United States Department of Agriculture
Forest Service
Rocky Mountain Region

Shoshone National Forest Travel Management Plan

Environmental Assessment

Appendix D: Supplemental Materials from Effects Analysis

Shoshone National Forest October 2021

Contents

Tables

Appendix D

Hydrology, Soils, Aquatics Effects

Best Management Practices for Implementation

General Best Management Practices that shall be considered during implementation are listed below. The scope and complexity of implementation is expected to vary between projects, so site specific BMPs shall be further developed by the Watershed and Engineering Programs as needed.

Source: USDA Forest Service. (2012). *National Best Management Practices for Water Quality Management on National Forest System Lands*. Vol. 1: National Core BMP Technical Guide. FS-990a. USDA.

General Operations

- Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.
- Coordinate stream channel, shoreline, lake, pond, and wetland activities with appropriate State and Federal agencies.
    - Obtain CWA 404 permit coverage from the U.S. Army Corps of Engineers when dredge or fill material will be discharged to waters of the United States.
    - Incorporate Clean Water Act (CWA) 404 permit requirements and other Federal, State, and local permits or requirements into the project design and plan.
- Obtain Clean Water Act (CWA) 402 stormwater discharge permit coverage from the appropriate State agency or the U.S. Environmental Protection Agency (EPA) when more than 1 acre of land will be disturbed through construction activities.
- Choose vegetation appropriate to the site to provide streambank stabilization and protection adequate to achieve project objectives.
- Use vegetation species and establishment methods suitable to the project site and objectives, consistent with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.

Operations in Aquatic Ecosystems

- Identify the aquatic and aquatic-dependent species that live in the waterbody, Aquatic Management Zone (AMZ & synonymous with Water Influence Zone (WIZ)), or on the floodplain and their life histories to determine protection strategies, such as timing of construction, sediment management, species relocation, and monitoring during construction.
- Use suitable measures to protect the waterbody when preparing the site for construction or maintenance activities.
    - Clearly delineate the work zone.

- Locate access and staging areas near the project site but outside of work area boundaries,
- AMZs, wetlands, and sensitive soil areas.
- Refuel and service equipment only in designated staging areas.
- Develop an erosion and sediment control plan to avoid or minimize downstream impacts using measures appropriate to the site and the proposed activity.
- Prepare for unexpected failures of erosion control measures.

- Schedule construction or maintenance operations in waterbodies to occur in the least critical periods to avoid or minimize adverse effects to sensitive aquatic and aquatic-dependent species that live in or near the waterbody.
    - Avoid scheduling instream work during the spawning or migration seasons of resident or migratory fish and other important life history phases of sensitive species that could be affected by the project.
    - Avoid scheduling instream work during periods that could be interrupted by high flows.
    - Consider the growing season and dormant season for vegetation when scheduling activities within or near the waterbody to minimize the period of time that the land would remain exposed, thereby reducing erosion risks and length of time when aesthetics are poor.
- Use suitable measures to protect the waterbody when clearing the site.
    - Clearly delineate the geographic limits of the area to be cleared.
    - Use suitable drainage measures to improve the workability of wet sites.
    - Avoid or minimize unacceptable damage to existing vegetation, especially plants that are stabilizing the bank of the waterbody.
- Use suitable measures to avoid or minimize impacts to the waterbody when implementing construction and maintenance activities.
    - Minimize heavy equipment entry into or crossing water as is practicable.
    - Conduct operations during dry periods.
    - Stage construction operations as needed to limit the extent of disturbed areas without installed stabilization measures.
    - Promptly install and appropriately maintain erosion control measures.
    - Promptly install and appropriately maintain spill prevention and containment measures.
    - Promptly rehabilitate or stabilize disturbed areas as needed following construction or maintenance activities.

- Stockpile and protect topsoil for reuse in site revegetation.
- Minimize bank and riparian area excavation during construction to the extent practicable.
- Keep excavated materials out of the waterbody.
- Use only clean, suitable materials that are free of toxins and invasive species for fill.
- Properly compact fills to avoid or minimize erosion.
- Balance cuts and fills to minimize disposal needs.
- Remove all project debris from the waterbody in a manner that will cause the least disturbance.
- Identify suitable areas offsite or away from waterbodies for disposal sites before beginning operations.
- Contour site to disperse runoff, minimize erosion, stabilize slopes, and provide a favorable environment for plant growth.
- Use suitable species and establishment techniques to revegetate the site in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.

- Use suitable measures to divert or partition channelized flow around the site or to dewater the site as needed to the extent practicable.
    - Return clean flows to channel or waterbody downstream of the activity.
    - Restore flows to their natural stream course as soon as practicable after construction or before seasonal closures.
- Inspect the work site at suitable regular intervals during and after construction or maintenance activities to check on quality of the work and materials and identify need for mid-project corrections.
- Consider short- and long-term maintenance needs and unit capabilities when designing the project.
    - Develop a strategy for providing emergency maintenance when needed.
- Include implementation and effectiveness monitoring to evaluate success of the project in meeting design objectives and avoiding or minimizing unacceptable impacts to water quality.
- Consider long-term management of the site and nearby areas to promote project success.
- Use suitable measures to limit human, vehicle, and livestock access to site as needed to allow for recovery of vegetation.

Stream Channels & Shorelines

- Determine stream type and classification using suitable accepted protocols.
- Determine need to control channel grade to avoid or minimize erosion of channel bed and banks before selecting measures for bank stabilization or protection.
    - Incorporate grade control measures into project design as needed.
- Determine design flows based on the value or safety of area to be protected, repair cost, and the sensitivity and value of the ecological system involved.
    - Obtain peak flow, low flow, channel forming flow, and flow duration estimates.
    - Use these estimates to determine the best time to implement the project, as well as to select design flows.
- Determine design velocities appropriate to the site.
    - Limit maximum velocity to the velocity that is non-scouring on the least resistant streambed and bank material.
    - Consider needs to transport bedload through the reach when determining minimum velocities.
    - Maintain the depth-area-velocity relationship of the upstream channel through the project reach.
    - Consider the effects of design velocities on desired aquatic organism habitat and passage.
- Avoid changing channel alignment unless the change is to reconstruct the channel to a stable meander geometry consistent with stream type.
- Design instream and streambank stabilization and protection measures suitable to channel alignment (straight reach versus curves).
    - Consider the effects of ice and freeze and thaw cycles on streambank erosion processes.
    - Consider the effects that structures may have on downstream structures and stream morphology, including streambanks, in the maintenance of a natural streambed.
- Add or remove rocks, wood, or other material in streams only if such action maintains or improves stream condition, provides for safety and stability at bridges and culverts, is needed to avoid or minimize excessive erosion of streambanks, or reduces flooding hazard.
    - Leave rocks and portions of wood that are embedded in beds or banks to avoid or minimize channel scour and maintain natural habitat complexity.
- Use mean high- and low-water levels to determine the design water surface.

- Consider the effects of fluctuating water levels, freeze or thaw cycles, and floating ice on erosion processes at the site.

Facility Construction & Stormwater Control

- Establish designated areas for equipment staging, stockpiling materials, and parking to minimize the area of ground disturbance.
- Establish and maintain construction area limits to the minimum area necessary for completing the project and confine disturbance to within this area.
- Develop and implement an erosion control and sediment plan that covers all disturbed areas, including borrow, stockpile, fueling, and staging areas used during construction activities.
- Schedule, to the extent practicable, construction activities to avoid direct soil and water disturbance during periods of the year when heavy precipitation and runoff are likely to occur.
    - Limit the amount of exposed or disturbed soil at any one time to the minimum necessary to complete construction operations.
    - Limit operation of equipment when ground conditions could result in excessive rutting, soil puddling, or runoff of sediments directly into waterbodies.
- Install suitable stormwater and erosion control measures to stabilize disturbed areas and waterways before seasonal shutdown of project operations or when severe or successive storms are expected.
- Use low-impact development practices where practicable.
- Maintain erosion and stormwater controls as necessary to ensure proper and effective functioning.

Travel Management Planning & Analysis

- Use interdisciplinary coordination for travel planning and project-level transportation analysis, including engineers, hydrologists, soil scientists, and other resource specialists as needed, to balance protection of soil, water quality, and riparian resources with transportation and access needs.
    - Design the transportation system to meet long-term land management plan desired conditions, goals, and objectives for access rather than to access individual sites.
- Limit roads to the minimum practicable number, width, and total length consistent with the purpose of specific operations, local topography, geology, and climate to achieve land management plan desired conditions, goals, and objectives for access and water quality management.
    - Use existing roads when practicable.
    - Use system roads where access is needed for long-term management of an area or where control is needed in the location, design, or construction of the road to

avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.

- Use temporary roads for short-term access needs if the road can be constructed, operated, and obliterated without specific control of techniques to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.
- Decommission temporary roads and return to resource production when the access is no longer needed.
- Consider placing roads in storage (Maintenance Level 1) when the time between intermittent uses exceeds 1 year and the costs of annual maintenance (both economic and potential disturbance) or potential failures due to lack of maintenance exceed the benefits of keeping the road open in the interim.
- Consider decommissioning unneeded existing roads within a planning area when planning new system roads to reduce cumulative impacts to soil, water quality, and riparian resources.

- Plan road networks to have the minimum number of waterbody crossings as is practicable and necessary to achieve transportation system desired conditions, goals, and objectives.
- Develop or update RMOs for each system road to include design criteria, operation criteria, and maintenance criteria to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.
- Identify and evaluate road segments causing, or with the potential to cause, adverse effects to soil, water quality, and riparian resources.
    - Identify and prioritize suitable mitigation measures to avoid, minimize, or mitigate adverse effects.

Road Location & Design

- Locate roads to fit the terrain, follow natural contours, and limit the need for excavation.
    - Avoid locations that require extended steep grades, sharp curves, or switchbacks.
- Locate roads on stable geology with well-drained soils and rock formations that dip into the slope.
    - Avoid hydric soils, inner gorges, overly steep slopes, and unstable landforms to the extent practicable.
- Locate roads as far from waterbodies as is practicable to achieve access objectives, with a minimum number of crossings and connections between the road and the waterbody.
    - Avoid sensitive areas such as riparian areas, wetlands, meadows, bogs, and fens, to the extent practicable.

- Provide an AMZ of suitable width between the road and a waterbody to maintain desired conditions, goals, and objectives for structure, function, and processes of the AMZ and associated waterbody when a road must parallel a waterbody.

- Relocate existing routes or segments that are causing, or have the potential to cause, adverse effects to soil, water quality, and riparian resources, to the extent practicable.
  - Obliterate the existing road or segment after the relocated section is completed.

- Design the road to fit the ground and terrain with the least practicable impacts to soil, water quality, and riparian resources considering the purpose and life of the road, safety, and cost.
  - Use road standards that minimize impacts for grade and alignment (e.g., width, turning radius, and maximum slope).
  - Use low impact development treatments that reduce long-term maintenance needs wherever practicable.

- Design the road to maintain stable road prism, cut, and fill slopes.
  - Design cut and fill slope ratios to reduce soil loss from mass failures.
  - Use structural or nonstructural measures as necessary to stabilize cut and fill slopes.

- Design the road surface drainage system to intercept, collect, and remove water from the road surface and surrounding slopes in a manner that minimizes concentrated flow in ditches, culverts, and over fill slopes and road surfaces.
  - Use structural or nonstructural measures suitable to the road materials, road gradient, and expected traffic levels.
  - Use an interval between drainage features that is suitable for the road gradient, surface material, and climate.
  - Use suitable measures to avoid or minimize erosion of ditches.

- Design the road subsurface drainage system to intercept, collect, and remove groundwater that may flow into the base course and subgrade, lower high-water tables, and drain water pockets.
  - Use suitable subsurface dispersion or collection measures to capture and disperse locally shallow groundwater flows intercepted by road cuts.
  - Use suitable measures to release groundwater into suitable areas without causing erosion or siltation.

- Design the road for minimal disruption of natural drainage patterns and to minimize the hydrologic connection of the road segment or network with nearby waterbodies.
  - Use suitable structural or nonstructural measures to avoid or minimize gully formation and erosion of fill slopes at outfalls of road surface drainage structures.

- Use suitable measures to avoid, to the extent practicable, or minimize direct discharges from road drainage structures to nearby waterbodies.
- Provide sufficient buffer distance at the outfalls of road surface drainage structures for water to infiltrate before reaching the waterbody.
- Use applicable practices to limit the number and length of water crossing connected areas to the extent practicable.

- Design road surface treatment to support wheel loads, stabilize the roadbed, reduce dust, and control erosion consistent with anticipated traffic and use.
  - Consider whether road closures or roadway surface drainage and erosion protection can adequately mitigate adverse effects to soil, water quality, and riparian resources.
- Design roads within the AMZ (when no practicable alternative exists outside of the AMZ to achieve access objectives) to maintain desired conditions, goals, and objectives for AMZ structure, function, and processes.
  - Use suitable measures to minimize or mitigate effects to waterbodies and other sensitive areas when adverse impacts cannot be practicably avoided.
- Design waterbody crossings to avoid or minimize adverse effects to soil, water quality, and riparian resources to the extent practicable consistent with road use, legal requirements, and cost considerations.

Road Construction & Reconstruction

- Use suitable construction techniques to create stable fills.
  - Use full bench construction techniques or retaining walls where stable fill construction is not possible.
  - Avoid incorporating woody debris in the fill portion of the road prism.
  - Leave existing rooted trees or shrubs at the toe of the fill slope to stabilize the fill.
  - Avoid use of road fills for water impoundment dams unless specifically designed for that purpose.
- Identify and locate waste areas before the start of operations.
  - Deposit and stabilize excess and unsuitable materials only in designated sites.
  - Do not place such materials on slopes with a risk of excessive erosion, sediment delivery to waterbodies, mass failure, or within the AMZ.
  - Provide adequate surface drainage and erosion protection at disposal sites.
- Do not permit side-casting within the AMZ.
  - Avoid or minimize excavated materials from entering waterbodies or AMZs.

- Reconstruct existing roads to the degree necessary to provide adequate drainage and safety.
    - Avoid disturbing stable road surfaces.
    - Use suitable measures to avoid, to the extent practicable, or minimize direct discharges from road drainage structures to nearby waterbodies.

Road Storage & Decommissioning

Road Storage

- Evaluate all stream and waterbody crossings for potential for failure or diversion of flow if left without treatment.
    - Use suitable measures to reduce the risk of flow diversion onto the road surface.
    - Consider leaving existing crossings in low-risk situations where the culvert is not undersized, does not present an undesired passage barrier to aquatic organisms, and is relatively stable.
    - Remove culverts, fill material, and other structures that present an unacceptable risk of failure or diversion.
    - Reshape the channel and streambanks at the crossing-site to pass expected flows without scouring or ponding, minimize potential for undercutting or slumping of streambanks, and maintain continuation of channel dimensions and longitudinal profile through the crossing site.
    - Use suitable measures to avoid or minimize scour and downcutting.
- Use suitable measures to ensure that the road surface drainage system will intercept, collect, and remove water from the road surface and surrounding slopes in a manner that reduces concentrated flow in ditches, culverts, and over fill slopes and road surfaces without frequent maintenance.
- Use suitable measures to stabilize unstable road segments, seeps, slumps, or cut or fill slopes where evidence of potential failure exists.

Road Conversion to Trail

- Reclaim unneeded road width, cut, and fill slopes when converting a road for future use as a trail.
- Use suitable measures to stabilize reclaimed sections to avoid or minimize undesired access and to restore desired ecologic structures or functions.
- Use suitable measures to ensure that surface drainage will intercept, collect, and remove water from the trail surface and surrounding slopes in a manner that minimizes concentrated flow and erosion on the trail surfaces without frequent maintenance.
- Use applicable practices to provide waterbody crossings suitable to the expected trail uses.

Road Decommissioning

- Use existing roads identified for decommissioning as skid roads in timber sales or land stewardship projects before closing the road, where practicable, as the opportunity arises.
- Evaluate risks to soil, water quality, and riparian resources and use the most practicable, cost effective treatments to achieve long-term desired conditions and water quality management goals and objectives.
- Use applicable practices for stormwater management and erosion control when obliterating system roads.
- Implement suitable measures to re-establish stable slope contours and surface and subsurface hydrologic pathways where necessary to the extent practicable to avoid or minimize adverse effects to soil, water quality, and riparian resources.
    - Remove drainage structures.
    - Recontour and stabilize cut slopes and fill material.
    - Reshape the channel and streambanks at crossing sites to pass expected flows without scouring or ponding, minimize potential for undercutting or slumping of streambanks, and maintain continuation of channel dimensions and longitudinal profile through the crossing site.
    - Restore or replace streambed materials to a particle size distribution suitable for the site.
    - Restore floodplain function.
- Implement suitable measures to promote infiltration of runoff and intercepted flow and desired vegetation growth on the road prism and other compacted areas.
- Use suitable measures in compliance with local direction to prevent and control invasive species.

Stream Crossings

- Design and locate crossings to minimize disturbance to the waterbody.
- Use suitable measures to locate, construct, and decommission or stabilize bypass roads to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.
- Use suitable surface drainage and roadway stabilization measures to disconnect the road from the waterbody to avoid or minimize water and sediment from being channeled into surface waters and to dissipate concentrated flows.
- Use suitable measures to avoid, minimize, or mitigate damage to the waterbody and banks when transporting materials across the waterbody or AMZ during construction activities.

Stream Crossings

- Locate stream crossings where the channel is narrow, straight, and uniform, and has stable soils and relatively flat terrain to the extent practicable.
    - Select a site where erosion potential is low.
    - Orient the stream crossing perpendicular to the channel to the extent practicable.
    - Keep approaches to stream crossings to as gentle a slope as practicable.
    - Consider natural channel adjustments and possible channel location changes over the design life of the structure.
- Design the crossing to pass a normal range of flows for the site.
    - Design the crossing structure to have sufficient capacity to convey the design flow without appreciably altering streamflow characteristics.
    - Install stream crossings to sustain bankfull dimensions of width, depth, and slope and maintain streambed and bank resiliency and continuity through the structure.
- Bridge, culvert, or otherwise design road fill to prevent restriction of flood flows.
    - Use site conditions and local requirements to determine design flood flows.
    - Use suitable measures to protect fill from erosion and to avoid or minimize failure of the crossing at flood flows.
    - Use suitable measures to provide floodplain connectivity to the extent practicable.
- Use suitable measures to avoid or minimize scour and erosion of the channel, crossing structure, and foundation to maintain the stability of the channel and banks.
- Design and construct the stream crossing to maintain the desired migration or other movement of fish and other aquatic life inhabiting the waterbody.
    - Consider the use of bottomless arch culverts where appropriate to allow for natural channel migration and desired aquatic organism passage.
    - Install or maintain fish migration barriers only where needed to protect endangered, threatened, sensitive, or unique native aquatic populations, and only where natural barriers do not exist.
    - Use stream simulation techniques where practicable to aid in crossing design.

Bridges

- Use an adequately long bridge span to avoid constricting the natural active flow channel and minimize constriction of any overflow channel.
- Place foundations onto nonscour-susceptible material (e.g., bedrock or coarse rock material) or below the expected maximum depth of scour.

- Set bridge abutments or footings into firm natural ground (e.g., not fill material or loose soil) when placed on natural slopes.
- Use suitable measures as needed in steep, deep drainages to retain approach fills or use a relatively long bridge span.
- Avoid placing abutments in the active stream channel to the extent practicable.
- Place in-channel abutments in a direction parallel to the streamflow where necessary.
- Use suitable measures to avoid or minimize, to the extent practicable, damage to the bridge and associated road from expected flood flows, floating debris, and bedload.
- Inspect the bridge at regular intervals and perform maintenance as needed to maintain the function of the structure.

Culverts

- Align the culvert with the natural stream channel.
- Cover culvert with sufficient fill to avoid or minimize damage by traffic.
- Construct at or near natural elevation of the streambed to avoid or minimize potential flooding upstream of the crossing and erosion below the outlet.
- Install culverts long enough to extend beyond the toe of the fill slopes to minimize erosion.
- Use suitable measures to avoid or minimize water from seeping around the culvert.
- Use suitable measures to avoid or minimize culvert plugging from transported bedload and debris.
- Regularly inspect culverts and clean as necessary.

Low-Water Crossings

- Consider low-water crossings on roads with low traffic volume and slow speeds, and where water depth is safe for vehicle travel.
- Consider low-water crossings to cross ephemeral streams, streams with relatively low baseflow and shallow water depth or streams with highly variable flows or in areas prone to landslides or debris flows.
- Locate low-water crossings where streambanks are low with gentle slopes and channels are not deeply incised.
- Select and design low-water crossing structures to maintain the function and bedload movement of the natural stream channel.
- Locate unimproved fords in stable reaches with a firm rock or gravel base that has sufficient load-bearing strength for the expected vehicle traffic.

- Construct the low-water crossing to conform to the site, channel shape, and original streambed elevation and to minimize flow restriction, site disturbance, and channel blockage to the extent practicable.
- Use suitable measures to stabilize or harden the streambed and approaches, including the entire bankfull width and sufficient freeboard, where necessary to support the design vehicle traffic Use vented fords with high vent area ratio to maintain stream function and aquatic organism passage.
- Construct the roadway-driving surface with material suitable to resist expected shear stress or lateral forces of water flow at the site.
- Consider using temporary crossings on roads that provide short-term or intermittent access to avoid, minimize, or mitigate erosion, damage to streambed or channel, and flooding.
- Design and install temporary crossings suitable for the expected users, loads, and timing of use.
- Design and install temporary crossing structures to pass a design storm determined based on local site conditions and requirements.
- Install and remove temporary crossing structures in a timely manner as needed to provide access during use periods and minimize risk of washout.
- Use suitable measures to stabilize temporary crossings that must remain in place during high runoff seasons.
- Monitor temporary crossings regularly while installed to evaluate condition.
- Remove temporary crossings and restore the waterbody profile and substrate when the need for the crossing no longer exists.

Standing Water and Wetland Crossings

- Disturb the least amount of area as practicable when crossing a standing waterbody.
- Provide for sufficient cross drainage to minimize changes to, and avoid restricting, natural surface and subsurface water flow of the wetland under the road to the extent practicable.
    - Locate and design roads or road drainage to avoid dewatering or polluting wetlands.
    - Avoid or minimize actions that would significantly alter the natural drainage for flow patterns on lands immediately adjacent to wetlands.
- Use suitable measures to increase soil-bearing capacity and reduce rutting from expected vehicle traffic.
- Construct fill roads only when necessary.
    - Construct fill roads parallel to water flow and to be as low to natural ground level as practicable.

- Construct roads with sufficient surface drainage for surface water flows.

Transportation Effects

Road Definitions and Descriptions

Expected Traffic

- Traffic during periods outside intensive timber management activities has been identified.
- None ~ Area closed to motorized traffic. Very limited administrative use can be expected.
- Low ~ Traffic less than 2 SADT (Seasonal Average Daily Traffic) is expected consisting of Forest Service administrative, permittee and motorized recreation.
- Medium ~ 2-20 SADT is expected. These roads access larger areas where higher administrative, permittee and dispersed recreational traffic would occur. These roads also offer access to private or forest developments which would create higher traffic volumes.
- High ~ Greater than 20 SADT is expected. These roads provide primary access through the project area or into developed Forest recreation sites.

Maintenance

Maintenance level (ML) ~ Defined in FSH 7709.58, 10, 12. 3 as the level of service provided by, and maintenance required for, a specific road. Maintenance levels must be consistent with road management objectives, and maintenance criteria. Roads may be maintained at one level and planned to be maintained at a different level at some future date. The operational maintenance level is the maintenance level currently assigned to a road considering today's needs, road condition, budget constraints, and environmental concerns; in other words, it defines the standard to which the road is currently being maintained. The objective maintenance level is the maintenance level to be assigned at a future date considering future road management objectives, traffic needs, budget constraints, and environmental concerns.

Maintenance level 1 road ~ Defined in FSH 7709.58, 10, 12. 3 as intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are "prohibit" and "eliminate." Roads receiving level 1 maintenance may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic, but may be open and suitable for nonmotorized uses. These roads have the following attributes: (1) vehicular traffic is eliminated, including administrative traffic; (2) physically blocked or entrance is Final Environmental Impact Statement 395 disguised; (3) not subject to the requirements of the Highway Safety Act; (4) maintenance is done only to minimize resource impacts; and (5) no maintenance other than a condition survey may be required so as long as no potential exists for resource damage.

Maintenance level 2 road ~ Defined in FSH 7709.58, 10, 12.3 as roads open for use by high-clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are

either (1) discourage or prohibit passenger cars or (2) accept or discourage high-clearance vehicles. These roads have the following attributes: (1) low traffic volume and low speed; (2) typically local roads; (3) typically connect collectors and other local roads; (4) dips are the preferred drainage treatment; (5) not subject to the requirements of the Highway Safety Act; (6) surface smoothness is not a consideration; and (7) not suitable for passenger cars.

Maintenance level 3 road ~ Defined in FSH 7709.58, 10, 12.3 as roads open and maintained for travel by prudent drivers in a standard passenger car. User comfort and convenience are low priorities. Roads in this maintenance level are typically low speed, single lane with turnouts, and spot surfacing. Some roads may be fully surfaced with either native or processed material. Appropriate traffic management strategies are either "encourage" or "accept." "Discourage" or "prohibit" strategies may be employed for certain classes of vehicles or users. These roads have the following attributes: (1) subject to the requirements of the Highway Safety Act and Manual of Uniform Traffic Control Devices (MUTCD); (2) roads have low to moderate traffic volume; (3) typically connect arterial and collector roads; (4) a combination of dips and culverts provide drainage; (5) may include some dispersed recreation roads; and (6) potholing or washboarding may occur.

Maintenance level 4 road ~ Defined in FSH 7709.58, 10, 12.3 as roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated. The most appropriate traffic management strategy is "encourage." However, the "prohibit" strategy may apply to specific classes of vehicles or users at certain times. These roads have the following attributes: (1) subject to requirements of the Highway Safety Act and MUTCD; (2) roads have moderate traffic volume and speeds; (3) may connect to county roads; (4) culverts provide drainage; (5) usually a collector; and (6) may include some developed recreation roads.

Maintenance level 5 road ~ Defined in FSH 7709.58, 10, 12.3 as roads that provide a high degree of user comfort and convenience. These roads are normally double-lane, paved facilities. Some may be aggregate surfaced and dust abated. The appropriate traffic management strategy is "encourage." These roads have the following attributes: (1) subject to the requirements of the Highway Safety Act and MUTCD; (2) highest traffic volume and speeds; (3) typically connect State and county roads; (4) culverts provide drainage; (5) usually arterial and collector; (6) may include some developed recreation roads; and (7) usually paved or chip-sealed.

Mixed-use road ~ Segments of National Forest System roads that are identified and signed as open to state licensed and unlicensed vehicles; generally more than 50 inches in width and usually, but not always, low maintenance roads with no high-speed traffic.

Motor vehicle ~ Any vehicle which is self-propelled, other than: (a) a vehicle operated on rails; and (b) any wheelchair or mobility device, including one that is battery-powered, that is designed solely for use Black Hills National Forest Travel Management Plan 396 by a mobility-impaired person for locomotion, and that is suitable for use in an indoor pedestrian area (36 CFR 212.1).

Motor vehicle use map (MVUM) ~ A map reflecting designated roads, trails, and areas on an administrative unit or a ranger district of the National Forest System (36 CFR 212.1).

Motorized mixed use ~ Designation of a National Forest System road for use by both highway-legal and non-highway legal motor vehicles (FSM 7700).

Motorized trail ~ A travelway usually, but not always, less than 50 inches in width usually, but not always, available for use by all-terrain vehicles (ATVs) and/or motorcycles. These travelways may also be made available to high-clearance four-wheel drive vehicles, and may also be used by bicycles, horses, and hikers.

Road Types

National Forest System road ~ A forest road other than a road which has been authorized by a legally documented right-of-way held by a state, county, or local public road authority (36 CFR 212.1).

Unauthorized road or trail ~ A road or trail that is not a forest road or trail or a temporary road or trail and that is not included in a forest transportation atlas (36 CFR 212.1).

Unauthorized route ~ Could refer to either an unauthorized road or unauthorized trail, or (plural) both.

Road Classification

Arterial road ~ A National Forest System road that provides service to large land areas and usually connects with other arterial roads or public highways.

Collector road ~ A National Forest System road that services smaller areas than an arterial road and that usually connects arterial roads to local roads or terminal facilities.

Local road ~ A National Forest System road that connects a terminal facility with collector roads, arterial roads, or public highways and that usually serves a single purpose involving intermittent use.

Road Management Objectives (RMO) ~ RMOs document the intended purpose of an individual road in providing access to implement a land and resource management plan as well as decisions about applicable standards for the road. RMOs should be based on management area direction and access management objectives. RMOs contain design criteria, operation criteria, and maintenance criteria. (FSM 7709.59.11)

Traffic Service Level ~ Describes the significant traffic characteristics and operating conditions of a road. (FSM 7705, FSH 7709.56, Chapter 4)

- Level G ~ Provides service for mixed traffic types offering passing room on the road. Safety is a prime concern with serious hazards identified to users. User costs are also a predominant consideration. Design limitations from topography is a factor which may reduce design speeds. A smooth and stable surface is provided. Oversize vehicular traffic would be regulated by permit.

- Level H ~ Provides service for mixed traffic. Congestion of traffic is anticipated. Topography is the predominate design factor. Safety considerations are incorporated into designs. Vehicle types may be managed to limit traffic. A stable surface shall be provided for the predominant traffic type.

- Level I ~ Provides service for erratic volumes of traffic with limited user comfort and efficiency. Location is generally dictated by topography. Difficulty in negotiating these roads is anticipated for some vehicle types. Traffic controls may be implemented frequently. Some rutting and an irregular road surface may be present.

- Level J ~ Provides limited service to traffic. Intermittent and controlled use is anticipated. Some vehicles may not be able to negotiate the facility. Minimum safety features would be incorporated into designs. Topography would dictate location. A rough and irregular surface is expected. The primary purpose of these roads is for a single resource use.

Traffic Management Strategies ~ Options for managing traffic on NFS roads where appropriate to control traffic. Use one or a combination of the following five strategies for different modes of travel:

- Encourage use ~ Encourage use consistent with the condition of the road and its Road Management Objectives (FSH 7709.59).
- Accept use ~ Accept, but do not encourage, use by vehicles that are suitable for the road.
- Discourage use ~ Discourage some or all types of motor vehicle use.
- Eliminate use ~ Eliminate use by blocking access to the road by motor vehicles.
- Prohibit use ~ Prohibit motor vehicle use. (FSM 7731.11)

Decommission ~ Demolition, dismantling, removal, obliteration and/or disposal of a deteriorated or otherwise unneeded asset or component, including necessary cleanup work. This action eliminates the deferred maintenance needs for the fixed asset. Portions of an asset or component may remain if they do not cause problems nor require maintenance. (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998)

Road decommissioning ~ Activities that result in restoration of unneeded roads to a more natural state (FSM 7734). Decommissioning includes applying various treatments, which may include one or more of the following:

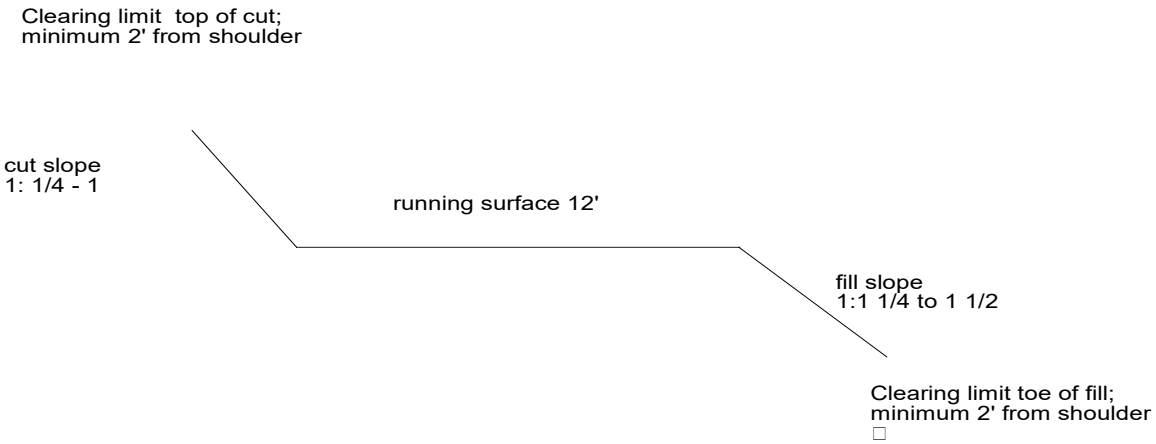
- Reestablishing former drainage patterns, stablizing slopes, and restoring vegetation;
- Blocking the entrance to a road; installing water bars;
- Removing culverts, reestablishing drainage-ways, removing unstable fills, pulling back road shoulders, and scattering slash on the roadbed;
- Completely eliminating the roadbed by restoring natural contours and slopes; or
- Other methods designed to meet the specific conditions associated with the unneeded roads.

Road Standards ~ Road standards were determined by anticipated traffic, maintenance and traffic management implementation. Aggregate surfacing would be utilized on road sections to protect soils and provide a more stable surface on roads serving large areas of the Forest. Figures 9 through 12 show typical road profiles for maintenance level 1, 2, 3, & 4 roads.

Figure 9 – Road Standard 1

These are minimum standard timber access roads. Season of use would be curtailed due to soil stability and drainage problems, which are expected seasonally. Generally used on short (less

than 1/2 mile) roads or roads with traffic restrictions or where timber haul is expected to be less than 1.0 MMBF per entry.



Features:

Surface: native

Turnouts: none

Grades: sustained 10%; pitches 500' to 16%

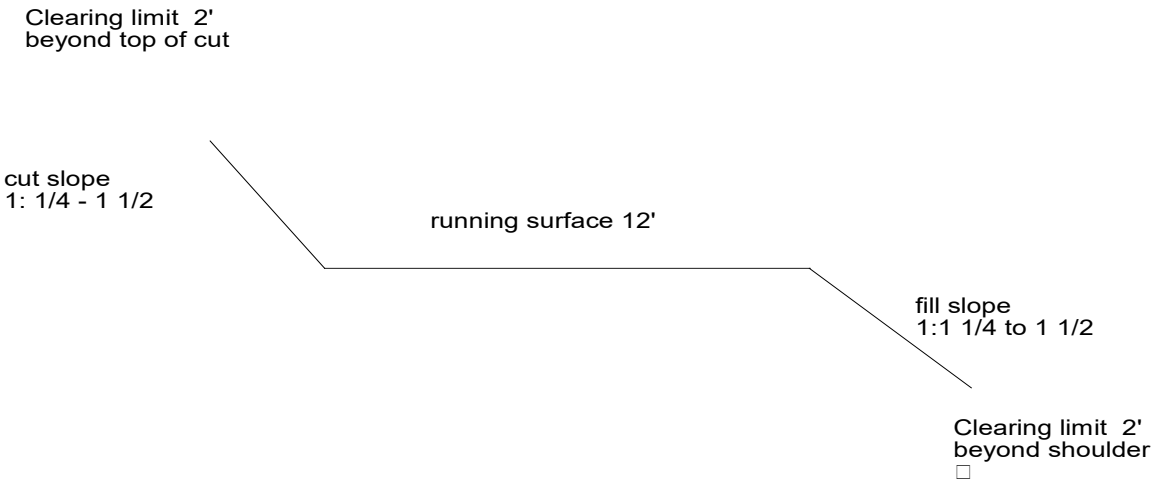
Curve widening: 400/R, maximum 4'

Curve radius: 50'

Drainage: rolling dips, low water crossings, metal pipes

Figure 10 – Road Standard 2

Timber access road where soil stability problems are anticipated with expected timber volumes. Road may or may not have travel restrictions. Used for roads expected to carry 0.5-1.5 MMBF/entry.



Surface: native, spot surfacing in deep unstable soils

Turnouts: at critical safety features (crests of grades)

Grades: sustained 10%, pitches 400' to 16%

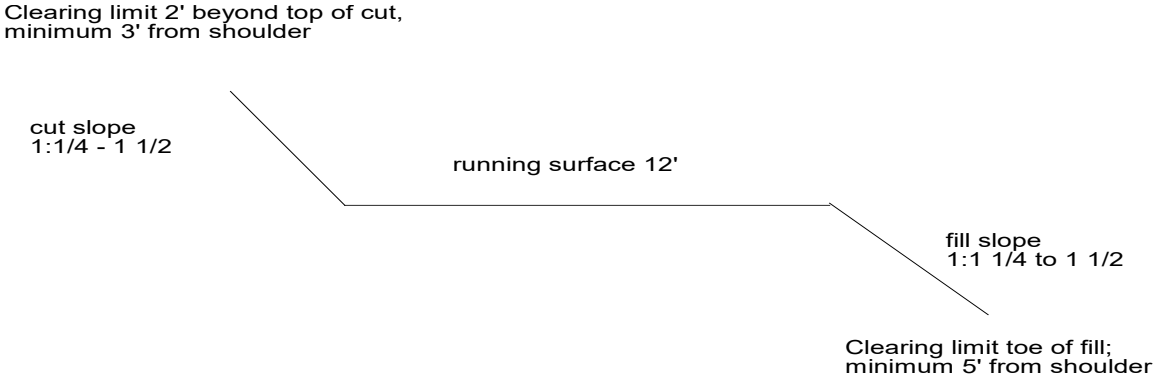
Curve widening: 400/R

Curve radius: 50'

Drainage: rolling dips, low water crossings, metal pipes

Figure 11 –Road Standard 3

This level of road standard is applied to roads where extensive timber haul is expected and where use may be important to maintaining logging continuity in the area or recreation roads where timber traffic is strictly regulated. Added safety features are needed for potential conflicts with mixed traffic.



Surface: aggregate where timber haul exceeds 3 MMBF reinforce deep unstable soils aggregate for user comfort of recreation access

Turnouts: 1500' maximum spacing

Grades: sustained 8%, pitches 400' to 15%

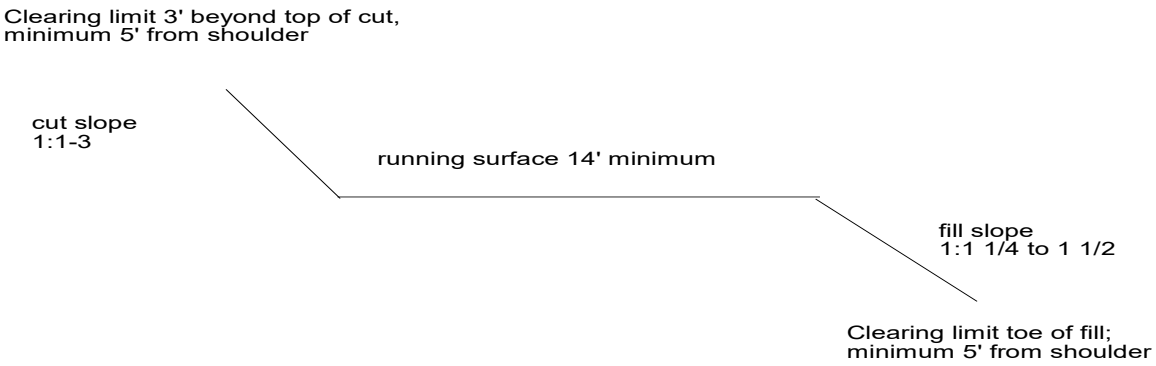
Curve widening: 400/R

Curve radius: 75'

Drainage: rolling dips, low water crossings, metal pipes

Figure 12 – Road Standard 4

Level 4 roads are those with high or medium traffic levels expected and user safety and comfort are the primary concerns.



Features:

Surface: aggregate or asphalt

Turnouts: inter-visible

Grades: sustained 8%, pitches to 300 feet 12%

Curve widening: 800/R

Curve radius: minimum 100 feet

Drainage: metal or concrete pipe or bridges

Level 5 roads meet the Standard of roads under the State or local county jurisdiction. Reconstruction activities would be evaluated as proposals are received from these agencies. Anticipated traffic, safety and land management needs would be considered.

Best Management Practices

33 C.F.R. § 323.4(a)(6) states that, "[c]onstruction or maintenance of farm roads, forest roads, or temporary roads for moving mining equipment, where such roads are constructed and maintained in accordance with best management practices (BMPs) to assure that flow and circulation patterns and chemical and biological characteristics of waters of the United States are not impaired, that the reach of the waters of the United States is not reduced, and that any adverse effect on the aquatic environment will be otherwise minimized. These BMPs which must be applied to satisfy this provision shall include those detailed BMPs described in the state's approved program description pursuant to the requirements of 40 CFR 233.22(i), and shall also include the following baseline provisions: **(NOTE: Items in bold print are engineering design guidelines or standard operating procedures as related to each BMP.)**

(i) Permanent roads (for farming or forestry activities), temporary access roads (for mining, forestry, or farm purposes) and skid trails (for logging) in waters of the United States shall be

held to the minimum feasible number, width, and total length consistent with the purpose of specific farming, silvicultural or mining operations, and local topographic and climatic conditions;

Reduce steep (greater than 10%) grades where possible. Consider seasonal or annual road and area closures to protect roads. Reference FSH 7709.56 Road Preconstruction Handbook for all design standards. Road Management Objectives, including road standards, maintenance level and travel management, are documented and approved for all roads. Minimize new construction. New roads are constructed to the minimum standard necessary for the type of use in accordance with FSH 7709.56. New road construction is closed following timber management activity unless documented and approved Road Management Objective states otherwise.

(ii) All roads, temporary or permanent, shall be located sufficiently far from streams or other water bodies (except for portions of such roads which must cross water bodies) to minimize discharges of dredged or fill material into waters of the United States;

Relocate roads out of bottoms to minimize impact in intermittent draws. Outlets of drainage devices provide for dispersion of water to dissipate flow. Catchment basins are of adequate size and location to prevent soil movement off the site. Minimize crossings of perennial streams. Consult with Forest hydrologist and fisheries biologist to develop the proper structure required for the stream characteristics, flow volume, soil type and drainage area. Placement of the structure shall be in accordance with State and Federal laws regarding construction in and near waterways, including placement of fill and measures to control sedimentation. Maintain a vegetative buffer as identified by Vbfr Equation between streams and parallel roads sufficient enough to eliminate movement of soil to the stream. Catchment basins are used where terrain permits. Fill slopes and other disturbed areas are revegetated. Road construction in non-wetland meadows is in accordance with the Forest Plan.

(iii) The road fill shall be bridged, culverted, or otherwise designed to prevent the restriction of expected flood flows;

Drainage devices are designed and installed in accordance with 33CFR323.4(a)(6) and applicable State BMPs and guidelines set forth in FSH 7709.56 Road Preconstruction Handbook and FSH 7709.56b Drainage Structures Handbook. Surface drainage devices include culverts, rolling dips and water diversion structures. Culverts and water diversion structures are generally considered for use on grades steeper than 10%. Culvert size and spacing are in accordance with the above mentioned Handbooks. Water diversion structures are spaced from 150' to 200' apart as needed on continuous grades. Culverts and stream crossings will be stabilized to the 100-year event. Rolling dips are spaced from 200' to 500' apart, on continuous grades without breaks, depending on soil type and road grade and may be plated with rocky material to protect the soil. Outlets of drainage devices provide for dispersion of water to dissipate flow. Catchment basins are of adequate size and location to prevent soil movement off the site. Subsurface drainage devices are in accordance with Handbook references. Aggregate surfaced roads shall be routinely maintained. Ditches that have revegetated may be bladed if they are not functioning as designed. Culverts and other drainage devices shall be cleaned of debris to ensure their function is maintained. Minimize crossings of perennial streams. Consult with Forest hydrologist and fisheries biologist to develop the proper structure required for

the stream characteristics, flow volume, soil type and drainage area. Placement of the structure shall be in accordance with State and Federal laws regarding construction in and near waterways, including placement of fill and measures to control sedimentation. Routinely maintain bridges and culverts to ensure unrestricted flow.

(iv) The fill shall be properly stabilized and maintained during and following construction to prevent erosion;

Rocky fills and geotextiles are used in marshy, wet areas when avoidance is not possible. Highly erodable soils, steep grades and flat areas may be protected by placement of aggregate on the roadbed. Depth of aggregate may vary depending on type of soil but 4" is generally the minimum depth applied to ensure proper bearing strength and soil protection. Where crossings of intermittent drainages, draws and valleys are proposed, 1' to 2' of rocky material or concrete cable mats may be used to protect the soil. Cut and fill slopes are seeded as soon as possible following completion of road template. Natural revegetation also occurs to supplement specified seeding. Aggregate surfaced roads shall be routinely maintained. Ditches that have revegetated may be bladed if they are not functioning as designed. Culverts and other drainage devices shall be cleaned of debris to ensure their function is maintained. Ensure fill slope protection with riprap, gabions, prompt seeding of slopes and/or other methods approved by the hydrologist, fisheries biologist and soil scientist. Placement of the structure shall be in accordance with State and Federal laws regarding construction in and near waterways, including placement of fill and measures to control sedimentation. Immediately repair damaged or eroded fill slopes.

(v) Discharges of dredged or fill material into waters of the United States to construct a road fill shall be made in a manner that minimizes the encroachment of trucks, tractors, bulldozers, or other heavy equipment within waters of the United States (including adjacent wetlands) that lie outside the lateral boundaries of the fill itself;

Placement of the structure shall be in accordance with State and Federal laws regarding construction in and near waterways, including placement of fill and measures to control sedimentation. Maintain a vegetative buffer as identified by Vbfr Equation between streams and parallel roads sufficient enough to eliminate movement of soil to the stream. Catchment basins are used where terrain permits. Fill slopes and other disturbed areas are revegetated. Construction equipment will not operate in vegetative buffer except as necessary to construct fills. Properly permitted (by Corps of Engineers) discharge of fill or dredged material into waters of the United States will be performed with minimal encroachment of construction equipment outside the fill itself. Minimize disturbance of vegetation in waters of the United States during construction and maintenance of roads.

(vi) In designing, constructing, and maintaining roads, vegetative disturbance in the waters of the United States shall be kept to a minimum;

Cut and fill slopes are seeded as soon as possible following completion of road template. Natural revegetation also occurs to supplement specified seeding. Aggregate surfaced roads shall be routinely maintained. Ditches that have revegetated may be bladed if they are not functioning as designed. Culverts and other drainage devices shall be cleaned of debris to ensure their function is

maintained. Minimize crossings of perennial streams. Consult with Forest hydrologist and fisheries biologist to develop the proper structure required for the stream characteristics, flow volume, soil type and drainage area. Placement of the structure shall be in accordance with State and Federal laws regarding construction in and near waterways, including placement of fill and measures to control sedimentation. Routinely maintain bridges and culverts to ensure unrestricted flow. Construction equipment will not operate in vegetative buffer except as necessary to construct fills. Minimize disturbance of vegetation in waters of the United States during construction and maintenance of roads.

(vii) The design, construction and maintenance of the road crossing shall not disrupt the migration or other movement of those species of aquatic life inhabiting the water body;

Placement of the structure shall be in accordance with State and Federal laws regarding construction in and near waterways, including placement of fill and measures to control sedimentation.

(viii) Borrow material shall be taken from upland sources whenever feasible;

Borrow material needed for road construction will be taken from upland areas. Also, discharge of waste material from maintenance of drainage structures shall be placed at upland sites.

(ix) The discharge shall not take, or jeopardize the continued existence of, a threatened or endangered species as defined under the Endangered Species Act, or adversely modify or destroy the critical habitat of such species;

The presence of Threatened and Endangered Species and their habitat is identified in Project Area analysis. Seasonal and/or annual road closures for wildlife considerations are identified in Travel Management documentation.

(x) Discharges into breeding and nesting areas for migratory waterfowl, spawning areas, and wetlands shall be avoided if practical alternatives exist;

Marshy, wet areas are avoided where possible. Rocky fills and geotextiles are used in marshy, wet areas when avoidance is not possible. Placement of the structure shall be in accordance with State and Federal laws regarding construction in and near waterways, including placement of fill and measures to control sedimentation. Immediately repair damaged or eroded fill slopes. Maintain a vegetative buffer as identified by Vbfr Equation between streams and parallel roads sufficient enough to eliminate movement of soil to the stream. Catchment basins are used where terrain permits. Fill slopes and other disturbed areas are revegetated. Road construction in non-wetland meadows is in accordance with the Forest Plan.

(xi) The discharge shall not be located in the proximity of a public water supply intake;

Specific mitigation measures would apply to municipal watersheds if utilized.

(xii) The discharge shall not occur in areas of concentrated shellfish production;

There are no areas of concentrated shellfish production on the Black Hills National Forest.

(xiii) The discharge shall not occur in a component of the National Wild and Scenic River System;

There are no components of the National Wild and Scenic River System on the Black Hills National Forest.

(xiv) The discharge of material shall consist of suitable material free from toxic pollutants in toxic amounts;

Materials to be used will be manufactured from non-contaminated sources.

(xv) All temporary fills shall be removed in their entirety and the area returned to its original elevation.

Under Public Works, compliance will be enforced by use of FAR clause 52.223-2 by the authorized contract personnel. Under timber sales, compliance will be ensured by enforcement of timber sale contract clauses (such as B6.62 and C6.62#) by designated timber sale contract personnel. All temporary structures (including fills) to be removed as part of specified work will be enforced from specifications and project notes contained and referenced in the contract.

Recreation Effects: ROS Crosswalk

Table 1: Roads open for Motorized Use

	Alt 1		Alt 2				Alt 3					
	Miles	IRA	Miles	IRA	Difference		Miles	IRA	Difference from Alt 2		Difference from Alt 1	
						IRA				IRA		IRA
Miles open to motorized use	*918.72	117.14	*929.98	116.8	11.26	-0.34	*929.5	118.01	-0.48	1.21	10.78	0.87
Non-compliant ROS	*1.39*	*0.29*	*1.39*	*0.29*	*0*	*0*	*1.39*	*0.29*	*0*	*0*	*0*	*0*
Compliant ROS	*840.10*	*116.85*	*854.68*	*116.51*	*14.58*	*-0.34*	*835.07*	*117.72*	*-19.61*	*1.21*	*-5.03*	*0.87*
**Mileage includes No Data (Non FS lands, or GIS analysis)*												

	Alt 1		Alt 2				Alt 3					
	Miles	IRA	Miles	IRA	Difference		Miles	IRA	Difference From Alt 2		Difference From Alt 1	
						IRA				IRA		IRA
Open to all	0	0	*139.92	13.38	139.92	13.38	*39.16	1.75	-100.76	-11.63	39.16	1.75
Non-compliant ROS	0	0	0	0	0	0	0	0	0	0	0	0
Compliant ROS	0	0	139.24	13.38	139.24	13.38	35.66	1.75	-103.58	-11.63	35.66	1.75
64″	0	0	40.03	1.27	40.03	1.27	*120.30	14.7	80.27	13.43	120.3	14.7
Non-compliant ROS	0	0	0	0	0	0	0	0	0	0	0	0
Compliant ROS	0	0	40.03	1.27	40.03	1.27	120.09	14.7	80.06	13.43	120.09	14.7
50″	*33.84	7.45	*15.87	7.75	-17.97	0.3	*36.01	7.45	20.14	7.15	2.17	0
Non-compliant ROS	0.07	0	0.07	0	0	0	0.07	0	0	0	0	0

Compliant ROS	33.53	7.45	15.56	7.75	-17.97	0.3	35.57	7.45	20.01	7.15	2.04	0
Single Track	2.04	1.87	2.04	1.87	0	0	2.04	1.87	0	1.87	0	0
Non-compliant ROS	0	0	0	0	0	0	0	0	0	0	0	0
Compliant ROS	2.04	1.87	2.04	1.87	0	0	2.04	1.87	0	1.87	0	0
*Mileage includes No Data (Non FS lands, or GIS analysis)												

Table 2: Subpart C – OSV Trails

	Alt 1	Alt 2		Alt 3		
			Difference		Difference from Alts 1 and 2	
					Alt 2	Alt 1
Open to OSV (acres)	522,970	521,616	-1,354	*512,442	-9,174	-10,528
Non-compliant ROS	*152,942*	*152,908*	-34	*143,841*	-9,067	-9,101
Compliant ROS	*370,028*	*368,708*	-1,320	*368,601*	-107	-1,427
Groomed (miles)	*201.19	*201.19	0	*201.20	0.01	0.01
Non-compliant ROS	*8.95*	*8.95*	0	*8.95*	0	0
Compliant ROS	*179.45*	*179.45*	0	*179.45*	0	0
Ungroomed	*87.69	*97.82	10.13	*87.69	-10.13	0
Non-compliant ROS	*21.68*	24.40	2.72	*21.68*	-2.72	0
Compliant ROS	*64.78*	*71.92*	7.14	*64.78*	-7.14	0
**Mileage includes No Data (Non FS lands, or GIS analysis)*						

Available Sampling Data Relevant to the High Lakes Wilderness Study

Available data collected intermittently over the last two decades helps to illustrate general usage in the area. The Forest Service conducted limited monitoring prior to Plan Revision during the 2000s, tracking OSV usage from two locations: the Pilot Peak Trailhead and from the junction of the Chief Joseph Scenic Highway and the Beartooth All-American Road. Data was collected via trail counters, which log any time a person crosses the counter (therefore, the actual number may reflect people leaving and returning). Data collection was not standardized, unfortunately, and information is not available for each location for every year or month. (Table 3)

Table 3: OSV Monitoring Data for the Clarks Fork Ranger District during the 2000s

Season	**Month**	**HWY 212 and HWY 296 Junction**	**Pilot Creek TH**	**Notes**
2004 - 2005	Nov	N/A	1488	
2004 - 2005	Dec	N/A	6550	
2004 - 2005	Jan	N/A	5050	
2004 - 2005	Feb	N/A	5800	
2004 - 2005	March	N/A	4500	

Season	Month	HWY 212 and HWY 296 Junction	Pilot Creek TH	Notes
2004 - 2005	April	N/A	2500	
2005 - 2006	Nov	N/A	3300	
2005 - 2006	Dec	N/A	7000	
2005 - 2006	Jan	N/A	5000	
2005 - 2006	Feb	N/A	N/A	
2005 - 2006	March	N/A	N/A	
2005 - 2006	April	N/A	N/A	
2006 - 2007	Nov	480	N/A	Recorded from 11/16 to 11/30
2006 - 2007	Dec	4415	N/A	Recorded from 12/12 to 12/28
2006 - 2007	Jan	3260	N/A	Recorded from 12/28 to 1/26
2006 - 2007	Feb	4469	N/A	Recorded from 2/3 to 2/24
2006 - 2007	March	1806	N/A	Recorded from 2/24 to 3/10
2006 - 2007	April	3017	N/A	Recorded from 3/10 to 4/17
2007 - 2008	Nov	N/A	N/A	
2007 - 2008	Dec	N/A	N/A	
2007 - 2008	Jan	N/A	N/A	
2007 - 2008	Feb	2434	5973	Recorded from 02/03 to 03/02
2007 - 2008	March	1152	2568	Recorded from 03/02 to 03/23
2007 - 2008	April	N/A	N/A	

In the build-up to the LMP revision, the Forest Service revised its monitoring, shifting locations from the Pilot Creek TH and the Highway Junction to Beartooth Lake and Island Lake. The shift in location provided a potentially more accurate vantage point from which to evaluate OSV usage in the HLWSA: both Beartooth Lake and Island Lake are situated just outside the southern boundary of the HLWSA, with ready access into the area. Similar trail counters as deployed at the Pilot Creek TH and Highway Junction were used to collect usage statistics. In the 2013 – 14 season, 1,013 visits were counted in the area; in the 2014 – 2015 season, 374 visits (Forest Service Communication from Julie Lyons to Susan Eickhoff (January 25, 2016)).[1] Additional data from the 2017 - 2018 season indicated up to 2,477 visits to the area (assuming that visits to Beartooth Lake and Island Lake were unique visitors).[2] (Table 4)

Table 4: OSV Visit Counters at Beartooth Lake and Island Lake for 2018-2019 Winter

Date	Beartooth Lake	Island Lake
1/2/2018	Installed	Not recorded
2/3/2018	Not recorded	Installed
2/8/2018	Not recorded	168
2/16/2018	800	71

[1] Location data similar to that included in Table 4 is unavailable for these seasons.
[2] Data from the 2018 – 2019 season is not representative due to the effects of the government furlough on staff availability to perform duties associated with data collection.

2/23/2018	437	197
3/10/2018	Not recorded	157
3/12/2018	235	31
3/23/2018	73	14
4/11/2018		189
5/2/2018	105	Not recorded
Total	1650	827

The Forest Service can extrapolate some general trends of usage when comparing the 2477 counted OSVs for the 2018- 2019 winter season (totaled from the separate counters at Beartooth Lake and Island Lake) with data collected from a separate study in the 1978 - 1979 and 1979 - 1980 winters. That prior study was conducted to support an environmental assessment for snowmobile use between Cooke City, Montana, and the Beartooth Plateau in Wyoming. Data on use in that EA was developed by the Wyoming Recreation Commission. That commission had conducted annual use studies to "obtain an indication of actual snowmobile use in the area." The Commission obtained these data during grooming operations between the Wyoming/Montana state line and Island Lake along U.S. Highway 212. The data cited in the EA showed the following use patterns:

Table 5: Data from Clarks Fork Snowmobile Trail Environmental Assessment (Forest Service, 1982)

Annual Season	Days of Grooming	Counted OSVs	Period	Counted Skiers
1978 – 1979	41	1315	01/08/1979 – 04/08/1979	34
1979 – 1980	55	1702	12/08/1979 – 04/15/1980	11
1980 – 1981*	Not Available	2472	N/A	Not Available

*The EA attributes the large increase in the 1980-1981 season to low snow fall across the region, with snowmobilers traveling to the higher elevation area of the High Lakes to recreate.

These data provide very rough estimates for usage rates during the 1980s along U.S. Highway 212, a primary route from which snowmobilers often access the HLWSA (including via the Northern Trail, which branches from U.S. Highway 212, and from the Beartooth Lake and Island Lake access points more recently monitored by the Forest Service). Available data do suggest outlier years (such as the low during the 2014 - 2015 winter and the high during the 1980 - 1981 winter), but the recent data combined with data from the 1970s and 1980s provide us with general ideas of OSV usage along and off of U.S. Highway 212. Additionally, normalizing counted vehicles by the number of days during which visits were tracked illustrates that usage rates have stayed roughly the same since the 1970s. (Table 6)

Table 6: Snowmobile Counts, Including Counts by Days, by Year

Year	Snowmobiles	Days Counted	Counts/Day
1979	1315	91	14.45
1980	1702	130	13.09
1981	2472	Not Recorded	Not Available
2014	1013	Not Recorded	Not Available
2015	374	Not Recorded	Not Available

2018	2477	121	20.47

These data indicate that use patterns may have increased since the 1970s. But these data have severe limitations: sampling methodology, locations, and consistency of data collection are all different. Indeed, even examining the Forest Service's most recent data limitations are apparent: the monitoring protocols differ year-to-year and month-to-month, with data missing for many time periods (and the additional change in location of trail counters further complicates any interpretation of the data). These usage statistics can inform decision-making, but should not drive decision-making.

Other studies have broadly examined patterns of use and economic effects associated with the HLWSA. (Jorgensen et al. 2013; Nagler et al. 2012) These studies reflect the broad usage rates for the area, demonstrating that the area features as a destination for OSV use both for in-state and out-of-state users. However, documented frequency, intensity, and duration of OSV use within the HLWSA is largely unavailable. Places traveled to, routes taken, and other information is not available. The available information—both the data counting use and survey results—provide a general picture of use within the area.

SNOTEL Site Locations on the Shoshone National Forest

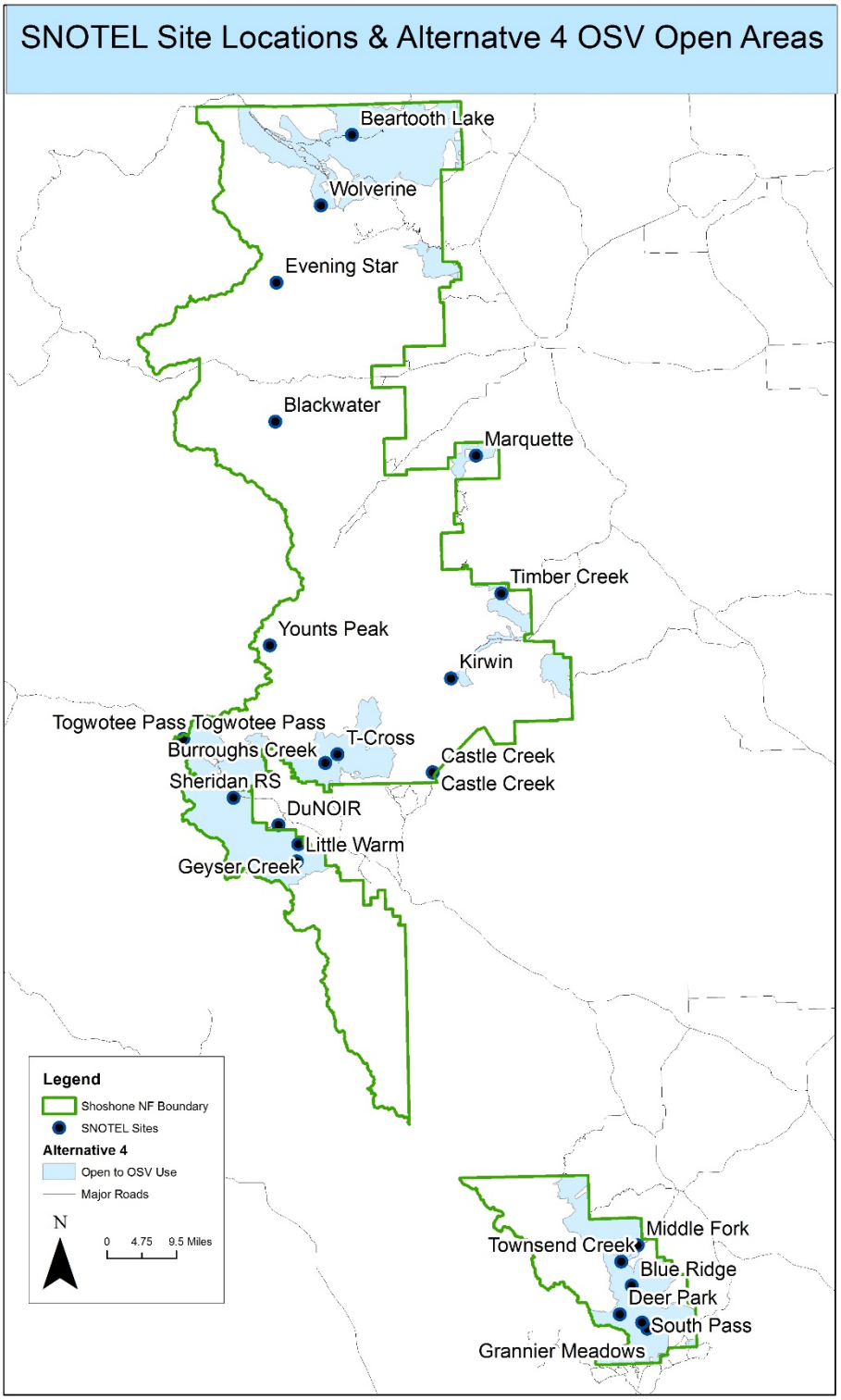


Figure 1: Map of SNOTEL Site locations on the Shoshone National Forest, includes areas open to OSV use under Alternative 4.