APPENDIX E

EROSION AND SEDIMENT CONTROL PLAN

1.0 POTENTIAL EFFECTS

Areas within 300 feet of surface waters, other areas that have the potential to deliver sediment to surface waters, and areas containing soils that have erosion hazard ratings of Severe or High, as discussed in Section 3.3 (Soils), are considered to be at the greatest risk of delivering sediment to streams from construction-related erosion. Upon completion of the final project alignment of new access roads, areas with similar hazard ratings that occur farther than 300 feet from any surface water will be subject to site inspection prior to ground disturbance for potential sediment delivery paths that could cause stream sedimentation. These delivery paths include ditches or roads lacking adequate cross-drains. Improper road construction or directing of concentrated runoff onto unstable soils could result in gullying or possibly earth slumps. Careful road location and proper road construction practices will avoid or mitigate the risk of mass movements.

Construction and maintenance impacts will be mitigated or prevented using appropriate construction methods and sediment control measures. Mitigative or preventative measures appropriate for preventing or minimizing erosion include the following measures, and are further described in the sections below.

1. Avoid or mitigate any construction activities in areas identified as potentially unstable or landslides according to the Washington State Department of Natural Resources (WDNR) Forest Practices Rules (WAC 222-24, and Sections 3 and 16 of the Forest Practices Board Manual [Washington Forest Practices Board, 2002]) and USDA Forest Practices guidance and consultation, in compliance with the Okanogan National Forest Plan (USDA Forest Service, 1989). Mitigative measures consistent with Best Management Practices (BMPs) will be employed where project feasibility requires construction on potentially unstable areas.
2. Use or upgrade existing roads. Upgrade of existing roads will be as specified in consultation and right-of-way (ROW) easement agreements with the WDNR for state land, and the Bureau of Land Management (BLM), and USDA Forest Service for Federal lands. Any upgrades of county roads will be by mutual agreement of the Okanogan PUD and Okanogan County. Upgrades of private roads will be per agreement with individual land owners.
3. Place new roads or transmission line structures on the lowest possible slope gradients.
4. Stream crossing approaches will generally approach as near perpendicular to streams as practical and appropriate to minimize bank disturbance. Stream crossing approaches are permissible on these steep slopes, provided that orientation is designed to minimize ground disturbance, and provided that road surface runoff from the rest of the road is directed away from crossing approaches.
5. Schedule new road construction and near channel activities for the dry season. The dry season is considered to occur between May 1 and November 15. Further details on construction scheduling are found in Section 4.7, Fisheries.
6. Where landowners are in agreement, restrict unauthorized traffic on all non-public roads by installing locked gates to prevent unauthorized four-wheel-drive vehicle access.
7. Use proper road construction and maintenance techniques and install adequate road drainage systems.

8. Provide sediment control BMPs to prevent sediment delivery to surface water (Washington Forest Practices Board, 2002).
9. For road construction, maintain temporary erosion control mitigation measures until revegetation goals are met. Erosion control structures on roads will be developed in coordination with property owner interests and uses of the road, and will meet requirements of the Washington Forest Practices Board (2002).
10. Spread spoils from structure excavations to conform with existing contours. Spoils piles are to be removed from areas within 50 feet of all channels unless such removal would require greater disturbance through additional road construction for heavy equipment access.
11. Additional BMPs or requirements may be specified and required during consultation with USDA Forest Service personnel once the project route is chosen, in order to meet goals, standards, and guidelines outlined in the Okanogan National Forest Plan (USDA Forest Service, 1989).

Areas with erosion hazard ratings that are Slight to Moderate will also be inspected prior to construction in order to further reduce the potential for erosion and sedimentation. Appropriate measures to prevent erosion-related surface water degradation will be implemented in compliance with state ROW easements and other landowner agreements.

2.0 GENERAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures shall be implemented where necessary in order to minimize or prevent degradation of areas in and near the project. Measures used will be a function of specific construction and weather-related conditions. This erosion and sediment control plan is designed to provide enough flexibility to ensure that effective measures can be adapted to each situation encountered during construction. The following guidelines will be implemented along with site-specific design features to control project-related impacts from erosion, sedimentation, and mass movements. All instream work will meet permit requirements and be reviewed by Washington State Department of Fish and Wildlife, NOAA Fisheries, and U.S. Fish and Wildlife Service, as required by the Joint Aquatic Resources Permit Application (JARPA) process. See Sections 3.7, Fisheries and 4.7, Fisheries Mitigation for further discussion of the role of these entities.

2.1 Construction Scheduling

Grading and construction will be timed to minimize soil exposure in areas of moderate to high soil-erosion potential. Construction occurring within 200 feet of surface waters will be constrained to the period from May 1 to October 1. Short-term work stoppages may be necessary if road traffic during inclement weather causes the degradation of road surfaces throughout the project area. Timing of instream work is discussed in Section 3.7, Fisheries. If winter snowpack covers any roads or construction areas, a no-construction-activity period of 2 weeks will be required following snow melt to allow for adequate drainage and soil stabilization.

2.2 Clearing

Project construction will disturb only those areas necessary for construction activities. Clearing limits will be defined in cooperation with landowners, including BLM and WDNR. Clearing within the ordinary high water marks of all channels will require a hydraulics permit, which will be applied for by the PUD as part of JARPA. Overstory clearing limitations within riparian and other sensitive areas is also addressed in Section 3.7,Fisheries and Section 3.8, Wildlife Resources.

Cleared areas in dry channels of typed or untyped waters will be separated from other portions of the channels by appropriate sediment-control measures, such as sediment filter-fences, catch basins, or temporary check dams. However, channels that are naturally armored with 20 percent or more of gravel- or larger-sized material will not utilize such measures because the natural bed roughness of those areas will provide adequate control of finer grained sediment. Gravel particles are defined here as being 2.0 millimeters (U.S. standard sieve size 10) or larger in diameter.

2.3 Vegetation

All existing vegetation will be left intact whenever feasible to minimize potential erosion. Areas disturbed by construction activities will be regraded to their original elevation contours and revegetated upon completion of construction. Temporary revegetation between construction seasons will be done on disturbed areas if construction activities occur during more than one season. Please refer to Section 3.5, Vegetation for a discussion of vegetation management and restoration.

2.4 Roads

Existing roads that are upgraded for the project, and newly constructed roads shall conform to WDNR standards as defined and discussed in *Washington Forest Practices Rules - WAC 222* Chapter 222-24 (Washington Forest Practices Board, 2002). Additional requirements may be determined by site-specific conditions, or in consultation with USDA Forest Service. Road abandonment will follow road abandonment BMPs described in the Washington Forest Practices Board manual (2002).

2.5 Excavation and Grading

If it is necessary to remove bedrock or boulders, low energy methods such as pre-splitting, small diameter shooting, or non-explosive hydraulic shooting will be used to minimize impacts to soils and the risk of unplanned mass wasting. When excavating on slopes exceeding 58 percent (30 degrees), cut slopes of unconsolidated material will be flattened to less than 58 percent, where appropriate, to prevent instability. All excess unconsolidated material that is removed will be used as road fill if it is suitable material or will be end-hauled to designated spoil-disposal areas. Excess excavated rock will be stockpiled for use in road construction, slope protection, and other construction uses. Excess excavated rock will also be end-hauled to areas requiring fill or to areas designated for the disposal of spoils. All permanent and long-term temporary spoils piles will be contoured to conform to adjacent land forms and revegetated to blend with surroundings. Sidecasting of road materials will be minimized within 200 feet of all stream channels, as well as in areas that have the potential to deliver sediment to surface waters.

2.6 Runoff

Runoff will be controlled by the installation of ditches, culverts, and road cross-drain systems described in the Washington State Forest Practices Board manual (Washington Forest Practices Board, 2002). Subsurface and surface water runoff will be directed away from denuded areas and construction sites in order to minimize erosion of those areas. Any fuels, oils, or solvents will be stored in designated areas located away from the stream channels and drainage ways. Any soil contaminated by spills will be transported away to designated disposal sites, as addressed in the Hazardous Waste Management Plan, which will fully describes the proposed actions, contingencies, and site-specific requirements once an alternative has been selected.

2.7 Sediment Retention

Erosion and sediment control measures will be installed and maintained at all disturbance areas that have the potential of delivering sediment to surface waters. These structures will meet the standard requirements of the Washington Forest Practices Board manual (Washington Forest Practices Board, 2002), and will be designed in consultation with landowners, including BLM and USDA Forest Service.

All temporary sediment retention structures will be maintained until adjacent construction areas are revegetated to 90 percent of pre-project conditions or the PUD, through consultation with either a qualified soil scientist/geologist or state governmental agencies with jurisdiction, determines that minimum erosion hazard exists based on field inspection.

Because the project disturbance area will exceed 1.0 acre, the project will require a site-specific Stormwater Pollution Prevention Plan once an alternative is chosen.

2.8 Dewatering

No dewatering is anticipated because construction timing can avoid seasonal flow in most streams requiring instream construction. The PUD will submit a dewatering plan to all relevant agencies prior to construction that includes provisions for the minimization of sediment production, if deemed necessary or applicable. It is not anticipated that dewatering during low-flow periods will be necessary for simple culvert placement.

3.0 REVEGETATION OF CONSTRUCTION AREAS

Revegetation of disturbed areas will help to minimize or prevent erosion, contribute to site aesthetics, provide forage, and maintaining existing species composition. Revegetation efforts will be compatible with the maintenance and service needs of the Project. Section 3.5, Vegetation further discusses revegetation. Revegetation will be completed in consultation with WDNR, USDA Forest Service, BLM, and other landowners.

3.1 Site Preparation

All disturbed areas other than road beds to be kept in active use by either the PUD or the landowner will be reseeded upon completion of the project; except, in order to avoid contamination of relatively pristine native vegetation by introducing seed from an outside source, additional seeding is not recommended in areas where USDA Forest Service or WDNR botanists determine that native vegetation is dominant and an adequate native seed source is present. These conditions are expected to be present where the vegetation has been designated as class B or C in the Botanical Field Report (Tetra Tech, 2004c). Where feasible, revegetation will occur immediately following completion of construction activities. If construction has not been completed prior to the winter season, any remaining disturbed areas will be seeded and mulched before winter. Standard erosion control revegetation measures will likely be used in already disturbed areas.

Reseeding efforts may also include both mulch and/or fertilizer, where appropriate. Fertilizer may not be appropriate in all areas because it is generally considered to benefit non-native species over non-native species. Mulch is generally not a problem in this regard. Mulch will consist of weed-free wood cellulose for hydroseeding and clean straw for other seed broadcast methods. Wood cellulose mulch will be applied at a rate of 25 to 30 pounds per 1,000 square feet, on shallow slopes, and at double that rate on slopes exceeding 58 percent (30 degrees). Straw mulch will be applied at a rate of 75 to 100 pounds (2 to 3 bales) per 1,000 square feet, or a depth of 2

inches (Ecology, 1992). Sources for straw mulch must be approved by the Okanogan Noxious Weed Control Board. Fertilizer will be applied in a manner that prevents it from entering the surface waters (see WDNR Forest Practices Rules [WAC 222-38]). Jute netting placed over a layer of clean seed-free straw is the recommended mulching method for slopes exceeding 58 percent (30 degrees). Netting shall be anchored to slopes using No. 11 gauge wire staples that are at least 6 inches in length. Net edges should be overlapped a minimum of 3 inches (Ecology, 1992).

A tackifier compound will be used where necessary to hold seed and mulch on steep surfaces and to reduce wind removal of loose mulch. The tackifier shall be derived from natural plant sources with no growth- or germination-inhibiting materials. The manufacturer's recommendations for application of the tackifier will be followed.

3.2 Planting Techniques

The Okanogan PUD will consult with the Okanogan County Noxious Weed Control Board and develop an acceptable planting plan prior to any land disturbance. The planting plan will adhere to the recommendations of the Noxious Weed Control Board and contain an acceptable seed mixture for use in areas to be seeded. The recommended rate of seeding is 20 pounds per acre, except in areas where there is a high probability of excessive erosion; planting rates in these locations are recommended at 50 pounds per acre. The landowners and the Okanogan County Noxious Weed Control Board will be consulted if seed availability necessitates a modification of the seed mixture at the time of reseeding.

4.0 MAINTENANCE AND MONITORING

Control measures will be frequently inspected and maintained as necessary to retain their effectiveness until all disturbed areas have been successfully revegetated. Revegetation will be considered acceptable if disturbed areas are covered to 90 percent of pre-project conditions 3 years from project completion. During construction, sediment retention basins will be cleaned on an as-needed basis. All sediment control devices will also be routinely inspected during construction and will be maintained when necessary.

The District will be responsible for ensuring proper mitigation and control. Any erosion problems detected during monitoring surveys or other inspections will be promptly addressed. Revegetation efforts will be monitored for the first 3 years following planting and seeding. For the first year after planting, monitoring will be bi-monthly, except when snow cover precludes effective monitoring. If revegetation is assured after one year, monitoring during the second and third years will occur biennially. Areas that require replanting will be monitored monthly for one year and biennially during the second year after replanting. Monitoring results will be regularly reported to the WDNR. Landowners will be notified immediately of any emergent problems to determine actions necessary to meet the objectives of the revegetation plan. The objective of the revegetation plan is to re-establish vegetation in disturbed areas outside of ongoing use roadbeds to 90 percent of the pre-project areal coverage. Pre-project conditions will be determined by comparing reseeded, disturbed sites to immediately adjacent areas not disturbed during construction.

For noxious weed monitoring, see the vegetation mitigation measures in Section 4.5.

4.0 REFERENCES

Bunning, B.B. 1990. Geologic map of the east half of the Twisp 1 : 100,000 quadrangle, Washington. OFR 90-9. Washington Division of Geology and Earth Resources. Olympia, Washington.

Chatwin, S.C.; Howes, D.E.; Schwab, J.W.; and Swanston, D.E. 1994. A guide for management of landslide-prone terrain in the Pacific Northwest: second edition. Land management handbook 18. Research Program, British Columbia Ministry of Forests, Victoria, British Columbia.

Gulick, C.W., and Korosec, M.A. 1990. Geologic map of the Omak 1:100,000 quadrangle, Washington. OFR 90-12. Washington Division of Geology and Earth Resources. Olympia, Washington.

USDA (United States Department of Agriculture). 1980. Soil survey of Okanogan County area, Washington. USDA Soil Conservation Service in cooperation with Washington State University Agriculture Research Center.

Ecology (Washington State Department of Ecology). 1992. Stormwater management manual for the Puget Sound basin (the technical manual). Publication 91 -72. Olympia, Washington.

Washington Forest Practices Board. 2002. Washington Forest Practices Prepared by the Department of Natural Resources Forest Practices Division. Olympia, Washington.

Washington State Department of Transportation. 1994. 1994 Standard specifications for road, bridge, and municipal construction. Published in association with American Public Works Association, Washington State Chapter.