

APPENDIX H – BEST MANAGEMENT PRACTICES

This Appendix lists the Best Management Practices (BMPs) that apply to the Sierra National Forest Travel Management Project. These practices may apply to any of several phases of the project: they may have been applied in project planning; they may apply to the management of facilities that are being added to the NFTS; or they may apply to the prescriptive actions that are needed in order to bring facilities up to standards so that they may be published on the MVUM. This Appendix includes a table (Table H- 1) that specifies to which of these phases each BMP applies, and provides information on how it will / has been applied. Table H- 2 provides a crosswalk that displays which BMPs apply to each of the prescriptive actions listed in Appendix A of the FEIS, as an aid to project implementation.

Table H- 1. Applicable BMPs

BMP Name, Objective, and Direction	Locations and/or 'Prescriptive Actions' Where Applies	How to Apply to the SNF Travel Management Project
<p>BMP 1-8 Streamside Management Zone Designation: To designate a zone along riparian areas, streams and wetlands that will minimize potential for adverse effects from adjacent management activities. Management activities within these zones are designed to improve riparian values.</p>	<p>All locations where heavy equipment or motor vehicles are used near stream channels</p>	<p>Streamside management zones (SMZs) and Riparian Management Areas (RMAs) are defined in Sierra Supplement No 1 (USDA Forest Service 1989). They include 100-ft buffers around all perennial features, including meadows, and buffers ranging from 75 to 25 feet wide around non-perennial stream channels, based on Channel Class.</p> <p>Within SMZs and RMAs, the constraints defined in Sierra Supplement No. 1 (USDA Forest Service, 1989) apply. These include the maintenance of a minimum of 50% well-distributed groundcover in all areas except permitted roads and trails. In areas where 50% groundcover is not met, treatments shall be applied to attain this minimum level of protection.</p> <p>During the implementation of work needed to bring routes up to standards prior to their addition to the NFTS, vehicles including heavy equipment will be restricted to existing routes except as described in other BMPs (for example, BMP 2-14). Some other BMPs (for example, BMP 2-10 and 2-11) apply only within SMZs.</p> <p>For any work where equipment will require off-route access near stream channels or meadows, or where side casting will occur, these zones will be delineated on the ground.</p> <p>A hydrologist or fisheries biologist may modify these guidelines where site-specific needs exist.</p>

BMP Name, Objective, and Direction	Locations and/or 'Prescriptive Actions' Where Applies	How to Apply to the SNF Travel Management Project
<p>BMP 2-1 General Guidelines for the Location and Design of Roads: To locate and design roads and motorized trails with minimal resource damage.</p>	<p>Minor realignment</p>	<p>The following considerations were incorporated into the selection of motorized trails for the managed system, and also apply to realignment of added routes:</p> <p>(a) Transportation facilities will be developed and operated to best meet resource management objectives with the least adverse effect on environmental values.</p> <p>(b) The location, design, and construction or improvement of motorized trails will include the use of the IDT.</p> <p>(c) Sensitive areas such as wetlands, inner gorges, and unstable ground will be avoided to the extent practicable.</p> <p>(d) Stream crossings will be designed to provide the most cost efficient drainage facility consistent with resource protection, facility needs, and legal obligations.</p>
<p>BMP 2-3 Timing of Construction Activities: To minimize erosion by conducting operations during minimal runoff periods.</p>	<p>Grade road/trail; Construct drainage features; Repair drainage features; Stabilization of sections of trail tread; Gully and rutting repairs; Minor realignment</p>	<p>All ground disturbing work will be accomplished during periods when rain and runoff are unlikely in order to minimize erosion. (However, work must also be conducted when there is adequate soil moisture to achieve compaction of the constructed features.)</p>

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<p>BMP 2-7 Control of Road Drainage: To minimize the erosive effects of water concentrated on roads (and motorized trails), to disperse runoff from road surfaces, to lessen sediment yield from roaded areas, and to minimize erosion of the road prism.</p>	<p>Construct drainage feature; Repair drainage feature; Gully and rutting repairs; Pad travel way</p>	<p>Water bars or other drainage structures will be located so as to disperse concentrated flows and filter out suspended sediments prior to entry into streamcourses.</p> <p>The following direction for drainage spacing is taken from the Sierra LRMP, S&G 128, which is shown in its entirety in the Watershed section of Chapter 3. HEHR = High Erosion Hazard Rating soils; VHEHR = Very High Erosion Hazard Rating soils.</p> <table border="1" data-bbox="1178 578 1648 867"> <thead> <tr> <th rowspan="2">Slope (%)</th> <th colspan="2">Drainage spacing (ft)</th> </tr> <tr> <th>HEHR</th> <th>VHEHR</th> </tr> </thead> <tbody> <tr> <td>0-15</td> <td>150</td> <td>125</td> </tr> <tr> <td>15-35</td> <td>75</td> <td>45</td> </tr> <tr> <td>35-65</td> <td>35</td> <td>20</td> </tr> <tr> <td>>65</td> <td>15</td> <td>15</td> </tr> </tbody> </table>	Slope (%)	Drainage spacing (ft)		HEHR	VHEHR	0-15	150	125	15-35	75	45	35-65	35	20	>65	15	15
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<p>BMP 2-9 Timely Erosion Control Measures on Incomplete Roads and Stream Crossing Projects: To minimize erosion and sedimentation from disturbed ground on incomplete projects.</p>	<p>Install stream crossing structure; Minor realignment</p>	<p>Implementation of stream crossing improvements and route realignments will be planned for periods when precipitation is not expected, and are small enough undertakings that they would not need to be left incomplete over a winter.</p> <p>However, if these projects are in progress when precipitation is predicted, preventative measures will be put in place. These include actions such as ensuring that stockpiled material will not be transported into a stream channel, ensuring that adequate drainage features are present on a route to control runoff and prevent erosion and sediment delivery, or mulching freshly disturbed areas.</p>																	
<p>BMP 2-10 Construction of Stable Embankments (Fills): To construct embankments with materials and methods that minimize the possibility of failure and subsequent water quality degradation.</p>	<p>Stabilization of sections of trail tread</p>	<p>If constructing embankments, use the following guidelines for construction of stable embankments: use inorganic material only; do not sidecast or end dump material in SMZs; place material in layers and compact each layer; construct retaining walls, plant, or use a combination of techniques to stabilize the fill.</p>																	

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<p>BMP 2-11 Control of Sidecast Material During Construction and Maintenance: To minimize sediment production originating from sidecast material during construction or maintenance.</p>	<p>Construct drainage feature; Repair drainage feature; Gully and rutting repairs; Stabilization of trail tread; Pad travel way; Install stream crossing structure; Repair stream crossing structure; Minor realignment</p>	<p>Sidecasting is not permitted within SMZs and should be avoided in all areas where the material could impact water quality.</p> <p>Waste areas must be located where excess material can be deposited and stabilized.</p>
<p>BMP 2-12 Servicing and Refueling Equipment: To prevent pollutants such as fuels, lubricants, bitumens and other harmful materials from being discharged into or near rivers, streams and impoundments, or into natural or man-made channels.</p>	<p>Any equipment use</p>	<p>This BMP applies to all actions that utilize equipment.</p> <p>Storage of hazardous materials (including fuels) and servicing and refueling of equipment will be conducted outside of RCAs and CARs (2004 ROD S&G #99).</p> <p>If fueling and/or storage of hazardous materials are needed within RCAs or CARs, those sites must be reviewed and approved by a hydrologist or aquatic biologist. Additional protection measures, such as spill pads or other spill containment devices, may be necessary.</p>
<p>BMP 2-13 Control of Construction and Maintenance Activities Adjacent to SMZs: To protect water quality by controlling maintenance actions in and adjacent to SMZs so that SMZ functions are not impaired.</p>	<p>Any equipment use; Brushing</p>	<p>Mechanized equipment may not leave the road or motorized trail surface within SMZs while performing maintenance.</p> <p>Woody debris (from brushing) may be disposed of in the SMZ but must not be placed within channels or on floodplains.</p> <p>Sidecast and fill materials will be kept out of SMZs except at designated crossing sites, to minimize effects to the aquatic environment.</p>

BMP Name, Objective, and Direction	Locations and/or 'Prescriptive Actions' Where Applies	How to Apply to the SNF Travel Management Project
<p>BMP 2-14 Controlling In-Channel Excavation: To minimize stream channel disturbances and related sediment production.</p>	<p>Install stream crossing structure; Install stream ford crossing; Repair stream crossing structure; Remove fill from stream crossing</p>	<p>When working near streams or improving stream crossings, limit the presence and movement of heavy equipment in the stream channel to what is necessary to complete the work. In addition, follow these minimum water quality protection requirements: do not disturb the natural streambed adjacent to the structure being installed without IDT approval; minimize disturbance to streambeds and banks; if disturbance occurs, restore stream channels to their appropriate configuration; stabilize disturbed stream banks.</p>
<p>BMP 2-17 Bridge and Culvert Installation: To minimize sedimentation and turbidity resulting from excavation for in-channel structures.</p>	<p>Install stream crossing structure</p>	<p>Spoil material generated during construction should not obstruct the stream or floodplain, or impair the function of the crossing structure. Preventative measures include: 1) keep excavated material out of channels; 2) remove any material stockpiled on the floodplain prior to any expected precipitation event; and 3) divert water around work site, if necessary to prevent downstream sedimentation.</p>
<p>BMP 2-19 Disposal of Right-of-Way and Roadside Debris: To ensure that organic debris generated during road construction and maintenance is kept out of streams so that channels, aquatic organism passage, and downstream facilities are not obstructed</p>	<p>Brushing; Remove downed trees from travel way; Minor realignment; Install energy dissipaters;</p>	<p>Any organic material generated during realignment or maintenance actions should be disposed of outside of the SMZ, except where needed as traffic barriers or filter material at drain dip outlets to prevent sediment delivery to streams.</p>
<p>BMP 2-20 Specifying Riprap Composition: To minimize sediment production associated with the installation and utilization of riprap material</p>	<p>Armor road/trail drainage features; Install energy dissipators</p>	<p>When riprap is used, it must be sized appropriately for the expected flow of water across it, so that it protects the surface underneath from scour and is not moved by the flow. In some cases, erosion control fabric or other techniques are needed to prevent undermining of the material. The material used for riprap must also be free of sources of fine sediment.</p> <p>The Corps of Engineers and Federal Highway Administration procedures are commonly used for designing riprap installation.</p>

BMP Name, Objective, and Direction	Locations and/or 'Prescriptive Actions' Where Applies	How to Apply to the SNF Travel Management Project
<p>BMP 2-22 Maintenance of Roads: To maintain roads and motorized trails in a manner that provides for water quality protection by minimizing rutting, failures, sidecasting, and blockage of drainage facilities, all of which can cause erosion, sedimentation, and deteriorating watershed conditions.</p>	<p>All added NFTS facilities (ongoing maintenance, once published on MVUM)</p>	<p>Roads and motorized trails will be maintained to protect the transportation system and to ensure that damage to adjacent land and resources is prevented. This may require annual inspection to determine work needed.</p> <p>(a) At a minimum, maintenance must protect drainage facilities and runoff patterns.</p> <p>(b) Additional maintenance, such as spot rocking or installation of additional drainage features, should be chosen to respond to resource needs.</p> <p>Project crew leaders and supervisors are responsible for ensuring that projects meet specifications and project design criteria.</p>
<p>BMP 2-23 Road Surface Treatment to Prevent Loss of Materials: To minimize the erosion of road surface materials and consequently reduce the likelihood of sediment production from those areas</p>	<p>Armor road/trail drainage features; Armor approaches to stream crossing</p>	<p>Use gravel or other surface hardening technique to harden constructed drainage structures on specified routes to prolong their useful life and to stabilize eroding stream channel approaches on specified routes.</p>
<p>BMP 2-24 Traffic Control During Wet Periods: To reduce surface disturbance and the rutting of roads and trails, and to minimize sediment washing from disturbed road and motorized trail surfaces.</p>	<p>Implemeted by the proposed Season of Use</p>	<p>Unsurfaced roads and motorized trails that are not improved to accommodate all-weather or winter use will be subject to closure periods to protect the surface from rutting and erosion that could impact water quality or aquatic habitats.</p>

BMP Name, Objective, and Direction	Locations and/or 'Prescriptive Actions' Where Applies	How to Apply to the SNF Travel Management Project
<p>BMP 2-26 Obliteration or Decommissioning of Roads: To reduce sediment generated from unneeded non-system roads and motorized trails by obliterating or decommissioning them.</p>	<p>Gully and rutting repair in conjunction with Minor realignment; Follow-up projects</p>	<p>Where realignment addresses severe rutting or gullying, which will not passively recover, the replaced segment will be obliterated to prevent continued motor vehicle use and to facilitate recovery. Gully and rutting repair are specified and rather than providing a trail tread, the route will be revegetated/obliterated as part of that work.</p> <p>Unauthorized routes that are not identified to be added to the NFTS should be assessed for obliteration opportunities and priorities. High priority routes should be identified to facilitate the initiation of follow-up decommissioning projects.</p>
<p>BMP 4-7 Water Quality Monitoring of OHV Use According to a Developed Plan: To determine if, when, and to what extent OHV use causes adverse effects to water quality.</p>	<p>Green-Yellow-Red monitoring on all motorized trail additions to the NFTS;</p>	<p>Each Forest OHV Plan will:</p> <ol style="list-style-type: none"> 1. Identify areas or routes where OHV use could cause degradation of water quality; 2. Establish baseline water quality data as a basis from which to measure change; 3. Identify water quality standards and the amount of change acceptable; 4. Establish monitoring methods and frequency; 5. Identify controls and mitigation for management of OHVs; 6. Restrict OHV use to designated routes. <p>If monitoring finds considerable adverse effects, immediate corrective action will be taken, which could include reducing OHV use, signing, barriers, partial closures, seasonal restrictions, or structural solutions such as culverts or bridges.</p>
<p>BMP 4-9 Protection of Water Quality Within Developed and Dispersed Recreation Areas: To protect water quality by regulating the discharge and disposal of potential pollutants.</p>	<p>Areas with issue code SW-28</p>	<p>Prohibit use of motor vehicles within 100ft of perennial streams in specified Open Areas.</p> <p>Encourage public through the use of signs, pamphlets, and public contact to conduct their activities in a manner that will not degrade water quality. This could include the use of information boards at main staging areas.</p>

BMP Name, Objective, and Direction	Locations and/or 'Prescriptive Actions' Where Applies	How to Apply to the SNF Travel Management Project
<p>BMP 7-3 Protection of Wetlands: To avoid adverse water quality impacts associated with destruction, disturbance, or modification of wetlands.</p>	<p>Implemented by the selection of routes in each alternative, and by Minor realignment of some routes</p>	<p>No routes that cross wetlands or meadows will be added to the NFTS (see also LRMP S&G 78 and 79).</p>
<p>BMP 7-7 Management by Closure to Use (Seasonal, Temporary, and Permanent): To exclude activities that could result in damages to either resources or improvements, such as roads and trails, resulting in impaired water quality</p>	<p>Any NFTS facility where Season of Use does not provide adequate protection for unusual conditions</p>	<p>A last step protective measure that may be applied through the issuance of a Forest Order to close a road for a period other than approved by the Road Closure Plan. The conditions requiring the closure could be due to land use, natural disaster (such as fire, flooding, or landslides), or unusual precipitation / moisture conditions.</p>

Table H- 2. Key to Best Management Practices that apply to each Needed Action

Prescriptive Action	Description of Prescriptive Action	Applicable BMPs
Grade road/trail	Grading using mechanized equipment during period with adequate soil moisture to achieve compaction.	1-8; 2-3; 2-11; 2-12; 2-13; 2-19
Construct drainage features	Construct waterbars, ditches, cross drains, dips, outsloping, or other water diversion feature designed to prevent water from flowing along the tread and causing erosion. Space drainage features for appropriate gradient and soils. References: LRMP S&G 128; BMP 2-7; Erosion Control and Treatment Selection Guide 0677 1203P; Riparian Restoration: Roads Field Guide 0577 1801P.	1-8; 2-3; 2-7; 2-11; 2-12; 2-13; 2-19; 2-22
Repair drainage features	Repair waterbars, ditches, cross drains, dips, outsloping, or other water diversion feature designed to prevent water from flowing along the tread and causing erosion. Space drainage features for appropriate gradient and soils. References: LRMP S&G 128; BMP 2-7; Erosion Control and Treatment Selection Guide 0677 1203P; Riparian Restoration: Roads Field Guide 0577 1801P.	1-8; 2-3; 2-7; 2-11; 2-12; 2-13; 2-19; 2-22
Armor road/trail drainage features	Add rock or other armoring to protect ditches, cross drains, dips, etc from erosion (due to steep slopes or fine-textured soils). Reference: BMP 2-7; BMP2-22	1-8; 2-12; 2-20; 2-23
Install energy dissipaters at drainage structure outlets	Provide sediment filter/energy dissipater using hand work by placing slash or rip-rap at outlets of drain dips or relief ditches.	2-19; 2-20
Stabilization of sections of trail tread	Construct a causeway by reshaping tread and capping with rock (use geotextile, if needed). Reference: Managing Degraded Off-Highway Vehicle Trails in Wet, Unstable, and Sensitive Environments 0223–2821–MTDC	1-8; 2-3; 2-10; 2-11; 2-12; 2-13
Gully and rutting repairs	Reconstruct or repair severely eroded road or trail tread and downslope erosion features by filling, reshaping, vegetating/mulching if necessary, and providing for adequate drainage to minimize future erosion. Fill gullies and ruts, including use of ¾ crushed base rock and compact Use of mechanized equipment during period with adequate soil moisture to achieve compaction.	1-8; 2-3; 2-7; 2-11; 2-12; 2-13; (2-26 ⁷)

⁷ When in conjunction with Minor realignment, as described for BMP 2-26 in Table A1-1.

Prescriptive Action	Description of Prescriptive Action	Applicable BMPs
Minor realignment	Avoid a resource concern by rerouting the road or trail within 15 meters of current alignment. Resource specialists will be consulted to confirm that implementation is consistent with all requirements specified in this analysis.	1-8; 2-1; 2-3; 2-9; 2-11; 2-12; 2-13; 2-19
Pad travel way	Install rock (or other approved material) padding with separation fabric. Typically for protecting cultural resources.	1-8; 2-7; 2-12; 2-13; 2-23
Install stream crossing structure	Install crossing structure (bridge, bottomless arch, single or multiple culverts) that provides for proper channel function and passage of flow and aquatic organisms. Use of mechanized equipment is probable. Consult with District Hydrologist and Aquatic Species Biologist to ensure that implementation achieves these objectives.	1-8; 2-9; 2-12; 2-13; 2-14; (2-17 if perennial)
Install stream ford crossing	Install a low water crossing (such as armoring with rock) that provides proper channel function and passage of flow and aquatic organisms. Consult with District Hydrologist and Aquatic Species Biologist to ensure that implementation achieves these objectives.	1-8; 2-12; 2-13; 2-14; (2-17 if perennial)
Repair stream crossing structure	Repair culvert, bridge/elevated crossing, arch pipe, low water crossing, high water crossing or other stream channel crossing structure. Work may be accomplished by hand or with equipment, as specified.	1-8; 2-12; 2-13; 2-14
Armor approaches to stream crossing	Install hardened surface (e.g. place rocks, cobbles and/or gravels; geoweb structure, concrete block pavers, compacted road base, etc) on approaches to stream channel crossing. Material will not be placed within the floodplain. Use of heavy equipment is probable. Consult with District Hydrologist or Forest Soils Program Manager to ensure that implementation achieves objectives.	1-8; 2-12; 2-13; 2-23
Remove fill from stream channel	Remove fill previously placed in stream channel and redistribute on trail tread outside of channel, in order to provide for proper stream channel function (stream width/depth). Consult with District Hydrologist to ensure that implementation achieves this objective.	1-8; 2-11; 2-12; 2-13; 2-14
Weed treatment, Eradicate weeds	Using manual (no herbicide) treatment of population for a specified period of time, depending on species.	N/A
Brushing	Reduce roadside or trailside brush to improve treadway or sight distance	1-8; 2-12; 2-13; 2-19

Prescriptive Action	Description of Prescriptive Action	Applicable BMPs
Remove downed trees from travelway	Use of chainsaw to remove log from travel way; sections or entire log may be used as barrier if needed.	1-8; 2-12; 2-13; 2-19
Remove barrier	Remove obstacles (large boulders or other obstacles) blocking route to prevent resource damage.	1-8; 2-12; 2-13; 2-19
Delineate boundaries of routes and areas	Reference: Using Landscape Timbers to Mark Unpaved Parking Areas, T&D News: Winter 2002 . 0271 2806;	1-8; 2-12; 2-13; 2-19
Install barrier	Large boulders or other imported material, placed in close proximity to road or designated route prism, designed to keep vehicle traffic on designated travel way. Reference: Vehicle Barriers: Their Use and Planning Considerations. 0623 1201P	1-8; 2-12; 2-13; 2-19
Install gate	Install gate in order to control traffic use on the road or trail. Reference: Vehicle Barriers: Their Use and Planning Considerations. 0623 1201P	1-8; 2-12; 2-13; 2-19
Install signs	Placement of one of a variety of educational and enforcement signs, aimed at limiting off-route travel, parking or other activities that could otherwise affect Forest resources. Reference: Revised Forest Service Guidelines for OHV Travel-Management Signs . 0623 2317; Sign Installation Guide 0371-2812-MTDC	1-8; 2-12; 2-13
Implement an existing project, as specified	An existing project, independent of this EIS and decision, is in progress and will address identified needs for road/trail. Described in the 'Implementation Guidelines'. Although these are independent projects, they are tracked here because they meet a need identified during this analysis and must be implemented prior to the route being available for public use.	As specified in the existing project planning

