

Appendix M: Best Management Practices (BMPs)

Best Management Practices (BMPs) are measures certified by the State Water Quality Board and approved by the Environmental Protection Agency (EPA) as the most effective way of protecting water quality from impacts stemming from non-point sources of pollution. Forest Service BMPs have been monitored and modified over several decades to make them more effective. On-site evaluations by State regulatory agencies found the practices were effective in protecting beneficial uses. The following list of BMPs will be implemented. A description of the objective of each BMP is included. The Gemmill Soils Report and the Gemmill Fisheries BA have detailed analyses of these BMPs and provide further detail on the rationale for each project-specific measure listed (indicated in **bold** and *italics*).

The use of the following mitigation measures and recommendations will enable the implementation of the proposed action or action alternatives in and around Riparian Reserves and prevent negative impacts to Riparian Reserves. All mitigation measures and recommendations are presented within the context of Best Management Practices.

Best Management Practices (BMPs) should be applied for all activities occurring in the Gemmill Thin Project Area. A complete description of each Best Management Practice is provided in the publication “Water Quality Management for National Forest System Lands in California” (USDA 2000).

The following are the BMPs for the control of non point source pollution associated with timber management activities. The line officer on each administrative subunit is responsible for fully implementing the directives that provide for water quality protection and improvement during timber harvest and management activities.

Earth scientists and other trained and qualified individuals are available to work with the timber management work force to provide technical assistance in identifying beneficial uses, the most recent state-of-the-art water quality control, methods and techniques, and evaluation of results.

Timber Harvest BMPs

The following BMPs are compiled from the publication “Water Quality Management for National Forest System Lands in California” (USDA 2000) and incorporate the Gemmill Thin IDT and Specialist input for project specific recommendations.

1.1 Timber sale planning process

1. **Objective:** To incorporate water quality and hydrologic considerations into the timber sale planning process.
2. **Explanation:** This BMP is addressed by including a soil scientist, botanist and hydrologist on the ID Team for the Gemmill Thin Project.
3. **Implementation:** This report documents water quality and hydrologic considerations as identified by the resource specialists, the Gemmill ID Team, and public scoping.

1.2 Timber harvest unit design

1. **Objective:** To ensure that timber harvest unit design will secure favorable conditions of water quality and quantity while maintaining desirable stream channel characteristics and watershed conditions.
2. **Implementation:** This practice was implemented by ground verifying hydrologic conditions for all units that were in close proximity to or within Riparian Reserves.

1.3 Determination of surface erosion hazard for timber harvest unit design

1. **Objective:** To identify high erosion hazard areas in order to adjust treatment measures to prevent downstream water quality degradation.
2. **Explanation:** The erosion hazard for soils in the Gemmill Project Area was assessed by a soil scientist using the Soil Resource Inventory for the project area. This survey is used to determine the soil mapping unit for each of the proposed management areas.
3. **Implementation:** The interpretations listed in the soil map unit description include an assessment of the Erosion Hazard Rating (EHR). This rating was made using the USDA Forest Service Soil and Water Conservation Handbook (FSH 2509.22), Computation of Erosion Hazard Rating (2/90).

1.4 Use of sale area maps (SAM) and/or project maps for designating water quality protection needs

1. **Objective:** To ensure recognition and protection of areas related to water quality protection delineated on a SAM or Project Map.
2. **Implementation:** This practice will be accomplished by displaying all stream channels located adjacent to or within the units on the Sale Area Map and the Project Map for Timber Sale Contract.

1.5 Limiting the operating period (LOP) of timber sale activities

1. **Objective:** To ensure that the purchasers conduct their operations, including erosion control work and road maintenance in a timely manner and within the timeframe specified in the timber sale contract.
2. **Explanation:** The extent of the wet weather and snowmelt season in Northern California can be very unpredictable, and some areas of the project area are more susceptible to erosive forces than others.
3. **Implementation:** Timber sale contract provision B6.6 can be used to close down operations because of wet weather, high water, or other considerations in order to protect resources. The spring snowmelt period (April-May) is the time when the potential for erosion impacts are greatest. The sale administrator will be responsible for ensuring that timber harvest activities will not degrade the soil and water resource.
 - a. Work will begin before winter storm season starts.

1.8 Streamside management zone designation.

1. **Objective:** To designate a zone along riparian areas, streams and wetlands that will minimize potential for adverse effects from adjacent management activities.
2. **Explanation:** Field verifying all units for Riparian Reserves, excluding sensitive areas from proposed units and identifying those portions of Riparian Reserves where thinning activities could be accomplished without negatively impacting the soil and water resource, met the objectives of practice 1.8.
3. **Implementation:** Riparian Reserves occurring adjacent to units will be identified on sale area maps and the prescriptions for treating these Riparian Reserves will be included on the stand record cards.
 - a. No tractor yarding or piling in Riparian Reserves (unless specifically designated).
 - b. No heavy equipment in waterways (unless specifically designated).

1.9 Determining tractor loggable ground

1. **Objective:** To minimize erosion and sedimentation resulting from ground disturbance of tractor logging systems.
2. **Explanation:** As a general guideline tractor logging should not occur on slopes greater than 35 percent.
3. **Implementation:** This objective was accomplished by ground verifying each unit for slope considerations during prescription development for the proposed action.

1.10 Tractor skidding design

1. **Objective:** To design skidding patterns to best fit the terrain, the volume, velocity, concentration, and direction of runoff water in order to minimize erosion and sedimentation.
2. **Explanation:** As a general guideline the skid trail network cannot exceed 15% of the area in each treatment unit.
3. **Implementation:** The sale administrator will accomplish this practice by reviewing and approving by agreement the skid trail design as provided by the purchaser.
 - a. No skid trails should be located within Riparian Reserves.
 - b. Rip (with winged subsoiler to 18 inches deep) and mulch primary skid-trails (last 200 feet to landing).

1.11 Suspended Log Yarding in Timber Harvesting

1. **Objective:**
 - a. To protect the soil mantle from excessive disturbance.
 - b. To maintain the integrity of the SMZ and other sensitive watershed areas.
 - c. To control erosion on cable corridors.
2. **Explanation:** Suspended log yarding includes all yarding systems, which suspend logs either partially or completely off the ground. These systems include, but are not limited to, skyline,

helicopter, and balloon yarders. The systems are used on steep slopes where tractors cannot operate. All of the systems result in less soil disturbance since heavy machinery is not used over the sale area. Erosion control measures are applied as necessary in cable corridors to control erosion and runoff.

3. **Implementation:** The areas where suspended log yarding is required will be determined during the pre-sale planning process, and they will be included in the sale plan. The specific systems must be included in the TSC, and designated on the SAM by the Sale Preparation Forester. The SA will oversee the project operation using the guidelines and standards established in the TSC and SA Handbook with reference to the sale plan.
 - a. Full log suspension across Riparian Reserves.
 - b. Require one-end suspension.
 - c. Cable corridors on contour (or acute angle to slope) require breaches in downhill side berm in lieu of water bars.

1.12 Log landing location

1. **Objective:** To locate new landings in such a way as to avoid watershed impacts and associated water quality degradation.
2. **Explanation:** This objective will be accomplished by following guidelines for proper landing locations as described on page 35 of Water Quality Management for National Forest System Lands in California (2000).
3. **Implementation:** All landings will be either designated in advance or approved by the sale administrator by agreement based on the guidelines. No landings will be located within Riparian Reserves.

1.13 Erosion prevention and control measures during timber sale operations

1. **Objective:** To ensure that the purchaser's operations will be conducted reasonably to minimize soil erosion.
2. **Explanation:** Drainage and erosion control work on temporary roads, skid trails, and permanent roads should be kept current during harvest activities.
3. **Implementation:** Equipment shall not be operated when ground conditions are such that excessive damage will result. The timber sale administrator will implement this practice through regular site visits and inspections.
 - a. Use water bars (per Timber Sale Administration Handbook specifications).
 - b. Install more than normal number water bars on skid trails (greater than 35% slope). Water bar every 20 to 40 feet on greater than 35% slopes.
 - c. Use skid trails when soil is dry to 4 inches deep.

1.14 Special Erosion Prevention Measures on Disturbed Land

1. **Objective:** To provide appropriate erosion and sedimentation protection for disturbed areas.
2. **Explanation:** This is an administrative and preventive treatment. When required by the contract, the purchaser will give adequate treatment by spreading slash, mulch or wood chips (or, by agreement, some other treatment) on portions of tractor roads, skid trails, landings, cable corridors or temporary road fills. This provision is to be used only for sales which contain identified special soil stabilization problems which are not expected to be adequately treated by normal methods prescribed under other contract provisions.
3. **Implementation:** During the timber sale planning process and/or during sale appraisal the IDT will identify criteria for selecting treatment areas or classes of areas for special treatment and document them in the environmental assessment. The Sale Preparation Forester will identify the acreage to be treated in the legend of the SAM. The specific areas to be treated will be designated on the ground by the SA.
 - a. Spread appropriate material on skid trails to achieve a minimum 50% ground cover. Applies to project area where needed to attain 50% cover, such as greater than 35% slopes or where steeper skid trails enter landings.
 - b. Install silt fences between skid trail and culvert when slope distance is less than 50 feet.
 - c. Seed and mulch landings
 - d. Seed and mulch landing fill slopes.
 - e. Place silt fence below landing fill slope during wet weather operations if runoff is causing erosion.

1.15 Revegetation of Areas Disturbed by Harvest Activities

1. **Objective:** To establish a vegetative ground cover on disturbed sites to prevent erosion and sedimentation.
2. **Explanation:** Where soil has been severely disturbed by the purchaser's operations, and the establishment of vegetation is needed to control accelerated erosion, the purchaser will be required to take appropriate measures normally used to establish an adequate ground cover of grass or other vegetative stabilization measures acceptable to the Forest Service. The type and intensity of treatment to establish ground cover is prescribed by the SA, with assistance from earth scientists and botanists as needed. This measure is applied in contracts where it is expected that disturbed soils in parts of the sale area will require vegetative cover for stabilization and other contract provisions will not mitigate problems.
3. **Implementation:** The Forest Service will include an estimate of the need for revegetation in the timber sale appraisal and sale contract. Where revegetation is prescribed, the prescription must be included in the TSC. The SA will designate the areas of disturbed soils, such as logging areas and temporary roads that must be treated.

The Forest Service will provide advice as to soil preparation and the application of suitable seed mixtures, mulch, and fertilizer, and the timing of such work. It is the responsibility of the SA to make sure that revegetation work is done correctly and in a timely manner.

1.16 Log landing erosion control

1. **Objective:** To reduce the impacts of erosion and subsequent sedimentation associated with log landings by use of mitigating measures.
2. **Implementation:** The timber sale administrator will implement this practice through regular site visits and inspections.
 - a. Landing areas with slopes less than 25% and greater than 1 acre should have natural non-constructed designs.
 - b. Outslope landings.
 - c. Wing subsoil all landings (minimum 18 inches deep).
 - d. Retained landings scarify to 6 inches
 - e. Divert skid trail and road runoff from crossing landing
 - f. If runoff must cross landing, design landing drainage in a way to prevent rilling and gulling of fill slope.
 - g. When building landings, layer place and compact soil material on fill slopes.
 - h. Pull organic materials out of fill slope of landings if necessary to prevent collapse.No landings will occur in Riparian Reserves in the Gemmill Project Area.

1.17 Erosion control on skid trails

1. **Objective:** To protect water quality by minimizing erosion and sedimentation derived from skid trails.
2. **Explanation:** Skid trail erosion control work should be kept current during implementation. Erosion control and drainage of skid trails should be complete prior to shutting down operations due to wet weather.
3. **Implementation:** The timber sale administrator will implement this practice through regular site visits and inspections.
 - a. No skid trails will occur within Riparian Reserves in the Gemmill Project Area.
 - b. Use water bars on skid corridor (per Timber Sale Admin. Handbook specs).
 - c. Cable corridors on contour (or acute angle to slope) require breaches in downhill side berm in lieu of water bars.

1.19 Streamcourse and aquatic protection

1. **Objective:** To control sediment and other pollutants entering streamcourses.
2. **Explanation:** Identifying all intermittent stream Riparian Reserves in the project area and excluding sensitive areas in Riparian Reserves from the proposed units meet the objectives of practice 1.19.

3. **Implementation:** A 50-foot skidding equipment exclusion zone extending from the inner gorge or channel bank is specified for units containing Riparian Reserves.
 - a. No tractor yarding or piling in Riparian Reserves (unless specifically designated).
 - b. No heavy equipment in waterways (unless specifically designated).
 - c. No debris disposal in or within 100 feet Streamside Management Zone, meadows, wetlands or Riparian Reserve.

1.20 Erosion Control Structure Maintenance

1. **Objective:** To ensure that constructed erosion control structures are stabilized and working.
2. **Explanation:** Erosion control structures are only effective when they are in good repair and function as designed. Once the erosion control structures are constructed there is a possibility that they may not become adequately effective, or they will become damaged from subsequent harvest activities. It is necessary to provide follow-up inspection and structural maintenance in order to avoid these problems and ensure adequate erosion control.
3. **Implementation:** During the period of the TSC, the purchaser will provide maintenance of soil erosion control structures constructed by the purchaser until they become stabilized, but not for more than one year after their construction. After one year, accomplish needed erosion control maintenance work using other funding sources under TSC provisions B6.6 and B6.66.

The Forest Service may agree to perform such structure maintenance under TSC provision B4.225 (Cooperative Deposits), if requested by the purchaser, subject to agreement on rates. If the purchaser fails to do seasonal maintenance work, the Forest Service may assume the responsibility and charge the purchaser accordingly.

Road and Building Site Construction BMPs_____

2.2 Erosion Control Plan

1. **Objective:** To limit and mitigate erosion and sedimentation through effective planning prior to initiation of construction activities and through effective contract administration during construction.
2. **Explanation:** Land disturbing activities can result in short term erosion. By effectively planning for erosion control, sedimentation can be controlled or prevented. Within a specified period after award of a contract (presently 60 days prior to the first operating season in Timber Sale Contracts, per C6.3) the purchaser will submit a general plan which, among other things, sets forth erosion control measures. Operations cannot begin until the Forest Service has given written approval of the plan. The plan recognizes the mitigation required in the contract. A similar plan is required of miners and special use permittees.
3. **Implementation:** Design engineers develop detailed mitigation using an IDT. The detailed mitigations are reflected in the contract specifications and provisions. The intent of mitigation is to prevent construction-generated erosion, as well as that generated from the completed road,

from entering watercourses. Contracted projects are implemented by the contractor or operator. Compliance with contract specifications and operating plans is ensured by the COR, ER, or FSR through inspection.

This practice is commonly applied to all road construction through contract clauses and specifications and will apply to road construction for timber sales, mining, recreation, special uses and other roadwork on NFS lands.

2.3 Timing of Construction Activities

1. **Objective:** To minimize erosion by conducting operations during minimal runoff periods.
2. **Explanation:** The amount of erosion and sedimentation from road construction are affected by the magnitude of water runoff. An essential element of effective erosion control is to schedule operations during the dry season or when rain and runoff are unlikely. Purchasers will be required to schedule and conduct operations during the dry season or when rain and runoff are unlikely. Purchasers will be required to schedule and conduct operations to minimize erosion and sedimentation. Equipment will not be allowed to operate when ground conditions are such that excessive rutting and soil compaction could result. Such conditions will be identified by the COR or ER with the assistance of an earth scientist or other specialists as needed.

Erosion control work will be kept as current as practicable on active road construction projects. Construction of drainage facilities and performance of other contract work to control erosion and sedimentation will be required in conjunction with earthwork projects. The operator should limit the amount of area being graded at a site at any one time, and should minimize the time that an area is laid bare. Erosion control work must be kept current when road construction occurs outside of the normal operating season.

3. **Implementation:** Detailed mitigations developed by design engineers and an IDT will be included in the environmental analysis and in subsequent project plans and contracts.

Project crew leaders and supervisors will be responsible for implementing force account projects to construction specifications and as specified in the project plan. Contracted projects are implemented by the contractor, or operator. Compliance with plans, specifications, and the operating plan will be achieved by the COR or ER through inspection.

2.4 Stabilization of Road Slope Surfaces and Spoil Disposal Areas

1. **Objective:** To minimize erosion from exposed cut slopes, fill slopes, and spoil disposal areas.
2. **Explanation:** This is a preventive practice using bioengineering and other techniques to prevent or minimize erosion. Depending on site factors such as slope angle, soil type, climate, and proximity to waterways, many fill slopes, some cut slopes, and some spoil disposal areas will require vegetative and/or mechanical measures to provide surface soil stability. The level of stabilization effort needed is determined on a case-by-case basis by trained and qualified employees.

Revegetation includes the seeding of plant species grass, legumes, or browse species--or the planting of brush, or trees. Revegetation may also include fertilizer, soil amendments, and mulching or even watering to ensure success. A combination of plant types with both woody root systems and fibrous root systems usually produce better results than a single plant type such as grass. Native species are preferred and used wherever feasible. Where local native seed is not available, not economically feasible or native plants would be ineffective in controlling erosion sterilized grass or cereal grain seed is applied.

Mechanical measures may include, but are not limited to: wattles, erosion nets, terraces, side drains, blankets, mats, riprapping, mulch, tackifiers, pavement, soil seals, and windrowing construction slash at the toe of fill slopes.

3. **Implementation:** Vegetative measures are generally a supplementary device, used to improve the effectiveness of mechanical measures, but can be effective and complete by themselves. They may not take effect for several seasons, depending on the timing of project completion in relation to the growing season.

Mechanical and vegetative surface stabilization measures will be periodically inspected to determine effectiveness. In some cases, additional work will be needed to ensure that the vegetative and/or mechanical surface stabilization measures continue to function as intended.

Initial project location, mitigation measures and management requirements are developed during the environmental analysis process. These are translated into project plans, contract provisions and specifications.

Project road inspectors and their supervisors monitor work accomplishment and effectiveness, to ensure that design standards, project plan management requirements, and mitigation measures are met.

- a. Soil material at approved disposal sites will be seeded and mulched prior to winter

2.6 Dispersion of Subsurface Drainage from Cut and Fill slopes

1. **Objective:** To minimize the possibilities of cut or fill slope failure and the subsequent production of sediment.
2. **Explanation:** This is a preventive practice. Roadways may change the sub-surface drainage characteristics of a slope. Since the angle and height of cut and fill slopes can increase the risk of instability, it is often necessary to provide subsurface drainage to avoid moisture saturation and subsequent slope failure. Where ground water dispersion is necessary because of slopes, soil, aspect, precipitation amounts, inherent instability, or other related characteristics, dispersion methods would include:
 - Underdrains or subdrains (e.g. pipes, geotextiles)
 - Horizontal drains or chimney drains

Dispersal of collected water will be accomplished in an area capable of withstanding increased flows. On erosive soils, energy dissipaters or other slope stabilization treatments or conveyance devices need to be placed below pipes carrying large volumes of water. Road surface may be designed to dissipate the intercepted water in a uniform manner along the road.

3. **Implementation:** Project location and detailed mitigation will be determined by design engineers and the IDT, documented and incorporated into subsequent project plans and contracts.

Project crew leaders and supervisors will be responsible for implementing force account projects to construction specifications as specified in the environmental analysis. Contracted projects are implemented by the contractor or timber sale operator. Compliance with project plan requirements and operating plans is ensured by the COR, FSR, or ER.

2.7 Control of Road Drainage

1. **Objective:** Is to minimize the erosive effects of water concentrated by road drainage features; to disperse runoff from disturbances within the road clearing limits; to lessen the sediment yield from roaded areas; to minimize erosion of the road prism by runoff from road surfaces and from uphill areas.
2. **Explanation:** This is a preventive practice. A number of treatments can be used, alone, or in combination, to control unacceptable effects of road drainage. Methods used to reduce erosion include but are not limited to such controls as construction of properly spaced cross drains, water bars or rolling dips; installing energy dissipaters, apron, downspouts, gabions, flumes, overside drains and debris racks; armoring of ditches, drain inlets and outlets and removing or adding berms to control runoff. Accomplish dispersal of runoff on the road surface by such means as rolling the grade, outsloping or crowning. Installing water spreading ditches or contour trenching can disperse road water after the water leaves the road surface. Dispersal of runoff reduces downstream peak flows and associated scouring of the channels and sediment transport.

Reduce sediment loads from road surfaces by adding aggregate or paving surfaces or by installing such controls as: sediment filters, settling ponds, and contour trenches. Soil stabilization can reduce sedimentation by lessening erosion on borrow and waste areas, on cut and fill slopes, and on road shoulders.

3. **Implementation:** Project location, design criteria and detailed mitigation are determined and documented during the environmental analysis process. These are then incorporated into the project plan.
 - a. Spot rock native surface roads with aggregate if used during wet weather operations.
 - b. Install silt fences at culvert outlets if road will be used during wet weather.

2.9 Timely Erosion Control Measures on Incomplete Roads and Stream Crossing Projects

1. **Objective:** To minimize erosion and sedimentation from disturbed ground on incomplete projects.
2. **Explanation:** The best drainage design can be ineffective if erosion control has not been completed by the end of the normal operating season. Affected areas can include roads, road fills, tractor trails, skid trails, landings, stream crossings, bridge excavations, and firelines. Preventive measures include:
 - Removal of temporary culverts, culvert plugs, diversion dams, or elevated stream crossings.
 - Installation of temporary culverts, side drains, flumes, cross drains, diversion ditches, energy dissipaters, dips, sediment basins, berms, debris racks, or other facilities needed to control erosion.
 - Removal of debris, obstructions and spoil material from channels and floodplains.
 - Planting vegetation, mulching, and/or covering exposed surfaces with jute mats or other protective material.
3. **Implementation:** Apply protective measures to all areas of disturbed, erosion-prone, unprotected ground that is not to be further disturbed in the present year. When conditions permit operations outside of the normal operating season, update the operating plan as necessary and keep erosion control measures sufficiently current with ground disturbance to allow rapid closure when weather conditions deteriorate. Do not leave project areas for the winter with remedial measures incomplete.

Develop project mitigation measures and layout requirements during the environmental analysis process. Incorporate them into subsequent project plans and/or contracts.

2.10 Construction of Stable Embankments (Fills)

1. **Objective:** To construct embankments with materials and methods, which minimize the possibility of failure and subsequent water quality degradation.
2. **Explanation.** The failure of road embankments and the subsequent deposition of material into waterways may result from the incorporation of slash, or other organic matter into fills, from a lack of compaction during the construction of the embankment, or use of inappropriate placement methods.

To minimize fill failures, design and construct the roadway as a stable and durable earthwork structure with adequate strength to support the treadway, shoulders, subgrade and the roads traffic loads. Proper slope ratio design will promote stable embankments. Adjacent to SMZs, construct and place embankments of inorganic material by methods 2 to 6 below. Construct or place other embankments of inorganic material by one, or more of the following methods:

- a. Sidecasting and end dumping
- b. Layer placement

- c. Layer placement (roller compaction)
- d. Controlled compaction
- e. Special project controlled compaction

In some situations, it will be necessary to minimize fill volumes and/or strengthen fills using retaining walls, confinement systems, plantings or a combination of techniques.

On projects, where required densities are specified, some type of moisture compaction control will be necessary. Where outer faces of embankments are not stabilized, due to equipment access difficulty, unfinished slopes subject to erosion and slipping will be stabilized following Practice 2.4.

3. **Implementation:** Project requirements and mitigation measures are developed and documented during the environmental analysis and road design process, by the IDT. The appropriate method of embankment placement is chosen during this process.
 - a. Pull organic materials out of fill slope of landings if necessary to prevent collapse.
 - b. When building landings, layer place and compact soil material on fill slopes.

2.11 Control of Sidecast Material during Construction and Maintenance

1. **Objective:** To minimize sediment production originating from sidecast material during road construction or maintenance.
2. **Explanation:** Unconsolidated materials including rocks and boulders that are cast over the side of the road shoulder can roll directly into streams, damage downslope vegetation and create bare areas that are difficult to stabilize with vegetation. Where spoil does not directly reach a stream, it is still highly susceptible to erosion, dry ravel and mass instability, and subsequently can directly deliver sediment to a nearby stream. Site-specific limits and controls for side casting or end hauling are developed and documented during environmental analysis. Loose, unconsolidated sidecast material must not be permitted to enter SMZs, (see Practice 2.17).

Sidecasting is an unacceptable construction alternative in areas where it can adversely impact water quality. Prior to the start of construction, or maintenance activities, waste areas must be located where excess material can be deposited and stabilized. During road maintenance operations, potential sidecast and other waste material will be utilized on the road surface or removed to designated disposal sites.

The roadway will be constructed within reasonable limits of the lines, grades, and dimensions given in the engineering drawings and designated on the ground. Provisions for waste material disposal are included in every road construction and maintenance contract.

3. **Implementation:** Project location, selected disposal areas, and mitigation will be developed and documented during the environmental analysis.

Project crew leaders and supervisors will be responsible for ensuring that force account projects meet construction specifications and project criteria. Road maintenance plans are developed for each forest and include slide and slump repairs and disposal site locations for excess material.

Contracted projects are implemented by the contractor or timber sale operator. Compliance with project criteria, contract specifications, and operating plans will be enforced by the COR, ER, or FSR. Standard maintenance specifications have been prepared which include disposal area operation, disposal methods, and surface treatment.

Timber sale contracts include clause C5.4 to address temporary road maintenance specifications, which includes slide and slump repair, surface blading, and side casting during road maintenance.

- a. No disposal within 100 feet of culverts, road dips, in an inside ditch, above a ditch or any where material can reach a stream channel.
- b. Dispose of cleaned out material from culvert intake to location where it will not enter a channel, ditch, or re-enter intake area.

2.19 Disposal of Right-of-Way and Roadside Debris

1. **Objective:**
 - a. To ensure that organic debris generated during road construction is kept out of streams so that channels and downstream facilities are not obstructed.
 - b. To ensure debris dams are not formed which obstruct fish passage, or which could result in downstream damage from high water flow surges after dam failure.
2. **Explanation:** As a preventive measure, construction debris and other newly generated roadside slash developed along roads in the streamside management zone is disposed of by the following means as applicable: (See also Practice 2.11)
 - a. On Site:
 - Piling and burning
 - Burying
 - Chipping
 - Scattering
 - Disposal in cutting units
 - Windrowing at the base of fill slopes
 - g) Incorporation {only in temporary roads}
 - b. Removal to agreed upon locations (especially stumps from the road prism).
 - c. A combination of the above.
 - d. Large limbs and cull logs are removed to designated sites outside the SMZ or relocated within the zone to meet aquatic resource management objectives.
3. **Implementation:** Criteria for the disposal of right-of-way and roadside debris was established during onsite evaluation by an IDT (see below). Project location and detailed mitigation

measures are also developed and set forth in the environmental analysis and incorporated into project plans and/or contracts.

- a. No debris disposal in or within 100 feet Streamside Management Zone, meadows, wetlands or Riparian Reserve.
- b. No disposal within 100 feet of culverts, road dips, in an inside ditch, above a ditch or any where material can reach a stream channel.
- c. Dispose of cleaned out material from culvert intake to location where it will not enter a channel, ditch, or re-enter intake area.
- d. Soil material at approved disposal sites will be seeded and mulched prior to winter.

2.22 Maintenance of roads

1. **Objective:** To maintain roads in a manner which provides for water quality protection by minimizing rutting, failures, sidecasting and blockage of drainage facilities all of which can cause erosion and sedimentation, and deteriorating watershed conditions.
2. **Implementation:** This practice will be accomplished by the purchaser, sale administrator and transportation planner.

2.23 Road Surface Treatment to Prevent Loss of Materials

1. **Objective:** To minimize the erosion of road surface materials and consequently reduce the likelihood of sediment production from those areas.
2. **Explanation:** Unconsolidated road surface material is susceptible to erosion during precipitation events. Likewise, dust derived from road use may settle onto adjacent water bodies and streamcourses. Contractors, purchasers, special users and Forest Service project Leaders undertake measures to minimize loss of road material when the need for such action is identified.

Road surface treatments include watering, dust oiling, penetration oiling, sealing, aggregate surfacing, chip-sealing, or paving, depending on traffic, soils, geology, and road design specifications.

3. **Implementation:** Project location and detailed mitigation will be developed by the design engineer, using an interdisciplinary approach, to meet project criteria.

Project crew leaders and supervisors will be responsible for ensuring that force account projects meet construction specifications and project criteria.