Appendix F - Best Management Practices

Introduction

Best management practices (BMPs) are those land and resource management techniques designed to maximize beneficial results and minimize negative impacts of management actions. Interdisciplinary site specific analysis is necessary to determine which management practices would be necessary to meet specific objectives and goals. BMPs described in this appendix are designed to assist in achieving the objectives for maintaining or improving water quality, soil productivity, and the protection of watershed resources. These guidelines will apply, where appropriate, to all use authorizations, including BLM-initiated projects. Modifications may be necessary on a site specific basis to minimize the potential for negative impacts. Each of the following BMPs are a part of the coordinated development of the plan and may be updated as new information becomes available. Applicants can suggest alternate conditions that could accomplish the same result.

BMPs are selected and implemented as necessary, based on site specific conditions, to meet water, soil, and watershed objectives for specific management actions. This document does not provide an exhaustive list of BMPs. Additional BMPs may be identified during an interdisciplinary process when evaluating site specific management actions. Implementation and effectiveness of BMPs need to be monitored to determine whether the practices are achieving water, soil, and other watershed resource objectives and progressing toward desired goals. Adjustments will be made as necessary to provide for meeting objectives and as needed to conform with changes in BLM regulations, policy, direction, or new scientific information.

These BMPs are a compilation of existing policies, guidelines, and commonly employed practices to minimize water quality degradation from nonpoint sources, to minimize the loss of soil productivity, and to provide guidelines for aesthetic conditions within watersheds from surface disturbing activities, while facilitating multiple-use resource management.

BMPs are considered one of the primary mechanisms to achieve Oregon water quality standards and reduce effects from nonpoint source pollution. Nonpoint sources of pollution result from natural causes, human actions, and the interactions between natural events and conditions associated with human use of the land and its resources. Nonpoint source pollution is caused by diffuse sources rather than from a discharge at a specific, single-source location. Such pollution results in alteration of the chemical, physical, and biological integrity of water.

BMPs are defined as methods, measures, or practices selected to meet nonpoint source control needs. BMPs include, but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 CFR 130.2(m), EPA Water Quality Standards Regulation).

Because the control of nonpoint sources of pollution is an ongoing process, continual refinement of BMP design is necessary. This process can be described in five steps: 1) selection of design of a specific BMP; 2) application of the BMP; 3) monitoring; 4) evaluation; and 5) feedback. Data gathered through monitoring in BMP design, application, or in the monitoring program.

Road Design and Maintenance

1. Design roads to minimize total disturbance, to conform with topography, and to minimize disruption of natural drainage patterns.

2. Base road design criteria and standards on road management objectives such as traffic requirements of the proposed activity and the overall TP, economic analysis, safety requirements, resource objectives, and minimal damage to the environment.

3. Locate roads on stable terrain such as ridge tops, natural benches, and flatter transitional slopes near ridges; valley bottoms and moderate sideslopes; away from slumps, slide prone areas, concave slopes, clay beds, and where rock layers dip parallel to the slope. Locate roads on well-drained soil types; avoid wet areas.

4. Construct cut and fill slopes to be approximately 3(h):1(v) or flatter where feasible. Locate roads to minimize heights of cutbanks. Avoid high, steeply sloping cutbanks in highly fractured bedrock.

5. Avoid head walls, midslope locations on steep, unstable slopes, fragile soils, seeps, old landslides, sideslopes in excess of 70 percent, and areas where the geologic bedding planes or weathering surfaces are inclined with the slope. Implement extra mitigation measures when these areas can not be avoided.

6. Construct roads for surface drainage by using outslopes, crowns, grade changes, drain dips, waterbars or insloping to ditches as appropriate.

7. Sloping the road base to the outside edge for surface drainage is normally recommended for local spurs or minor collector roads where low traffic volume and lower traffic speeds are anticipated. This is also recommended in situations where long intervals between maintenance will occur and where minimum excavation is wanted. Out-sloping is not recommended on steep slopes. Sloping the road base to the inside edge is an acceptable practice on roads with steep sideslopes and where the underlying soil formation is very rocky and not subject to appreciable erosion or failure.

8. Crown and ditching is recommended for arterial and collector roads where traffic volume, speed, intensity and user comfort are considerations. Recommended gradients range from 0 to 15 percent where crown and ditching may be applied, as long as adequate drainage away from the road surface and ditch lines is maintained.

9. When constructing roads, minimize excavation through the use of balanced earthwork, narrowing road widths, and end hauling where sideslopes are between 50 and 70 percent.

10. If possible, construct roads when soils are dry and not frozen. When soils or road surfaces become saturated to a depth of three inches, BLM-authorized activities should be limited or ceased unless otherwise approved by the authorized officer.

11. Consider improving inadequately surfaced roads that are to be left open to public traffic during wet weather with gravel or pavement to minimize sediment production and maximize safety.

12. Retain vegetation on cut slopes unless it poses a safety hazard or restricts maintenance activities. Roadside brushing of vegetation should be done in a way that prevents disturbance to root systems and visual intrusions (i.e., avoid using excavators for brushing).

13. Retain adequate vegetation between roads and streams to filter runoff caused by roads.

14. Avoid riparian/wetland areas where feasible; locate in these areas only if the roads do not interfere with the attainment of PFC.

15. Minimize the number of unimproved stream crossings. When a culvert or bridge is not feasible, locate drive-through (low water crossings) on stable rock portions of the drainage channel. Harden crossings with the addition of rock and gravel if necessary. Use angular rock if available.

16. Locate roads and limit activities of mechanized equipment within stream channels to minimize their influence on riparian areas. When stream crossing is necessary, design the approach and crossing perpendicular to the channel where practical. Locate the crossing where the channel is well-defined, unobstructed, and straight.

17. Avoid placing fill material in floodplain unless the material is large enough to remain in place during flood events.

18. Use drainage dips instead of culverts on roads where gradients would not present a safety issue. Locate drainage dips in such a way that water would not accumulate or where outside berms prevent drainage from the roadway. Locate and design drainage dips immediately upgrade of stream crossings and provide buffer areas and catchment basins to prevent sediment from entering the stream.

19. Construct catchment basins, brush windrows, and culverts in a way to minimize sediment transport from road surfaces to stream channels. Install culverts in natural drainage channels in a way to conform with the natural streambed gradients with outlets that discharge onto rocky or hardened protected areas.

20. Design and locate water crossing structures in natural drainage channels to accommodate adequate fish passage, to provide for minimum effects to water quality, and to be capable of handling a 100-year event for runoff and floodwaters.

21. Use culverts that pass, at a minimum, a 50-year storm event or have a minimum diameter of 24 inches for permanent stream crossings and a minimum diameter of 18 inches for road crossdrains.

22. Replace undersized culverts and repair or replace damaged culverts and downspouts. Provide energy dissipators at culvert outlets or drainage dips.

23. Locate culverts or drainage dips in such a manner as to avoid discharge onto unstable terrain such as head walls or slumps. Provide adequate spacing to avoid accumulation of water in ditches or road surfaces. Culverts should be placed on solid ground to avoid road failures.

24. Proper sized aggregate and riprap should be used during culvert construction. Place riprap at culvert entrance to streamline water flow and reduce erosion.

25. Establish adapted vegetation on all cuts and fill immediately following road construction and maintenance.

26. Remove berms from the down slope side of roads, consistent with safety considerations.

27. Leave abandoned roads in a condition that provides adequate drainage without further maintenance. Close abandoned roads to traffic. Physically obstruct the road with gates, large berms, trenches, logs, stumps, or rock boulders as necessary to accomplish permanent closure.

28. Abandon and rehabilitate roads no longer needed. Leave these roads in a condition that provides adequate drainage. Remove culverts.

29. When plowing snow for winter use of roads, provide breaks in snow berms to allow for road drainage. Avoid plowing snow into streams. Plow snow only on existing roads.

30. Maintenance should be performed to conserve existing surface material, retain the original crowned or out-sloped self-draining cross section, prevent or remove rutting berms (except those designed for

slope protection) and other irregularities that retard normal surface runoff. Avoid wasting loose ditch or surface material over the shoulder where it can cause stream sedimentation or weaken slump-prone areas. Avoid undercutting back slopes.

31. Do not disturb the toe of cut slopes while pulling ditches or grading roads. Avoid sidecasting road material into streams.

32. Grade roads only as necessary. Maintain drain dips, waterbars, road crown, in-sloping and out-sloping, as appropriate, during road maintenance.

33. Maintain roads in ACECs and WSAs, according to the ACEC Management Plan or the WSA IMP. Retain roads within existing disturbed areas and sidecast material away from the ACEC or WSA.

34. When landslides occur, save all soil and material usable for reclamation or stockpile for future reclamation needs. Avoid sidecasting of slide material where it can damage, overload, and saturate embankments, or flow into down slope drainage courses. Reestablish vegetation as needed in areas where vegetation has been destroyed due to sidecasting.

35. Strip and stockpile topsoil ahead of construction of new roads, if feasible. Reapply soil to cut and fill slopes prior to revegetation.

Surface Disturbing Activities

1. Special design and reclamation measures may be required to protect scenic and natural landscape values. This may include transplanting trees and shrubs, mulching and fertilizing disturbed areas, use of low profile permanent facilities, and painting to minimize visual contrasts. Surface disturbing activities may be moved to avoid sensitive areas or to reduce the visual effects of the proposal.

2. Above ground facilities requiring painting should be designed to blend in with the surrounding environment.

3. Disturbed areas should be contoured to blend with the natural topography. Blending is defined as reducing form, line, and color contrast associated with the surface disturbance. Disturbance in visually sensitive areas should be contoured to match the original topography, where matching is defined as reproducing the original topography and eliminating form, line, and color caused by the disturbance as much as possible.

4. Reclamation should be implemented concurrent with construction and site operations to the fullest extent possible. Final reclamation actions shall be initiated within six months of the termination of operations unless otherwise approved in writing by the authorized officer.

5. Fill material should be pushed into cut areas and up over back slopes. Depressions that would trap water or form ponds should not be left.

Rights-of-Way and Utility Corridors

1. Rights-of-way and utility corridors should use areas adjoining or adjacent to previously disturbed areas whenever possible, rather than traverse undisturbed communities.

2. Waterbars or dikes should be constructed on all of the RDWs and utility corridors, and across the full width of the disturbed areas, as directed by the authorized officer.

3. Disturbed areas within road RDWs and utility corridors should be stabilized by vegetation practices designed to hold soil in place and minimize erosion. Vegetation cover should be reestablished to increase infiltration and provide additional protection from erosion.

4. Sediment barriers should be constructed when needed to slow runoff, allow deposition of sediment, and prevent transport from the site. Straining or filtration mechanisms may also be employed for the removal of sediment from runoff.

Forest Management

1. Design harvest units and forest health treatments to blend with natural terrain.

2. Consider clearcutting only where it is silviculturally essential to accomplish site specific objectives. Areas with fragile watershed conditions or high scenic values should not be clearcut.

3. When soils or road surfaces become saturated to a depth of three inches, BLM-authorized activities such as log yarding and hauling should be limited or cease unless otherwise approved by the authorized officer.

4. Scatter unmerchantable material (tops, limbs, etc.) in cutting units and treatment areas, consistent with fuel loading limitations.

5. Ground-yarding systems are not recommended on slopes that are of 30 percent or greater.

6. Utilize designated skid trails and haul roads, where feasible, when ground-yarding timber harvest operations.

7. Locate skid trails on upper slope positions, as far as possible from surface water. Avoid skidding across drainage bottoms or creating conditions that concentrate and channelize surface flow.

8. Use directional felling, when applicable, to minimize skidding distance and locate skid trails as far as possible from sensitive areas.

9. Install waterbars and apply native seed, when available, to skid trails and landings prior to temporary seasonal closures and following harvest operations. Consider ripping or subsoiling on skid trails and abandoned haul roads to reduce compaction where soil and slope conditions permit.

10. When ground- or cable-yarding, logs should be fully suspended, or should at least have the lead end suspended.

11. Locate landings away from surface water. Design landings to minimize disturbance consistent with safety and efficiency of operation.

12. Use low pressure grapple equipment, if possible, when piling slash.

13. Conduct forested land treatments when soil surfaces are either frozen, dry, or have adequate snowpack, to minimize effects to soil and water resources.

Fire Suppression

1. Where possible, minimize surface disturbances and avoid the use of heavy earth moving equipment on all fire suppression and rehabilitation activities, including mop-up, except where high value resources (including lives and property), are being protected.

2. Install waterbars and seed all constructed firelines with native or adapted nonnative species, as appropriate.

3. Avoid dropping fire retardant detrimental to aquatic communities on streams, lakes, ponds, and in riparian/wetland areas.

4. The location and construction of handlines should result in minimal surface disturbance while effectively controlling the fire. Hand crews should locate lines to take full advantage of existing land features that represent natural fire barriers. Whenever possible, handlines should follow the contour of the slope to protect the soil, provide sufficient residual vegetation to capture and retain sediment, and maintain site productivity.

5. Suppression in riparian areas should be by hand crews when possible.

Prescribed Burning

1. To protect soil productivity, burning should be conducted, if possible, under conditions when a low-intensity burn can accomplish stated objectives and only when conditions of organic surface or duff layer have adequate moisture to minimize effects to the physical and chemical properties of the soil. When possible, maximize the retention of the organic surface or duff layer.

2. Slash should not be piled and burned within riparian/wetland areas. If riparian/wetland areas are within or adjacent to the prescribed burn unit, piles should be firelined or scattered prior to burning.

3. When preparing the unit for burning, avoid piling concentrations of large logs and stumps; pile small material (three to eight inches in diameter). Slash piles should be burned when soil and duff moisture are adequate to reduce potential damage to soil resources.

Livestock Grazing Management

Grazing management projects and improvements are constructed as a portion of adaptive management to reduce resource management conflicts and to achieve multiple use management objectives. Rangeland improvements may include but are not limited to the following examples:

- Water developments (i.e., spring developments, pipelines/troughs and reservoirs) to facilitate upland distribution and reduce concentration in riparian wetland areas of livestock, wildlife and wild horses.
- Hardened crossings and water access points, or water gaps to direct livestock use to specific watering locations and reduce use over larger riparian wetland areas.
- Placement of salt or other supplements to distribute livestock throughout uplands and away from riparian areas.
- Riding and herding livestock to control use in sensitive areas.
- Planting desirable forage species in uplands to attract livestock away from riparian or other sensitive areas.
- Fencing to delineate pastures associated to area specific management objective(s), or to establish permanent, temporary or seasonal exclusion from specific areas.
- Barriers (i.e., trees, brush, boulder, gap fences) to reduce access or avoid specific areas.

Grazing schedules are developed and adjusted through the adaptive management process on an allotment specific basis. This is to mitigate effects to resource values, and to progress toward multiple use management objectives and sustainability of desirable values. Appendix O provides further details on intensity and season of use.

Mining

1. Reclaim all disturbed surface areas promptly, performing concurrent reclamation as necessary, and minimize the total amount of all surface disturbance.

2. Prior to conducting operations, all surface soil should be stripped stockpiled, and reapplied during reclamation, regardless of soil quality. Minimize the length of time soil remains in stockpiles and the depth or thickness of stockpiles. When slopes on topsoil exceed five percent, a berm or trench should be constructed below the stockpile to prevent sediment transport offsite.

3. Strip and separate soil surface horizons where feasible and reapply in proper sequence during reclamation.

4. Locate soil stockpiles and waste rock disposal areas away from surface water to minimize offsite drainage effects.

5. Establish vegetation cover on soil stockpiles that are to be in place longer than one year.

6. Construct and rehabilitate temporary roads to minimize total surface disturbance, consistent with intended use.

7. Consider temporary measures such as silt fences, straw bales, or mulching to trap sediment in sensitive areas until reclaimed areas are stabilized with vegetation.

8. Reshape to the approximate original contour all areas to be permanently reclaimed, providing for proper surface drainage.

9. Leave reclaimed surfaces in a roughened condition following soil application.

10. Complete reclamation and seeding during the fall if possible.

Noxious Weed Management

1. All contractors and land use operators moving surface disturbing equipment in or out of weed infested areas should clean their equipment before and after use on public land.

2. Control all weeds annually in areas frequently disturbed such as gravel pits, recreation sites, roadsides, and livestock concentration areas.

3. Consider livestock quarantine, removal, or timing limitations in weed infested areas.

4. All seed, hay, straw, mulch, or other vegetation material transported and used on public land weed-free zones for site stability, rehabilitation, or project facilitation should be certified by a qualified federal, state, or county officer as free of noxious weeds and noxious weed seed. All baled feed, pelletized feed, and grain transported into weed-free zones and used to feed livestock should also be certified as free of noxious weed seed.

5. All vehicles, including off-road and all-terrain, traveling in or out of weed-infested areas should be cleaned before and after use on public land.

Developed Recreation

1. Construct recreation sites and provide appropriate sanitation facilities to minimize effects to resource values, public health, and safety, and to minimize user conflicts regarding approved activities and access within an area, as appropriate.

2. Minimize effects to resource values and provide a quality recreational setting and experience. Harden site and locations subject to prolonged/repetitive concentrated recreational uses with selective placement of gravel or other porous materials and allow for dust abatement, paving, and engineered road construction.

3. Use public education or physical barriers (e.g., rocks, posts, vegetation) or both to direct or preclude uses and to minimize adverse effects to resource values and the quality of recreational experience.

4. As appropriate, employ limitations on specific activities to avoid or correct adverse effects to resource values, public safety issues, and conflicts between recreational uses.

5. Employ land use ethics programs and techniques such as "Leave No Trace" and "Tread Lightly." Use outreach efforts of such programs to reduce the need for implementing more stringent regulatory measures in order to protect resources and provide a quality recreation experience.