APPENDIX 2

Lava Environmental Assessment - Best Management Practices for water quality protection

BMP Title (2012 National Core BMP Technical Guide)	Objective	Explanation	Implementation and Responsibility	Project Details and Project Design Criteria (PDC)	Ability to Implement	Effectiveness	Monitoring
Plan-2. Project Planning and Analysis	Use the project planning, environmental analysis, and decision making processes to incorporate water quality management BMPs into project design and implementation.	The project planning, environmental analysis, and decision making process is the framework for incorporating water quality management BMPs into project design and implementation. The process should identify likely direct, indirect, or cumulative impacts from the proposed project or management activities on soils, water quality, and riparian resources in the project area. Project documents (plans, contracts, permits, etc.) should include site-specific BMP prescriptions to meet water quality objectives as directed by the environmental analysis. Project planning should ensure that activities are consistent with land management plan direction; State BMPs, floodplain, wetland, coastal zone; and other requirements including CWA 401 certification, CWA 402 permits, and CWA 404 permits; wilderness or wild and scenic river designations; and other Federal, State, and local rules and regulations.	Hydrologists, fish biologists, geologists, and soil scientists evaluate watershed characteristics and estimate response to proposed activities. The project is designed to include site-specific prescriptions for each area of water quality concern. The subsequent contract would include provisions to meet water quality criteria and other resource protection requirements as provided by the EA. The Forest Service Contracting Officer or his/her designee would monitor the implementation of the PDCs during construction and operations on regular basis and would have the authority to provide direction and/or take action if construction or	Throughout the planning process The IDT reviewed the list of recommended methods from the BMP Technical Guide and developed project level PDCs based on the methods where applicable and PDC D-1, D-2	High	High based on experience and fact	Monitored throughout the NEPA planning process. The project will be in a pool of timber/stewardship sale projects where District Rangers will conduct a “Plan in Hand” review on a minimum of one timber/stewardship sale within each zone every other year. The goal of the review is to monitor and evaluate forest resource management prescriptions to measure compliance with goals and objectives, determine effects, and adjust subsequent management actions when needed as required by Forest Service Manual direction. The Forest Service Contracting Officer or his/her designee would monitor the implementation of the PDCs, as described in implementation and responsibility. This project would go into a pool of similar projects to be selected for project level BMP

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			operations are not conducted according to the PDC				implementation and effectiveness monitoring as per the National BMP Monitoring Protocol. If selected an IDT would evaluate whether the site-specific BMPs were implemented and the effectiveness of the BMPs.

BMP Title (2012 National Core BMP Technical Guide)	Objective	Explanation	Implementation and Responsibility	Project Details and Project Design Criteria (PDC)	Ability to Implement	Effectiveness	Monitoring
Plan-3. Aquatic Management Zone Planning	To maintain and improve or restore the condition of land around and adjacent to waterbodies in the context of the environment in which they are located, recognizing their unique values and importance to water quality while implementing land and resource management activities.	The land around and adjacent to waterbodies plays an important ecologic role in maintaining the structure, function, and processes of the aquatic ecosystem. These areas provide shading, soil stabilization, sediment and water filtering, large woody debris recruitment, and habitat for a diversity of plants and animals. The quality and quantity of water resources and aquatic habitats may be adversely affected by ground-disturbing activities that occur on these areas. Protection and improvement of soil, water, and vegetation are to be emphasized while managing these areas under the principles of multiple use and sustained yield. Designation of a zone encompassing these areas around and adjacent to a waterbody is a common BMP to facilitate management emphasizing aquatic and riparian-dependent resources. These management zones are known by several common terms such as streamside management area or zone, riparian management area, stream environment zone, and water influence zone. For purposes of the National Core BMPs, these areas would be referred to as AMZs. Local regulation often stipulates the area and extent of AMZs and may be listed in land management plans; biological opinions, evaluations, or assessments; and other regional or State laws, regulations, and policies.	The AMZ requirements are identified by an interdisciplinary team during the environmental analysis. The project is designed to include site-specific BMP prescriptions for the prevention of sedimentation and other stream damage from construction and operations. The Forest Service Contracting Officer or his/her designee would monitor the implementation of the PDCs during construction and operations on regular basis and would have the authority to provide direction and/or take action if construction or operations are not conducted according to the PDC.	Throughout the planning process and PDC V-2, V-3, F-3, R-14, L-2, L-3, A-1 through A-8, D-9, D-13, D-14, D-19	Moderate to High	Moderate to High based on literature, experience and fact	Same as previous BMP.

BMP Title (2012 National Core BMP Technical Guide)	Objective	Explanation	Implementation and Responsibility	Project Details and Project Design Criteria (PDC)	Ability to Implement	Effectiveness	Monitoring
AqEco-2. Operations in Aquatic Ecosystems	Avoid, minimize, or mitigate adverse impacts to water quality when working in aquatic ecosystems.	Common construction or maintenance operations in waterbodies often involve ground disturbance. The close proximity to, and contact with, the waterbody increases the potential for introducing sediment and other pollutants that can affect water quality. This BMP includes practices for minimizing direct and indirect water quality impacts when working in or adjacent to waterbodies.	The project is designed to include site-specific prescriptions for each area of water quality concern. The subsequent contract would include provisions to meet water quality criteria and other resource protection requirements as provided by this EA. The IDT will coordinate with the personnel developing the contract to insure that PDCs associated with the BMP are incorporated into the contract. The Forest Service Contract Administrator or his/her designee would monitor the implementation of the PDCs during construction and operations on regular basis and would have the authority to provide direction and/or take action if construction or operations are not conducted according to the PDC.	PDC R-10, R-11, R-14, L-3, A-1, A-2, A-4, A-5, A-6, A-9 through 13, A-15, D-2 through D-9, D-13 through D-16, D-19	Moderate to High	Moderate to High based on literature, experience and fact	Same as previous BMP.

BMP Title (2012 National Core BMP Technical Guide)	Objective	Explanation	Implementation and Responsibility	Project Details and Project Design Criteria (PDC)	Ability to Implement	Effectiveness	Monitoring
Road-1. Travel Management Planning and Analysis	Use the travel management planning and analysis processes to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during road management activities.	Road management related planning includes travel analyses as well as consideration of road management objectives and maintenance levels to address access needs and adjustments for projects. Planning occurs at scales that range from forestwide assessments and plans, to watershed scale or project-level analyses, to individual road activities. Effects to soil, water quality, and riparian resources are evaluated during planning and balanced with the social, economic, and land management needs of the area. Appropriate protection and mitigation measures are considered when soil, water quality, and riparian resources may be adversely impacted. Project-level travel analyses are conducted to inform decisions and facilitate vegetation, fire and fuels, rangeland, recreation, minerals, or other management actions. Such analyses contain detail on the condition of individual roads. Road Management Objectives (RMOs) are developed and documented for each system road and include the intent and purpose in providing access to implement the land management plan. In addition to considering route needs at the site scale, RMOs also document the purpose of the road (access needs) along with operational maintenance levels and objectives.	Hydrologists, fish biologists, geologists, soil scientists and roads project engineers on the IDT for the project evaluate the road network and develop PDCs to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during road management activities. The subsequent contract to implement the project will include provisions to meet water quality criteria and other resource protection requirements during road management activities. The IDT will coordinate with the personnel developing the contract to insure that PDCs associated with the BMP are incorporated into the contract The Forest Service Contracting Officer or his/her designee would monitor the implementation of the PDCs during project	Throughout the NEPA planning process Travel management planning at the project level is included in the EA at s. 3.2. The proposed road actions are described in s. 2.2.	High	High based on experience	Same as previous BMP.

BMP Title (2012 National Core BMP Technical Guide)	Objective	Explanation	Implementation and Responsibility	Project Details and Project Design Criteria (PDC)	Ability to Implement	Effectiveness	Monitoring
			implementation on regular basis and will have the authority to provide direction and/or take action if construction or operations are not conducted according to the project design criteria.				
Road-3. Road Construction and Reconstruction	Avoid or minimize adverse effects to soil, water quality, and riparian resources from erosion, sediment, and other pollutant delivery during road construction or reconstruction.	During road construction and reconstruction activities, vegetation and ground cover is removed exposing soil to erosion. Temporary and long-term erosion control and stormwater management measures are necessary to reduce erosion and maintain overall slope stability. These erosion control measures may include vegetative and structural practices to ensure long-term stability of the area.	Same as previous BMP.	PDC R-10 through R-13, A-9 through A-13, D-9, D-13, D-15	High	Moderate to High based on literature, experience and fact	Same as previous BMP.

BMP Title (2012 National Core BMP Technical Guide)	Objective	Explanation	Implementation and Responsibility	Project Details and Project Design Criteria (PDC)	Ability to Implement	Effectiveness	Monitoring
Road-4. Road Operations and Maintenance	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling road use and operations and providing adequate and appropriate maintenance to minimize sediment production and other pollutants during the useful life of the road.	Control of road use and operations and appropriate maintenance can protect road investment and soil, water quality, and riparian resources. Periodic inventory and assessment that determine road condition are used to determine operational controls and maintenance needs. Operational objectives and activities are documented in the RMOs. In travel management decisions, roads open to motorized vehicle use are designated by allowed vehicle class and, if appropriate, by time of year. Road operations include administering permits, contracts, and agreements, controlling allowed use, maintaining roads in closed status, and revising maintenance levels and seasonal closures as needed. Road closures and restrictions are necessary because many forest roads are designed for dry season use. Many local roads are not surfaced; while others have some surfacing but little to no base. Such roads can be damaged by use during wet periods or by loads heavier than the road was designed to convey. Properly maintained road surfaces and drainage systems can reduce adverse effects to water resources by encouraging natural hydrologic function. Roads and drainage systems normally deteriorate because of traffic, weather, and age. In addition, roads occasionally become saturated by groundwater springs and seeps after a wildfire or unusually wet periods. Many such conditions can be corrected by timely maintenance. While routine maintenance is needed to ensure the road performs as designed, however, it can also be a source of soil disturbance, concentrated flow, sediment production, and slope instability if done improperly. Lower impact maintenance techniques may be desired to minimize disturbance of stable sites.	Same as previous BMP.	PDC R-1, R-10, R-12, R-13, L-1, L-2, A-6, A-9 through A-13, D-1	High	Moderate to High based on literature, experience and fact	Same as previous BMP.

BMP Title (2012 National Core BMP Technical Guide)	Objective	Explanation	Implementation and Responsibility	Project Details and Project Design Criteria (PDC)	Ability to Implement	Effectiveness	Monitoring
Road-5. Temporary Roads	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from the construction and use of temporary roads.	Temporary roads may be used in situations where access needs are short-term and the roads can be constructed without requiring advanced engineering design or construction practices to avoid, minimize, or mitigate adverse effects to resources. Practices related to road location and stormwater and erosion control should be applied to temporary roads. Temporary roads are to be decommissioned and the area returned to resource production after the access is no longer needed.	Same as previous BMP.	PDC R-6, R-9 through R-12, L-3, A-6	High	Moderate to High based on literature, experience and fact	Same as previous BMP.

BMP Title (2012 National Core BMP Technical Guide)	Objective	Explanation	Implementation and Responsibility	Project Details and Project Design Criteria (PDC)	Ability to Implement	Effectiveness	Monitoring
Road-6. Road Storage and Decommissioning	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by storing closed roads not needed for at least 1 year (Intermittent Stored Service) and decommissioning unneeded roads in a hydrologically stable manner to eliminate hydrologic connectivity, restore natural flow patterns, and minimize soil erosion.	Roads not needed for access for long periods (greater than 1 year) may be put into storage (Intermittent Stored Service—Maintenance Level 1) to reduce maintenance costs. Level 1 roads receive basic custodial maintenance focusing on maintaining drainage facilities and runoff patterns to avoid or minimize damage to adjacent resources and to perpetuate the road for future use. The integrity of the roadway is retained to the extent practicable and measures are implemented to reduce sediment delivery from the road surface and fills and reduce the risk of crossing failure and stream diversion. Roads no longer needed are identified during transportation planning activities at the forest, watershed, or project level. The former road may be decommissioned or converted to a trail as appropriate. Decommissioned roads are stabilized and restored to a more natural state to protect and enhance NFS lands. Temporary roads constructed for a specific short-term purpose (e.g., ski area development, minerals exploration, or timber harvesting) are decommissioned at the completion of their intended use. Road decommissioning includes a variety of treatments to block the road, revegetate the road surface, restore surface drainage, remove crossing structures and fills, mitigate road surface compaction, re-establish drainageways, remove unstable road embankments, and recontour the surface to restore natural slopes. One or more treatments are applied to decommission the road depending on resource objectives and cost.	Same as previous BMP.	PDC R-4, R-8, D-1 through D-9, D-13 through D-16, D19	Moderate to High	Moderate to High based on literature, experience and fact	Same as previous BMP.

BMP Title (2012 National Core BMP Technical Guide)	Objective	Explanation	Implementation and Responsibility	Project Details and Project Design Criteria (PDC)	Ability to Implement	Effectiveness	Monitoring
Road-7. Stream Crossings	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when constructing, reconstructing, or maintaining temporary and permanent waterbody crossings.	Crossings should be designed and installed to provide for flow of water, bedload, and large woody debris, desired aquatic organism passage, and to minimize disturbance to the surface and shallow groundwater resources. Construction, reconstruction, and maintenance of a crossing usually requires heavy equipment to be in and near streams, lakes, and other aquatic habitats to install or remove culverts, fords, and bridges, and their associated fills, abutments, piles, and cribbing. Such disturbance near the waterbody can increase the potential for accelerated erosion and sedimentation by altering flow paths and destabilizing streambanks or shorelines, removing vegetation and ground cover, and exposing or compacting the soil. Use of heavy equipment has a potential for contaminating the surface water from vehicle fluids or introducing aquatic nuisance species.	Same as previous BMP.	PDC R-12, R-13, R-14, D-1, D-2, D-13, D-19, L-3	High	Moderate to High based on literature, experience and fact	Same as previous BMP.
Road-8. Snow Removal and Storage	Avoid or minimize erosion, sedimentation, and chemical pollution that may result from snow removal and storage activities.	Snow removal from roads and parking areas may adversely affect water quality and riparian resources in several ways. Plowing may physically displace native or engineered surfaces on roads, damage drainage structures, or alter drainage patterns. Plowing may also remove protective soil cover (e.g., vegetation or mulch). These changes can result in concentrated flow, increased erosion, and greater risk of sediment delivery to waterbodies. Snow piled in large mounds or berms, or in sensitive areas, may contribute to increased run-off, hill slope erosion, mass slope instability, and in-channel erosion from snowmelt. Snow stored in riparian areas and floodplains may compact soils, break or stunt vegetation, or channel runoff in undesirable	Same as previous BMP.	PDC L-1	High	High based on experience	Same as previous BMP.

BMP Title (2012 National Core BMP Technical Guide)	Objective	Explanation	Implementation and Responsibility	Project Details and Project Design Criteria (PDC)	Ability to Implement	Effectiveness	Monitoring
		patterns, thereby weakening the buffering capacity of these areas. Additionally, both snow removal and storage may result in additions of salts or fine aggregates used for de-icing or traction control and other vehicle pollutants directly to surface water and indirectly to both surface water and groundwater during runoff.					
Road-10. Equipment Refueling and Servicing	Avoid or minimize adverse effects to soil, water quality, and riparian resources from fuels, lubricants, cleaners, and other harmful materials discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resources during equipment refueling and servicing activities.	Many activities require the use and maintenance of petroleum-powered equipment in the field. For example, mechanical vegetation management activities may employ equipment that uses or contains gasoline, diesel, oil, grease, hydraulic fluids, antifreeze, coolants, cleaning agents, and pesticides. These petroleum and chemical products may pose a risk to contaminating soils, surface water, and groundwaters during refueling and servicing the equipment. BMP Fac-6 (Hazardous Materials) provides additional guidance for handling hazardous materials.	Same as previous BMP.	PDC A-6, A-15, D-4 through D-8	High	Moderate to High based on literature, experience and fact	Same as previous BMP.

BMP Title (2012 National Core BMP Technical Guide)	Objective	Explanation	Implementation and Responsibility	Project Details and Project Design Criteria (PDC)	Ability to Implement	Effectiveness	Monitoring
Veg-1. Vegetation Management Planning	Use the applicable vegetation management planning processes to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during mechanical vegetation treatment activities.	Vegetation on NFS lands is managed for a variety of purposes to achieve land management plan desired conditions, goals, and objectives for many resources. Planning for vegetation management generally follows a sequence of steps. The gathering and assessment of data involves evaluating the current condition of the vegetation compared to land management plan desired conditions, goals, and objectives. Potential vegetation treatment options to move the site towards desired conditions are developed and compared. Detailed treatment prescriptions are prepared to implement the preferred treatment option. The project is subjected to the National Environmental Policy Act (NEPA) analysis process where alternatives are developed and effects are analyzed. A decision is made and implemented. During the development of vegetation treatment prescriptions and alternatives, site specific measures consistent with BMP guidance to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resource are identified and included in the project as design criteria or mitigation measures. These BMP prescriptions are incorporated into the timber sale contract, stewardship contract, or project plan. Vegetation management for scheduled timber harvest on NFS lands has additional specific requirements from the National Forest Management Act that are incorporated into the project in the planning process. Scheduled timber harvest can occur only where watershed conditions would be maintained, lands can be adequately restocked within 5 years after final regeneration harvest, and water quality would be protected.	Same as previous BMP.	Throughout the planning process	High	High based on experience	Same as previous BMP.

BMP Title (2012 National Core BMP Technical Guide)	Objective	Explanation	Implementation and Responsibility	Project Details and Project Design Criteria (PDC)	Ability to Implement	Effectiveness	Monitoring
Veg-2. Erosion Prevention and Control	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by implementing measures to control surface erosion, gully formation, mass slope failure, and resulting sediment movement before, during, and after mechanical vegetation treatments.	Prevention and control of erosion on areas undergoing mechanical vegetation treatments is critical to maintaining water quality. The process of erosion control has three basic phases: planning, implementation, and monitoring. During planning, areas subject to excessive erosion, detrimental soil damage and mass failure can be identified and avoided. Also during planning, treatments can be designed and units laid out to minimize or mitigate damage to soils, streambanks, shorelines, wetlands, riparian areas, and water quality. Planning for erosion control is addressed in BMP Plan- 2 (Project Planning and Analysis) and BMP Veg-1 (Vegetation Management Planning). Suitable erosion control measures are implemented while the mechanical vegetation treatment is ongoing and following project completion. Inspection and maintenance of implemented measures would ensure their function and effectiveness over their expected design period. The potential for accelerated erosion or other soil damage during or following mechanical treatments depends on climate, soil type, site conditions, and type of equipment and techniques used at the site. Erosion control measures are grouped into two general categories: structural measures to control and treat runoff and increase infiltration and nonstructural measures to increase ground cover. Many erosion control handbooks, technical guides, and commercial products are available. Both structural and nonstructural measures require onsite expertise to ensure proper design and implementation to conform to local site characteristics.	Same as previous BMP.	PDC A-1, A-4, A-5, F-3, S-2	High	High based on literature, experience and fact	Same as previous BMP.

BMP Title (2012 National Core BMP Technical Guide)	Objective	Explanation	Implementation and Responsibility	Project Details and Project Design Criteria (PDC)	Ability to Implement	Effectiveness	Monitoring
Veg-3. Aquatic Management Zones	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when conducting mechanical vegetation treatment activities in the AMZ.	Designation of an AMZ around and adjacent to waterbodies is a typical BMP to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. Mechanical vegetation treatments are a tool that can be used within the AMZ to achieve a variety of resource-desired conditions and objectives when implemented with suitable measures to maintain riparian and aquatic ecosystem structure, function, and processes. Depending on site conditions and resource desired conditions and objectives, mechanical vegetation treatments in the AMZ could range from no activity or equipment exclusion to purposely using mechanical equipment to create desired disturbances or conditions. When treatments are to be used in the AMZ, a variety of measures can be employed to avoid, minimize, or mitigate soil disturbance, damage to the waterbody, loss of large woody debris recruitment, and shading, and impacts to floodplain function.	Same as previous BMP.	PDC V-2, V-3, F-3, A-1 through A-5, A-7, A-8, S-2	Moderate to High	Moderate to High based on literature, experience and fact	Same as previous BMP.

BMP Title (2012 National Core BMP Technical Guide)	Objective	Explanation	Implementation and Responsibility	Project Details and Project Design Criteria (PDC)	Ability to Implement	Effectiveness	Monitoring
Veg-4. Ground-Based Skidding and Yarding Operations	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during ground-based skidding and yarding operations by minimizing site disturbance and controlling the introduction of sediment, nutrients, and chemical pollutants to waterbodies.	Ground-based yarding systems include an array of equipment from horses, rubber-tired skidders, and bulldozers, to feller or bunchers, forwarders, and harvesters. Each method can compact soil and cause soil disturbance, though the amount of impact depends on the specific type of equipment used, the operator, unit design, and site conditions. Ground-based yarding systems can be designed and implemented to avoid, minimize, or mitigate potential adverse effects to soils, water quality, and riparian resources.	Same as previous BMP.	PDC A-1 through A-4, S-1, S-3	Moderate to High	Moderate to High based on literature, experience and fact	Same as previous BMP.
Veg-5. Cable and Aerial Yarding Operations	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during cable and aerial yarding operations by minimizing site disturbance and controlling the introduction of sediment, nutrients, and chemical pollutants to waterbodies.	Cable and aerial yarding systems partially or fully suspend logs off the ground when yarding logs to the landing. They include skyline cable, helicopter, and balloon systems that typically are used in steep, erodible, and unstable areas where ground-based systems should not operate. Soil disturbance and erosion risks from these systems are primarily confined to cable corridors and landings.	Same as previous BMP.	PDC A-2, A-3, A-7, A-8	Moderate to High	Moderate to High based on literature, experience	Same as previous BMP.

BMP Title (2012 National Core BMP Technical Guide)	Objective	Explanation	Implementation and Responsibility	Project Details and Project Design Criteria (PDC)	Ability to Implement	Effectiveness	Monitoring
Veg-6. Landings	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from the construction and use of log landings.	Log landings, in general, are the site of intense activity, serving as the endpoint of yarding operations, the setup location of large equipment (such as skyline yarders), loading areas for log trucks, and fueling and maintenance locations for heavy equipment. To accommodate all this activity, landings tend to be large, and their soils generally become compacted, rutted, and disturbed much more than the rest of the project area. Thus, landings have a high probability of being a source of concentrated overland flow containing sediment and other pollutants.	Same as previous BMP.	PDC A-5	High	High based on literature, experience and fact	Same as previous BMP.
Veg-7. Winter Logging	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from winter logging activities.	Winter logging on frozen or snow-covered ground is a common BMP in the colder regions of the country to avoid or minimize soil, watershed, riparian, and wetland impacts. Winter logging is not without risks of watershed effects. Unknowingly operating in wetland or riparian areas when the snow cover is inadequate can cause damage to soil and vegetation. Skidding or hauling on roads when the roadbed or the soil is not sufficiently frozen can cause soil compaction and rutting. Inadequate installation and maintenance of erosion controls before snowmelt and spring runoff can cause accelerated erosion and damage to roads.	Same as previous BMP.	PDC S-3	Moderate	High based on experience	Same as previous BMP.

BMP Title (2012 National Core BMP Technical Guide)	Objective	Explanation	Implementation and Responsibility	Project Details and Project Design Criteria (PDC)	Ability to Implement	Effectiveness	Monitoring
Veg-8. Mechanical Site Treatment	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling the introduction of sediment, nutrients, chemical, or other pollutants to waterbodies during mechanical site treatment.	Mechanical treatments are used to remove or reduce the amount of live and dead vegetation on a site to meet management objectives, such as site preparation for reforestation, fuel treatments to reduce fire hazards, wildlife habitat improvement, recreation access, utility corridor maintenance, and other activities that require removing vegetation from specified areas on a periodic and repeated basis. Mechanical treatments include cutting and piling; chipping or mulching; roller chopping or masticating using heavy equipment; and pushing over vegetation. Disturbance from mechanical site treatments can expose and compact soils, resulting in accelerated runoff and erosion.	Same as previous BMP.	PDC F-4	High	High based on experience	Same as previous BMP.

Criteria for Rating "Ability to Implement" and BMP "Effectiveness"

These estimates are general, given the range of conditions throughout the Forest. More specific estimates are made at the project level when the specific BMPs are developed.

Ability to implement

Provides a qualitative estimate of the ability of the Forest Service to implement the BMP. The following index is used to rate the ability to implement as either High, Moderate or Low:

High: Almost certain the BMP can be implemented as planned.

Moderate: Greater than 75% certainty the BMP can be implemented as planned.

Low: Less than 75% certainty the BMP can be implemented as planned.

Effectiveness

Provides a qualitative assessment of the expected effectiveness that the applied measure would have on preventing or reducing impacts on water quality and beneficial uses. The effectiveness of each BMP would be evaluated with an index that rates the effectiveness of each BMP as either High, Moderate, or Low.

High: Practice is highly effective (90%) and one or more of the following types of documentation are available:

- Literature/Research - must be applicable to area.
- Administrative studies-local or within similar ecosystem.
- Experience- judgment of an expert by education and/or experience.
- Fact-obvious by reasoned (logical) response.

Moderate: Documentation shows that the practice is effective less than 90% of the time, but at least 75% of the time; or logic indicates that this practice is highly effective, but there is little or no documentation to back it up.

Low: Effectiveness unknown or unverified, and there is little or no documentation; **or** applied logic is uncertain in this case, **or** the practice is estimated to be less than 75% effective.

Effectiveness of BMPs are based on guidance from the National Best Management Practices for Water Quality Management on National Forest System Lands, Volume 1: National Core BMP Technical Guide (USDA, 2012), models, literature, research, 25 years of monitoring implementation of projects on National Forest Lands in the Northwest and professional experience.

Models include:

- Water Erosion Prediction Project (WEPP) (USDA Forest Service, 1999).

Other Applicable BMP Software:

- Erosion Draw 4.0 (Erosion Control Standards and Construction Drawings – Salix Applied Earthcare, 2002)

Relevant research includes:

- Effectiveness Of Timber Harvest Practices For Controlling Sediment Related Water Quality Impacts (Rashin et. al. 2006).

- Sediment Trapping by Streamside Management Zones of Various Widths after Forest Harvest and Site Preparation (Lakel and others, 2010).

- Reduction of soil erosion on forest roads (Burroughs and King, 1989)

Monitoring Includes:

Administrative BMP Monitoring Studies, Mt. Hood National Forest: Various administrative monitoring studies were planned and implemented from 1997 through 2004. Monitoring for BMP implementation and effectiveness was performed on a wide variety of BMPs, ranging from riparian reserve protection to temporary road construction. Monitoring results are summarized in the Forest Plan Monitoring and Evaluation Reports for Fiscal Years 1997 through 2004. BMP monitoring completed during this period indicates that overall the BMPs monitored were prescribed and implemented as planned, resulting in adequate soil and water protection in most instances.

Best Management Practices Evaluation Program (BMPEP), 1992-2002 Monitoring Results (Draft Report). USDA Forest Service, Pacific Southwest Region, Pacific Southwest Region
This draft report summarizes the results of the USDA Forest Service, Pacific Southwest Region, Best Management Practices Evaluation Program (BMPEP), from 1992 to 2002. Past monitoring completed as part of the BMPEP program has validated the effectiveness of BMPs in mitigating the effects of forest management activities on water quality.

Monitoring done during the Mount Hood National Forest administrative studies cited generally correlates well with the extensive monitoring done during the BMPEP monitoring program in the Pacific Southwest Region. .

Professional Experience - A small group of local professionals further refined assignments of "Ability to Implement" and "Effectiveness" ratings for Lava PDC and BMP based on experience. This group consisted of a Soil Scientist with over 25 years of professional experience in planning, monitoring and implementation of a variety of Forest Service projects in the Pacific Northwest, a Fisheries Biologist with over 23 years of professional experience in planning, monitoring and implementation of a variety of Forest Service projects in the Pacific Northwest and a Hydrologist with over 25 years of professional experience in planning, monitoring and implementation of a variety of Forest Service projects in the Pacific Northwest. The resource professionals assessment of the 'Ability to Implement" and "Effectiveness" ratings for BMPs was validated with the area Forest Service Representative who has 25 years of experience administrating Forest Service Timber Sale Contracts.

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