RECOMMENDED MITIGATION MEASURES

FOR

TIMBER OPERATIONS

IN

DECOMPOSED GRANITE SOILS

WITH PARTICULAR REFERENCE TO

GRASS VALLEY CREEK AND NEARBY

DRAINAGES

Prepared by

CALIFORNIA DEPARTMENT OF FORESTRY

AND FIRE PROTECTION

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PREAMBLE

In highly erodible decomposed granite soils alternative yarding systems and road locations should be investigated in preparing the Timber Harvesting Plan by the Registered Professional Forester on behalf of the applicant. In selecting these alternative yarding systems and road locations, the RPF will be guided by the terms of Section 898 (Feasible Alternatives) and Section 943 (Logging Roads and Landings) from the Board of Forestry's regulations.

Mitigations described herein will be selected to fit site specific locations on individual timber harvesting plans. They will be described in sufficient detail that the timber operator knows exactly what is expected and where. These mitigations are intended to be used in addition to applicable forest practice rules and are not intended to supplant those rules unless they provide greater resource protection than the rules.

Definitions: Temporary road - one year use; put to bed before October 15.

Permanent Road - More than one season of use; road surface will be rocked.

I. ROAD CONSTRUCTION

A. New road construction within the WLPZ is prohibited. Exceptions may be approved where these locations will result in less impact to the water-course. Exceptions must be explained and justified.

B. Utilize favorable topography and minimize excavation.

C. Minimize fill sections where side slopes exceed 50% by utilizing:

1. Full-bench roads.

2. End haul, slot doze and place brow logs, where necessary, to prevent sidecasting.

D. Leave native vegetation in place in the lower 1/3 of the road prism. Leave or place cut vegetation and slash at toe of fill.

E. Cut Slopes.

1. Cut slopes should be as steep as possible, but not to exceed 1/4:1.

2. Minimize through cuts.

F. Roads widths should not exceed 12 feet to minimize cut height. Exceptions must be explained and justified in the THP.

G. Fill Slopes

1. Construct berms, only where necessary, to protect fill sections on permanent roads.

2. Armour fill slopes that contact stream flow with competent angular rock or alternative material that will provide equal or better protection; this shall include the approaches to removed temporary crossings.

3. All through fills must be crowned.

H. Culverts

1. Culverts shall be installed only on permanent roads that will receive continuous maintenance.

2. Culverts will be sized to a 50-year storm and oversized when streambed conditions warrant. Woody slash and debris must be cleared out for a minimum of 30 feet above inlet to culvert.

3. Culverts shall be a minimum of 18 inches in diameter.

4. Use a backhoe or excavator for culvert installations and removals except where other methods are justified.

5. Decomposed granite soils must be compacted in a moist condition when used as fill material around culverts. Importing clay soil for fill material is recommended where feasible.

I. Roadbeds shall be outsloped at 2%, except for short inslopes immediately above culverts and/or where outsloping will result in diverting runoff onto fill slopes longer than 10 feet or non-vegetated soils.

II. ROAD CONSTRUCTION

A. Evaluate impact of reconstruction versus new construction and be prepared to explain reasons for choice selected to the review team.

B. Identify previous failures on THP map and redesign using appropriate mitigation measures described herein.

III. EROSION CONTROL

The EHR of road and skid trail areas shall be rated as extreme.

Reduce volume and velocity of water by directing it off the road, skid trail or landing surface as soon as possible at controlled locations.

A. Permanent Roads

1. Control discharge of all drainage structures or facilities by utilizing;

   a. Natural vegetation.

   b. Hand-placed energy dissipaters, such as straw bales, slash, logs, rock overside drains or a combination of the above.

2. The road-running surface must be rocked. Rock will consist of current Cal Trans standard specifications for Class II aggregate base (or equal) 1 1/2" or 3/4". Pit run shale may be substituted. The rock will have a compacted depth of 6 inches over the entire width of the road including turnouts and landings.

3. Fill Slopes

   a. Seed, straw mulch and fertilize (see stabilization section) all sidecast over 10 feet in length.

   b. Place logging slash from road right-of-way along toe of fill.

4. Cut Slopes

   a. Where necessary, treat exposed cut slopes; i.e., hydromulch, or seed, straw and fertilize.

B. Temporary Roads

1. Control discharge of all drainage structures or facilities by utilizing:

   a. Natural vegetation.

   b. Hand-placed energy dissipaters such as straw bales, slash, logs, rock overside drains, or a combination of the above.

2. Fill Slopes

   a. Seed, straw mulch and fertilize (see stabilization section) all sidecast over 10 feet in length.

   b. Place logging slash from road right-of-way along toe of fill.

3. Remove temporary crossings on all Class I, II and III watercourses. Bring channels to natural grade and width, and armor with competent angular rock to stabilize reconstructed channel.

4. Waterbreak Construction

   a. Waterbreak spacing shall not exceed 50 feet.

   b. Straw bales, slash or natural vegetation must be used to control waterbreak discharge.

   c. Waterbreaks ~~constructed-by-hand~~ shall be a minimum of 18 inches in height (bottom of trench to top of berm).

5. Scarify, seed, mulch and fertilize road running surface after use.

C. LANDINGS

1. Locate away from watercourses and outside WLPZ unless otherwise explained and justified and approved by the Director.

2. Keep to a minimum size and number. Use favorable topography.

3. Minimize cuts and fills. Seed, straw mulch and fertilize sidecast over 10 feet in length.

4. Use brow logs, where necessary, to minimize sidecasting during construction and landing cleaning.

5. Restore drainages to original gradient and width. Stabilize and armour the drainages crossing landings.

6. Scarify, seed, mulch and fertilize landing surfaces and fill slopes prior to October 15.

D. SKID TRAILS

1. End line logs, wherever possible, to minimize skid trail construction. Logs within 100 feet of a skid road will always be endlined on slopes exceeding 30%.

2. Flag primary skid trails prior to preharvest inspection and show locations on THP map.

3. Confine skid trails to:

   a. Ridge tops.

   b. Contoured laterals.

   c. The construction of skid trails on slopes over 50% shall be prohibited. This prohibition shall include contoured laterals and skid trails on steep ridges. Exceptions should only be allowed where adequate control of sidecast material and protection from erosion are assured.

4. Waterbreak Construction

   a. Install waterbreaks at 25-foot intervals for the first 100 feet, or as agreed upon, on skid trails which exit onto haul roads and landings.

   b. Waterbreaks shall be installed at no more than 50-foot intervals in all other areas.

   c. Waterbreaks ~~constructed-by-hand~~ should be a minimum of 18 inches in height (bottom of trench to top of berm).

   d. Use straw mulch, slash or natural vegetation to control waterbreak discharge.

   e. Waterbreaks shall be located to discharge into natural vegetation. Where this is not possible, slash or straw bales shall be placed at the discharge point to effectively dissipate water, or waterbreak spacing shall be reduced to 25 feet.

   f. Where feasible, waterbreaks shall be discharged on the slope with the heaviest vegetation or on the gentlest slope, if adequate vegetation is present.

5. Seed, straw mulch and fertilize for a distance of 100 feet, all skid trails which exit onto landings or roads.

IV. WATERCOURSE PROTECTION

Watercourse and lake protection zones shall be flagged prior to the Pre-Harvest inspection. Exceptions shall be explained and justified in the THP. The location of Class I, II, and III watercourse crossings shall be shown on the THP map.

A. 1. WLPZ width shall be a minimum of 100 feet on Class I and II watercourses.

2. Equipment exclusion zones, 50 feet in width minimum, shall be designated on Class III watercourses.

B. Increase WLPZ and EEZ widths (by at least 50%), as necessary, to prevent erosion when the following conditions are present:

1. Adjacent slopes exceed 50 percent.

2. Areas of instability are present.

3. Sparse vegetation exists either prior to or projected after the operation.

4. Excessive natural or man-caused erosion is present.

5. The watercourse or nearby downstream channels support fisheries.

C. Scarcify, seed (see stabilization section), straw mulch and fertilize all of the following areas of exposed soil within the watercourse protection zone:

1. Road (unless rocked), landing and skid trail running surfaces including sidecast.

2. Temporary crossing approaches.

D. Use brow logs, where needed, to minimize sidecast within the WLPZ's.

V. WATERCOURSE CROSSINGS

Watercourse crossings shall be designed such that watercourse flows cannot divert onto the road running surace. Class I, II and III crossing locations and skid trail approaches shall be flagged prior to PHI.

A. Permanent Crossings

1. Minimize excavation by using a backhoe or excavator, when necessary.

2. Rip-rap inlets and/or install flared inlets.

3. Insofar as practical, cross watercourses at right angles.

4. Install culverts at natural channel grade.

5. Control direction of the discharge by the culvert to grade and center of stream channel.

6. Culverts shall be sized for 50 year return interval storm.

B. Temporary Crossings

1. Evaluate use of metal pipe vs. Humboldt crossing vs. Rocked Dip in THP, and explain reason(s) for choice.

2. Cross drainages at right angles.

3. Minimize excavation and remove by October 15.

4. Culverted crossings:

a. Use a backhoe or excavator, where practical, for installation and removal.

b. Minimum culvert size 18 inches.

c. Use washed rock as fill material, if available.

5. Humboldt Crossings

a. Use sound logs just long enough to facilitate skidding or transporting logs. Maximize number of logs to minimize amount of fill.

b. If possible, install and remove logs with a front-end loader.

c. If access restricts front-end loader, pre-attach chokers prior to installation or provide for choker attachment upon removal.

d. Minimize ground disturbance during installation and removal.

e. Keep fill depth to a minimum.

f. Use brow logs on skid crossings, where necessary, to minimize sidecast.

VI. STABILIZATION

A. Seed Requirements

1. The following seeding specifications have all proven effective:

a. Recommendation #1 (to be used on wetter sites, and northfacing slopes)

Species	Lbs/Acre
Topar or Luna Pubescent Wheat Grass	50
Akaroa or Burber Orchard Grass	20
Legume (Red Clover)	30

b. Recommendation #2 (to be used on harsh, dry sites)

Species	Lbs/Acre
Topar or Luna Pubescent Wheat Grass	12
Tegmar Dwarf Wheat Grass	12
Zorro Annual Fescue	10

c. Recommendation #3 (to be used on moderately wet sites)

Species	Lbs/Acre
Topar or Luna Pubescent Wheat Grass	30
Akoroa Orchard Grass	15

d. Recommendation #4 (to be used on dry sites where existing grass stands are found)

Species	Lbs/Acre
Topar or Luna Pubescent Wheat Grass	30

e. Other species mix as recommended by local SCS.

B. Fertilizers

1. Chemical analysis should be 16 percent nitrogen, 20 percent phosphous, and 0 percent potassium (16-20-0).

2. The application rate should average 250 pounds per acre.

3. The fertilizer should not be applied more than 15 days prior to seeding.

C. Straw mulch

1. The application rate should average 3,000 pounds per acre or 3 to 4 inches thick.

2. If straw is blown on, it should not be reduced to less than 6 inches in length.

3. On the steeper slopes, over 60 percent, the straw mulch should be tucked into the soil.

VII. TIME SCHEDULES

The following time frames should be strictly followed. Our experience indicates that fall rains can cause serious erosion problems when the schedule is not met.

A. Winter operations are prohibited.

B. All log skidding and waterbreak construction shall be completed by October 15.

C. All stabilization work shall be completed by October 15, or sooner.

D. No more than three active landings per side shall be without waterbars.

VIII. SILVICULTURE

A. All trees to be cut will be marked prior to the preharvest inspection.

B. The RPF and the review team will evaluate the adequacy of protective vegetative cover that will remain following harvesting to protect the site from unacceptable erosion.

IX. MAINTENANCE PERIOD

Maintenance will be conducted for a period of 3 years following conclusion of timber harvesting operations. Maintenance will include repairs of dysfunctional drainage structures and erosion control measures.

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