected. Culvert sizing for permanent installations should be based on the size and nature of the stream channel being crossed, or on the size and nature of the watershed above the crossing. Appendix 9 provides two possible methods for determining culvert diameter.
- When crossing broad channels or wetlands, several small culverts, spaced

throughout the crossing, are normally preferable to a single large one. This arrangement maintains a lower road surface elevation and does not artificially concentrate the flow into one small segment of the channel.

- For temporary stream crossings, a culvert may be sized to reflect seasonal flow conditions. For example, during normally dry periods a small culvert may provide adequate stormflow capacity on a temporary basis. However, a culvert sized under such conditions must be removed immediately following the activity, or replaced with a size that will accommodate normal year-round flows.
- Periodically inspect all culverts to prevent clogging, plugging and eventual failure. Remove any debris or sediment deposits that have the potential to cause culvert clogging.

Hard Surface Crossings

Hard surface crossings or fords are commonly used for stream crossings during forestry operations. These crossings consist of lining the stream channel with rock, brick, logs, concrete, or other such material. In some cases, the stream bottom may be naturally armored and may accommodate light traffic without artificial substrate.

Hard surface crossings may be constructed on both perennial and intermittent streams, and offer some important advantages over culverted crossings. In many cases, a hard surface crossing may cost considerably less than a culvert crossing, depending on the availability of surfacing material. Also, hard surface crossings are virtually maintenance free and normally do not become clogged or plugged because they maintain the natural shape of the stream channel. This is a particularly important feature in areas with beaver populations.

The material used in hard surface crossings is relatively large and stable. Consequently, these type crossings usually do not fail or blow-out the way other structural crossings can. As long as the armoring material does not significantly impound flow or cause erosive currents, these crossings can accommodate normal streamflow while providing good access at very low risk to water quality.

The major disadvantage of hard surface crossings is the limited access during periods of high flow. For that reason, these crossings are best suited for relatively small, well defined channels that tend to have “flashy” stormflow characteristics. Also, hard surface crossings are usually not well suited for high speed, main haul-road applications.

- Use clean material that will not rapidly degrade and that is heavy enough to stay in place during high flow conditions, i.e., lime rock, railroad rock, bricks, etc.





- Do not use asphalt or other petroleum based materials.
- Do not construct a hard surface crossing on streams where the bottom is mucky, muddy or otherwise unstable, or if down-stream water quality standards violations occur under normal operating conditions.
- Do not use logs or logging slash as a permanent hard surface crossing material. Logs may be used to facilitate temporary crossings but must be removed from the channel upon completing the operation.
- Keep the height of the surfacing material at a minimum; hard surface crossings must not significantly restrict normal streamflow.

Note: *Make sure that crossings are in compliance with other standards and regulations that apply - all types of stream crossings may be subject to permitting by regulatory agencies.*

Application of BMPs: Timber Harvesting

Timber harvesting activities should be conducted carefully, especially on steeper slopes and near streams, lakes, sinkholes, wetlands or other waterbodies. **When harvesting timber in close proximity to a waterbody, follow the specific criteria provided in the Special Management Zone section of this manual.** Depending on conditions, timber harvesting in these areas may be significantly limited.

BMPs for Timber Harvesting

Skid Trails

- Locate skid trails along the contour whenever practical to promote revegetation and reduce soil erosion. If skidding must be done up or down the slope, the operator should skid uphill and avoid long, continuous skid trails.
- After skidding activities are complete, stabilize skid trails where necessary by installing water bars or similar structures at recommended intervals - seeding and fertilizing skid trails will accelerate stabilization on erodible soils and/or steep slopes.
- When skidding in muck or peat (organic) soils such as in swamps, bogs or similar wetlands, concentrate skidding to as few trails as possible - this will confine soil compaction to small areas.
- When skidding on mineral soils, such as in uplands, skidding should be dispersed so that soil compaction is minimal even in individual trails.
- Keep main skid trails out of all Special Management Zones except to approach a designated crossing.
- Keep loading decks or landings out of all Special Management Zones. In addition, keep all log bunching points out of the Primary Zone of the SMZ.

Slash Disposal

- Logging slash, such as tops and limbs, which are incidental to timber harvesting activities may be left in place, as long as such material is not left in a waterbody.
- Remove logging slash from all waterbodies including both intermittent and perennial streams, lakes and sinkholes.
- Do not pile or push logging slash into cypress ponds or strands, swamps, marshes, grassy ponds, or waterbodies such as streams, lakes, sinkholes or similar water resource features.





Application of BMPs: Site Preparation & Planting

Although site preparation activities are part of the reforestation operation, these activities can temporarily create large areas of bare soil. Depending on soil types and slope, mechanical site preparation in particular, may have the potential for significant erosion and sedimentation. For these reasons, mechanical site preparation may be restricted or prohibited near streams, lakes, sinkholes and other waterbodies. **When conducting site preparation activities near surface waters, follow the specific criteria provided in the Special Management Zone section of this manual.**

BMPs for Site Preparation and Planting

- Plan site preparation and planting procedures prior to timber harvesting activities.
- Select only the site preparation techniques that are necessary to establish seedlings and minimize vegetative competition - do not needlessly disturb the ground surface or expose the topsoil.
- Do not conduct mechanical site preparation within any part of the Special Management Zone.
- Do not conduct intensive mechanical site preparation such as bedding, raking and windrowing in wetlands.
- When chopping, pull chopper perpendicular to a waterbody to orient soil indentations along the contour (not necessary if chopping is followed by bedding or if the waterbody is separated from the chopped area by windrows or a similar barrier to overland flow).
- Arrange windrows and soil beds parallel to a waterbody or wetland in order to provide a barrier to overland flow, prevent concentration of runoff and reduce erosion.
- When using a blade to shear, push, or pile debris, keep the blade above the soil surface. This will minimize erosion and facilitate rapid site recovery and tree growth.
- Do not pile or push logging slash into cypress ponds or strands, swamps, marshes, grassy ponds, or waterbodies such as streams, lakes or similar water resource features.
- Do not conduct site preparation burning within the SMZ where slopes are 18% or greater.

Application of BMPs: Fireline Construction

Fireline construction is an integral component of both fire suppression and prescribed burning. However, firelines can result in excessive erosion and water quality degradation. Lines plowed in wetlands can also result in excessive drainage and possibly conversion of wetlands to non-wetland systems. Extra precautions are necessary when constructing firelines near surface waters and wetlands.

BMPs for Firelines

- Construct firelines only where necessary, making use of existing barriers such as roads, waterbodies, etc.
- Where possible, use alternatives to plowed lines such as harrowing, foam lines, wet lines or permanent grass.
- Do not plow lines through sensitive areas such as wetlands, marshes, prairies and savannas unless absolutely necessary. Avoid these areas or use alternative line construction methods.
- Maintain minimum plow depth at all times.
- When crossing waterbodies, raise the equipment to prevent connecting the line directly to the waterbody.
- Do not construct firelines which act as drainage systems, particularly those that might connect or drain isolated wetlands.
- Avoid constructing plowed firelines in the Special Management Zone, particularly the Primary Zone.
- Use water bars, turnouts and/or vegetation to stabilize firelines when erosion and sedimentation might otherwise result.
- When revegetating firelines, use native species when possible.
- Orient firelines along the contour wherever possible to prevent erosion and gullyng.
- Do not prescribe burn for site preparation purposes within the Special Management Zone when the slope of the site is 18% or greater (SSCs 5 and 6). Burning for ecological purposes on steep slopes is not restricted.





Application of BMPs: Pesticide & Fertilizer Use

Pesticide and fertilizer application is a common silvicultural management technique in some areas of Florida. Pesticides and fertilizer are usually applied near tree planting time or shortly after. Occasionally, nitrogen fertilizer and some types of pesticides may be added later in the rotation.

These chemicals generally do not pose a threat to water quality as long as they are applied according to the label and in compliance with the following BMPs.

BMPs for Pesticide and Fertilizer Use

Pesticides

- Choose equipment that directs the chemical only to the target area. Misdirected or excessive amounts of pesticides are wasteful, expensive and can pose a serious threat to water quality and aquatic life.
- Do not conduct aerial application, mist blowing or operational application (See Glossary) of pesticides within the Primary Zone of the SMZ, including any drift from nearby applications.
- Do not leave pesticide containers on site - these should be rinsed and disposed of according to the directions on the label.
- Do not rinse spray equipment or discharge rinse water in waterbodies, wetlands or within the Special Management Zone.

Fertilizer

- Do not conduct aerial application, or operational application (See Glossary) of fertilizer or locate fertilizer transfer/loading areas within the Primary Zone of the SMZ, including any drift from nearby applications.
- Whenever practical, apply fertilizer to maximize the uptake of nutrients, which might otherwise move off-site; consider the use of slow release fertilizer when conditions are appropriate.

Fertilizer Application Limits

Good nutrient management is essential for healthy forest production and environmental protection. The key to success is identifying the needs of target plants and matching fertilization operations to those needs. One way to accomplish this is to develop and implement a nutrient management plan based on soil, water, plant and organic material sample analyses, along with expected or desired timber yields (see Florida Extension Service Circular 1230). This should result in fertilizer application rates that minimize the amount of available nutrients while optimizing growth and yield.

In addition, it should be understood that not all silviculture strategies require, or can benefit from, forest fertilization. Where forest fertilization is conducted, such operations should be planned and implemented with consultation from a knowledgeable professional, and in accordance with all applicable BMPs or other measures that reduce nutrient delivery to water resources.

To that end, the following BMP represents fertilizer application limits not to be exceeded during forest fertilization operations (these are not recommended rates of application):

Elemental Nitrogen

- No more than a 1000 lbs/acre over any 20-year period.
- No more than 250 lbs/acre for any 3-year period.
- No more than 80 lbs/acre during the first 2-years of newly established plantations.

Elemental Phosphorus

- No more than 250 lbs/acre over any 20-year period.
- No more than 80 lbs/acre for any 3-year period.

Note: *Some pesticides require the applicator to be certified by the Florida Department of Agriculture and Consumer Services. Also, pesticide labels may have additional restrictions for application near open waters or wetlands. **Read and follow the label.** Failure to comply with requirements of pesticide labels can result in civil and/or criminal penalties under state and federal law.*





Application of BMPs: Waste Disposal

Heavy equipment such as tractors, skidders and large trucks are commonly used in forestry activities. Consequently, routine maintenance activities including oil changes, often take place at the work site, i.e. “in the woods”. Proper collection and disposal of used oil is necessary to prevent soil and water contamination and to promote oil recycling.

Florida Law prohibits the discharge of pollutants both on the ground and in waterbodies. Pollutants include petroleum products of all kinds, including used oil. The discharge itself and the failure to report the discharge may be subject to penalties under Florida Law and Federal Law. Discharges or spills should be reported in accordance with the requirements of the Department of Environmental Protection rules.

BMPs for Waste Disposal

Used Oil

- During equipment maintenance, used oil should be collected and stored until properly disposed.
- Do not discharge used oil or other pollutants on the ground, in sinkholes, or in waterbodies of any kind (including wetlands and canals).
- Do not mix used oil with other materials such as degreasing solvents, carburetor cleaners, etc. Such mixing may render the used oil unsuitable for recycling and therefore unacceptable at recycling centers.

Solid Waste

- Do not dispose of solid wastes, such as trash, litter, containers, etc. into waterbodies of any kind.
- Remove trash, litter and other solid wastes from project areas. In particular, remove and properly dispose of all chemical containers, hydraulic fluid and oil containers, oil filters, batteries, and tires.

Note: *For information concerning oil spill reporting requirements, contact the local Department of Environmental Protection office.*

Note: *Most counties in Florida maintain a used oil collection facility which will accept used oil and hydraulic fluid. Contact your County Landfill Operation for the nearest location of such a facility.*

Application of BMPs: Wet Weather Operations

Creek and river floodplains and isolated wetlands are periodically inundated, which can result in large areas of flowing and/or “standing” water. Heavy equipment operation, such as skidding, in flowing water or in standing water that is contiguous with nearby flowing water is likely to cause the discharge of sediment or turbid runoff into waters of the State. Discharges of this nature can cause numerous problems to the water resource and may also constitute a State water quality standards violation.

In addition, heavy equipment operation during flooded or saturated soil conditions can cause excessive rutting, which may result in significant soil compaction. If such rutting is widespread, overall reforestation of the site may be severely limited.

The best alternative for logging during wet weather conditions is to postpone the operation until drier conditions prevail. However, when operations must be conducted, the following BMPs apply.

BMPs for Wet Weather Operations

- Avoid heavy equipment operations, especially skidding, during flooded or wet soil conditions. Under certain conditions, special low-ground pressure equipment or other alternatives to conventional skidding may be necessary.
- Do not operate heavy equipment, especially skidders, in floodplains when they are flooded or during conditions of flowing or standing floodwater.
- Minimize skidder and other heavy equipment operation in wetlands during wet conditions to avoid widespread excessive soil rutting. Although some minor rutting may occur in a typical wetland harvesting operation, skidders and other heavy equipment operation should be planned for dry seasons and/or dry periods as much as possible.
- Confine skid trails to as small an area as possible when working in organic or muck soils, especially during wet conditions.

Note: *Wet weather forestry operations have the potential for creating water quality standards violations. Such operations that generate an offsite discharge of visibly turbid water above natural background levels, are likely to be in violation of State water quality standards.*





Application of BMPs: Emergency Operations

In the event of a wildfire, insect or disease outbreak, exotic/invasive tree infestation, or other catastrophe, a Best Management Practice may be temporarily relaxed to aid fire suppression, to conduct appropriate salvage techniques, and to promote rapid site recovery. Harvesting guidelines which apply to Wetlands and the Special Management Zone may be relaxed to allow tree removal for the control of exotic/invasive trees and/or the salvage of damaged or downed timber.

BMPs During Emergencies

Wildfire

- Firelines, road construction and stream crossings will be unrestricted during emergencies, but stabilized according to Best Management Practices following the salvage and revegetation process (see Fireline Construction section).
- When necessary, mechanical site preparation techniques may be conducted within the Special Management Zone to help return the site to a productive, protective condition.

Insect and Disease

- During insect or disease epidemics, appropriate pesticides and/or harvesting may be used within the Special Management Zone to protect and maintain the health of the affected and surrounding forest.

Exotic/Invasive Trees

- For areas where exotic/invasive tree infestations are present, the exotic/invasive trees may be harvested without regard to the leave-tree criteria that would otherwise apply to Wetlands and Special Management Zones. BMPs other than the leave-tree criteria would still apply to the operation. This section does not apply to cultivated species such as eucalyptus.

Appendices

1. SMZ Widths/Site Management Recommendations (SSC).....	40
2. Soil Erodibility/K-Factors of Florida Soils.....	58
3. Guide for Estimating K-Factors and Slope Category.....	62
4. OFWs, ONRWs, Class I Waters of Florida.....	64
5. Wetland Types.....	89
6. Seedling Rates for Vegetative Stabilization.....	90
7. Spacing for Road Drainage Structures.....	91
8. Road Drainage Design Illustrations.....	92
9. Culvert Sizing Tables.....	98
10. Special Management Zone Acreage Calculations.....	104
11. Exceptions to Primary Zone Management Criteria.....	105
12. Division of Forestry Field Offices.....	108
13. Florida Water Management District Offices.....	110
14. U.S. Army Corp of Engineers Offices.....	111
15. Glossary.....	112



Appendix 1 Site Management Recommendations • SSC A1

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	35	35
Perennial (<20 ft.)	35	none	35
Perennial (20-40 ft.)	75	none	75
Perennial (>40+ ft.)	200	none	200
OFW, ONRW, Class I Waters	200	none	200
LAKES			
Intermittent	Stringer	35	35
Perennial	35	none	35
OFW, ONRW, Class I Waters	200	none	200
SINKHOLES			
Intermittent	Stringer	35	35
Perennial	35	none	35

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	none
		Water Turnouts	200
		Broad-base Dips	none
Temp. Roads/Skid Trails	0-300	Water Bars	250
Firelines	0-300	Water Bars	250

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6

Appendix 1 Site Management Recommendations • SSC A2

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	45	45
Perennial (<20 ft.)	35	10	45
Perennial (20-40 ft.)	75	none	75
Perennial (>40+ ft.)	200	none	200
OFW, ONRW, Class I Waters	200	none	200
LAKES			
Intermittent	Stringer	45	45
Perennial	35	10	45
OFW, ONRW, Class I Waters	200	none	200
SINKHOLES			
Intermittent	Stringer	45	45
Perennial	35	10	45

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	200
		Water Turnouts	120
		Broad-base Dips	180
Temp. Roads/Skid Trails	0-300	Water Bars	135
Firelines	0-300	Water Bars	135

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6

Appendix 1 Site Management Recommendations • SSC A3

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	60	60
Perennial (<20 ft.)	35	25	60
Perennial (20-40 ft.)	75	none	75
Perennial (>40+ ft.)	200	none	200
OFW, ONRW, Class I Waters	200	none	200
LAKES			
Intermittent	Stringer	60	60
Perennial	35	25	60
OFW, ONRW, Class I Waters	200	none	200
SINKHOLES			
Intermittent	Stringer	60	60
Perennial	35	25	60

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	150
		Water Turnouts	100
		Broad-base Dips	140
Temp. Roads/Skid Trails	0-300	Water Bars	80
Firelines	0-300	Water Bars	80

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6

Appendix 1 Site Management Recommendations • SSC A4

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	300	300
Perennial (<20 ft.)	35	265	300
Perennial (20-40 ft.)	75	225	300
Perennial (>40+ ft.)	200	100	300
OFW, ONRW, Class I Waters	200	100	300
LAKES			
Intermittent	Stringer	300	300
Perennial	35	265	300
OFW, ONRW, Class I Waters	200	100	300
SINKHOLES			
Intermittent	Stringer	300	300
Perennial	35	265	300

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	125
		Water Turnouts	75
		Broad-base Dips	125
Temp. Roads/Skid Trails	0-300	Water Bars	60
Firelines	0-300	Water Bars	60

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6

Appendix 1 Site Management Recommendations • SSC A5

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	300	300
Perennial (<20 ft.)	35	265	300
Perennial (20-40 ft.)	75	225	300
Perennial (>40+ ft.)	200	100	300
OFW, ONRW, Class I Waters	200	100	300
LAKES			
Intermittent	Stringer	300	300
Perennial	35	265	300
OFW, ONRW, Class I Waters	200	100	300
SINKHOLES			
Intermittent	Stringer	300	300
Perennial	35	265	300

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	100
		Water Turnouts	50
		Broad-base Dips	120
Temp. Roads/Skid Trails	0-300	Water Bars	45
Firelines	0-300	Water Bars	45

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6

Appendix 1 Site Management Recommendations • SSC A6

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	300	300
Perennial (<20 ft.)	35	265	300
Perennial (20-40 ft.)	75	225	300
Perennial (>40+ ft.)	200	100	300
OFW, ONRW, Class I Waters	200	100	300
LAKES			
Intermittent	Stringer	300	300
Perennial	35	265	300
OFW, ONRW, Class I Waters	200	100	300
SINKHOLES			
Intermittent	Stringer	300	300
Perennial	35	265	300

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	75
		Water Turnouts	40
		Broad-base Dips	110
Temp. Roads/Skid Trails	0-300	Water Bars	30
Firelines	0-300	Water Bars	30

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6

Appendix 1 Site Management Recommendations • SSC B1

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	35	35
Perennial (<20 ft.)	35	none	35
Perennial (20-40 ft.)	75	none	75
Perennial (>40+ ft.)	200	none	200
OFW, ONRW, Class I Waters	200	none	200
LAKES			
Intermittent	Stringer	35	35
Perennial	35	none	35
OFW, ONRW, Class I Waters	200	none	200
SINKHOLES			
Intermittent	Stringer	35	35
Perennial	35	none	35

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	none
		Water Turnouts	150
		Broad-base Dips	none
Temp. Roads/Skid Trails	0-300	Water Bars	250
Firelines	0-300	Water Bars	250

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6

Appendix 1 Site Management Recommendations • SSC B2

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	60	60
Perennial (<20 ft.)	35	25	60
Perennial (20-40 ft.)	75	none	75
Perennial (>40+ ft.)	200	none	200
OFW, ONRW, Class I Waters	200	none	200
LAKES			
Intermittent	Stringer	60	60
Perennial	35	25	60
OFW, ONRW, Class I Waters	200	none	200
SINKHOLES			
Intermittent	Stringer	60	60
Perennial	35	25	60

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	200
		Water Turnouts	120
		Broad-base Dips	180
Temp. Roads/Skid Trails	0-300	Water Bars	135
Firelines	0-300	Water Bars	135

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6

Appendix 1 Site Management Recommendations • SSC B3

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	75	75
Perennial (<20 ft.)	35	40	75
Perennial (20-40 ft.)	75	none	75
Perennial (>40+ ft.)	200	none	200
OFW, ONRW, Class I Waters	200	none	200
LAKES			
Intermittent	Stringer	75	75
Perennial	35	40	75
OFW, ONRW, Class I Waters	200	none	200
SINKHOLES			
Intermittent	Stringer	75	75
Perennial	35	40	75

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	150
		Water Turnouts	100
		Broad-base Dips	140
Temp. Roads/Skid Trails	0-300	Water Bars	80
Firelines	0-300	Water Bars	80

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6

Appendix 1 Site Management Recommendations • SSC B4

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	300	300
Perennial (<20 ft.)	35	265	300
Perennial (20-40 ft.)	75	225	300
Perennial (>40+ ft.)	200	100	300
OFW, ONRW, Class I Waters	200	100	300
LAKES			
Intermittent	Stringer	300	300
Perennial	35	265	300
OFW, ONRW, Class I Waters	200	100	300
SINKHOLES			
Intermittent	Stringer	300	300
Perennial	35	265	300

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	125
		Water Turnouts	75
		Broad-base Dips	125
Temp. Roads/Skid Trails	0-300	Water Bars	60
Firelines	0-300	Water Bars	60

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6

Appendix 1 Site Management Recommendations • SSC B5

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	300	300
Perennial (<20 ft.)	35	265	300
Perennial (20-40 ft.)	75	225	300
Perennial (>40+ ft.)	200	100	300
OFW, ONRW, Class I Waters	200	100	300
LAKES			
Intermittent	Stringer	300	300
Perennial	35	265	300
OFW, ONRW, Class I Waters	200	100	300
SINKHOLES			
Intermittent	Stringer	300	300
Perennial	35	265	300

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	100
		Water Turnouts	50
		Broad-base Dips	120
Temp. Roads/Skid Trails	0-300	Water Bars	45
Firelines	0-300	Water Bars	45

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6

Appendix 1 Site Management Recommendations • SSC B6

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	300	300
Perennial (<20 ft.)	35	265	300
Perennial (20-40 ft.)	75	225	300
Perennial (>40+ ft.)	200	100	300
OFW, ONRW, Class I Waters	200	100	300
LAKES			
Intermittent	Stringer	300	300
Perennial	35	265	300
OFW, ONRW, Class I Waters	200	100	300
SINKHOLES			
Intermittent	Stringer	300	300
Perennial	35	265	300

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	75
		Water Turnouts	40
		Broad-base Dips	110
Temp. Roads/Skid Trails	0-300	Water Bars	30
Firelines	0-300	Water Bars	30

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6

Appendix 1 Site Management Recommendations • SSC C1

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	35	35
Perennial (<20 ft.)	35	none	35
Perennial (20-40 ft.)	75	none	75
Perennial (>40+ ft.)	200	none	200
OFW, ONRW, Class I Waters	200	none	200
LAKES			
Intermittent	Stringer	35	35
Perennial	35	none	35
OFW, ONRW, Class I Waters	200	none	200
SINKHOLES			
Intermittent	Stringer	35	35
Perennial	35	none	35

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	none
		Water Turnouts	150
		Broad-base Dips	none
Temp. Roads/Skid Trails	0-300	Water Bars	250
Firelines	0-300	Water Bars	250

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6

Appendix 1 Site Management Recommendations • SSC C2

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	60	60
Perennial (<20 ft.)	35	25	60
Perennial (20-40 ft.)	75	none	75
Perennial (>40+ ft.)	200	none	200
OFW, ONRW, Class I Waters	200	none	200
LAKES			
Intermittent	Stringer	60	60
Perennial	35	25	60
OFW, ONRW, Class I Waters	200	none	200
SINKHOLES			
Intermittent	Stringer	60	60
Perennial	35	25	60

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	200
		Water Turnouts	120
		Broad-base Dips	180
Temp. Roads/Skid Trails	0-300	Water Bars	135
Firelines	0-300	Water Bars	135

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6

Appendix 1 Site Management Recommendations • SSC C3

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	80	80
Perennial (<20 ft.)	35	45	80
Perennial (20-40 ft.)	75	5	80
Perennial (>40+ ft.)	200	none	200
OFW, ONRW, Class I Waters	200	none	200
LAKES			
Intermittent	Stringer	80	80
Perennial	35	45	80
OFW, ONRW, Class I Waters	200	none	200
SINKHOLES			
Intermittent	Stringer	80	80
Perennial	35	45	80

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	150
		Water Turnouts	100
		Broad-base Dips	140
Temp. Roads/Skid Trails	0-300	Water Bars	80
Firelines	0-300	Water Bars	80

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6

Appendix 1 Site Management Recommendations • SSC C4

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	300	300
Perennial (<20 ft.)	35	265	300
Perennial (20-40 ft.)	75	225	300
Perennial (>40+ ft.)	200	100	300
OFW, ONRW, Class I Waters	200	100	300
LAKES			
Intermittent	Stringer	300	300
Perennial	35	265	300
OFW, ONRW, Class I Waters	200	100	300
SINKHOLES			
Intermittent	Stringer	300	300
Perennial	35	265	300

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	125
		Water Turnouts	75
		Broad-base Dips	125
Temp. Roads/Skid Trails	0-300	Water Bars	60
Firelines	0-300	Water Bars	60

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6

Appendix 1 Site Management Recommendations • SSC C5

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	300	300
Perennial (<20 ft.)	35	265	300
Perennial (20-40 ft.)	75	225	300
Perennial (>40+ ft.)	200	100	300
OFW, ONRW, Class I Waters	200	100	300
LAKES			
Intermittent	Stringer	300	300
Perennial	35	265	300
OFW, ONRW, Class I Waters	200	100	300
SINKHOLES			
Intermittent	Stringer	300	300
Perennial	35	265	300

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	100
		Water Turnouts	50
		Broad-base Dips	120
Temp. Roads/Skid Trails	0-300	Water Bars	45
Firelines	0-300	Water Bars	45

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6

Appendix 1 Site Management Recommendations • SSC C6

SPECIAL MANAGEMENT ZONES (Each Side)

Stream Class	Primary (ft.)	Secondary (ft.)	Total SMZ (ft.)
STREAMS			
Intermittent (All)	Stringer	300	300
Perennial (<20 ft.)	35	265	300
Perennial (20-40 ft.)	75	225	300
Perennial (>40+ ft.)	200	100	300
OFW, ONRW, Class I Waters	200	100	300
LAKES			
Intermittent	Stringer	300	300
Perennial	35	265	300
OFW, ONRW, Class I Waters	200	100	300
SINKHOLES			
Intermittent	Stringer	300	300
Perennial	35	265	300

ROAD CONSTRUCTION and MAINTENANCE DRAINAGE RECOMMENDATIONS

Structure	Zone Width (ft.)	Treatments Allowed	Spacing (ft.)
Permanent Roads	0-300	Culvert or Cross Ditch	75
		Water Turnouts	40
		Broad-base Dips	110
Temp. Roads/Skid Trails	0-300	Water Bars	30
Firelines	0-300	Water Bars	30

SITE SENSITIVITY CLASSIFICATION (SSC) INDEX

Soil Erodibility	K-Factor	Slope %					
		0-2	3-7	8-12	13-17	18-22	22+
Low	≤0.20	A1	A2	A3	A4	A5	A6
Moderate	0.21 - 0.27	B1	B2	B3	B4	B5	B6
High	≥0.28	C1	C2	C3	C4	C5	C6