APPENDIX A MITIGATION MEASURES

Table 2. Management Requirements and Mitigation Measures (continued)

Mitigation Measure or Project Design Feature	Objective	Effectiveness and Basis	Forest Plan Standard & Guideline	Enforcement
Soil, Water Resources, and Fisheries				
A Spill Prevention, Control, and Countermeasures Plan or a Hazardous Spill Plan would be implemented during construction activities to reduce the potential for chemical spills and transport to nearby stream. Have hazardous spill cleanup materials and trained operators on site. Fuel trucks must also carry spill cleanup materials. Prior to starting work each day, check all machinery for leaks (fuel, oil, hydraulic fluid, etc); make all necessary repairs before leaving the vehicle staging area and entering a Riparian Reserve.	Prevent and minimize effects to water quality.	MODERATE (Implementation of spill plans are an industry standard)	Forest Plan S&Gs Soil Resource #2; Water Resources and Riparian Area #2	Contract Administrator
All machinery maintenance involving potential contaminants (fuel, oil, hydraulic fluid, etc.) shall occur at a site greater than 150 feet from stream channels, water bodies, or wetlands, or at a prior approved site. Equipment operated instream should be cleaned before beginning operations below the bankfull elevation to remove all external oil, grease, dirt, and mud. Stationary power equipment (e.g., generators, cranes) operated within 150 feet of any stream, water body, or wetland should be diapered to prevent leaks.	Prevent and minimize effects to water quality and aquatic resources.	MODERATE (Implementation of spill machinery maintenance and operation are an industry standard)	Forest Plan S&Gs Soil Resource #2; Water Resources and Riparian Area #2	Contract Administrator

Table 2. Management Requirements and Mitigation Measures (continued)

Mitigation Measure or Project Design Feature	Objective	Effectiveness and Basis	Forest Plan Standard & Guideline	Enforcement
Soil, Water Resources, and Fisheries				
Excess material (spoils) shall be disposed of and stabilized so it does not enter flowing waters, stream channels, or other water bodies.	Prevent and minimize effects to water quality.	MODERATE (Logic)	Forest Plan S&Gs Soil Resource #2; Water Resources and Riparian Area #2; USFWS Biological Opinion and Conference Report (August 16, 2005) and USDC (NOAA/NMFS) Biological and Conference Opinion (October 28, 2005)	Contract Administrator
Wastewater from project activities and water removed from within the work area shall be routed to an area landward of the 100-year floodplain to allow removal of fine sediment and other contaminants prior to being discharged to the stream.	Minimize sedimentation to fish-bearing waters and protect aquatic resources.	MODERATE (Logic)	USFWS Biological Opinion and Conference Report (August 16, 2005) and USDC (NOAA/NMFS) Biological and Conference Opinion (October 28, 2005); Forest Plan S&Gs Fish Habitat Management #; ROD S&G RF-51	Contract Administrator
Stabilize all work areas within 3 days following the construction period.	Minimize sedimentation to fish-bearing waters. Protect stream bank integrity and aquatic resources.	MODERATE (Burroughs 1989)	Forest Plan S&Gs Soil Resources #5; USFWS Biological Opinion and Conference Report (August 16, 2005) and USDC (NOAA/NMFS) Biological and Conference Opinion (October 28, 2005)	Contract Administrator

Table 2. Management Requirements and Mitigation Measures (continued)

Mitigation Measure or Project Design Feature	Objective	Effectiveness and Basis	Forest Plan Standard & Guideline	Enforcement
Soil, Water Resources, and Fisheries				
Site restoration and cleanup includes protection of bare earth by seeding, planting, mulching, and fertilizing. All damage areas at the project site are to be restored to pre-work conditions including restoration of the pre-flood conditions, including channel bank slope and contours, to the extent practicable. Minimize channel bank grading to revegetate and restore bank conditions.	Minimize sedimentation to fish-bearing waters. Protect stream bank integrity and aquatic resources.	MODERATE (Burroughs 1989; Switalski et al. 2004)	Forest Plan S&Gs Soil Resource #4; USFWS Biological Opinion and Conference Report (August 16, 2005) and USDC (NOAA/NMFS) Biological and Conference Opinion (October 28, 2005)	Contract Administrator
All disturbed ground shall be reclaimed using appropriate best management practices. Retain measures to prevent sediment from reaching streams until the soil is secure. If appropriate, native species should be used in revegetation. Disturbed ground where runoff has the potential to drain into stream channels shall be revegetated or protected from surface erosion by seeding, mulching, or other methods prior to the fall rainy season. Within 1 year after project completion, disturbed stream banks would be revegetated with woody vegetation to maintain soil stability and provide shade and future sources of instream large woody debris (LWD).	Prevent silt-laden water from entering streams. Prevent and minimize effects to water quality. Protect stream bank integrity and aquatic resources.	MODERATE (Burroughs 1989; Madej 2001; Switalski et al. 2004)	Forest Plan S&Gs Soil Resource #5; ROD for preventing and managing invasive plants in the Pacific NW S&G #13 (Forest Service 2005); BMPs R-12; USFWS Biological Opinion and Conference Report (August 16, 2005) and USDC (NOAA/NMFS) Biological and Conference Opinion (October 28, 2005)	Contract Administrator

Table 2. Management Requirements and Mitigation Measures (continued)

Mitigation Measure or Project Design Feature	Objective	Effectiveness and Basis	Forest Plan Standard & Guideline	Enforcement
Soil, Water Resources, and Fisheries				
Segments of the road decommissioned, placed in storage, or disturbed by construction activities would be revegetated	Prevent silt-laden water from entering the streams or other waterbodies. Reduce the effects of lost soil productivity.	MODERATE (Luce 1997; Burroughs 1989; Switalski et al. 2004)	ROD S&G RF-2, RF-3, RF-4, RF-5	Contract Administrator
When constructing or decommissioning roads: • Outslope the roadway surface unless outsloping would increase sediment delivery to streams or where outsloping is infeasible. • Route road drainage away from channels and potentially unstable hill slopes. • Where necessary, install water bars to route water away from streams to allow removal of fine sediment and other contaminants before discharge to the stream.	Limit water accumulation and/or concentration, erosion, and sediment delivery to streams to protect water quality.	MODERATE (Years of use by agency) HIGH (Water bars are an industry standard and have been shown to be effective on closed roads)	ROD S&G RF-5; BMPs R-1, R-3, R-4, R-5, R-7, R-8, R-9, R-11, R-12, R-14	Contract Administrator
All non-treated wood present in the river/stream shall be left in place (a measure designed to protect existing LWD in the stream channel).	Protect stream bank integrity and aquatic resources.	HIGH (Avoids damage that would occur if trees were removed)	ROD S&G FA-2; Forest Plan S & G's Water Resources and Riparian Reserves #2, #7, and #8; USFWS Biological Opinion and Conference Report (August 16, 2005) and USDC (NOAA/NMFS) Biological and Conference Opinion (October 28, 2005)	Contract Administrator

Table 2. Management Requirements and Mitigation Measures (continued)

Mitigation Measure or Project Design Feature	Objective	Effectiveness and Basis	Forest Plan Standard & Guideline	Enforcement
Soil, Water Resources, and Fisheries				
Any trees greater than 12 inches diameter at breast height to be felled within reach of the stream shall be considered for felling toward the stream and left in place or utilized to armor disturbed stream banks, if feasible. The disposition of down wood, such as blowdown or felled hazard trees would be determined based on the Forest woody debris policy with priority given to retaining onsite or stockpiled for use in restoration projects. Move LWD at all streamside construction sites, and place along the riprap where feasible, if this would protect structures and improve stream habitat. A Forest Service aquatic specialist would coordinate with FHWA prior to construction to obtain the limits of clearing and perform a field review of the trees that should be felled and those that should remain.	Protect stream bank integrity and aquatic resources. Maintain routing of large wood in channel network.	HIGH (Avoidance) LOW (Experience shows wood is often broken during removal and placement is often difficult)	Forest Plan S&Gs Water Resources and Riparian Reserves #2, #5, #8; USFWS Biological Opinion and Conference Report (August 16, 2005) and USDC (NOAA/NMFS) Biological and Conference Opinion (October 28, 2005) ACS Obj. 6	Contract Administrator
Stream banks shall be properly sloped to an angle of stability (natural repose) when removing culverts.	Protect stream bank integrity and aquatic resources.	MODERATE (MBS Forest roads experience)	ROD S&G RF-4	Contract Administrator
Boundaries of the clearing limits associated with site access and construction shall be flagged to prevent ground disturbance of critical riparian vegetation, wetlands, and other sensitive sites beyond the flagged boundaries.	Protect riparian and other sensitive habitats; protect aquatic resources.	HIGH (Avoidance)	USFWS Biological Opinion and Conference Report (August 16, 2005) and USDC (NOAA/NMFS) Biological and Conference Opinion (October 28, 2005)	Contract Administrator

Table 2. Management Requirements and Mitigation Measures (continued)

Mitigation Measure or Project Design Feature	Objective	Effectiveness and Basis	Forest Plan Standard & Guideline	Enforcement
Soil, Water Resources, and Fisheries				
When breaking up natural (boulder/bedrock) or man-made (bridge decking, piers, abutments) materials using hydraulic breaker, or test drilling, the following measures shall be done (when appropriate): • Prevent spoils from operations from entering the active channel • Monitor the underwater sound/vibration effects of hydraulic breaker operations at the various horizontal distances from the site using underwater sound-detection equipment	Protect aquatic resources.	MODERATE (Logic)	USFWS Biological Opinion and Conference Report (August 16, 2005) and USDC (NOAA/NMFS) Biological and Conference Opinion (October 28, 2005)	Contract Administrator
Minimize roads in Riparian Reserves. The location, design, and reconstruction of necessary crossings should minimize disruption to natural hydrologic paths and adverse effects to aquatic resources. Avoid sidecasting of loose material. Accommodate at least the 100-year flood, and associated bedload and debris.	Maintain surface hydrology and Riparian Reserve function and integrity.	HIGH (Avoidance)	ROD S&G RF-2, RF-4; BMPs T-8, T-10, T-11, R-1, R-6, R-11, R-12, R-14; Forest Plan S&Gs Water Resources and Riparian Reserves #6	Contract Administrator
Post-construction measures requiring ground disturbing work likely to cause erosion shall be implemented during the dry season of the year but still must fall within the designated in-water work windows.	Minimize sedimentation to fish-bearing waters.	HIGH (Logic)	MOU between FS and WDFW for hydraulic projects (2005)	Contract Administrator
A qualified Forest Service biologist would perform periodic site inspections during construction to ensure that the project is progressing as planned and that there are no unintended consequences to fish, wildlife, plants, and their habitats.	Protect aquatic resources and fish, wildlife, plants, and their habitats.	MODERATE (Logic)	Forest Plan S&Gs Fish Habitat Management #1; USFWS Biological Opinion and Conference Report (August 16, 2005) and USDC (NOAA/NMFS) Biological and Conference Opinion (October 28, 2005)	Contract Administrator

Table 2. Management Requirements and Mitigation Measures (continued)

Mitigation Measure or Project Design Feature	Objective	Effectiveness and Basis	Forest Plan Standard & Guideline	Enforcement
Wildlife				
To minimize the likelihood of adverse effects to nesting marbled murrelet, all project activities would occur between 2 hours after sunrise and 2 hours before sunset, from May 1 to September 15 each year. Timing restrictions are considered successful by eliminating sources of disturbance during the critical breeding period. The timing restrictions that would be implemented reduce potential adverse effects to post-incubating murrelets, but would not mitigate possible effects on incubating birds.	Eliminate sources of disturbance during the critical breeding period.	HIGH [MBS Forest experience, Biological Opinion (USFWS 2005) In the post-incubation stage, 90 percent of feedings by adults occur within two hours of sunrise and sunset; therefore, mitigation measure would dramatically reduce the potential disruption of feeding. During the incubating season, adults would be at the nest site continuously, so the mitigation measure would be ineffective.	Biological Opinion of the Effects of the Mount Baker-Snoqualmie National Forest Program of Activities for 2003-2007 on Marbled Murrelets and Northern Spotted Owls (USFWS 2002a)	Contract Administrator

Table 2. Management Requirements and Mitigation Measures (continued)

Mitigation Measure or Project Design Feature	Objective	Effectiveness and Basis	Forest Plan Standard & Guideline	Enforcement
Botany				
If any previously undiscovered Threatened, Endangered, and Sensitive (or other rare or uncommon) vascular plants, bryophytes, lichens, or fungi are discovered, before or during project implementation, halt work until a Forest Service botanist is consulted and necessary mitigation measures are enacted.	Prevent impact to TES or S&M plants.	HIGH (logic)	Forest Plan S&G Threatened, Endangered, and Sensitive Species #1	Contract Administrator
Equipment brought on to the National Forest must be free of weeds and weed seeds. If weeds are present in the project area, all equipment and gear should be cleaned before leaving the area to avoid spreading the infestation further.	Prevent introduction of weeds. Prevent weed spread.	MODERATE (Forest Service 2005) HIGH (Logic)	Forest Plan S&G Wilderness – (Vegetation) #1; Forest Plan S&Gs Vegetation Management #2; ROD for preventing and managing invasive plants in the Pacific NW S&G #2 (Forest Service 2005)	Contract Administrator; District Botanist
All gravel, fill, and borrow material sources must be weed free.	Prevent introduction of weeds.	MODERATE (Forest Service 2005)	ROD for preventing and managing invasive plants in the Pacific NW S&G #7 (Forest Service 2005)	Contract Administrator; District Botanist
Use weed free straw and mulch for all projects conducted or authorized by the Forest Service on National Forest System lands.	Prevent introduction of weeds.	HIGH (Forest Service 2005)	ROD for preventing and managing invasive plants in the Pacific NW S&G #3 (Forest Service 2005)	Contract Administrator; District Botanist
For known infestations of noxious weeds, schedule appropriate weed treatments including R6-approved herbicides.	Eradicate known infestations.	HIGH (Forest Service 2005)	ROD for preventing and managing invasive plants in the Pacific NW S&G #16 (Forest Service 2005)	Contract Administrator; District Botanist

Table 2. Management Requirements and Mitigation Measures (continued)

Mitigation Measure or Project Design Feature	Objective	Effectiveness and Basis	Forest Plan Standard & Guideline	Enforcement
Botany				
Any seed used for revegetation shall be tested using standards of the Association of Official Seed Analysis (WSCIA 2003) and pass State standards for noxious weeds prior to use (WAC 16-302-100).	Prevent introduction and spread of weeds.	HIGH (Forest Service 2005)	ROD for preventing and managing invasive plants in the Pacific NW (Forest Service 2005)	Contract Administrator; District Botanist
Abandoned roads and new cut and fill slopes would be seeded and mulched to deter the establishment of noxious weeds. Fertilizer is not recommended. Seed and straw mulch must be free of weeds and weed seeds. One to two inches of weed free straw should be placed over the seed. The seed mix to use consists of the following: • Tufted hairgrass (*Deschampsia caespitosa*) @ 4 lbs/acre • Annual ryegrass (*Lolium multiflorum*) @ 10 lbs/acre • Winter triticale (*Triticum aestivum* x *Secale cereale*) @ 60 lbs/acre • Alsike clover (*Trifolium hybridum*) @ 2 lbs/acre	Prevent introduction and spread of weeds.	HIGH (Forest Service 2005)	Forest Plan Best Management Practices; ROD for preventing and managing invasive plants in the Pacific NW S&G #3 (Forest Service 2005)	Contract Administrator; District Botanist
The location of any soil material moved off-site must be made known to the Botanist for monitoring purposes.	Prevent introduction and spread of weeds and treat new infestations quickly.	HIGH (Logic)	ROD for preventing and managing invasive plants in the Pacific NW S&G #8 (Forest Service 2005)	Contract Administrator; District Botanist

Table 2. Management Requirements and Mitigation Measures (continued)

Mitigation Measure or Project Design Feature	Objective	Effectiveness and Basis	Forest Plan Standard & Guideline	Enforcement
Heritage Resources				
If a previously unidentified heritage resource were discovered during project implementation, or if an identified resource were affected in an unanticipated way, the Forest Heritage Specialist would be notified and the Forest would fulfill its responsibilities in accordance with the Programmatic Agreement between the Forest Service and the State Historic Preservation Office regarding cultural resource management on National Forests in the State of Washington.	Protect cultural resources.	MODERATE (Experience)	Forest Plan, Archaeology Protection, p. 4-99 36 CFR 800 regulations of the National Historic Preservation Act.	Contract Administrator; Forest Heritage Specialist

Table 2. Management Requirements and Mitigation Measures (continued)

Mitigation Measure or Project Design Feature	Objective	Effectiveness and Basis	Forest Plan Standard & Guideline	Enforcement
Recreation				
Alternatives B & C Road 26 would be kept open to all vehicles to MP 12.5, where the existing temporary gate will remain, and a suitable turnaround and parking area for 10 vehicles will be created, utilizing the already wide section of road through this area. Beyond MP12.5 the road is to be kept open to foot traffic, stock use, bicycle use and administrative traffic (as practicable) except when there are hazardous conditions. • The closure for hazardous conditions at any work site would occur between the hours of 0700 to 1200 and from 1300 to 1700 during weekdays, as needed. • Signage would be installed, stating the hours and times of closed/open access at MP 12.5 and at MP 15.0 or 23.0 (as appropriate) • A travel plan that would use the existing road and designated signed detour routes around the project area(s) shall be approved by the Forest Service prior to starting construction activities. • Construction fencing and other appropriate hardware would be used to designate the passage around the project area(s). • If longer delays or closures are necessary for specific construction activities, advance public notice (a minimum of 2 weeks) is required before those delays or closures. This includes notice to local radio stations and newspapers within a 75 mile radius of the project area, and notification to the District Ranger and Forest Service liaison for this project. Alternative B The detour routes around Downey Creek and Sulphur Creek Bridge project areas could include horse fords, foot logs, and/or ladders to access the bridge decks.	Minimize effects on recreationist and other forest users	High (experience)	1990 Forest Plan p. 4-84, 4-140	Contracting Officer Representative (COR) for road projects Forest Service Liaison