

Appendix A

Project Design Criteria and Mitigation Measures

To minimize the effects of the proposed action on aquatic and terrestrial resources, the following project design criteria and mitigation measures have been prescribed for the Dry Burton Thin. These project design criteria (PDC) and mitigation measures have been factored into the affects analysis. All PDCs and mitigation measures are expected to be implemented, and will be incorporated into the contract (except as specified as a separate project). The effectiveness of implementation is dependent on the quality of the implementation and monitoring to ensure success. In all cases the potential ability to implement projects and their potential effectiveness is considered high, including implementation of post-sale projects such as for wildlife and invasive weed mitigation, due to past experience and Forest and Regional policy regarding management of invasive weed species.

Table 1. Project Design Criteria by Resource Area

Aquatic and Soils Project Design Criteria		Best Management Practices
A&S.1 (EA 3)	Trees will be felled away from streams or other riparian features. Exceptions would be trees which are leaning towards the creek, or when conditions would not allow safe felling. Any portion of a felled tree that land in the no cut buffer (inner 1/3) will be left on the ground. The objective of this measure is to prevent damage to riparian vegetation and soils within Riparian Reserves.	T-6, T-13
A&S.2 (EA 4)	One end log suspension will be required for ground-based and cable yarding systems (except during winching or lateral yarding). This would reduce the risk of soil compaction and displacement from dragging entire logs along the ground. The objective of this measure is to minimize erosion and potential sedimentation.	T-13
A&S.3 (EA 5)	To minimize the extent of areas subject to soil compaction and displacement, all equipment will be confined to approved temporary roads, skid trails and landings during yarding and brush disposal operations. Landings, temporary roads, skid trails and skyline corridors will be approved by the sale administrator prior to timber felling. All skid trails will be restricted to the outer-third of riparian reserves (see riparian reserve prescriptions). Temporary roads will not be constructed within Riparian Reserves. Winching would be employed in ground-based yarding units as well as felling trees to lead in all units regardless of yarding system.	T-11

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A&S.4 (EA 6)	In areas of past harvest, temporary roads and skid trails would be reestablished on previous locations rather than constructing new ones. These trails and roads will be treated to restore hydrologic function as needed. The Forest Plan requires losses in soil productivity be limited to 20 percent or less of the activity area, including the transportation system in and adjacent to a unit. If a logging system other than described above is used, it must first be approved by a logging systems specialist to ensure that less than 20% of the activity area is impacted. The objective of this measure is to minimize the extent of areas subject to soil compaction and displacement, and to allow infiltration of runoff, and sediment filtration.	T-11
A&S.5 (EA 10)	All drainage structures will be designed to accommodate peak-flow flood events, consistent with NFP Standards and Guidelines (ROD, USDA 1994). Temporary drainage structures would be utilized one season and removed prior to the fall rainy season. If new structures are to weather through fall and winter, they must comply with standards and guidelines as if a permanent structure.	NWFP S&G T-13, T-14, T-16
A&S.6 (EA 13)	Streams and piping located during pre-sale or harvest will be managed as riparian reserves. The District aquatic specialist is to verify stream types and Riparian Reserve widths.	NWFP S&G
A&S.7 (EA 14)	To minimize the amount of sediment entering the stream and possible damage to stream banks and channel bottoms, stream crossings and activities in the stream are prohibited except as prescribed for instream projects.	R-12
A&S.8 (EA 15)	To reduce the potential for damage to the stream and floodplains as a result of a hazardous material spill, fueling and equipment will be located outside of riparian reserves. A Hazardous Material kit will be on site, and would contain materials to control/contain a spill of fuel, oils, and/or hydraulic fluid. All service work on heavy machinery and refueling will be done on an established system road at a site approved by the Forest Service. All action alternatives.	T-4, T-7, T-17, T-22, R-12
A&S.9 (EA 18)	To minimize effects to fish and other aquatic organisms the project will follow Washington State Laws (WAC 220-110-070) and conform to provisions of the Hydraulic Project Approval including the USDA Forest Service – Washington State Memorandum of Understanding.	WAC 220; WDFW/FS MOU 2005
Additional Soil Project Design Criteria		
S.1 (EA 23)	Slopes steeper than 30 percent will be cable or helicopter yarded. Machinery will not be permitted on slopes steeper than 30 percent. This measure will limit the amount of soil compaction and displacement associated with tractor yarding on steep slopes.	NWFP S&G T-13, T-16
Wildlife Project Design Criteria		Implementation notes
W.1 (EA 31)	No project activities that exceed ambient noise levels will occur between March 1 to June 30 to minimize harassment to northern spotted owls that may be nesting adjacent to sale units, unless surveys to protocol standards are conducted, and no spotted owls are detected within a) 35 yards of the proposed activity for heavy machinery use, or b) 65 yards for chainsaw use, or c) one mile for large (logging) helicopter use, or blasting (USFWS 2004).	Also a PDC
W.2 (EA 32)	No sale activities that exceed ambient levels will occur between May 15 to July 1, to limit disturbance to deer and elk during the fawning and calving period.	Also a PDC
W.3 (EA 33)	Helicopter logging operations under alternatives 4 and 4.1 will include a provision that helicopters will avoid flying within .25 miles of the upper	

	elevations of Smith Ridge and South Point (i.e. open, rocky, subalpine and alpine areas) during the duration of the sale, to avoid unnecessary disturbance to mountain goats.	
W.4 (EA 34)	Existing old-growth, legacy down trees, and old-growth, legacy snags will be protected from disturbance to the extent feasible by placing unthinned patches around them, or otherwise minimizing impacts to these sites during yarding, provided that they do not present a logging safety hazard. In unit 4, a minimum of three unthinned patches (“skips”) of approximately one-half acre in size, will be placed around old-growth, legacy snags and accumulations of old-growth, legacy down trees <u>outside</u> of riparian reserves to provide protection for these habitat features. Unthinned patches should be utilized in other sale units if it is not possible to protect large, legacy snags and down trees without them.	Implemented via contract
W.5 (EA 37)	Identify and protect “wildlife trees”, large old legacy trees and legacy snags where such trees would not pose safety hazards. Large-diameter trees with broken tops, significant defect, large amounts of dwarf mistletoe, etc. are examples of potential wildlife trees. Provide specific criteria in contract clauses to identify such trees using Dx/D prescriptions.	Implemented via contract
Recreation Management Project Design Criteria		
R.1	Pull slash 50 feet from the trailhead and trail located in Unit 5. Scatter slash to eliminate accumulations. Do not use ground-based equipment on the trail or trailhead, and do not use the trailhead as a landing location.	Applies to Unit 5; Implemented via contract

Riparian Treatment Project Design Criteria.

The silvicultural treatment in the riparian reserve will follow a prescription to optimize structural development and plant species diversity to benefit water quality and old growth dependent fauna including native salmonids. The riparian silvicultural prescription will be broken into three riparian management zones including the following components.

Table 1b. PDC’s and Riparian silvicultural treatment prescriptions

Riparian Project Design Criteria:	
Ri.1	Inner zone: A no-harvest buffer will cover the first 1/3 of the riparian reserve. Class I and II stream riparian reserves are two site-potential tree heights and Class III and IV streams are one site-potential tree height measured horizontally from the ordinary high water mark on each side of the stream. Riparian vegetation is an important source of both stream shade and input of foliar debris providing favorable stream temperatures and source of food for aquatic organisms.
Ri.2	Middle zone: In ground based units, loaders will be allowed to travel no more than 44 feet inside of the Riparian Reserves on approved skid trails. For example, riparian reserves in ground based units are 132 feet wide. Loaders will be able to access the middle zone from the outer zone, which is 44 feet wide, measured from the edge of the riparian reserve. Trees will be felled to lead, and loaders will retrieve what can be reached from designated skid trails.
Ri.3	Outer zone: Selective thinning will be used in the outer 80-85 feet of the riparian reserve with average canopy closure retained at 55-65 % percent with silvicultural treatment and consistent with the rest of the unit. If currently below this target, riparian reserve canopy closure will remain at existing condition. <ul style="list-style-type: none"> a) Canopy closure will be retained at 55-65 % percent with silvicultural treatment. b) Riparian plant diversity, density and vigor will be maintained by retaining all western red cedar (<i>Thuja plicata</i>), red alder (<i>Alnus rubra</i>) and broadleaf maple (<i>Acer macrophyllum</i>) and other species. c) Downed large woody debris should be evenly dispersed in the flood prone area. The goal is to provide 10 percent cover in logs greater than 6 inches Two percent should

	be sound (class I and II) logs and 8 percent in decayed logs (class III, IV and V). The down wood should be consistent with Late Seral Reserve (LSR) guidelines for Western Hemlock and Pacific Fir plant communities (USDA 1997). Large wood will serve to moderate high flows and provide future source of instream wood.
	d) Apply downed large wood to riparian reserves and add surface roughness adequate to prevent the delivery of anthropogenic sediments. Down wood is abundant, > 5 trees per acre (>75 feet long and in decay class I-III), and providing ample sediment trapping opportunities.
	e) Riparian reserve widths and surface roughness will be maintained to prevent delivery of sediments resulting from management activities. Excessively wet and unstable areas will be avoided in sale layout and/or identified on sale are map.
	f) Silvicultural treatment will maintain combined trees, shrubs, grass, and forbs cover on more than 90% of the ground. Small openings will be evenly dispersed. The silvicultural treatment will maintain a variety of species and age classes that represent the potential site community. Result of treatment will optimize ground cover; promote necessary growth, density, vigor and reproduction to develop root cohesion and surface roughness to help provide hill slope stability.
	g) Silvicultural treatment will retain and promote growth of the largest trees to provide future large wood recruitment in streams. Retain all trees measuring >20 inches in diameter at breast height (dbh) in Riparian Reserves.

Table 2. Required mitigation measures by resource area. All measures will be implemented via contract.

Aquatics and Soils Mitigation Measures		BMPs
A&S.1 (EA 1)	Prohibit further ground equipment travel where rutting exceeds Region 6 Standards and Guidelines (Forest Service 1998); defined as 6 inches in depth for a length of ten feet or more. Deviations from this measure should involve consultation with the appropriate resource specialist and documentation in daily diaries. The objective is to limit the degree of soil compaction, rutting, and puddling as well as reduce the potential for offsite stream sedimentation.	T-13
A&S.2 (EA 2)	To minimize soil compaction and displacement during wet conditions, the use of ground-based yarding equipment or other equipment on and off roads or landings will be restricted from October 1 through June 15, or during periods when soils are excessively wet or saturated. This requirement is provisional depending on site conditions to be determined by the timber sale contract administrator in consultation with the District aquatic specialist and approved by the District Ranger.	T-13
A&S.3 (EA 7)	Temporary roads and landings will be subsoiled to a depth of 18 inches (minimum). Subsoiling and the subsequent application of seed and mulch must be done immediately following logging activities. Subsoiling must strive to create an uneven, rough surface without furrows. Proposed alternative methods to subsoiling must be approved by the Zone aquatic specialist or earth scientist in consultation with the sale administrator. To prevent re-compacting of the treated roadways and landings, no ground-based equipment will be operated on subsoiled portions of roads and landings after subsoiling is completed. Plan harvest and slash disposal activities to maximize use of pre-designated skid trails prior to sub-soiling to minimize the creation of new skid trails. Crossdrains or water bars will be installed every 50 to 150 feet depending on slope. Available logging slash will be placed across the subsoiled road landing surface.	T-13, T-14, T-16
A&S.4 (EA 8)	Acceptable grass seed mix, type of weed free mulch, and application rates will be specified by the Zone botanist in consultation with the Zone	T-13, T-14, T-16

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	<p>aquatic specialist. Subsequent vehicular access to these areas will be prevented (e.g., by construction of a 4-foot high earth berm at the entrance to the road or landing). Closure to vehicles is required to prevent these areas from being re-compacted and to allow vegetation to develop. The objectives of this measure includes the rehabilitation of areas compacted during management activities, the acceleration of the recovery of compacted soils, the facilitation of water infiltration and revegetation on those disturbed areas, the maintenance of organic matter in amounts sufficient to prevent short or long-term nutrient deficits, and the prevention of the establishment of invasive weeds. This treatment is also intended to provide ground cover for exposed soils in order to reduce the potential for surface erosion and avoid long-term detrimental physical and biological soil conditions. (Helicopter landings would be planted to trees, species specified by the zone botanist.)</p>	
A&S.5 (EA 9)	<p>The following measures will minimize the routing of water and sediment to streams. Prior to any expected seasonal period of precipitation and runoff, cross drains and grade breaks will be installed in all temporary roads, skid trails, landings and skyline corridors. After sale activities are complete, impacted areas on landings, temporary roads and skid trails will be outsoiled and sub-soiled (or comparable treatment) as described in no. A&S.3 and the surface will be seeded with a Forest Service designated mix and fertilized. (An impacted area is generally where greater than 60 feet of continuous soil compaction or displacement, identified by 6-inch deep ruts, has occurred.) In special cases (i.e. stream crossings, contributing areas near streams, or other sensitive areas), mulch, erosion matting or re-contouring may be used as needed to prevent or reduce sedimentation. Where designated by the timber sale contract administrator, impacted areas of skyline yarding will be waterbarred, seeded and fertilized as above. The expectation of this mitigation measure is the maintenance of soil permeability and soil productivity and near elimination of increased channelization of surface flows in harvest units near streams from temporary roads and harvest related activities.</p>	T-13, T-14, T-16
A&S.6 (EA 11)	<p>All currently closed permanent roads used by the sale will be reclosed after sale activities have been completed. The roads will be left in a self-maintaining condition by removing temporary culverts (prior to rainy season), constructing cross-ditching on steep-gradient sections and adjacent to culverts or other drainage locations deemed necessary by an aquatics specialist. This measure will prevent chronic ground disturbance.</p>	T-13, T-14, T-16
A&S.7 (EA 12)	<p>The following measures are prescribed to minimize the amount of sediment delivered to streams along the haul route and from reconstructed and obliterated roads. Dispose of soils 100 feet from any perennial or intermittent stream at a location approved by the Sale Administrator. In addition, place sediment barriers (straw bales, slash filter windrow and/or sediment fence) in ditchlines along the haul route or in areas where the ground is disturbed and sediment has the potential for delivery to streams. Sediment filters should be left in place where possible to naturally degrade. If non-biodegradable filters are used, precautions should be followed to minimize transport of trapped sediment material during removal, including the following: a) work during the dry season, and/or b) relocate captured sediment to a stable location.</p>	T-13, R-12
A&S.8 (EA 16)	<p>For instream projects: To minimize the amount of sediment reaching the stream and to accelerate the re-vegetation process, rehabilitate areas compacted during management activities, and accelerate recovery of compacted soils, subsoil the compacted areas and plant native vegetation to restore any areas used as access points by equipment. Alternatives to</p>	R-12

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	subsoiling will involve consultation with the appropriate resource specialist. To minimize the amount of sediment entering the stream channel during instream activities, the operation period would be limited to low flow and within seasonal windows as permitted in the MOU with the WDFW.	
A&S.9	For instream projects: To reduce the potential for damage to the stream and flood plain as a result of a hazardous material spill, Spill-Booms will be placed downstream of the work site. A Hazardous Material kit will be on site, and would contain materials to control/contain a spill of fuel, oils, and/or hydraulic fluid. All service work on heavy machinery and refueling will be done on an established system road at a site approved by the Forest Service.	T-4, T-7, T-17, T-22, R-12
A&S.10 (EA 19)	Native seed provided by the Gifford Pinchot National Forest should be used for revegetation of the disturbed roadside areas. The following prescription is recommended: A mix of 65% <i>Elymus glaucus</i> with 35% <i>Deschampsia elongata</i> (by weight) applied at a rate of 100 lbs/acre, with fertilizer @ 200 lbs/acre and enough mulch that the seed is covered 2 to 3 inches. Alternative 2, 3 and 4. Variations from this prescription must be issued by the Zone Botanist. Use weed-free straw as mulch. The application of mulch may be substituted in consultation with the project Hydrologist/Aquatic Specialist.	T-13, T-14 Also a PDC
Additional Soil Mitigation Measures		
S.1 (EA 20)	Skid trails will be pre-designated for all ground-based equipment operations, and new skid trails will be spaced a minimum of 120 feet apart for ground-based units. Use of existing skid trails and roads must be used if possible rather than creating new ones. Timber will be felled to lead to the skid trail locations. Skidders will remain on skid trails and winch logs as necessary. Feller-bunchers, preferably track-mounted, operating off designated skid trails must operate over slash beds that are as thick and continuous as practicable. The objective of this measure is to limit the extent and the degree of soil damage, displacement, and disturbance.	T-11, T-13, T-16 Also a PDC
S.2 (EA 21)	Rock will be used only when necessary on landings and temporary roads, and applied only where needed (“spot rocking”). Rock will be incorporated into the roadbed by ripping or scarification following harvest activities (see following mitigation measure). The objective is to allow better substrate for vegetative growth and water infiltration following management activities with ground based equipment. Harvest during the dry season will prevent excessive use of rock.	T-14 Also a PDC
S.3 (EA 22)	If partial suspension logging systems gouge the surface greater than 12 inches deep for a length of 10 feet or more, the log skid trails would be rehabilitated with cross drains that have outlets and erosion seeded or have slash piled over them. This measure would minimize soil erosion and avoid stream sedimentation.	T-16
Wildlife Mitigation Measures		
W.1 (EA 35)	Create an average of 2.8 snags per acre in each sale unit following harvest with post-sale funding, to meet AMA/Matrix and Riparian Reserve (i.e. LSR) goals. Created snags should be greater than 17 inches in diameter, unless this results in the largest trees in the unit being selected for snag creation. In that case, the average size trees in a unit will be selected for snag creation, however all created snags will exceed 15 inches in diameter.	Post-harvest funding source
W.2 (EA 36)	Fall 10 trees per acre in units 5, 6, 8, and 17 for down wood with post-sale funding following sale completion, unless contract provisions allow for it to occur in association with the sale. As with snag creation, the size of the felled down wood trees will reflect the average sized tree in each unit; the largest trees will not be preferentially selected for down wood creation. All	Post-harvest funding source

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	down wood trees will exceed 15 inches in diameter, however. Due to the large amount of down wood already existing in unit 4, no down wood creation will occur in this unit, unless post-sale surveys indicate a need for it due to the disturbance of significant quantities of existing down wood.	
Traffic Control Mitigation Measures		
T.1 (EA 24)	Traffic warning signs will be placed at all sites where the roadway line of site distance has changed as a result of construction activities.	safety
T.2 (EA 25)	Detour signs will be placed at the intersection of Forest Roads 2300 and 2500, Forest Roads 2300 and 2800, Forest Roads 2800 and 2700, and Forest Roads 2700 and 2500, as well as along Forest Roads 2300, 2800, and 2700, to direct traffic during construction activities.	safety
Invasive Weed Mitigation Measures		
IW.1 (EA 26)	To prevent the introduction of noxious weeds into the project area, all heavy equipment, or other off- road equipment used in the project is to be cleaned to remove soil, seeds, vegetative matter or other debris that could contain seeds. Cleaning shall be done before entering National Forest Lands, and when equipment moves from project sites or areas known to be infested into other areas, infested or otherwise. An inspection will be required to ensure that equipment is clean before work can begin. This is the responsibility of the COR (Equipment cleaning clause Wo-C6.35).	R6 Weed EIS
IW.2 (EA 27)	In order to prevent the spread of weeds that currently exist on Forest Roads into newly disturbed sale activity areas Class B and C noxious weeds are to be removed, through hand pulling and/or weed wrenching (or other appropriate means) along roadsides adjacent to harvest units, and extending 200 feet along the road beyond the unit boundary. If funding or personnel time is available to treatment will occur prior to project activities. KV funds will be sought to revisit weedy sites in the sale area to control ensuing infestations.	R6 Weed EIS
IW.3 (EA 28)	Temporary roads, landings and other areas of heavy disturbance shall be revegetated with a native seed mix and application prescription developed by the Forest. Guidelines for site preparation shall also be followed (see Gifford Pinchot Native Species Policy, 2000). This information will be provided by the Gifford Pinchot National Forest North Zone Botanist prior to project implementation.	R6 Weed EIS, GP policy
IW.4 (EA 29)	There is a large, continuous population of meadow knapweed at the junction of Forest road 20 and spur road 2010. It appears to have been isolated in the past, judging from the mono-culture at the road-side landing site, but it is actively spreading from various vectors. This project will be implemented after the growing season, but soil from and adjacent to this site should not be spread to other un-infested areas. Of particular notice is the need to thoroughly clean vehicles after operating in this area. If funding or personnel time is available, treatment of this population will occur prior to project activities.	R6 Weed EIS, GP policy
IW.5 (EA 30)	There are no special recommendations for St. John's wort and oxeye daisy. These species are common through the planning area and adjacent area. They also propagate via under ground root-stems (rhizomes). Pulling and cutting is not recommended since each piece of plant matter has the capability to reproduce a new plant. Chemical treatment of these species is the one way to eliminate existing plants, with out the risk of compounding the problem the following season.	R6 weed EIS GP policy