Appendix Q Final Supplemental Wetlands Technical Report

Final Supplemental Wetlands Technical Report

Bonneville Power Administration
Kangley-Echo Lake Transmission Line Project

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1.0 Executive Summary

This report describes the existing conditions and potential impacts to wetlands from the proposed Bonneville Power Administration (BPA) Kangley-Echo Lake Transmission Line Project. This report serves as the primary basis for the wetlands discussion in the National Environmental Policy Act (NEPA) Supplemental Draft Environmental Impact Statement (SDEIS) prepared for the project.

1.1 Alternatives

This Technical Report presents the preferred alternative (Alternative 1) and four additional action alternatives for constructing a new 500-kilovolt (kV) electrical transmission line intended to increase the capacity and reliability of energy provided to the Seattle metropolitan area. This increased capacity and reliability would reduce the potential for rolling brownouts or blackouts that could transpire by the winter of 2002 to 2003 if severe winter weather were to cause inordinate power demand and a simultaneous outage were to occur on one of the existing transmission lines in the area. Each alternative as shown in Figure 1 is described below in Section 1.1.2.

1.1.1 Construction Methods

BPA would construct all of the action alternatives using the existing practices described below for building transmission lines and substations. BPA would first obtain from landowners any additional easements for right-of-way (ROW) for the transmission line or access roads that would be needed. BPA would then build or improve access roads as necessary, clear vegetation in the ROW, and construct the required towers. BPA typically uses existing, cleared staging areas for storage and assembly of materials or structures.

After the structures are in place and conductors are strung between the structures, BPA would restore all disturbed areas.

The following sections describe in greater detail the sequential steps that BPA typically takes to construct a transmission line.

1.1.1.1 Right-of-Way Requirements

BPA would obtain easements from landowners for the transmission line ROW, and easements for access roads outside of the transmission line ROW easement. The easements give BPA the right to construct, operate, and maintain the line and access roads. A 150-foot (ft.) ROW width is assumed for the proposed 500-kV line.

Fee title to the land comprising the easement generally remains with the owner, subject to the provisions of the easement. The easement prohibits structures, tall trees, storing of flammable materials, and other activities that could be hazardous to people or endanger the transmission line. Activities that do not interfere with the transmission line or endanger people are usually not restricted.

Rights (usually easements) for new access roads that are outside the transmission line ROW would be acquired from property owners, as necessary. A 50-ft. ROW easement generally would be acquired for the new access roads, which are typically constructed to a roadbed width about

16 ft. wide. A 20-ft-wide easement would be purchased for the use of any existing access roads that are needed.

1.1.1.2 Clearing

The height of vegetation within the ROW would be restricted to provide safe and reliable operation of the line. All tall growing vegetation would be cleared within the transmission line ROW. Some trees outside of the ROW would also be cleared to prevent unstable or undesirable trees from falling onto the lines. These trees are referred to as "danger trees." A clearing advisory would be generated using ground information from cross section data. This clearing advisory would specify a safe vegetation height along and at varying distances from the line. The amount of vegetation removed would be based on this clearing advisory and local knowledge of regional conditions such as weather patterns, storm frequency and severity, general tree health, and soils. Other factors that influence the amount of clearing along the line are the line voltage; vegetation species, height, and growth rates; ground slope; conductor elevation above the ground; and clearance distance required between the conductors and other objects.

Merchantable timber purchased from private owners would be marketed and non-merchantable timber would be either lopped and scattered, piled, and/or chipped and left onsite, or would be taken offsite. Non-merchantable timber may or may not be burned because of air quality constraints. Contractors would be required to use brush blades that leave low-growing vegetation in place instead of dirt blades on bulldozers for clearing. Other specialized brushing/mulching equipment may also be required. Additional best management practices (BMPs) for timberland would also be used.

At the new tower sites, all trees and snags would be felled and stumps over 22 inches (in.) would be removed, including their root systems. The site would be graded to provide a relatively level work surface. The total amount of clearing required for this project is presently unknown.

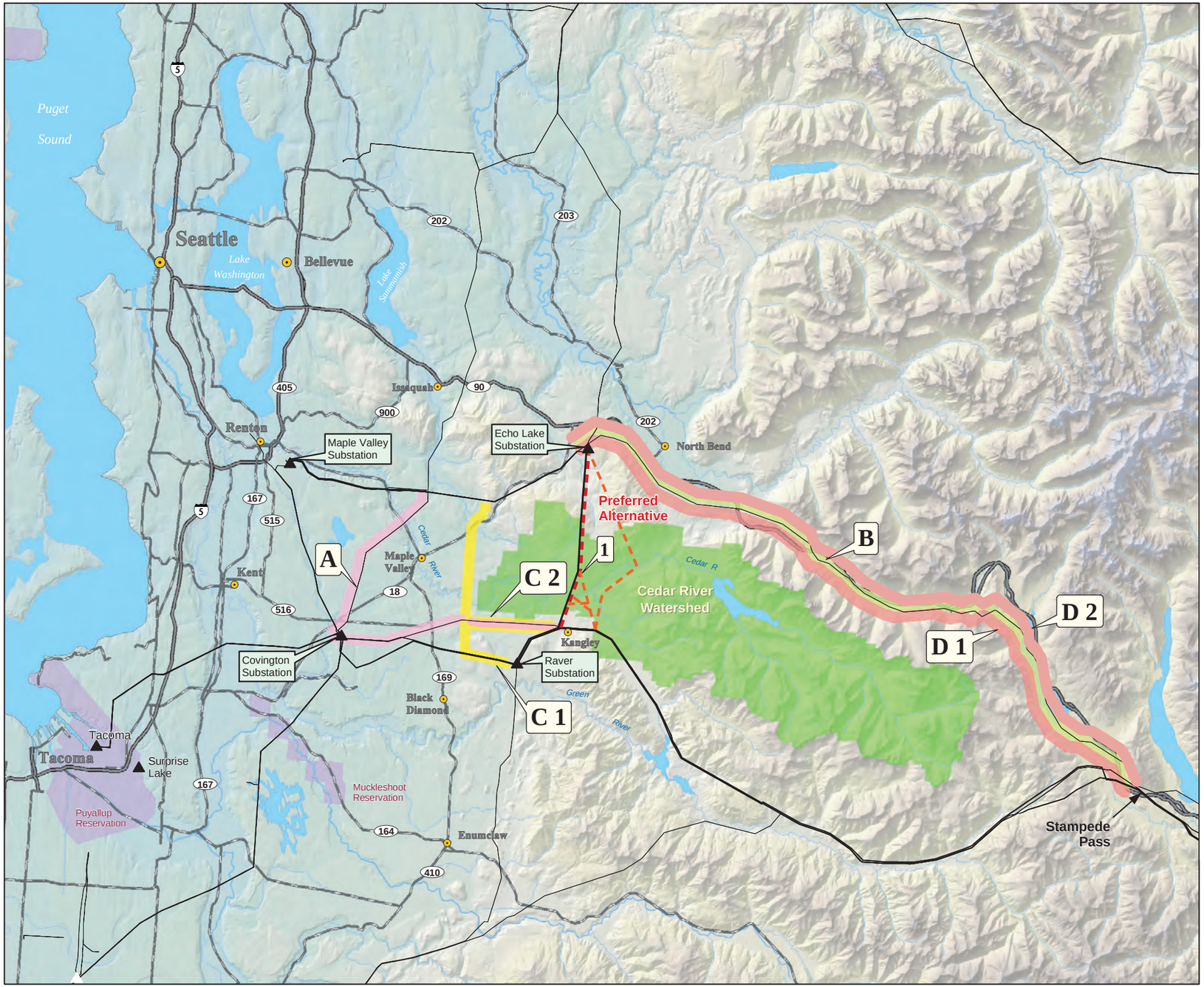
Additional land would be cleared for roads that are needed off the ROW and for roads determined to be in poor condition and requiring upgrading by BPA.

1.1.1.3 Access Road Construction and Improvement

An access road system within and outside of the ROW would be used to construct and maintain the new line. Access roads would be 16 ft. wide, with additional road widths of up to 20 ft. for curves. Existing access roads may also need improvement. Roads generally would be surfaced with gravel, and appropriately designed for drainage and erosion control. The access roads would generally have grades of 6% or less for erodible soils and 10% or less for resistant soils. The maximum grades would be 15% for trunk roads and 18% for spur roads. No permanent access road construction would be allowed in cultivated or fallow fields.

Clearing and construction activities for new access roads would disturb an area about 20 ft. wide, depending on terrain. New roads would be constructed within the ROW wherever possible, but where conditions dictate, roads would be constructed and used outside of the ROW. Construction of new roads is recommended only to access new towers or to avoid greater natural resource impacts.

Dips, culverts, and waterbars would be installed within the roadbed to provide drainage. Fences, gates, cattle guards, and additional rock would be added to access roads as necessary.



ADDITIONAL ALTERNATIVES to be CONSIDERED

Kangley - Echo Lake Transmission Line Project

Legend

- Existing BPA Transmission Lines
- Preferred Alternative
- ▲ BPA Substations

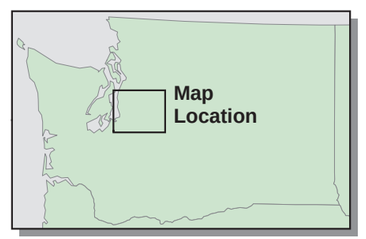
Alternatives

A Construct New Single-Circuit 500-kV Line from tap near Kangley to Covington Substation.
Rebuild Covington - Maple Valley 230-kV to Double-Circuit 500-kV

B Rebuild Portion of Rocky Reach-Maple Valley 345-kV to Double-Circuit 500-kV from East of Stampede Pass to Echo Lake Substation

C Construct New Single-Circuit 500-kV Line West of the Cedar River Watershed to the Echo Lake - Maple Valley Lines

D Construct New Single-Circuit 500-kV Line from East of Stampede Pass Adjacent to Rocky Reach-Maple Valley Line



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Source: Bonneville Power Administration 2002.

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Jones & Stokes

Figure 1
Location Map and Proposed Transmission Line Alternatives

Where temporary roads are used, any disturbed ground would be repaired and, where land use permits, the road would be reseeded with grass or other appropriate seed mixtures. After construction, access roads would be used for line maintenance. Where ground must be disturbed for maintenance activities, the roadbed would be repaired and reseeded as necessary.

The amount of new roads required for this project would vary depending on the alternative chosen and the ability of BPA to acquire rights on existing roads in the area.

1.1.1.4 Storage, Assembly, and Refueling Areas

Construction contractors usually establish storage areas near the transmission line where they can stockpile tower steel, conductor spools, and other construction materials. These areas would be accessible from major highways. Structural steel would be delivered in pieces on flatbed trucks and would be assembled either on or offsite. A mobile crane may be needed to handle the bundles. If the terrain were too steep at the actual tower site, general assembly yards would be used to erect the tower in pieces. The structure would then be transported to the tower site by truck or helicopter. Because trucks and helicopters need to refuel often, these construction areas may also be used for refueling.

1.1.1.5 Tower Site Preparation

Site preparation begins with removing all vegetation from a tower site. In areas of uneven topography, the site would be graded to provide a level work area. An average area of 30,000 square feet (150 by 200 ft.) could be disturbed at each tower site. Additional areas that could be disturbed include the site where the conductor is strung and pulled. These disturbances could be as large as a 370-ft. radius from the tower center.

Bulldozers would be used to clear and construct any new access roads to the transmission line towers and any new tower site landings. Manual methods, including chainsaws and brush hogs, would be used to clear the new ROW. BMPs would be used during clearing and construction to reduce impacts.

In addition to clearing the ROW for the transmission line towers, construction crews would remove selected trees in a 50- to 60-ft.-wide area on each side of the ROW. This additional clearing would be done to reduce the possibility of unstable trees falling on the new transmission line. Some trees newly exposed to the wind would be expected to fall after the initial clearing process because they have not developed the root structure to remain standing once they become more fully exposed to strong winds.

1.1.1.6 Towers and Tower Construction

Steel lattice towers would be erected to support the transmission line conductors. The height of each tower would vary by location and surrounding landforms. Single circuit towers would average 135 ft. high and double circuit towers would average 180 ft. high. The towers would be spaced about 1,100 to 1,200 ft. apart.

Most towers used on the proposed line would be “tangent” or “suspension” towers. This type of tower is designed to support conductors strung along a virtually straight line with only small turns or angles. “Deadend” towers would also be used on a limited basis where stresses on the transmission line conductors would have to be equalized because of changes in direction, because of the need to support an excessively long span, or where a span crossing is needed for extremely

steep or rugged terrain or a river. Deadend towers use more insulators and heavier steel than tangent or suspension towers, thus making them more visible. Deadend towers also are more costly to build than suspension towers.

The towers would be constructed from the ground as much as possible, rather than using helicopters. The equipment used depends on the weight and size of the towers and such site conditions as weather and soil characteristics. Most of the 500-kV towers would be built using mobile cranes; however, helicopter tower erection could be used if access was not available or if sensitive resources would be encountered.

Steel towers would be assembled in sections near the tower site. Each tower contains three components: the legs, body, and bridge. The bridge is the uppermost portion of the tower and serves as the attachment point for the insulators that support the conductors.

Steel towers are anchored to the ground by footings. Each tower requires four footings placed in holes that have been excavated, augured, or blasted. Large machinery, such as backhoes or truck-mounted augers, would be used to excavate the footings. Topsoil would be stockpiled during excavation. The design of the footings would vary based on soil properties, bedrock depth, and the soundness of the bedrock at each site. Typically, towers would be attached to steel plates or grillages placed within the excavated area. The areas would then be backfilled with excavated material or concrete. Topsoil would then be replaced to restore the original ground surface.

Typical footings for single-circuit towers include 4- by 4-ft. plates placed 10 to 12 ft. deep for suspension towers and 12.5- by 12.5-ft. grillage placed 14 to 16 ft. deep for heavy deadend towers. Typical footings for the double-circuit towers include 8.25- by 8.25-ft. grillage placed 12 to 14 ft. deep for suspension towers and 16- by 16-ft. grillage placed 14.5 to 18.5 ft. deep for heavy deadend towers. On average, for an entire transmission line project, each footing would occupy an area about 10 by 10 ft. to a depth of 15 ft. if bedrock was not encountered. The holes in which the plates and grillage would be installed must be large enough to provide about 1 ft. of clearance on each side of the plate or grillage. If bedrock were encountered and had properties that allowed anchor borings, holes would be drilled and steel rods grouted into the rock. These rods would either be attached to a concrete footing or welded directly to a tower member and embedded in compacted backfill. If rock properties were not suitable for anchor rods, the rock may be blasted to obtain adequate footing depth.

As the towers are built, heavy machinery would disturb the ground surface and/or compact soils at the tower site and along access roads. The machinery also would generate noise and dust.

1.1.1.7 Conductors, Overhead Ground Wires, and Insulators

The wires or lines that carry the electrical current in a transmission line are called conductors. Alternating-current transmission lines, such as the proposed line, require three wires or sets of wires, each of which is referred to as a "phase." Three 1.3-in. Bunting conductors would be included for each phase. Each bundle is 16 by 20 in.

Conductors are not covered with insulating material. Instead, the air surrounding each conductor acts as insulation. Each phase of conductor would be physically separated on the transmission tower.

After the transmission towers are in place, workers would attach a smaller steel cable to the conductor and then pull the conductor under tension through the insulators and string the

conductor between towers. Conductors would be attached to the structure using glass, porcelain, or fiberglass insulators. Insulators prevent the electricity in the conductors from moving to other conductors on the tower, the tower itself, and the ground. As the conductors are strung, the ground surface would be disturbed at the tensioning sites, and noise and dust would be generated by the machinery.

Transmission towers elevate conductors to provide safe clearance for people and structures within the ROW. The National Electrical Safety Code (NESC) establishes minimum conductor heights. The minimum conductor-to-ground clearance for a 500-kV line is a little more than 29 ft. Greater clearances would be provided by BPA over county roads and highways, railroads, and river crossings.

One or two smaller wires, called overhead ground wires, would also be attached to the top of the transmission towers. Overhead ground wires would be installed to protect the transmission line against lightning damage. The diameter of the wire would vary from 0.375 to 0.625 in.

1.1.1.8 Substation Addition

Under the current proposal, the Echo Lake Substation would be expanded to the east on land owned in fee title by BPA. The size of the expansion would be approximately 150 by 750 ft. The site would be cleared in the same manner as the ROW for the transmission line. The site would include a fenced yard and a graded and graveled parking lot. The existing road around the substation would be realigned to the east to accommodate this expansion. New transformers, switches, and other equipment would be installed in the expanded area. A continuous ground wire would also be installed.

1.1.1.9 Site Restoration and Clean-up

Disturbed areas around the towers, conductor reels, and pull site locations would be reshaped and contoured to be consistent with their original condition. Access roads would be repaired.

Disturbed areas would be reseeded with grass or an appropriate seed mixture to prevent erosion. The seed mixture would include native plant species and would be free of noxious weeds. All solid waste from construction would be removed and properly disposed offsite, and equipment would be removed from the ROW.

1.1.2 Alternative Rights-of-Way

Alternative 1, the preferred alternative, is presented for comparison purposes only. Please refer to the *Final Wetlands Technical Report* (Jones & Stokes 2002) for a detailed description.

1.1.2.1 Alternative 1: Preferred Alternative

The alignment for Alternative 1 would be immediately adjacent and parallel to a portion of the existing 12-mi. Raver-Echo Lake transmission line from a point approximately 3 mi. north of Raver (S26, T22N, R7E) to the Echo Lake Substation (S11, T23N, R7E) (see Figure 1). This alternative would be approximately 9 mi. long and would require about 2.9 mi. of new access roads. The existing 150-ft. ROW would be widened to 300 ft., with the widening and new line located east of the existing ROW.

1.1.2.2 Alternative A

The alignment for Alternative A would be located west of the Cedar River Municipal Watershed (Figure 1). This alternative proposes to construct a new single-circuit 500-kV line within an existing BPA ROW from a tap along the Schultz-Raver No. 2 line near the community of Kangley to just outside BPA's substation near Covington. The line then routes along the outside of the northeast fence line of Covington substation to the existing Covington-Maple Valley 230-kV transmission line. This entire segment would be constructed in a single-circuit configuration with tower heights averaging 135 ft.

The remainder of this alternative would require replacing a portion of BPA's existing Covington-Maple Valley single-circuit 230-kV transmission line with a double-circuit 500-kV line north of Covington Substation. One side of the new double circuit towers would be operating at 500-kV and the other side at 230-kV. The 500-kV circuit would continue on to terminate at Echo Lake Substation utilizing a vacant circuit on the Maple Valley-Echo Lake double-circuit 500-kV transmission line. New double-circuit towers, about 180 ft. tall, would support both double circuit segments. The new transmission lines would be built on existing rights-of-way, with the exception of a portion of the single-circuit line near the Covington Substation. New right-of-way would need to be acquired across from the Covington Substation to connect the single-circuit 500-kV transmission line with the double-circuit line.

1.1.2.3 Alternative B

Alternative B proposes to replace about 38 mi. of BPA's existing Rocky Reach-Maple Valley 345-kV transmission line to a double-circuit 500-kV line (Figure 1). The new towers would be about 180 ft. tall, approximately 30 to 90 ft. taller than the existing towers. The new 500-kV line would be connected to the existing Schultz–Raver No. 2, 500-kV transmission line just east of Stampede Pass and to Echo Lake Substation at the west end. The line would cross Interstate 90 (I-90) twice. Almost all of this route would be on existing right-of-way.

1.1.2.4 Alternative C (Option C-1)

Alternative C (Option C-1) proposes to construct a new single-circuit 500-kV line from near the community of Kangley at BPA's Raver Substation on mostly new 150-ft.-wide right-of-way totaling 10 mi. in length (see Figure 1). The proposed transmission line would be carried on towers approximately 135 ft. high and originate at the Raver Substation. The proposed line would proceed westerly a distance of about 2.5 mi. on new 150-ft.-wide right-of-way immediately north of the Tacoma-Raver double-circuit 500-kV transmission line. At that point the line would turn north through the Ravensdale and Hobart areas and would be connected to an existing vacant (unused) Echo Lake-Maple Valley 500-kV circuit. The vacant circuit would need to be connected to a new bay in the Echo Lake Substation. This option would require the purchase of approximately 6 mi. of new transmission line right–of-way.

1.1.2.5 Alternative C (Option C-2)

Alternative C (Option C-2) proposes to construct a new single-circuit 500-kV line from a tap along the Schultz-Raver No. 2 line near the community of Kangley, to an existing vacant (unused) Echo Lake-Maple Valley 500-kV circuit (see Figure 1). New towers would be about 135 ft. tall. The new line would pass through the Ravensdale and Hobart areas. The vacant circuit would then need to be connected to a new bay in the Echo Lake Substation. This option would require the purchase of approximately 10.5 mi. of new transmission line right–of-way.

1.1.2.6 Alternative D (Options D-1 and D-2)

Alternative D proposes to construct a new single-circuit 500-kV transmission line from east of Stampede Pass to the Echo Lake Substation, over a distance of approximately 38 mi. (see Figure 1). The new line would be located either on the south side or the north side of the existing Rocky Reach-Maple Valley 345-kV line, immediately adjacent to the existing cleared transmission line right-of-way. New towers would average about 135 ft. tall. The line would cross I-90 twice. A new 150-ft.-wide right-of-way would need to be acquired either on the south side of the existing ROW (Option D-1) or on the north side (Option D-2).

1.2 Key Issues for Wetlands

Wetlands are susceptible to degradation from excavation, fill, and clearing. Federal, state, and local agencies require the disclosure of potential impacts to wetlands associated with the construction and maintenance of the transmission line.

Wetlands that could be affected include scrub-shrub, forested, emergent, riverine, unconsolidated bottom, and open water habitats. Most of the wetlands identified are associated with scrub-shrub habitats. Some of these habitats would be permanently altered with the construction of access roads and the transmission line. Forested wetland would be permanently altered by removal of trees for construction of access roads and the transmission line. Construction of access roads and towers within wetlands would result in the permanent fill of these resources. Moderate to high levels of impact to wetlands would occur with the construction of any of the proposed transmission line alternatives.

Impacted wetland functions associated with vegetation clearing, access road construction, and tower construction are wildlife habitat, water quality improvement, flood storage, moderation of flood flow, and groundwater discharge and recharge. In forested wetlands, permanent impacts would occur where trees are removed. These wetlands would be permanently maintained as scrub-shrub or emergent wetlands. Minimizing the disturbance to soil structure during vegetation clearing would reduce impacts to water quality, flood storage, and flood flow moderation functions.

Where possible, BPA would place new roads and tower structures outside of wetland areas to avoid permanently altering wetland hydrology and soils through excavation or fill.

1.3 Major Conclusions

A total of 78 wetlands were identified within the study area during a June 2002 site reconnaissance. (See Section 2.1 below.) Alternative C (Option C-2) would result in the least potential impact to wetlands with a total of 1.23 acres (ac.) of wetland vegetation clearing impact and 0.31 ac. of wetland fill impact. Alternative D (Option D-2) would result in the greatest potential impact to wetlands with 11.94 ac. of wetland vegetation clearing and 0.19 ac. of wetland fill impact. Impacts to wetlands associated with the construction of the transmission line would occur from the clearing of vegetation and from fill associated with the placement of access roads and towers. Operation and maintenance impacts, including the continued clearing of vegetation, would be similar except with less severity.

Wetlands within the proposed ROWs include scrub-shrub, emergent, forested, riverine, unconsolidated bottom, and open water habitats. Permanent impacts to wetland functions would occur from the removal of trees from forested wetlands within the 150-ft. transmission line ROW

and their subsequent maintenance as scrub-shrub communities, and from the placement of fill associated with the construction of access roads and towers. Key wetland functions that would be degraded from construction of the transmission line are wildlife habitat, flood storage and flood flow moderation, and water quality. Identifying and avoiding wetland resources before and during construction, and limiting disturbance to the minimum necessary when working in and immediately adjacent to wetlands, would minimize wetland impacts. New road construction could carry sediment into wetlands, affecting water quality and biological productivity; however, use of erosion control devices would minimize these direct impacts.

2.0 Study Scope and Methodology

2.1 Data Sources and Study Methods

The collection of wetland data for the study area focused on two tasks:

- Habitat-Based Evaluation
- Field Verification

The habitat-based evaluation was initiated by reviewing existing data and literature applicable to the project area. Background review of wetlands data for the project area was based on:

- U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps (United States Department of the Interior 1987 map series).
- Wetland maps and other information from King County (King County 2000).
- 1:24,000-scale orthophotos.
- U.S. Geological Survey (USGS) 7.5-minute series quadrangle topographic maps.

A basemap of potential wetland locations was created by superimposing the transmission alternatives over the wetlands location data provided by the aforementioned data sources. This map was used to aid the field survey of wetlands within the ROWs. The wetlands reconnaissance conducted in June 2002 focused on field-verifying selected areas of the wetland basemap that may be impacted. The approximate wetland boundaries were then field-mapped on the orthophotos provided by BPA. Some portions of the study area were inaccessible for field review because of heavy snow cover, degraded access roads, inaccessible private property, and time restrictions. However, several wetlands located within these areas were inventoried, and any information regarding these wetlands is based on existing data, maps, and literature review.

Jones & Stokes wetland biologists located wetlands within a 500-ft. survey corridor between June 4 and 11, 2002. Wetlands previously identified by King County and the National Wetlands Inventory were located. Several other wetlands not identified by King County or other sources were also located. No waters of the United States were "delineated"; subsequently no jurisdictional wetland boundaries were established for the purposes of the Draft Supplemental Environmental Impact Statement. Because of the size of the wetlands and their readily apparent signature on the aerial photographs, the boundaries were sketched on 1:24,000-scale aerial photographs and subsequently digitized electronically to the aerial orthophotos using the ArcView mapping program.

Wetland biologists located wetlands, including waters of the United States, using criteria for jurisdictional wetland identification developed by the U.S. Army Corps of Engineers (Environmental Laboratory 1987), the Washington State Department of Ecology (Ecology 1997). Wetland class, rating, and size were determined at each wetland location. Wetlands were classified following the standardized national system established in Cowardin et al. (1979). Wetlands were rated and buffer widths were assigned based on the King County Environmentally Sensitive Areas Ordinance (King County Code 21A.24.320), Kittitas County Critical Areas Code (Chapter 17A.04), City of Kent Wetland Management Code (11.05.050), City of Maple Valley Critical Areas Regulations (Code 18.60.030), City of Covington Zoning Code (21A.06.1415), the Washington State Wetlands Rating System for Western Washington (Ecology 1993), and the Washington State Wetlands Rating System for Eastern Washington (Ecology 1991).

Wetlands within the 500-ft. corridor were mapped by alternative consecutively from east to west and/or south to north. Wetlands were numbered based upon their association with a primary alternative and the order from east to west and/or south to north. For example, the easternmost wetland located on Alternative A is wetland A-W-1. Because Alternative D (Options D-1 and D-2) runs immediately alongside Alternative B, any wetlands identified within any or all of the three alternative study corridors were identified as BD. For example, the easternmost wetland located in Alternative B is wetland BD-1. The third wetland identified within Alternatives B and D (Options D-1 and D-2) was identified as BD-3. In addition, Alternatives A and C (Option C-2) share a portion of the same route. Therefore, Alternative C (Option C-2) has a wetland identified with an A because it falls within both alternatives.

Wetland clearing impacts were calculated for Alternatives A, B, C (Options C-1 and C-2), and D (Options D-1 and D-2) using the ArcView mapping program by overlaying each proposed 150-ft. ROW on the June 2002 surveyed wetlands. The sum of potential wetland impacts from vegetation clearing was then calculated for each alternative.

The analysis of impacts assumes standard BPA clearing, grading, and filling requirements for the construction of towers and roads as described in Section 1.1.1 of this report. Potential locations for the construction of new transmission towers were approximated based on standard BPA construction requirements, the location of existing towers, topographical and natural features, and conversations with BPA engineers. All tower locations are approximate and subject to modification. The majority of potential access road construction and reconstruction was determined by field review of the alternative alignments by a BPA engineer and subsequently provided to Jones & Stokes.

2.2 Agencies Contacted

- Kittitas County Planning Department

3.0 Affected Environment

3.1 Regional Overview

The project area generally spans from Easton to Kent, between Black Diamond and North Bend, Washington. Major portions of Alternative B, and D (Options D-1 and D-2), pass through the Okanogan-Wenatchee and Mt. Baker-Snoqualmie National Forests. Landowners include Weyerhaeuser Timber Company, private owners, and local municipalities.

Water Resource Inventory Areas (WRIAs) designated by the Washington Department of Ecology (Ecology) that are crossed by the proposed ROWs include Lake Washington (#8), Snohomish River (#7), Green River (#9), and Upper Yakima (#39).

Wetlands within the region are typical of the Puget Lowland and western and eastern Cascade Mountain foothills. Wetland soils are often formed in gravels, sands, and clay and silt tills derived from glacial deposits. Mixed deciduous and coniferous-forested wetlands with pockets of shrub, emergent, and open water communities are common. Wetland water sources include hillside seeps, perched water tables, overland runoff, precipitation, and flows from adjacent streams.

3.2 Regulations, Standards, and Guidelines

3.2.1 Federal

Clean Water Act (CWA) Section 404 requires the avoidance of development in wetlands wherever practicable. Wetlands are important natural communities that deserve special consideration because of historical and current regional and statewide losses, and because of the federal laws and policies that pertain to their protection. Wetland communities in the project ROWs play a vital role in groundwater discharge, supporting stream baseflow, capturing sediment and nutrient runoff, and providing habitat for wildlife and plant species.

Under Section 404 of the CWA, the U.S. Army Corps of Engineers (Corps) and the U.S. Environmental Protection Agency (EPA) regulate the placement of dredge and fill material into waters of the United States, which include jurisdictional wetlands. Although the CWA protects wetlands, filling of wetlands can occur after the Corps issues a Section 404 permit.

For regulatory purposes, the federal agencies define wetlands as follows:

> Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (CFR 328.3, CFR 230.3).

Other waters of the United States include seasonal or perennial surface water features, such as streams and drainages, that are not considered wetlands because they do not meet one or more of the three mandatory technical criteria that characterize jurisdictional wetlands (i.e., hydrophytic vegetation, hydric soil, and wetland hydrology), as defined by the Corps Wetlands Delineation Manual (1987). See the Fisheries Technical Report for a complete discussion of these other surface water features within the project area.

3.2.2 United States Forest Service

USFS manages two National Forests in the project area, the Mt. Baker-Snoqualmie National Forest and the Okanagon-Wenatchee National Forest. USFS also manages lands on the fringes of these two national forests within the project area. In 1993, USFS and the Bureau of Land Management (BLM) developed the Northwest Forest Plan to set guidelines for the management of the natural environment in Pacific Region National Forests. The goals of the Northwest Forest Plan are designed to protect forest ecosystems and allow renewable use of forest material, but they also include protection for riparian areas, streams, and wetlands. The forest management and implementation portion of the strategy was analyzed in a draft supplemental environmental

impact statement. The final EIS and the Record of Decision (ROD) (USFS and BLM 1994) were published in February 1994. The ROD amended the planning documents of 19 National Forests and 7 Bureau of Land Management Districts.

The Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. Under the ROD, all actions on USFS land must maintain or restore aquatic habitat in accordance with the Aquatic Conservation Strategy Objectives (ACSOs) to qualify for approval. The Northwest Forest Plan Standards and Guidelines define the process by which proposed projects are determined to be in compliance with the ACSOs. ACSOs (listed below) are designed to protect the watershed at a variety of spatial and temporal scales.

1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape scale features to ensure the protection of the aquatic systems to which species, populations, and communities are uniquely adapted (watershed complexity).

2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species (watershed connectivity).

3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations (geomorphic integrity).

4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities (water quality).

5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of the sediment input, storage, and transport (sediment regime).

6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected (streamflow).

7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands (water table elevation).

8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distribution of coarse woody debris sufficient to sustain physical complexity and stability (riparian/wetland vegetation).

9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species (habitat).

The ACS seeks to manage and evaluate aquatic ecosystems at larger watershed scales, but it also incorporates ecosystem principles in project-level planning. Both positive and negative impacts may span temporal scales ranging from days to centuries, often taking decades or longer to become evident. The anticipated effect of an action can be used to determine consistency of the action with ACSOs even though the effects may not be fully evident until some distant time. Management actions that do not maintain the existing condition or lead to improved conditions in the long term would not meet the intent of the ACS and should not be implemented (USFS and BLM 1994).

The four main components that allow attainment of the ACSOs are Riparian Reserves, Key Watersheds, Watershed Analysis, and Watershed Restoration. Actions that negatively affect or impede implementation of these components would result in non-attainment of the ACSOs. This would include impacts to wetlands or the portions of a watershed required for maintaining hydrologic, geomorphic, and ecologic processes that directly affect standing and flowing waterbodies such as lakes and ponds, wetlands, streams, stream processes, and fish habitats.

Watershed analyses are the foundation of this process, and each watershed analysis must describe existing conditions, natural variability, and the effects of proposed management activities. Watershed analysis is one of the principal analyses that will be used in making decisions on implementation of the Aquatic Conservation Strategy. Watershed Analyses have been completed for Yakima River (USFS 1997) and South Fork Snoqualmie River (USFS 1995). The Keechelus Lake-Mosquito Creek sub-watershed occurs within the greater Yakima River Watershed and also has a completed Watershed Analysis (Plum Creek 1997). Restoration should be based on watershed analysis and planning and should be identified in the watershed analysis.

This document will be the primary NEPA document for identifying impacts to wetlands within USFS-managed lands in the project area. Please refer to the Fisheries Report for complete analysis related to Riparian Reserves. Impacts to ACSOs associated with impacts to wetlands are described at a scale equivalent to the current level of analysis within the affected watersheds under the proposed alternatives. If either Alternative B or D (Options D-1 or D-2) is chosen as the preferred alternative, USFS-managed lands would be involved, and the appropriate level of analysis for ascertaining impacts to ACSOs would be completed.

3.2.3 State

Section 401 of the federal CWA requires that proposed dredge and fill activities permitted under Section 404 be reviewed by the Washington Department of Ecology for compliance with state water quality standards. Certification ensures that federally permitted activities comply with the federal CWA, state water quality laws, and any other state aquatic protection requirements. (Unless certified by the state, the federal Section 404 permit is considered invalid.)

3.2.4 Local

Local jurisdictions include county and city lands crossed by the proposed alternative alignments. Compliance with the local authorities' critical areas ordinance is required whenever a project located near or within critical areas wetlands is proposed. The local jurisdictions crossed by the proposed alternatives include:

- King County
- Kittitas County
- City of Maple Valley

- City of Kent
- City of Covington

Wetlands within the project ROWs were rated using the criteria defined in the King County Sensitive Areas Ordinance (Ordinance #9614). This ordinance categorizes wetlands into Class 1, 2, and 3 based on the size, the presence of species listed as threatened or endangered, and the number of vegetation classes present.

The King County Sensitive Areas Ordinance requires minimum buffer widths for wetlands, as determined by the wetland category. Wetland buffers are measured from the wetland edge. The King County Sensitive Areas Ordinance provides for permanent protection of wetlands and their buffers by regulation of development and other activities. Minimum buffer requirements are:

- Class 1: 100 ft.
- Class 2: 50 ft.
- Class 3: 25 ft.

In addition, and unless otherwise specified, a minimum building setback of 15 ft. is required from the edge of a wetland buffer.

The Cities of Kent, Covington, and Maple Valley have adopted King County's wetland rating and buffer classification system.

Kittitas County defers to Ecology's Washington State Wetlands Rating System for Eastern Washington (Ecology 1991, Hall pers. comm.) for wetland categorization. This system categorizes wetlands into Category 1, 2, 3, and 4 based on the wetlands' size, sensitivity to disturbance, rarity, the functions that they provide, and the number of vegetation classes present.

The King County Critical Areas Ordinance requires minimum buffer widths for wetlands, as determined by the wetland category. Wetland buffers are measured from the wetland edge. The Kittitas County Critical Areas Ordinance provides for permanent protection of wetlands and their buffers by regulation of development and other activities. Minimum buffer requirements are:

- Category 1: 300 ft.
- Category 2: 200 ft.
- Category 3: 75 ft.
- Category 4: 75 ft.

3.3 Study Area and Approach

The study area for wetlands included a 500-ft.-wide corridor along all of the transmission line alternatives. Figure 2 presents the locations of all wetlands surveyed within the ROWs during the June 2002 reconnaissance. Table 1 presents the wetlands identification numbers and vegetation classes by alternative as surveyed in June 2002.

A total of 78 wetlands were identified within the study area during the June 2002 reconnaissance for wetlands (see Figure 2).

Wetland vegetation classes in the study area included palustrine emergent, scrub-shrub, forested, riverine, unconsolidated bottom, and open water wetlands as defined by Cowardin et al. (1979). Commonly, wetlands on flat bench areas were associated with depressional areas that receive

water from overland runoff and precipitation. Wetlands east of Snoqualmie Pass were generally associated with riparian fringes and floodplains of streams. Hydrology of these wetlands depends on stream flows and flooding. Just west of Snoqualmie Pass, wetlands were predominantly located on sloped areas and were fed by groundwater discharge seeps. In the Cascade foothills and Puget Sound lowlands, wetlands are generally associated with depressional areas that receive water from overland runoff and precipitation.

Frequently observed wetland plant species throughout the alternatives included willow (*Salix* spp.), Douglas' spirea (*Spiraea douglasii*), salmonberry (*Rubus spectabilis*), red alder (*Alnus rubra*), soft rush (*Juncus effusus*), and creeping buttercup (*Ranunculus repens*).

Wetland buffers within the existing alignments associated with Alternatives A, B, and C (Options C-1 and C-2) have been cut to allow conductor span, and generally maintain low shrub and herbaceous cover. Wetland buffers within the private timberlands and National Forests reflect the mosaic past and recent timber harvests, and are generally intact and dominated by a mix of shrubs and young deciduous and coniferous trees. Wetland buffers in the more urban areas of A, and C (Options C-1 and C-2) typically consist of grasses, shrubs, or trees.

The wetlands in the study area provide many functions and values that directly or indirectly benefit society. Many of the depressional and seep discharge wetlands identified within the study area are located in the upper third of their respective watersheds and are connected to drainages. These characteristics increase flood storage and moderate flows in periods of flooding, two important wetland functions. Several wetlands are associated with the riparian fringe of streams, an area that plays an important role in filtering pollutants and sediments before they reach the waterway. High vegetative structural complexity within the wetlands and adjacent to intact forested upland communities may provide foraging, breeding, cover, and rearing habitat for many wildlife species.

Wetland buffers provide important functions, including protection of wetland functions and values, water quality improvement, wildlife habitat, and deterrence of human access and associated impacts. Vegetated buffers may reduce impacts to water quality in wetlands by controlling soil erosion and filtering out pollutants. Vegetated buffers provide essential life needs for birds and mammals that are considered wetland-dependent.

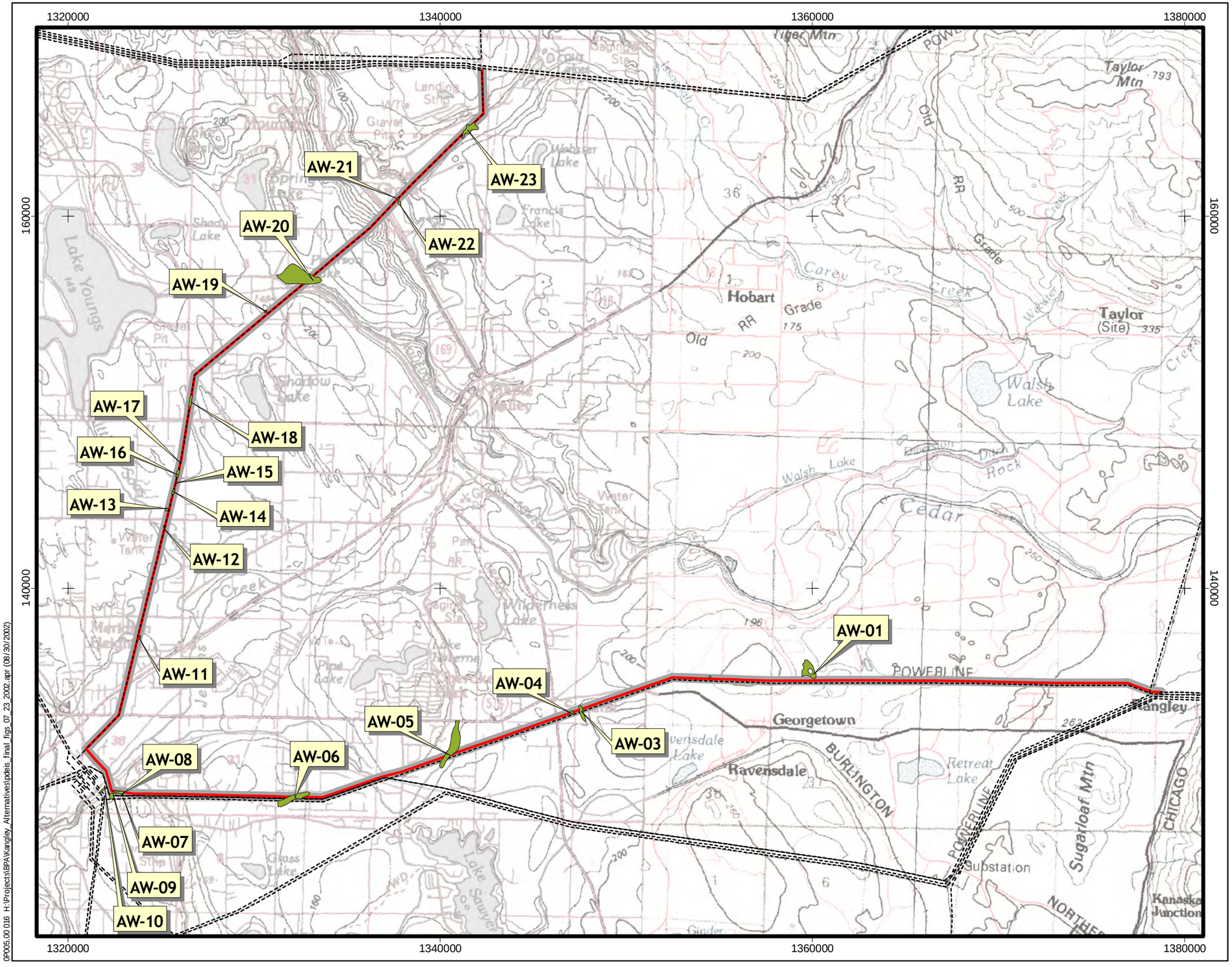
3.4 Transmission Line Alternatives

Alternative 1, the preferred alternative, is presented for comparison purposed only. Refer to BPA Final Wetlands Technical Report (Jones & Stokes 2002) for a detailed description of the preferred alternative.

3.4.1 Alternative 1: Preferred Alternative

A total of 10 wetlands, totaling 242 ac., were identified within the 500-ft. transmission line study corridor for Alternative 1 during the October 2000 reconnaissance. All of the wetlands identified within the 500-ft. corridor would be crossed by the proposed 150-ft. ROW. The April 2001 reconnaissance of the 150-ft. preferred Alternative 1 corridor identified 31 wetlands totaling 13.9 ac. The discrepancy between the two surveys is attributable to the survey methods described in the Final Wetlands Technical Report (Jones & Stokes 2002).

Figure 2-A
Alternative A
Wetland Locations within the 500-ft Study Area of the Action Alternatives



Legend

- Wetlands
- 500 Foot Study Area
- Alternative A Centerline
- Existing BPA Transmission Lines

Source: USGS Tacoma, Snoqualmie Pass, WA 100K Quadrangles.

Projection: Washington State Plane
Zone: North Zone
Datum: NAD83
Units: Feet US

N

0.5 0 0.5 1 1.5 Miles

Scale 1" = 1 Mile

Jones & Stokes

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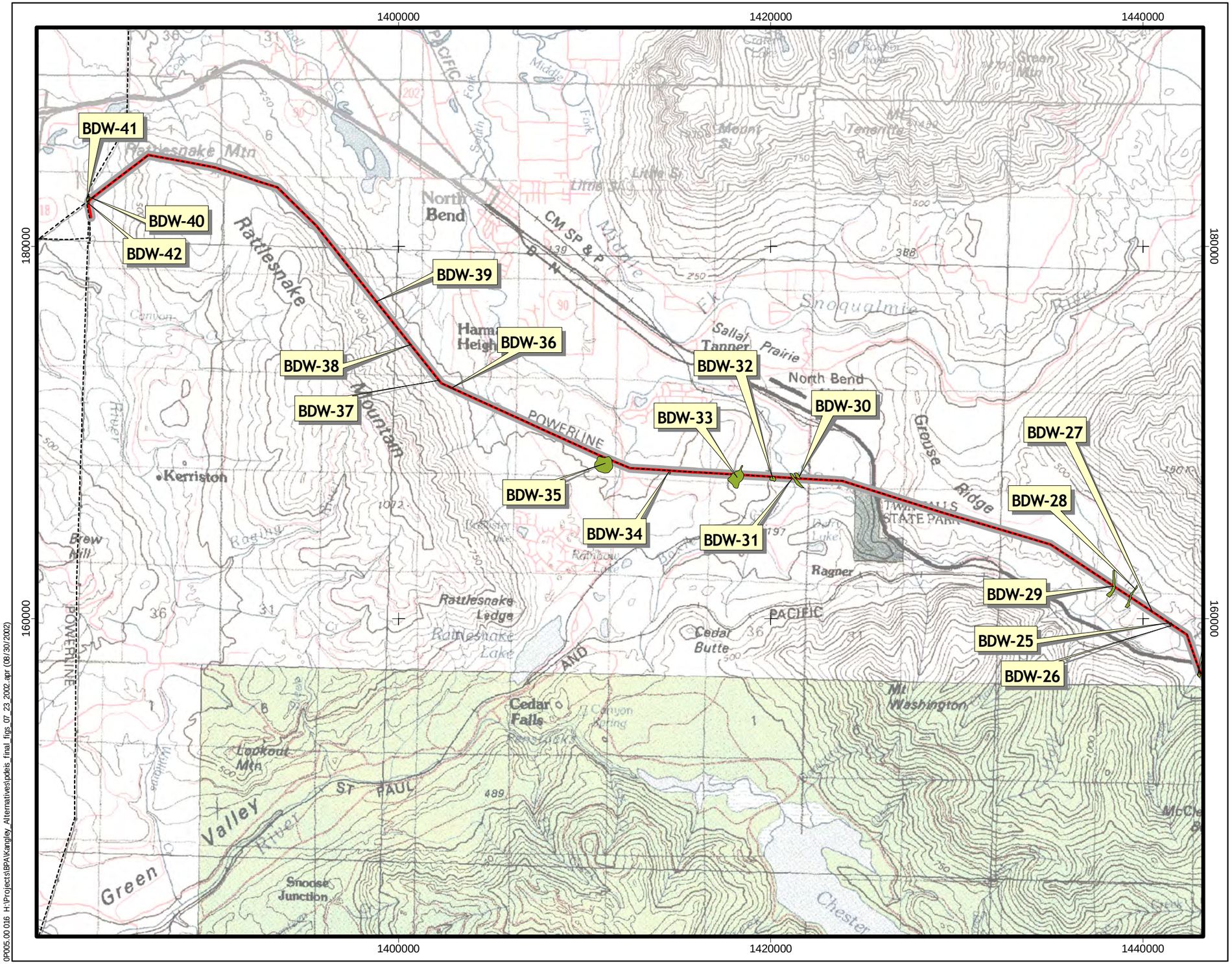
Figure 2-B
Sheet 1 of 3
Alternative B
Wetland Locations within the 500-ft Study Area of the Action Alternatives



Legend

- Wetlands
- 500 Foot Study Area
- Alternative B Centerline
- Existing BPA Transmission Lines

Source: USGS Skykomish River, Snoqualmie Pass, WA 100K Quadrangles.

Projection: Washington State Plane
Zone: North Zone
Datum: NAD83
Units: Feet US

N

0.5 0 0.5 1 1.5 Miles

Scale 1" = 1 Mile

Jones & Stokes

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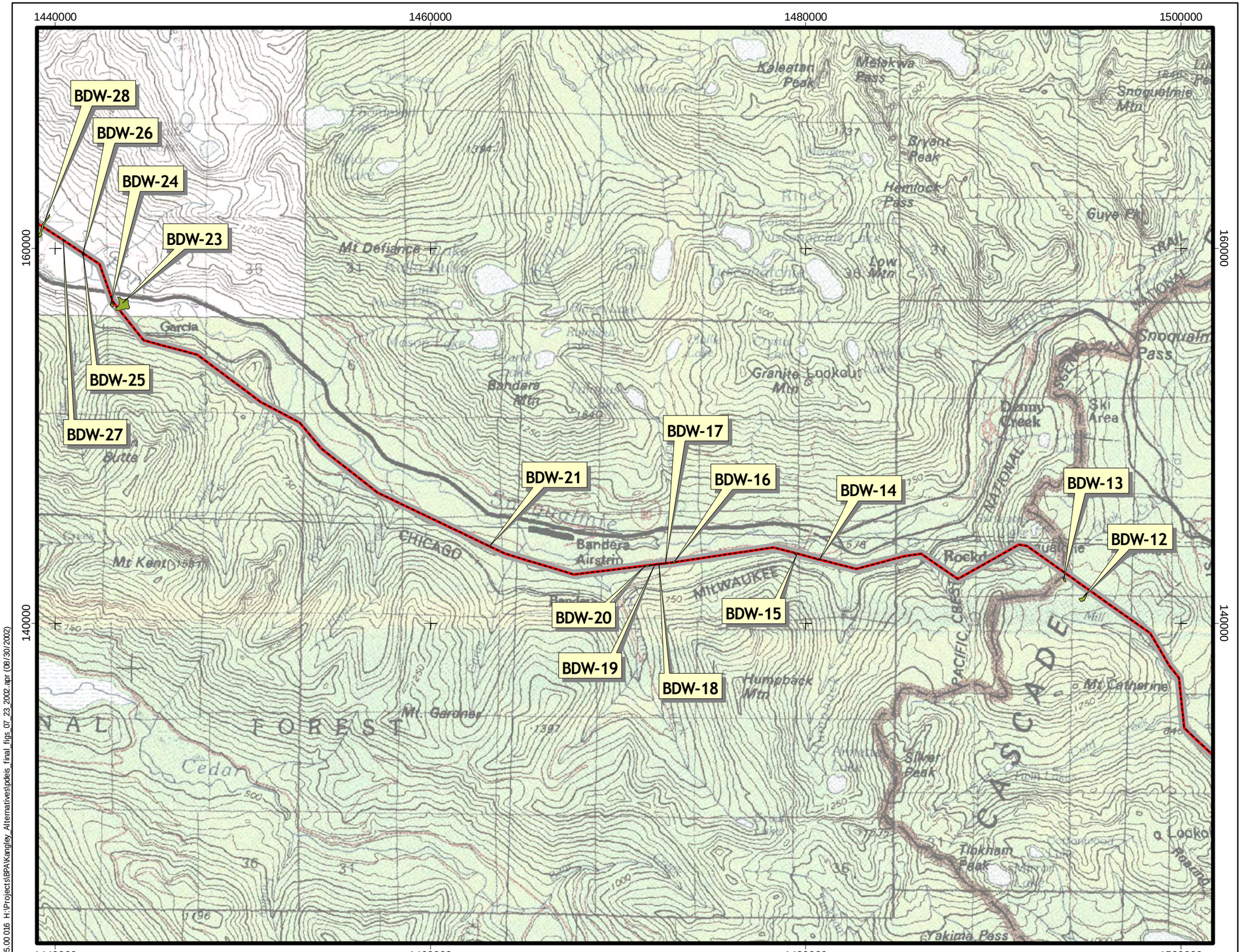
Figure 2-B
Sheet 2 of 3
Alternative B
Wetland Locations within the 500-ft Study Area of the Action Alternatives



Legend

- Wetlands
- 500 Foot Study Area
- Alternative B Centerline
- Existing BPA Transmission Lines

Source: USGS Snoqualmie Pass, WA
100K Quadrangle.

Projection: Washington State Plane
Zone: North Zone
Datum: NAD83
Units: Feet US

N

0.5 0 0.5 1 1.5 Miles

Scale 1" = 1 Mile

Jones & Stokes

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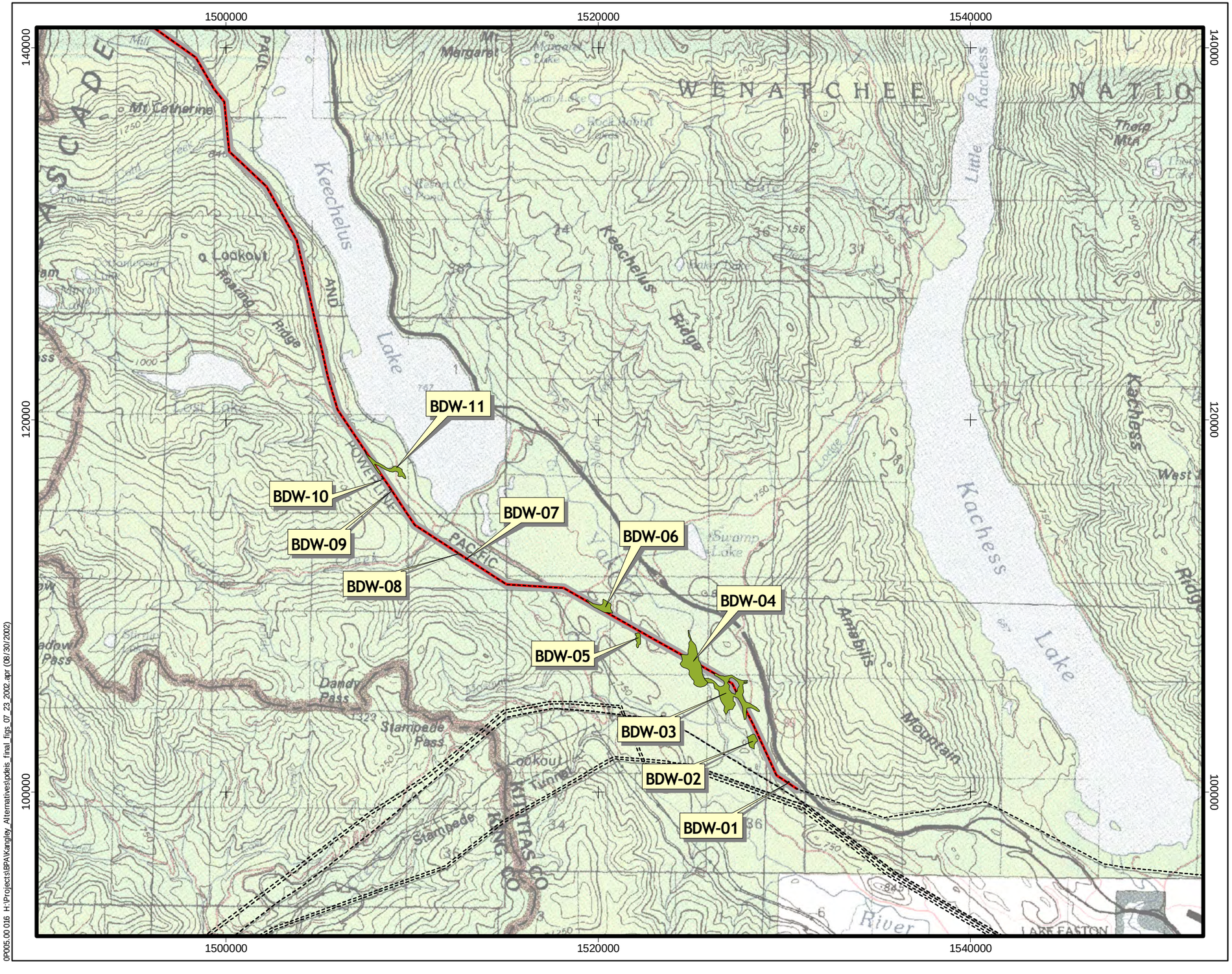

Figure 2-B
Sheet 3 of 3
Alternative B
Wetland Locations within the 500-ft Study Area of the Action Alternatives

Legend

- Wetlands
- 500 Foot Study Area
- Alternative B Centerline
- Existing BPA Transmission Lines

Source: USGS Snoqualmie Pass, WA 100K Quadrangle.

Projection: Washington State Plane
Zone: North Zone
Datum: NAD83
Units: Feet US

N

0.5 0 0.5 1 1.5 Miles

Scale 1" = 1 Mile

Jones & Stokes

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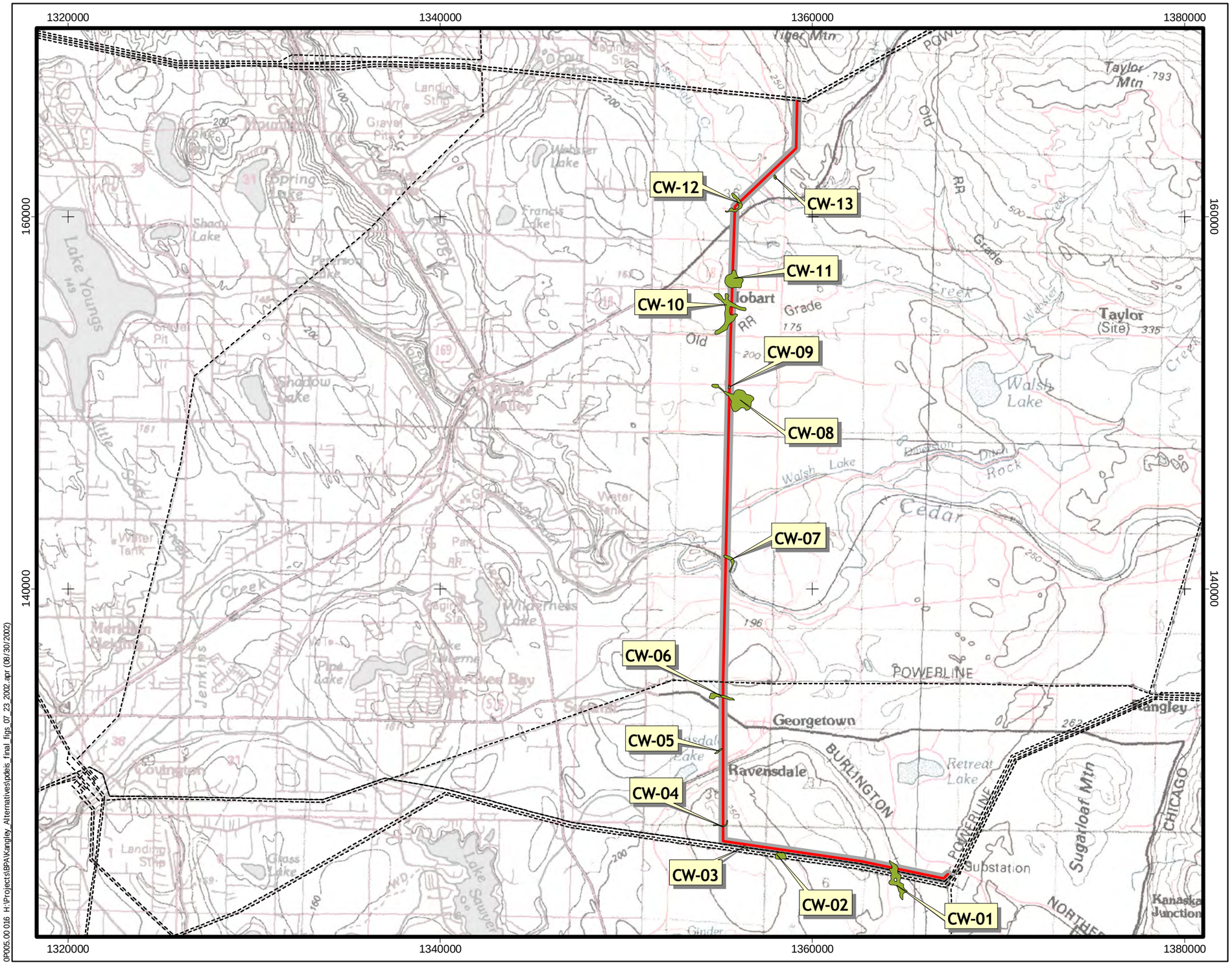

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Figure 2-C-1
Alternative C (Option C-1)
Wetland Locations within the 500-ft Study Area of the Action Alternatives

Legend

- Wetlands
- 500 Foot Study Area
- Alternative C1 Centerline
- Existing BPA Transmission Lines

Source: USGS Tacoma, Snoqualmie Pass, WA 100K Quadrangles.

Projection: Washington State Plane
Zone: North Zone
Datum: NAD83
Units: Feet US

N

0.5 0 0.5 1 1.5 Miles

Scale 1" = 1 Mile

Jones & Stokes

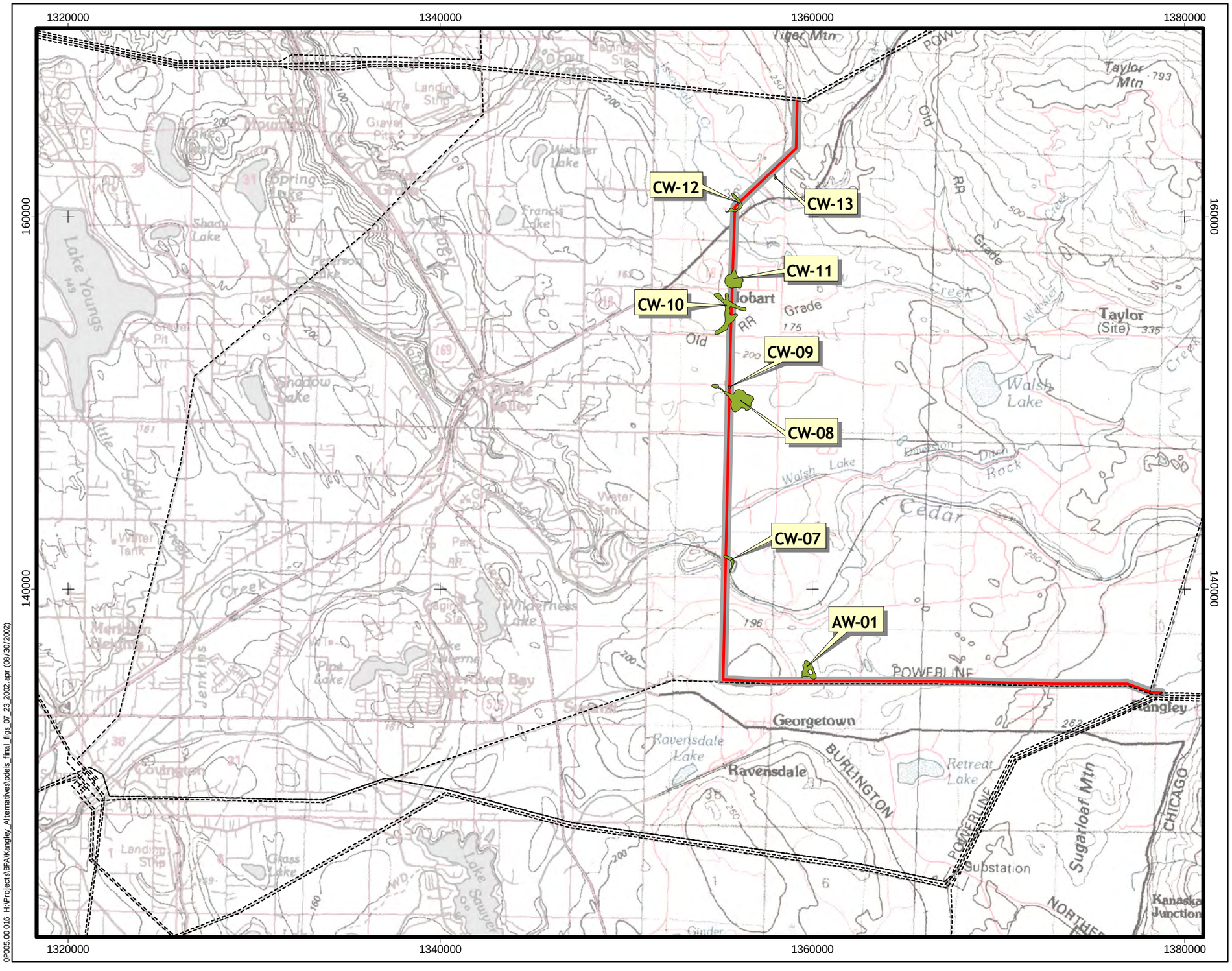

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Figure 2-C-2
Alternative C (Option C-2)
Wetland Locations within the 500-ft Study Area of the Action Alternatives

Legend

- Wetlands
- 500 Foot Study Area
- Alternative C2 Centerline
- Existing BPA Transmission Lines

Source: USGS Tacoma, Snoqualmie Pass, WA 100K Quadrangles.

Projection: Washington State Plane
Zone: North Zone
Datum: NAD83
Units: Feet US

N

0.5 0 0.5 1 1.5 Miles

Scale 1" = 1 Mile

Jones & Stokes

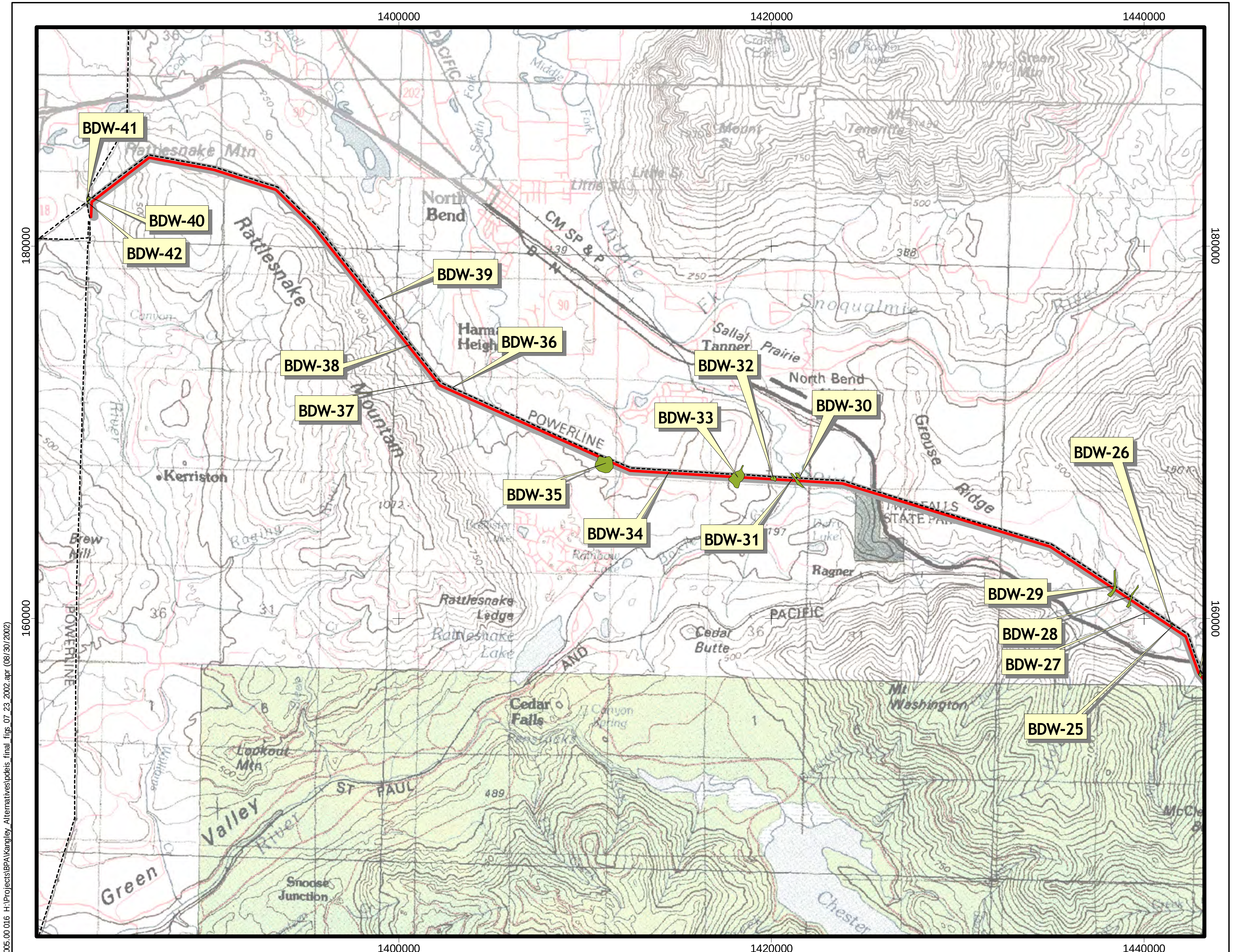

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Figure 2-D-1
Sheet 1 of 3
Alternative D (Option D-1)
Wetland Locations within the 500-ft Study Area of the Action Alternatives

Legend

- Wetlands
- 500 Foot Study Area
- Alternative D South Centerline
- Existing BPA Transmission Lines

Source: USGS Skykomish River, Snoqualmie Pass, WA 100K Quadrangles.

Projection: Washington State Plane
Zone: North Zone
Datum: NAD83
Units: Feet US

N

0.5 0 0.5 1 1.5 Miles

Scale 1" = 1 Mile

Jones & Stokes

1440000 1460000 1480000 1500000

160000

140000

BDW-28
BDW-26
BDW-24
BDW-23
BDW-25
BDW-27
BDW-17
BDW-21
BDW-16
BDW-14
BDW-13
BDW-12
BDW-20
BDW-15
BDW-19
BDW-18

Kaleetan Peak
Melakwa Pass
Snoqualmie Mtn
Bryant Peak
Hemlock Pass
Guye Pk
Mt Defiance
Low Mtn
Garcia
Granite Lookout Mtn
Bandera Mtn
Snoqualmie Pass
Denny Creek
Ski Area
Butte
Bandera Airstrip
Mt Kent
CHICAGO
MILWAUKEE
Rockdale
PACIFIC CREST NATIONAL
CASCADE
Mt Catherine
Humpback Mtn
Mt Gardner
FOREST
Silver Peak
Tinkham Peak
Yakima Pass

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Figure 2-D-1
Sheet 2 of 3
Alternative D (Option D-1)
Wetland Locations within the 500-ft Study Area of the Action Alternatives

Legend

- Wetlands
- 500 Foot Study Area
- Alternative D South Centerline
- Existing BPA Transmission Lines

Source: USGS Snoqualmie Pass, WA 100K Quadrangle.

Projection: Washington State Plane
Zone: North Zone
Datum: NAD83
Units: Feet US

N

0.5 0 0.5 1 1.5 Miles

Scale 1" = 1 Mile

Jones & Stokes

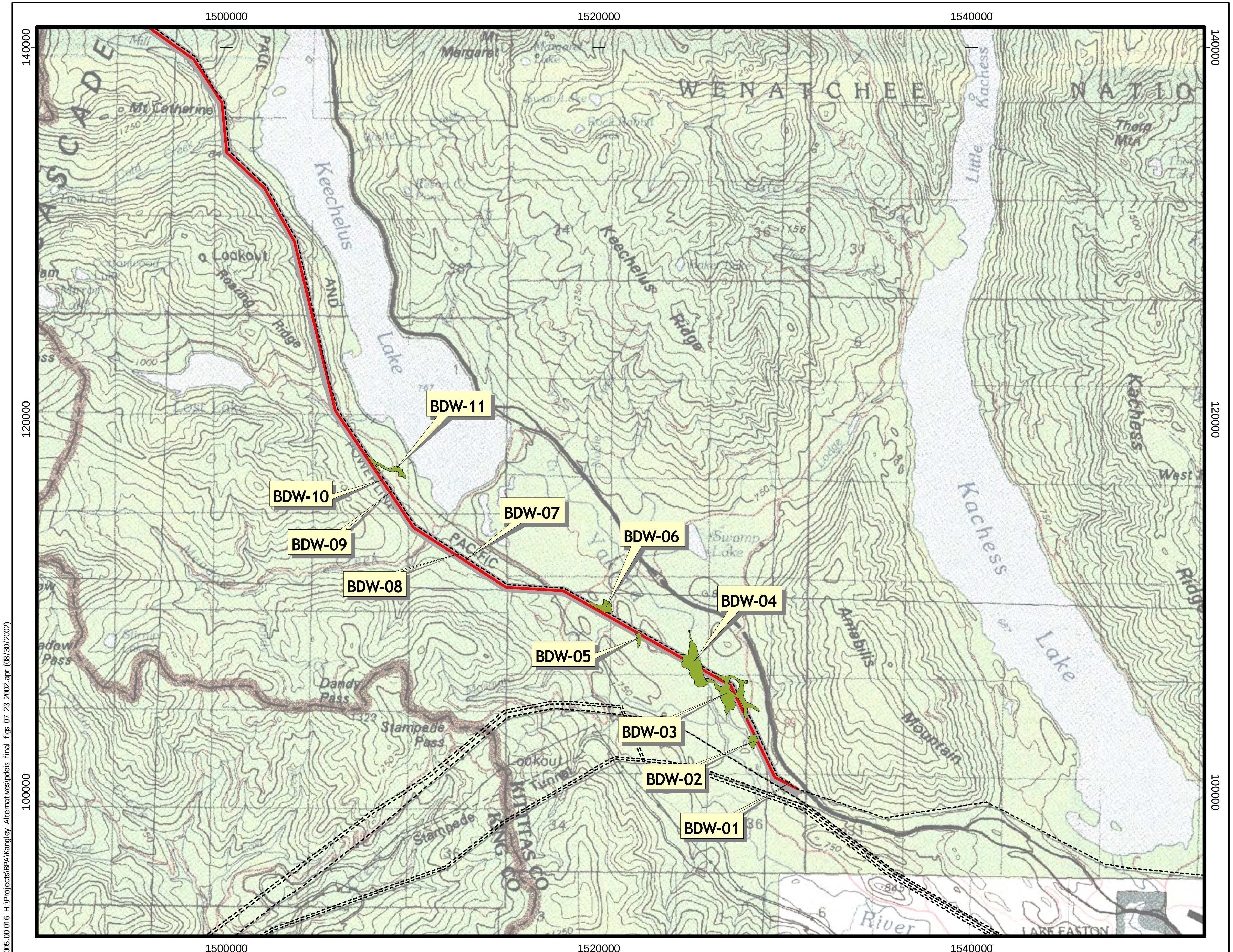

Figure 2-D-1
Sheet 3 of 3
Alternative D (Option D-1)
Wetland Locations within the 500-ft Study Area of the Action Alternatives

Legend

- Wetlands
- 500 Foot Study Area
- Alternative D South Centerline
- Existing BPA Transmission Lines

Source: USGS Snoqualmie Pass, WA 100K Quadrangle.

Projection: Washington State Plane
Zone: North Zone
Datum: NAD83
Units: Feet US

N

0.5 0 0.5 1 1.5 Miles

Scale 1" = 1 Mile

Jones & Stokes

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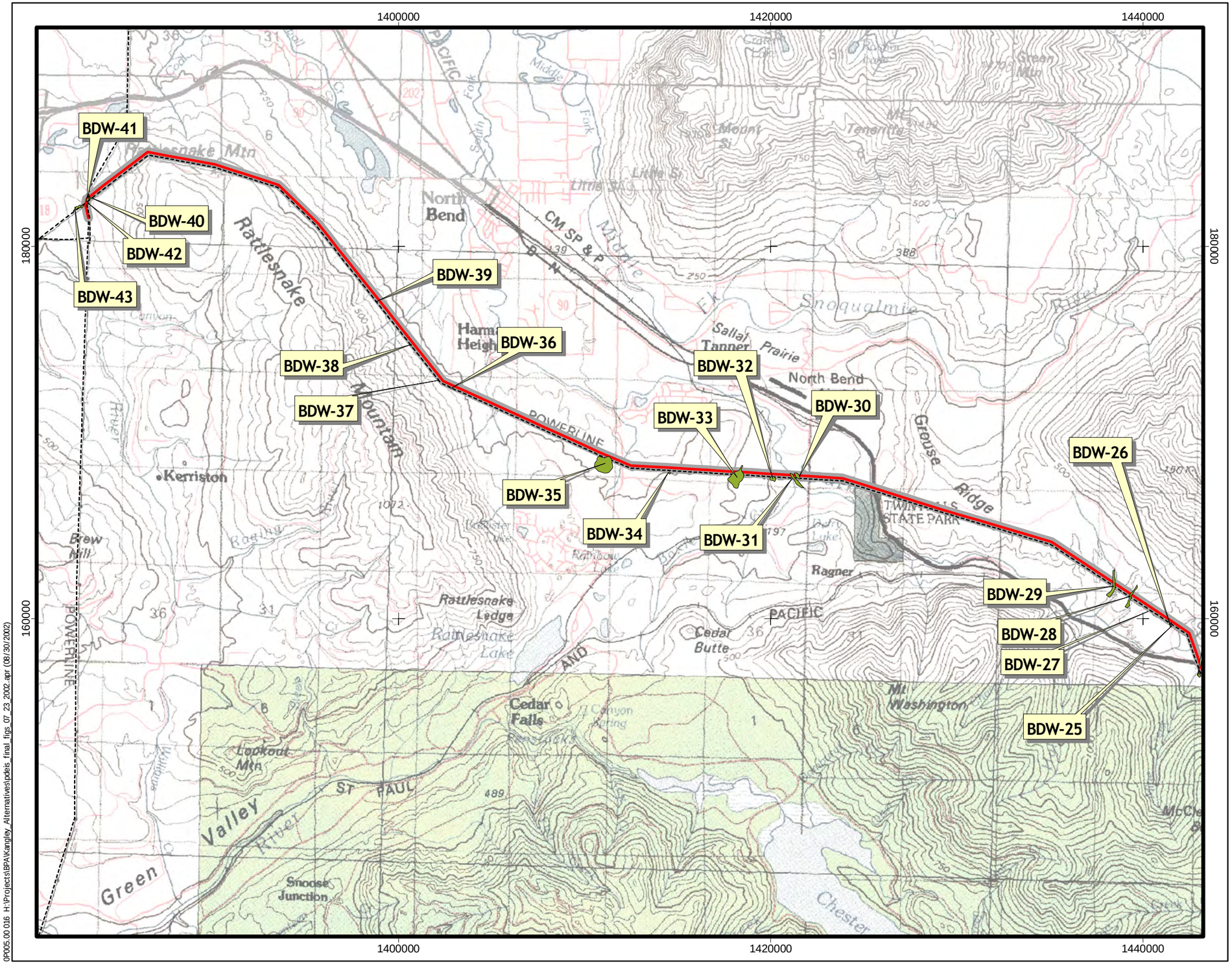
Figure 2-D-2
Sheet 1 of 3
Alternative D (Option D-2)
Wetland Locations within the 500-ft Study Area of the Action Alternatives



Source: USGS Skykomish River, Snoqualmie Pass, WA 100K Quadrangles.

Projection: Washington State Plane
Zone: North Zone
Datum: NAD83
Units: Feet US

N

0.5 0 0.5 1 1.5 Miles

Scale 1" = 1 Mile

Jones & Stokes

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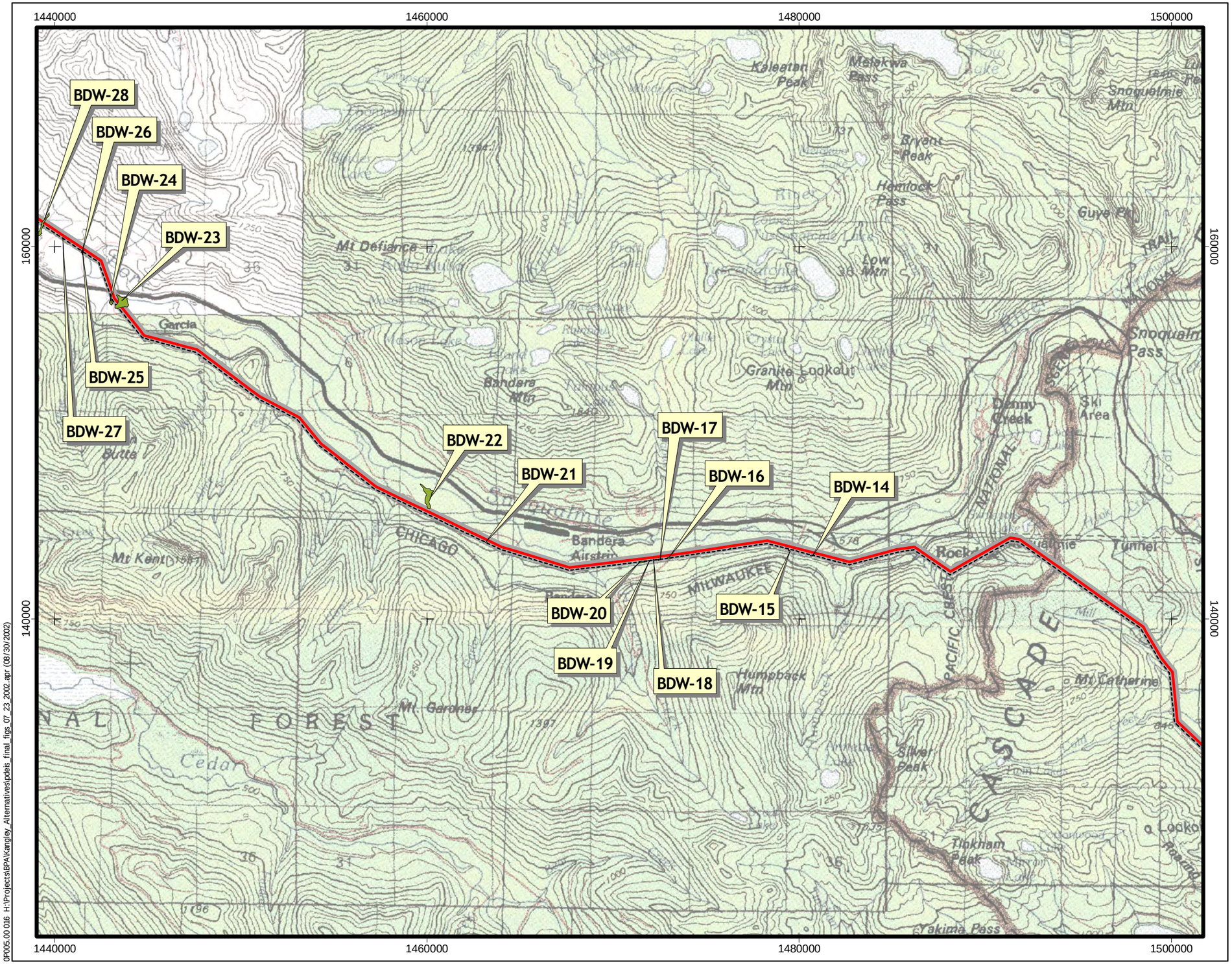

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Figure 2-D-2
Sheet 2 of 3
Alternative D (Option D-2)
Wetland Locations within the 500-ft Study Area of the Action Alternatives

Legend

- Wetlands
- 500 Foot Study Area
- Alternative D North Centerline
- Existing BPA Transmission Lines

Source: USGS Snoqualmie Pass, WA
100K Quadrangle.

Projection: Washington State Plane
Zone: North Zone
Datum: NAD83
Units: Feet US

N

0.5 0 0.5 1 1.5 Miles

Scale 1" = 1 Mile

Jones & Stokes

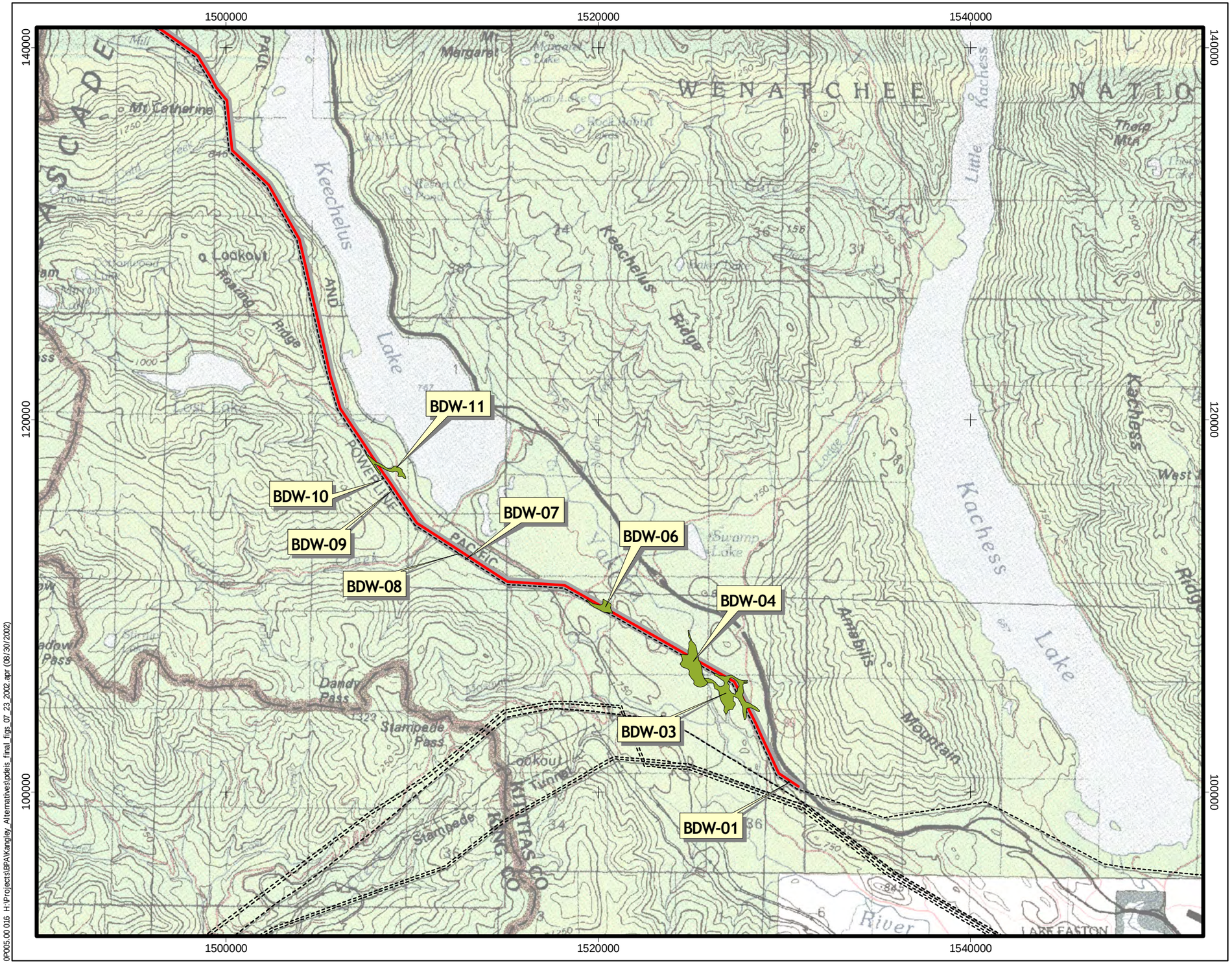

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Figure 2-D-2
Sheet 3 of 3
Alternative D (Option D-2)
Wetland Locations within the 500-ft Study Area of the Action Alternatives

Legend

- Wetlands
- 500 Foot Study Area
- Alternative D North Centerline
- Existing BPA Transmission Lines

Source: USGS Snoqualmie Pass, WA 100K Quadrangle.

Projection: Washington State Plane
Zone: North Zone
Datum: NAD83
Units: Feet US

N

0.5 0 0.5 1 1.5 Miles

Scale 1" = 1 Mile

Jones & Stokes

Table 1. Summary of Wetlands Present by Transmission Line Alternative

Wetland ID	Vegetation Class[a]	Jurisdiction	Class[b]	Total Ac. within 500-ft. Study Corridor	WRIA
Alternative A					
A-W-01	PSS[c]	King Co.	1[c]	0.82	8
A-W-02	POW	King Co.	3	0.29	8
A-W-03	PSS[c]	Kent	3[c]	1.76	8
A-W-04	POW	Maple Valley	3	0.78	8
A-W-05	PSS[c]	King Co.	2[c]	6.10	9
A-W-06	PUB[c]	King Co.	2[c]	8.03	9
A-W-08[d]	PSS	King Co.	2	1.48	9
A-W-09	PSS	King Co.	2	0.80	9
A-W-10	POW	Covington	3	0.02	9
A-W-11	PEM	King Co.	3	0.20	9
A-W-12	PUB[c]	King Co.	3[c]	0.05	9
A-W-13	PSS	King Co.	2	0.53	9
A-W-14	PSS	King Co.	3	0.79	9
A-W-15	PSS	King Co.	2	.17	9
A-W-16	PEM	King Co.	3	1.18	9
A-W-17	PEM[c]	King Co.	2[c]	0.08	9
A-W-18	POW/PSS[c]	King Co.	3[c]	1.78	8
A-W-19	POW/PSS/PFO[c]	King Co.	1[c]	0.36	8
A-W-20	PUB[c]	King Co.	3[c]	7.92	8
A-W-21	PUB[c]	King Co.	3[c]	0.21	8
A-W-22	PSS	King Co.	2	.42	8
A-W-23	PSS	King Co.	2	5.79	8
			Total	**39.55**	
Alternative B[e]					
BD-W-01	PFO	USFS	II	0.07	39
BD-W-02	PFO	USFS	II	1.04	39
BD-W-03	PFO/PSS/PEM	USFS	II	15.95	39
BD-W-04	PSS/PEM	USFS/Kittitas Co.	II	12.30	39
BD-W-05	PEM	USFS	I	0.71	39
BD-W-06	PFO/PSS/PEM	USFS/Kittitas Co.	II	7.02	39
BD-W-07	PSS	USFS	III	0.06	39
BD-W-08	PSS	USFS	III	0.12	39
BD-W-09	PSS	USFS	III	0.12	39
BD-W-10	PSS	USFS	III	0.09	39
BD-W-11	PSS	USFS	II	4.51	39
BD-W-12	PEM[c]	Kittitas Co.	III[c]	0.06	39

Wetland ID	Vegetation Class[a]	Jurisdiction	Class[b]	Total Ac. within 500-ft. Study Corridor	WRIA
BD-W-13	POW[c]	USFS	III[c]	0.08	7
BD-W-14	PEM	USFS	III	0.08	7
BD-W-15	PSS	USFS	III	0.06	7
BD-W-16	PSS/PEM	USFS	III	0.22	7
BD-W-17	PSS/PEM	USFS	III	0.13	7
BD-W-18	PSS	USFS	III	0.04	7
BD-W-19	PSS	USFS	III	0.07	7
BD-W-20	PSS/PEM	USFS	III	0.44	7
BD-W-21	PSS	USFS	III	0.03	7
BD-W-23	POW/PEM/PFO/PSS	USFS	II	2.26	7
BD-W-24	PFO	USFS	III	0.67	7
BD-W-25	PSS	King Co.	3	0.18	7
BD-W-26	PSS	King Co.	3	0.08	7
BD-W-27	PEM	King Co.	3	0.05	7
BD-W-28	PFO	King Co.	2	1.08	7
BD-W-29	PFO	USFS	II	1.74	7
BD-W-30	R[c]	King Co.	2[c]	1.13	7
BD-W-31	PSS[c]	King Co.	2[c]	1.70	7
BD-W-32	PSS[c]	King Co.	3[c]	1.37	7
BD-W-33	PFO	King Co.	2	6.45	7
BD-W-34	PSS/POW	King Co.	3	0.17	7
BD-W-35	PSS	King Co.	2	5.21	7
BD-W-36	PSS	King Co.	3	0.07	7
BD-W-37	PSS	King Co.	3	0.09	7
BD-W-38	PSS/PEM	King Co.	3	0.16	7
BD-W-39	PEM[c]	King Co.	3	0.05	7
BD-W-40	PSS	King Co.	3	0.19	7
BD-W-41	PSS/PEM	King Co.	2	0.53	7
BD-W-42	PEM	King Co.	3	0.19	7
			Total	**66.57**	
Alternative C (Option C-1)					
C-W-01	PSS/PEM[c]	King Co.	2[c]	4.28	9
C-W-02	PEM/PSS	King Co.	2	0.83	9
C-W-03	POW	King Co.	3	0.36	9
C-W-04	POW	King Co.	2	0.74	9
C-W-05	PEM/PSS	King Co.	2	0.35	9
C-W-06	PEM[c]	King Co.	2[c]	1.45	8
C-W-07	POW[c]	King Co.	2[c]	1.40	8

Wetland ID	Vegetation Class[a]	Jurisdiction	Class[b]	Total Ac. within 500-ft. Study Corridor	WRIA
C-W-08	PSS/PEM[c]	King Co.	2[c]	4.34	8
C-W-09	PEM	King Co.	3	0.34	8
C-W-10	PEM[c]	King Co.	2[c]	10.18	8
C-W-11	PEM	King Co.	2	9.21	8
C-W-12	PEM/PSS[c]	King Co.	2[c]	3.58	8
C-W-13	PSS[c]	King Co.	3[c]	0.02	8
			Total	**37.08**	
Alternative C (Option C-2)[f]					
A-W-1	PSS[c]	King Co.	1[c]	0.82	9
C-W-07	POW[c]	King Co.	2[c]	1.40	8
C-W-08	PSS/PEM[c]	King Co.	2[c]	4.34	8
C-W-09	PEM	King Co.	3	0.34	8
C-W-10	PEM[c]	King Co.	2[c]	10.18	8
C-W-11	PEM	King Co.	2	9.21	8
C-W-12	PEM/PSS[c]	King Co.	2[c]	3.58	8
C-W-13	PSS[c]	King Co.	3[c]	0.02	8
			Total	**29.89**	
Alternative D (Option D-1)[e]					
BD-W-01	PFO	USFS	II	0.07	39
BD-W-02	PFO	USFS	II	2.78	39
BD-W-03	PFO/PSS/PEM	USFS	II	15.30	39
BD-W-04	PSS/PEM	USFS/Kittitas Co.	II	14.18	39
BD-W-05	PEM	USFS	I	1.70	39
BD-W-06	PFO/PSS/PEM	USFS/Kittitas Co.	II	4.42	39
BD-W-07	PSS	USFS	III	0.06	39
BD-W-08	PSS	USFS	III	0.12	39
BD-W-09	PSS	USFS	III	0.12	39
BD-W-10	PSS	USFS	III	0.09	39
BD-W-11	PSS	USFS	II	3.58	39
BD-W-12	PEM[c]	Kittitas Co.	III[c]	0.39	39
BD-W-13	POW[c]	USFS	III[c]	0.55	7
BD-W-14	PEM	USFS	III	0.08	7
BD-W-15	PSS	USFS	III	0.06	7
BD-W-16	PSS/PEM	USFS	III	0.22	7
BD-W-17	PSS/PEM	USFS	III	0.13	7
BD-W-18	PSS	USFS	III	0.04	7
BD-W-19	PSS	USFS	III	0.07	7
BD-W-20	PSS/PEM	USFS	III	0.44	7

Wetland ID	Vegetation Class[a]	Jurisdiction	Class[b]	Total Ac. within 500-ft. Study Corridor	WRIA
BD-W-21	PSS	USFS	III	0.03	7
BD-W-23	POW/PEM/PFO/PSS	USFS	II	1.08	7
BD-W-24	PFO	USFS	III	0.67	7
BD-W-25	PSS	King Co.	3	0.18	7
BD-W-26	PSS	King Co.	3	0.08	7
BD-W-27	PEM	King Co.	3	0.05	7
BD-W-28	PFO	King Co.	2	1.18	7
BD-W-29	PFO	USFS	II	1.82	7
BD-W-30	R	King Co.	II	0.44	7
BD-W-31	PSS[c]	King Co.	2[c]	2.09	7
BD-W-32	PSS[c]	King Co.	3[c]	1.37	7
BD-W-33	PFO	King Co.	2	7.81	7
BD-W-34	PSS/POW	King Co.	3	0.17	7
BD-W-35	PSS	King Co.	2	8.34	7
BD-W-36	PSS	King Co.	3	0.07	7
BD-W-37	PSS	King Co.	3	0.09	7
BD-W-38	PSS/PEM	King Co.	3	0.16	7
BD-W-39	PEM	King Co.	3	0.05	7
BD-W-40	PSS	King Co.	3	0.11	7
BD-W-41	PSS/PEM	King Co.	2	0.11	7
BD-W-42	PEM	King Co.	3	0.19	7
			Total	**70.49**	
Alternative D (Option D-2)					
BD-W-01	PFO	USFS	II	0.07	39
BD-W-03	PFO/PSS/PEM	USFS	II	17.39	39
BD-W-04	PSS/PEM	USFS/Kittitas Co.	II	10.25	39
BD-W-06	PFO/PSS/PEM	USFS/Kittitas Co.	II	8.73	39
BD-W-07	PSS	USFS	III	0.06	39
BD-W-08	PSS	USFS	III	0.12	39
BD-W-09	PSS	USFS	III	0.12	39
BD-W-10	PSS	USFS	III	0.07	39
BD-W-11	PSS	USFS	II	5.48	39
BD-W-14	PEM	USFS	III	0.08	7
BD-W-15	PSS	USFS	III	0.06	7
BD-W-16	PSS/PEM	USFS	III	0.22	7
BD-W-17	PSS/PEM	USFS	III	0.13	7
BD-W-18	PSS	USFS	III	0.04	7
BD-W-19	PSS	USFS	III	0.07	7

Wetland ID	Vegetation Class[a]	Jurisdiction	Class[b]	Total Ac. within 500-ft. Study Corridor	WRIA
BD-W-20	PSS/PEM	USFS	III	0.44	7
BD-W-21	PSS	USFS	III	0.03	7
BD-W-22	PSS/PFO[c]	USFS	II[c]	0.31	7
BD-W-23	POW/PEM/PFO/PSS	USFS	II	4.48	7
BD-W-24	PFO	USFS	III	0.13	7
BD-W-25	PSS	King Co.	3	0.15	7
BD-W-26	PSS	King Co.	3	0.08	7
BD-W-27	PEM	King Co.	3	0.05	7
BD-W-28	PFO	King Co.	2	1.02	7
BD-W-29	PFO	USFS	II	1.67	7
BD-W-30	R[c]	King Co.	2[c]	1.22	7
BD-W-31	PSS[c]	King Co.	2[c]	1.01	7
BD-W-32	PSS[c]	King Co.	3[c]	0.64	7
BD-W-33	PFO	King Co.	2	4.18	7
BD-W-34	PSS/POW	King Co.	3	0.03	7
BD-W-35	PSS	King Co.	2	2.22	7
BD-W-36	PSS	King Co.	3	0.07	7
BD-W-37	PSS	King Co.	3	0.09	7
BD-W-38	PSS/PEM	King Co.	3	0.16	7
BD-W-39	PEM	King Co.	3	0.05	7
BD-W-40	PSS	King Co.	3	0.19	7
BD-W-41	PSS/PEM	King Co.	2	0.53	7
BD-W-42	PEM	King Co.	3	0.19	7
BD-W-43	PSS/PEM	King Co.	2	0.28	7
			Total	**62.11**	

[a] Vegetation class definitions (as defined by Cowardin et al. 1979, Classification of Wetlands and Deepwater Habitats. U.S. Fish and Wildlife Service):
PEM – Palustrine Emergent
PFO – Palustrine Forested
PSS – Palustrine Scrub-Shrub
POW – Palustrine Open Water
R – Riverine

[b] King County ratings are explained in Section 3.2.4

[c] No wetland access, therefore information is based on NWI and local ratings or estimation.

[d] Wetland A-W-07 was intentionally omitted.

[e] Wetland BD-W-22 was intentionally omitted.

[f] Alternative A and a portion of Alternative C (Option C-1) overlap, thus the inclusion of wetland A-W-1 within Alternative C (Option C-1).

Large depressional wetlands occupy flat benches on the north and south slopes of Brew Hill and are often fed by groundwater seeps. Several wetlands are also associated with the riparian area of

tributaries to the Raging River to the north and Rock Creek to the south of Brew Hill, within the watershed and on private lands. Many of the wetlands continue outside of the 150-ft. corridor into the existing transmission line corridor and onto adjacent lands.

A majority of wetlands in this alternative have a palustrine forested vegetation community component dominated by red alder. The red alder forest is often associated with western red cedar and western hemlock in the canopy. Salmonberry, and Douglas' spirea are common wetland shrub species, with piggy-back plant, meadow buttercup, and skunk cabbage often dominating the herbaceous layer. The depressional wetlands occupying the south and north bench areas of Brew Hill provide important groundwater discharge and recharge functions, while serving as the headwaters for Rock Creek and the Raging River. These forested wetland communities also provide bird, mammal, fish, amphibian, and invertebrate habitat for a variety of species that use seasonally and perennially saturated wetlands and riparian areas for feeding, nesting, and rearing.

No wetlands were identified south of the Cedar River crossing within the Alternative 1 ROW.

3.4.2 Alternative A

A total of 22 wetlands, totaling 39.55 ac., were identified within the 500-ft. transmission line study corridor for Alternative A during the June 2002 reconnaissance (see Table 1 and Figure 2-A). The 150-ft ROW would not cross 6 of the 22 wetlands identified within the study corridor. Most of the wetlands are associated with depressions that collect overland flows and precipitation and hold this water over prolonged periods. These wetlands provide water quality, flood storage, and flood retention functions. About half of these wetlands consist of scrub-shrub vegetation communities while the remainder consists of emergent, open water, and forested vegetation communities.

Two wetlands are associated with streams and provide riparian wildlife habitat, as well as water quality improvement, flood storage, and floodwater retention. Wetland A-W-20 is associated with Patterson Creek and consists of scrub-shrub, forested, and open water components. Wetland A-W-02 contains an open water component that forms the headwaters of a tributary to Rock Creek.

3.4.3 Alternative B

A total of 41 wetlands, totaling 66.57 ac., were identified within the 500-ft. study corridor for Alternative B (see Table 1 and Figure 2-B). The 150-ft. ROW would not cross 7 of the 41 wetlands defined within the study corridor. The majority of wetlands east of Snoqualmie Pass are dominated by scrub-shrub and/or emergent vegetation, and they are associated with streams that saturate/flood riparian areas during high flow. These wetlands provide wildlife habitat, as well as water quality improvement, flood storage, and floodwater retention. West of Snoqualmie Pass, wetlands are mostly scrub-shrub and/or emergent associated with seeps, streams, and depressions. These wetlands provide wildlife habitat, as well as water quality improvement, flood storage, and floodwater retention. Wetlands in higher elevations around Snoqualmie Pass were inaccessible because of snow. Snow melt provides the primary source of hydrology to wetlands during spring, while water from overland flows or discharge from hill slope seeps provides the primary source of hydrology during the summer and fall growing season.

Three wetlands are associated with the Yakima River and provide wildlife habitat, as well as water quality improvement, flood storage, and floodwater retention. Wetlands BD-W-02, -03,

and -04 consist of scrub-shrub, forested, emergent, and open water components. Several other wetlands are also associated with tributaries to the Yakima and South Fork Snoqualmie Rivers.

3.4.4 Alternative C (Option C-1)

A total of 13 wetlands, totaling 37.08 ac., were identified within the 500-ft. study corridor for Alternative C (Option C-1) (see Table 1 and Figure 2- C-1). The 150-ft. ROW would not cross 3 of the 13 wetlands identified within the study corridor. Most of the wetlands are associated with depressions that collect overland flows and precipitation and hold this water over prolonged periods. These wetlands provide water quality, flood storage, and flood retention functions. Ten of these wetlands consist of scrub-shrub and/or emergent vegetation communities while three consist of open water.

One wetland, W-C-05, is associated with Rock Creek and provides wildlife habitat, as well as water quality improvement, flood storage, and floodwater retention.

3.4.5 Alternative C (Option C-2)

A total of 8 wetlands, totaling 29.89 ac., were identified within the 500-ft. study corridor for Alternative C (Option C-2) (see Table 1 and Figure 2- C-2). The 150-ft. ROW would not cross 2 of the 8 wetlands identified within the study corridor. Most of the wetlands are associated with depressions that collect overland flows and precipitation and hold this water over prolonged periods. These wetlands provide water quality, flood storage, and flood retention functions. Seven of these wetlands consist of scrub-shrub and/or emergent vegetation communities while one consists of open water.

One wetland, W-C-05, is associated with Rock Creek and provides wildlife habitat, as well as water quality improvement, flood storage, and floodwater retention.

3.4.6 Alternative D (Option D-1)

A total of 41 wetlands, totaling 70.49 ac., were identified within the 500-ft. study corridor for Alternative D (Option D-1) (see Table 1 and Figure 2- D-1). Of the 41 wetlands defined within the study corridor, 26 would not be crossed by the 150-ft. ROW. The majority of wetlands east of Snoqualmie Pass are dominated by scrub-shrub and/or emergent vegetation, and they are associated with streams that saturate/flood riparian areas during high flow. These wetlands provide wildlife habitat, as well as water quality improvement, flood storage, and floodwater retention.

West of Snoqualmie pass, wetlands are mostly scrub-shrub and/or emergent associated with seeps, streams, and depressions. These wetlands provide wildlife habitat, as well as water quality improvement, flood storage, and floodwater retention. Wetlands in higher elevations around Snoqualmie Pass were inaccessible because of snow. Snow melt provides the primary source of hydrology to wetlands during spring, while water from overland flows or discharge from hill slope seeps provides the primary source of hydrology during the summer and fall growing season. Three wetlands are associated with the Yakima River and provide wildlife habitat, as well as water quality improvement, flood storage, and floodwater retention. Wetlands BD-W-02, -03, and -04 consist of scrub-shrub, forested, emergent, and open water components. Several other wetlands are also associated with tributaries to the Yakima and South Fork Snoqualmie Rivers.

3.4.7 Alternative D (Option D-2)

A total of 39 wetlands, totaling 62.11 ac., were identified within the 500-ft. study corridor for Alternative D (Option D-2) (see Table 1 and Figure 2- D-2). The 150-ft. ROW would not cross 30 of the 39 wetlands defined within the study corridor. The majority of wetlands east of Snoqualmie Pass are dominated by scrub-shrub and/or emergent vegetation, and they are associated with streams that saturate/flood riparian areas during high flow. These wetlands provide wildlife habitat, as well as water quality improvement, flood storage, and floodwater retention.

West of Snoqualmie Pass, wetlands are mostly scrub-shrub and/or emergent associated with seeps, streams, and depressions. These wetlands provide wildlife habitat, as well as water quality improvement, flood storage, and floodwater retention. Wetlands in higher elevations around Snoqualmie Pass were inaccessible because of snow. Snow melt provides the primary source of hydrology to wetlands during spring, while water from overland flows or discharge from hill slope seeps provides the primary source of hydrology during the summer and fall growing season. Three wetlands are associated with the Yakima River and provide wildlife habitat, as well as water quality improvement, flood storage, and floodwater retention. Wetlands BD-W-02, -03, and -04 consist of scrub-shrub, forested, emergent, and open water components. Several other wetlands are also associated with tributaries to the Yakima and South Fork Snoqualmie Rivers.

3.5 Access Roads

An access road system within and outside of the ROW would be used to construct and maintain the new transmission line. Access roads would be 16 ft. wide, with additional road widths of up to 20 ft. for curves. In addition to the construction of new access roads, existing roads may need to be improved. New and improved roads generally would be surfaced with gravel and appropriately designed for drainage and erosion control.

The location of access roads would be chosen to avoid identified wetlands wherever possible.

3.6 Echo Lake Substation

A large wetland complex is located adjacent to the footprint of the Echo Lake Substation expansion; however no wetland area will be filled. Wetland E-1 is located at the base of the hill slope within a depressional area to the east and south of the current Echo Lake Substation. The wetland is a mixture of palustrine scrub-shrub and palustrine emergent vegetation communities. Water emerges within the proposed expansion area as a seep, draining over the surface to the west of the proposed substation expansion area into the existing Raver-Echo Lake transmission line ROW.

4.0 Environmental Consequences and Mitigation

For all transmission line alternatives, impacts to wetlands would occur during construction and operation (maintenance). Impacts to wetlands could occur during construction of new roads or widening of existing access roads, replacement or insertion of culverts into wetland areas, clearing vegetation within the 150-ft.-wide ROW, preparation and clearing vegetation for staging and materials storage areas, clearing vegetation for work areas, and clearing and grubbing for construction of tower footings. Operational impacts to wetlands could include the periodic removal of vegetation within or adjacent to wetlands to ensure proper clearance to conductors.

A **high impact** to wetlands would occur if the project:

- permanently altered wetland hydrology, vegetation, and/or soils by excavation or fill, and the ecological integrity of a wetland was impaired; or
- caused non-attainment of USFS ACSOs and/or direct impacts to USFS-managed wetlands; or
- completely filled a wetland or destroyed a wetland function.

A **moderate impact** would occur if the project:

- partially filled a wetland or degraded a wetland function. Recovery generally would require restoration and monitoring; or
- created temporary impediments to attainment of USFS ACSOs and/or temporary impacts to USFS-managed wetlands.

A **low impact** would occur if the project:

- changed vegetation or soils for the short term but did not change hydrology; or
- enabled attainment of USFS ACSOs with temporary impacts to USFS-managed wetlands that would be largely mitigated; or
- caused a short-term disruption of a wetland function.

No impact would occur if the project avoids wetlands and their buffers; if new or widened access roads do not affect wetlands and buffers; if construction, operation, and maintenance of facilities do not affect wetlands and buffers; or if the size, quality, and functions of existing wetlands are not reduced.

Impacts caused by clearing wetland vegetation for the construction of towers and transmission lines within the 150-ft. ROW are limited to forested wetlands, except in crossing steep, deep drainages or other locations where conductor clearance is sufficient. Scrub-shrub, emergent, and open water wetlands would be spanned and therefore would not sustain any impacts caused by clearing vegetation. Such impacts resulting from the construction of access roads and angle tower string and pull areas would include scrub-shrub, emergent, and forested wetland types.

4.1 Construction Impacts

4.1.1 Impacts Common to All Transmission Line Alternatives

4.1.1.1 Impacts

Each transmission line ROW would cross stream channels, valleys, and other landforms supporting wetlands. The conductor would span wetlands, and new structures and roads would be sited to avoid wetlands wherever possible. A 150-ft.-wide ROW generally would be cleared of all woody vegetation, except in crossing steep, deep drainages or in other locations where conductor clearance was sufficient, and within Alternative B where only a 20-ft.-wide clearing width would be necessary.

Direct construction impacts within wetlands could occur from permanent fill resulting from access road construction, placement of culverts, and tower construction. Although clearing of forested wetland areas would impair the ecological integrity of the wetland, no land clearing by mechanical means would occur in forested wetlands within any of the transmission line corridor alternatives.

To minimize soil disturbance within forested wetlands, trees would be hand-felled and stumps would remain in place. Clearing activities would result in the loss of vegetation and other habitat features such as stumps, downed logs, and snags. Soil disturbance from these activities could injure or kill plants if large portions of the plant roots or aboveground shoots were cut or damaged. Soil disturbance from land clearing would result in an increase of sedimentation within wetlands and promote erosion on steep slopes. The removal of forested vegetation could also affect evapotranspiration rates and would increase soil and water temperatures because of the lack of shading.

The majority of new roads would be short spurs from the existing tower locations or roads to the new tower locations. Poor road conditions associated with existing access roads would require the reconstruction of road prisms and potentially the widening of existing access roads to support construction equipment. Wetlands located directly adjacent to the existing roads could be filled during widening of the road prism.

On average, existing roads are 10 ft. wide and need to be widened to 16 ft. Road widening would consist of grading the current road surface and adding crushed rock 4 to 6 ft. beyond the current road edge. Existing drainage devices such as water bars and roadside ditches need to be replaced or repaired in some places. Several culverts would be installed where newly constructed roads cross either wetland areas or streams. The placement of impervious road surface in wetlands would impair their ability to infiltrate surface water and discharge groundwater, would alter surface and subsurface flows, would destroy wildlife habitat, and would result in increases in sedimentation and pollutants entering the adjacent wetland area.

Indirect impacts to wetlands could occur from construction activities adjacent to wetlands. Such impacts could accrue from staging and material storage areas, work areas, the placement of tower footings, and construction or widening of access roads and spurs. These indirect impacts could result in short-term increases in sedimentation and pollutants from ground disturbance and machinery operation, the removal of upland wildlife habitat, increases in surface water temperatures from the lack of vegetative shading, and the spreading of invasive wetland plant species such as reed canarygrass and Douglas' spirea, species that already grow in many of the wetland areas within the existing transmission line corridors.

Wetland Impact Avoidance and Minimization—Ecology and NEPA guidelines assign the highest priority to reducing impacts through avoidance and minimization and secondarily to rectifying and compensating for unavoidable impacts. Criteria used by BPA to select the alternative ROW included avoidance of known high-quality natural resources such as wetlands and streams. Any wetlands identified along the selected transmission line ROW would be avoided where feasible. Factors used in assessing feasibility would include land ownership, road configuration, spanning to avoid wetlands, construction costs, reducing sharp angles and bends in the ROW, and access.

Vegetation Impacts—Vegetation impacts from construction of the towers, roads, and transmission lines would include clearing trees from wetlands and wetland buffers. Trees cut within forested wetlands would result in a permanent modification of that wetland type to either

an emergent or shrub-scrub condition. Forested wetlands where vegetation would be permanently altered to shrub-scrub and emergent communities would experience greater impacts than other wetland areas. The low-growing vegetation within herbaceous and scrub-shrub wetlands is generally compatible with the vegetation height requirements for conductor clearance. Vegetation impacts from construction of access roads and angle tower stringing and pull areas would include clearing scrub-shrub, emergent, and forested wetlands.

Hydrology Impacts—Construction-related activities could impact the hydrology of wetlands within and immediately adjacent to the cleared ROW and substation facilities. Construction could affect wetland hydrology by:

- Filling wetlands for the placement or reconstruction of road access or for tower construction;
- Altering the subbasin that drains to a particular wetland by diverting surface and subsurface flows from grading and road construction;
- Altering evapotranspiration by modifying vegetation; and
- Increasing soil and water temperatures as a result of reduced shading.

Construction within or adjacent to wetlands associated with streams or other surface water could also adversely affect those surface water resources. Factors that determine the risk of altering wetland hydrology include the source of water for the wetland (e.g., groundwater, surface runoff, or streamflow), landscape position, size, surface geology, and soils.

Clearing tree cover would cause a high-level impact (as defined in Section 4.0) to forested wetlands. Tower and road construction would generally avoid wetland areas. This approach would allow hydric soils in forested wetlands within the ROW to be maintained. However, wetland hydroperiod (seasonal occurrence of flooding and/or soil saturation) would change with the removal of trees and resulting reduced evapotranspiration and forest litter; increased storm runoff volumes and delivery rates to adjacent waters would be expected (Reinelt and Taylor 1997).

Water Quality Impacts—The reduction in forested cover within wetlands and construction of new roads could result in degradation of water quality (Horner et al. 1997). Construction activities could introduce sediments into wetlands and thereby degrade the water quality of the wetlands if preventive measures are not taken. The most likely source of sediment would be construction of roads, staging areas, and excavation for tower footings. Construction of tower footings could require dewatering to maintain safe working conditions and conditions suitable for footing construction.

Wildlife Impacts—Removal of vegetation within and adjacent to wetlands could affect wildlife habitat and use in those wetlands. Because of the need to maintain low-growing vegetation for safety, the impacts to vegetative cover in forested wetlands would be more dramatic than the impacts to other wetland areas. The change in vegetative cover from trees and snags to low-growing scrub-shrub or emergent vegetation would impact wildlife species. Wildlife that depend on forested wetlands (e.g., cavity-dwelling birds and mammals) would be most impacted by construction because of loss of habitat (Richter and Azous 1997).

4.1.1.2 Mitigation

Standard mitigation measures to minimize wetland impacts include the following:

- Locate structures and new roads to avoid wetlands and buffers.
- Avoid any activities within designated King County, Kittitas County, City of Kent, City of Covington, and City of Maple Valley wetland buffers, where possible.
- Perform no mechanized clearing within wetlands.
- Use helicopters during construction to minimize the need for use of roads and avoid impacts to wetlands.
- Limit disturbance to the minimum necessary when working in and immediately adjacent to wetlands.
- Locate construction staging areas outside of wetlands and associated buffers.
- Delineate wetlands and wetland buffers before final design and flag for avoidance during construction.
- Use erosion control measures when conducting any earth disturbance upslope of wetlands to ensure soil is not washed downhill during storms.
- Ensure that the hydrology of wetlands and associated streams is maintained wherever the ROW crosses these resources. This can be accomplished by ensuring that landforms are regraded to pre-existing conditions, and that connectivity is maintained between streams and wetlands.
- Stockpile wetland topsoil when excavating wetlands and redeposit soil in place for restoration following construction.
- Minimize impacts to wetlands as described in Washington Department of Natural Resources (WDNR) Forest Practices Rules (WAC 222) and regulations.
- Return temporary roads to their original contours following construction to reestablish pre-project surface water flow patterns.
- Ensure noxious weed infestations do not become a problem in wetlands by washing all construction vehicles and conducting a weed inventory 1 year after construction to verify that weeds have not been introduced.
- Avoid clearing vegetation within forested wetlands wherever possible.
- Use vehicle crossing mats to support equipment used during construction to minimize wetland soil compaction.

4.1.1.3 Cumulative Impacts

Filling or adverse modification of wetlands would result in the incremental reduction of wetland acreage and function within the watersheds of the project area. This outcome could be offset through mitigation and restoration of degraded wetlands within the affected watersheds.

In the future, the transmission line ROW would be a logical choice for construction of other linear projects, including additional transmission lines, fiber optic cables, or pipelines. The decision to create a new right-of-way or to expand an existing corridor could increase the likelihood of such proposals.

4.1.1.4 Unavoidable Effects, Irreversible or Irretrievable Commitment of Resources

Unavoidable effects and commitment of wetland resources would be dependent on the final siting decisions for towers, roads, and other facilities. Siting of facilities to avoid wetlands could avoid or reduce the unavoidable, irreversible, or irretrievable effects.

4.1.2 Echo Lake Substation Impacts

4.1.2.1 Impacts

Expansion of the substation would not impact wetlands or streams. The substation expansion has been designed to avoid all impacts to wetlands surveyed adjacent to the existing substation site.

4.1.2.2 Mitigation

Wetland E-1 is small and could be avoided. Mitigation would be the same as described in Section 4.1.1.2.

4.1.2.3 Unavoidable Effects, Irreversible or Irretrievable Commitment of Resources

High-level impacts to wetlands from towers, roads, and expansion of the substation could be largely avoided.

4.1.3 Alternative Transmission Line Impacts

Alternative 1, the preferred alternative, is presented for comparison purposes only. Refer to BPA Final Wetlands Technical Report (April 2002) for a detailed description of the preferred alternative.

4.1.3.1 Alternative 1: Preferred Alternative

Impacts—The 150-ft.-wide cleared ROW would cross a total of 13.9 ac. of wetlands. A total of 13.9 ac. of these wetlands have palustrine forested components that would be cleared of deciduous and coniferous trees. No wetland areas would be filled for the construction of Alternative 1. Wetlands surveyed within the Alternative 1 ROW consisted primarily of palustrine scrub-shrub and palustrine forested types. The majority of wetlands were low-gradient, depressional wetlands; however, several seep wetlands are present on the south and north slopes of Brew Hill. Major streams and rivers within the Alternative 1 ROW include the Raging River, Rock Creek, and Cedar River.

Clearing would cause a high-level impact to forested wetlands and their buffers. The permanent alteration of forested wetland community to scrub-shrub wetland community would degrade wildlife habitat, lower flood flow and flood storage capability, alter hydrology through changes in evapotranspiration rates, lower water quality improvement functions, and increase soil and water temperatures through the reduction of shading. Scrub-shrub and open water wetlands would experience moderate, low, or no impact assuming the wetlands could be avoided or spanned and that soils, hydrology, and vegetation were maintained.

Mitigation—Mitigation measures specific to the wetland resources along Alternative 1 would include:

- All towers and roads will be sited to avoid direct fill impacts to wetlands.
- Construction of new access roads will be minimized, and temporary crossings will be used where necessary to cross wetlands.

Also refer to Section 4.1.1.2 for discussion of mitigation common to all action alternatives.

Unavoidable Effects, Irreversible or Irretrievable Commitment of Resources—Unless wetlands were avoided during construction, the project would result in the loss of wetlands from the construction of towers, clearing for the ROW and roads, and construction and filling for access roads. This commitment of wetland resources could occur in all watersheds crossed by Alternative 1.

4.1.3.2 Alternative A

Impacts—The 150-ft.-wide cleared ROW would cross a total of 16.76 ac. of wetlands. Within the 150-ft. ROW, Alternative A would have no wetland vegetation clearing impacts from tower and line construction because all wetlands would be spanned due to their vegetation class and topographic positions (see Section 4.0). However, the construction of new and improved access roads and angle tower string and pull areas, would necessitate the clearing of 2.35 ac. of wetland vegetation (Table 2). Approximately 0.45 ac. of wetland fill would be associated with road and tower construction (Table 2). Wetlands surveyed within the Alternative A ROW consisted primarily of palustrine scrub-shrub and palustrine open water. The majority of wetlands were low-gradient, depressional wetlands. Major streams and rivers associated with wetlands within the Alternative A ROW include Paterson Creek and a tributary to Rock Creek.

Table 2. Acreage of Wetland Impact by Transmission Line Alternative

Alternative	Ac. of Wetland Impact		
	Vegetation Clearing	Access Road Construction Fill	Tower Fill
A	2.35	0.44	0.01
B	2.69	0.12	0.02
C (Option C-1)	1.28	0.34	<0.01
C (Option C-2)	1.23	0.31	<0.01
D (Option D-1)	4.28	0.30	<0.01
D (Option D-2)	11.94	0.19	0.01

Impacts from development of the access roads network, totaling 0.44 ac., would occur to palustrine scrub-shrub, open water, and unconsolidated bottom wetlands established within the existing transmission line corridor. These wetlands provide important groundwater discharge and recharge, and water quality functions. Existing tower 5/1 of the Covington-Maple Valley transmission line, is within wetland A-W-18, and would be replaced with the construction of Alternative A. Although the current tower sits on previous fill, the construction of the new tower may require additional fill and grading. As a result, the replacement tower would result in 0.01 ac. of fill to wetland A-W-18 (Table 2). This wetland provides important water quality and groundwater recharge functions because outflow is less than inflow, because there is slow or no flow through the site, and because vegetation cover exceeds 80%.

Mitigation—Mitigation measures specific to the wetland resources along Alternative A would include:

- Towers should be sited to span Patterson Creek and associated wetland A-W-20, resulting in no clearing impact.

Unavoidable Effects, Irreversible or Irretrievable Commitment of Resources—Unless wetlands were avoided during construction, the project would result in the loss of wetlands from vegetation clearing and from additional fill necessary for the construction of towers and access roads. This commitment of wetland resources could occur in all watersheds crossed by Alternative A.

4.1.3.3 Alternative B

Impacts—The existing 150-ft.-wide cleared ROW would cross a total of 26.99 ac. of wetlands. Within the 150-ft. ROW, Alternative B would have no wetland vegetation clearing impacts from tower and transmission line construction because all wetlands would be spanned due to their vegetation class and topographic positions (see Section 4.0). However, the construction of new and improved access roads and angle tower string and pull areas, would necessitate the clearing of 2.69 ac. of wetland vegetation (Table 2). Approximately 0.14 ac. of wetland fill would be associated with road and tower construction. Wetlands surveyed within the Alternative B ROW consisted primarily of palustrine scrub-shrub types. East of Snoqualmie Pass, wetlands are associated with streams that provide hydrology to these wetlands. West of Snoqualmie Pass, wetlands are low-gradient, depressional wetlands; however several seep wetlands are present just west of the pass. Major streams and rivers associated with wetlands within the Alternative B ROW include the South Fork Snoqualmie River, tributaries to the South Fork Snoqualmie River, and tributaries to the Yakima River.

The majority of impacts from development of the access roads network would occur to palustrine scrub-shrub and emergent wetlands established within the existing transmission line corridor. These wetlands provide important groundwater discharge and recharge, and water quality functions. Existing towers associated with the Rocky Reach-Maple Valley line, 79/4, 81/6, and 93/1 are within wetland BD-W-03, -06, and –16 respectively. These towers would be replaced with the construction of Alternative B. Although the current towers sit on fill previously provided for their construction, building the new towers may require additional fill and grading. As a result, the replacement towers would incur 0.02 ac. of fill to these wetlands (Table 2). These wetlands provide important water quality, groundwater recharge, and habitat functions because of their size, location in the watershed, vegetation cover, and mammal and bird habitat.

Inclusive in the impacts described above are impacts specific to USFS-managed lands and wetlands that are protected under the standards and guidelines of the Northwest Forest Plan and an integral component in attainment of ACSOs. Direct loss of wetlands associated with wetland filling and clearing would contribute to non-attainment of all nine ACSOs and therefore constitute a high impact.

Mitigation—Mitigation measures specific to the wetland resources along Alternative B would include:

- Towers should be sited to span the South Fork Snoqualmie River and its associated wetland BD-W-23.

- Towers should be sited to span Boxley Creek and associated wetlands BD-W-30 and -31.

Unavoidable Effects, Irreversible or Irretrievable Commitment of Resources—Unless wetlands were avoided during construction, the project would result in the loss of wetlands from vegetation clearing and fill for the construction of towers and access roads. This commitment of wetland resources could occur in all watersheds crossed by Alternative B.

4.1.3.4 Alternative C (Option C-1)

Impacts—The 150-ft.-wide cleared ROW would cross a total of 9.95 ac. of wetlands. Within the 150-ft. ROW, Alternative C (Option C-1) would have no impacts on the clearing of wetland vegetation caused by tower and transmission line construction because all wetlands would be spanned due to their vegetation class and topographic positions (see Section 4.0). However, the construction of new and improved access roads and angle tower string and pull areas, would necessitate the clearing of 1.28 ac. of wetland vegetation (Table 2). Approximately 0.34 ac. of wetland fill would be associated with road and tower construction (Table 2). Wetlands surveyed within the Alternative C (Option C-1) ROW consisted primarily of palustrine scrub-shrub. The majority of wetlands were low-gradient, depressional wetlands. There are no major streams or rivers associated with wetlands within proposed ROW of Alternative C (Option C-1).

The majority of impacts from development of the access roads network would occur to palustrine scrub-shrub and emergent wetlands established within the proposed transmission line corridor. These wetlands provide important groundwater discharge and recharge, and water quality functions. Construction of a tower is proposed within wetland C-W-11, and its construction would require <0.01 ac. of fill (Table 2). This wetland provides important water quality and groundwater recharge functions.

Mitigation—Refer to Section 4.1.1.2.

Unavoidable Effects, Irreversible or Irretrievable Commitment of Resources—Unless wetlands were avoided during construction, the project would result in the loss of wetlands from vegetation clearing and fill for the construction of towers and access roads. This commitment of wetland resources could occur in all watersheds crossed by Alternative C (Option C-1).

4.1.3.5 Alternative C (Option C-2)

Impacts—The 150-ft.-wide cleared ROW would cross a total of 8.16 ac. of wetlands. Within the 150-ft. ROW, Alternative C (Option C-2) would have no impacts on the clearing of wetland vegetation from tower and transmission line construction because all wetlands would be spanned

due to their vegetation class and topographic positions (see Section 4.0). However, the construction of new and improved access roads and angle tower string and pull areas, would clear 1.23 ac. of wetland vegetation (Table 2). Approximately 0.31 ac. of wetland fill would be associated with road and tower construction (Table 2). Wetlands surveyed within the Alternative C (Option C-2) ROW consisted primarily of palustrine scrub-shrub. The majority of wetlands were low-gradient, depressional wetlands. There are no major streams or rivers associated with wetlands within Alternative C (Option C-2) ROW.

The majority of impacts from development of the access roads network would occur to palustrine scrub-shrub and emergent wetlands established within the proposed transmission line corridor. These wetlands provide important groundwater discharge and recharge, and water quality functions. Construction of a tower is proposed within wetland C-W-11, and its construction would require <0.01 ac. of fill (Table 2). This wetland provides important water quality and groundwater recharge functions because of its size, vegetation cover, and ability to hold overland runoff.

Mitigation—Refer to Section 4.1.1.2.

Unavoidable Effects, Irreversible or Irretrievable Commitment of Resources—Unless wetlands were avoided during construction, the project would result in the loss of wetlands from vegetation clearing and fill for the construction of towers and access roads. This commitment of wetland resources could occur in all watersheds crossed by Alternative C (Option C-2).

4.1.3.6 Alternative D (Option D-1)

The 150-ft.-wide cleared ROW would cross a total of 17.93 ac. of wetlands. A total of 4.28 ac. of these wetlands have palustrine forested components that would be cleared of deciduous and coniferous trees (Table 2). The construction of new and improved access roads and angle tower string and pull areas would clear an additional 0.30 ac. of wetland vegetation (Table 2). Approximately 0.30 ac. of wetland fill would be associated with road and tower construction (Table 2). Wetlands surveyed within the Alternative D (Option D-1) ROW consisted primarily of palustrine scrub-shrub types. East of Snoqualmie Pass, wetlands are associated with streams that provide hydrology to these wetlands. West of Snoqualmie Pass, wetlands are low-gradient, depressional wetlands; however, several seep wetlands are present on the west slope of Stampede Pass. Major streams and rivers associated with wetlands within the Alternative D (Option D-1) ROW include the South Fork Snoqualmie and Yakima Rivers.

Clearing would cause a high-level impact to forested wetlands and their buffers. The permanent alteration of forested wetland community to scrub-shrub wetland community would degrade wildlife habitat, lower flood flow and flood storage capability, alter hydrology through changes in evapotranspiration rates, lower water quality improvement functions, and increase soil and water temperatures through the reduction of shading. Scrub-shrub, emergent, and open water wetlands associated with Alternative D (Option D-1) would have no impacts from vegetation clearing because all wetlands would be spanned because of their vegetation class and topographic positions (see Section 4.0).

Impacts caused by clearing of wetland vegetation and fill impacts from development of the access roads network would occur to the forested portion of wetland BD-W-03. This wetland provides important wildlife habitat, flood flow and flood storage, and water quality functions. Proposed towers are located within wetland BD-W-02 and –03 respectively, and their construction would require <0.01 ac. of fill (Table 2). This wetland provides important water quality, habitat, and

groundwater recharge functions because of its size, location in the watershed, vegetation cover, and mammal and bird habitat.

Inclusive in the impacts described above are impacts specific to USFS-managed lands and wetlands that are protected under the standards and guidelines of the Northwest Forest Plan and an integral component in attainment of ACSOs. Direct loss of wetlands associated with wetland filling and clearing would contribute to non-attainment of all nine ACSOs and therefore constitute a high impact.

Mitigation—Mitigation measures specific to the wetland resources along Alternative D (Option D-1) would include:

- Towers should be sited to span the South Fork Snoqualmie River and its associated wetland BD-W-23.

- Towers should be sited to span Boxley Creek and associated wetland BD-W-31.

- Towers should be sited to span wetland W-BD-05.

Unavoidable Effects, Irreversible or Irretrievable Commitment of Resources—Unless wetlands were avoided during construction, the project would result in the loss of wetlands from wetland vegetation clearing and fill for the construction of towers, and access roads. This commitment of wetland resources could occur in all watersheds crossed by Alternative D (Option D-1).

4.1.3.7 Alternative D (Option D-2)

Impacts—The 150-ft.-wide cleared ROW would cross a total of 16.45 ac. of wetlands. A total of 11.94 ac. of these wetlands have palustrine forested components that would be cleared of deciduous and coniferous trees (Table 2). The construction of new and improved access roads and angle tower string and pull areas would clear an additional 0.32 ac. of wetland vegetation (Table 2). Approximately 0.20 ac. of wetland fill would be associated with road and tower construction (Table 2). Wetlands surveyed within the Alternative D (Option D-2) ROW consisted primarily of palustrine scrub-shrub with some palustrine forested, emergent, and open water types. The majority of wetlands east of Snoqualmie Pass are dominated by scrub-shrub and/or emergent vegetation, and they are associated with streams that saturate/flood riparian areas during high flow. West of Snoqualmie Pass, wetlands are mostly scrub-shrub and/or emergent associated with seeps, streams, and depressions. Major streams and rivers associated with wetlands within the Alternative D (Option D-2) ROW include the Yakima and South Fork Snoqualmie Rivers.

Clearing would cause a high-level impact to forested wetlands and their buffers. The permanent alteration of forested wetland community to scrub-shrub wetland community would degrade wildlife habitat, lower flood flow and flood storage capability, alter hydrology through changes in evapotranspiration rates, lower water quality improvement functions, and increase soil and water temperatures through the reduction of shading.

Wetland vegetation clearing and fill impacts from development of the access roads network would occur to palustrine forested and scrub-shrub wetlands. These wetlands provide important wildlife habitat, flood flow and flood storage, and water quality functions. Construction of a tower is proposed within wetland BD-W-03, and its construction would require <0.01 ac. of fill

(Table 2). This wetland provides important water quality, habitat, and groundwater recharge functions because of its size, location in the watershed, vegetation cover, and mammal and bird habitat

Inclusive in the impacts described above are impacts specific to USFS-managed lands and wetlands that are protected under the standards and guidelines of the Northwest Forest Plan and an integral component in attainment of ACSOs. Direct loss of wetlands associated with wetland filling and clearing would contribute to non-attainment of all nine ACSOs and therefore constitute a high impact.

Mitigation—Mitigation measures specific to the wetland resources along Alternative D (Option D-2) would include:

- Towers should be sited to span the South Fork Snoqualmie River and its associated wetland BD-W-23.

- Towers should be sited to span Boxley Creek and associated wetlands BD-W-30 and -31.

Unavoidable Effects, Irreversible or Irretrievable Commitment of Resources—Unless wetlands were avoided during construction, the project would result in the loss of wetlands from vegetation clearing and fill for the construction of towers and access roads. This commitment of wetland resources could occur in all watersheds crossed by Alternative D (Option D-2).

4.1.4 Access Roads

Impacts—New or reconstructed access roads would be required to construct each of the alternatives. Where possible, new access roads would avoid identified wetlands for any of the proposed transmission line alternatives.

New road construction or reconstruction could carry sediment into wetlands, affecting water quality and biological productivity. However, use of erosion control devices would minimize these impacts. Wetlands within the ROW and adjacent to access roads would be subject to soil compaction and vegetation damage from vehicles carrying heavy construction machinery and transmission line structures.

Mitigation—Mitigation measures specific to construction of access roads within the project area would include:

- Utilize existing road system to access tower locations and for the clearing of the transmission line ROW.

- Maintain properly functioning drainage control devices.

- Avoid construction on steep slopes and geologically unstable areas.

- Avoid constructing steep road grades.

- Construct roads consistent with WDNR Forest Practice Rules (WAC 222).

Also refer to Section 4.1.1.2 for discussion of mitigation common to all action alternatives.

Unavoidable Effects, Irreversible or Irretrievable Commitment of Resources—Unless wetlands were avoided during construction, the project would result in the loss of wetlands from the addition of fill and the construction of access roads. This commitment of wetland resources could occur in all watersheds crossed by the proposed alternatives.

4.2 Operation and Maintenance Impacts

4.2.1 Impacts Common to All Transmission Line Alternatives

4.2.1.1 Impacts

Maintenance of the 150-ft. transmission ROW and substations would require the periodic removal of trees to ensure a safe clearance from the conductors. Individual trees would be removed as routine maintenance in forested wetlands and their buffers if trees grow to a height that conflicts with the safe operation of the transmission line.

Moderate-level wetland impacts would also occur where the forest cover was removed and permanently maintained as scrub-shrub or emergent vegetation.

4.2.1.2 Mitigation

Standard mitigation measures to minimize impacts to wetland resources during operation and maintenance of the transmission line would include:

- Require contractors to use manual methods within wetlands.
- Limit disturbance to the minimum necessary when working in and immediately adjacent to wetlands.
- Use erosion control measures when conducting any earth disturbance upslope of wetlands to ensure that soil is not washed downhill during storm events.
- Minimize impacts to wetlands consistent with the WDNR Forest Practices Rules (WAC 222) regulations.
- Avoid clearing vegetation within forested wetlands wherever possible.

4.2.1.3 Cumulative Impacts

Loss or modification of wetlands would result in an incremental reduction in wetland functions within the watersheds of the project area.

4.2.1.4 Unavoidable Effects, Irreversible or Irretrievable Commitment of Resources

Forested wetlands would be permanently modified through the removal of trees and maintenance of shrub-scrub wetland communities. Wildlife habitat, flood flow and flood storage moderation, and water quality functions would be permanently degraded. This commitment of wetland resources could occur in all watersheds crossed by the proposed alternatives.

4.2.2 Access Roads

4.2.2.1 Impacts

Access roads used for maintenance of towers and the vegetation within the transmission line could carry sediment into wetlands, affecting water quality and biological productivity. Truck travel, exposed soil, and malfunctioning drainage control devices could result in low- to moderate-level impacts.

4.2.2.2 Mitigation

Mitigation measures specific to the operation and maintenance of access roads within the project area would include:

- Utilize existing road systems to access tower locations and to clear the transmission line ROW.
- Maintain properly functioning drainage control devices on all roads.
- Repair degraded road surfaces.
- Decommission unused roads.

Also refer to Section 4.2.1.2 for discussion of mitigation common to all action alternatives.

4.2.3 Substations

No additional wetland impacts would occur from the operation and maintenance of the substation.

5.0 Environmental Consultation, Review and Permit Requirements

Several federal laws and administrative procedures must be met by the alternatives. This section lists and briefly describes requirements that could apply to wetland elements of this project.

5.1 Discharge Permits Under the Clean Water Act

5.1.1 Section 401

Section 401 of the CWA, the State Water Quality Certification program, requires that states certify compliance of federal permits and licenses with state water quality requirements. A federal permit to conduct an activity that results in discharges into waters of the United States, including wetlands, is issued only after the affected state certifies that existing water quality standards would not be violated if the permit were issued.

5.1.2 Section 402

The CWA Section 402 program, also known as the National Pollutant Discharge Elimination System (NPDES) program, regulates the discharge of pollutants from point sources into waters of the United States (other than dredged or fill material, which is covered under Section 404).

5.1.3 Section 404

Authorization from the Corps is required in accordance with the provisions of Section 404 of the CWA when there is a discharge of dredge or fill material into waters of the United States, including wetlands. This requirement includes excavation activities that result in the discharge of dredged material that could destroy or degrade waters of the United States.

This project, with mitigation measures as stated, would meet the standards outlined by the CWA.

5.2 Other Standards and Guidelines

5.2.1 Washington Department of Natural Resources

The WDNR Forest Practices Rules (WAC 222) describe the types of forest practices allowed under the State of Washington Forest Practices Act (RCW 76.09). The rules divide forest practices into four classes based on potential impacts to public resources, and they classify wetlands as Forested, Nonforested Type A, or Nonforested Type B. Specific wetland management zones and permitted practices within each management zone are applied to each wetland class.

5.2.2 King County Department of Development and Environmental Services

The King County Department of Development and Environmental Services reviews public and private projects under the King County Sensitive Areas Ordinance (Ordinance #9614) to ensure consistency with county code for project activities in wetlands and wetland buffers.

5.2.3 Kittitas County

The Kittitas County Planning Department reviews public and private projects under the Kittitas County Critical Areas Code (Title 17A) to ensure consistency with county code for project activities in wetlands and wetland buffers.

5.2.4 City of Kent

The City of Kent Public Works Department reviews public and private projects under the City of Kent Wetlands Management Code (Chapter 11.05) to ensure consistency with the city's code for project activities in wetlands and wetland buffers.

5.2.5 City of Maple Valley

The City of Maple Valley Department of Community Development reviews public and private projects under the City of Maple Valley's Environment Code (Title 14) to ensure consistency with the city's code for project activities in wetlands and wetland buffers.

5.2.6 City of Covington

The City of Covington Department of Planning and Community Development reviews public and private projects under the City of Covington's Planning Code (Title 20) to ensure consistency with the city's code for project activities in wetlands and wetland buffers.

5.2.7 National Forest

Wetlands under the jurisdiction of the U.S. Forest Service must follow standards and guidelines outlined for riparian reserves under the Northwest Forest Plan of 1994. The U.S. Forest Service will review this project to ensure consistency with the standards and guidelines.

6.0 Individuals and Agencies Contacted

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7.0 List of Preparers

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9.0 Glossary and Acronyms

This section contains a list of acronyms, abbreviations, and technical terms used in this report. Words that would be defined in a desk-size dictionary (for example, the College Edition of the American Heritage Dictionary) are not included.

9.1 Glossary

100-year floodplains are areas that have a 1% chance of being flooded in a given year.

Access roads are constructed to each structure site first to build the tower and line and later to maintain and repair it. Access roads are built where no roads exist. Where county roads or other access is already established, short spurs are built to the structure sites. Access roads are maintained after construction, except where they pass through cultivated land where the roads would be removed and crop production would be restored after construction is completed.

Alternatives refer to different choices or means to meet the need for action.

Anthropogenic is of, relating to, or resulting from the influence of human beings on nature.

Aquifers are water-bearing rock or sediments below the surface of the earth.

Best Management Practices are a practice or a combination of practices that are the most effective and practical means of preventing or reducing the amount of pollution generated by non-point sources to a level compatible with water quality goals.

Biological Assessments are documents prepared to fulfill the implementing regulations of the Endangered Species Act, found at 50 CFR, part 402, which require an assessment of potential effects on listed species and critical habitat prior to implementing a proposed action. A proposed action is defined as any activity authorized, funded, or carried out by a federal agency (50 CFR 402.10).

Biological Evaluations are the means by which the U.S. Forest Service conducts a review and documents the findings of the effects of an action or proposed action on any sensitive species.

Culverts are corrugated metal or concrete pipes used to carry or divert runoff water from a discharge. Culverts are usually installed under roads to prevent washouts and erosion.

Cumulative impacts are created by the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions.

Cut and fill is the process by which a road is cut or filled on a side slope. The term refers to the amount of soil that is removed (cut) or added (filled).

CWA signifies the Clean Water Act, a federal law intended to restore and maintain the chemical, physical, and biological integrity of the nation's waters and secure water quality.

Danger trees or high-growing brush occur in or alongside the project right-of-way and are hazardous to the transmission line. These trees are identified by special crews and must be removed to prevent tree-fall into the line or other interference with the wires. The owner of danger trees off the right-of-way is compensated for their value. BPA's Construction Clearing Policy requires that trees be removed that meet either one of two technical categories: Category A contains any tree that in 15 years will grow within about 5 m (18 ft.) of conductors when the conductor is at maximum sag (100°C or 212°F) and is swung by 30 kg per sq/m (6 lb per sq/ft.) of wind (93 kph or 58 mph); Category B represents any tree or high-growing bush that after 8 years of growth will fall within about 2 m (8 ft.) of the conductor when it reaches maximum sag (80°C or 176°F) in a static position.

Deadends are heavy towers designed for use where the transmission line loads the tower primarily in tension rather than compression. Deadends are used in turning large angles along a line or in bringing a line into a substation.

Easement is a grant of certain rights to use a piece of land, which then becomes a "right-of-way." BPA normally acquires easements for its transmission lines. Easement includes the right to enter the ROW to build, maintain, and repair facilities.

Emergent plants have their bases submerged in water.

Endangered species are those species listed as endangered either by the Federal Government or the State of Washington. Federally-listed Endangered Species are those officially designated by the U.S. Fish and Wildlife Service as being in danger of extinction throughout all or a significant portion of their range. These species receive full protection under the Endangered Species Act. State-listed Endangered Species are those species native to the State of Washington that are seriously threatened with extinction throughout all or a significant portion of their range within the state, as designated in Washington Administrative Code 232-12-014.

Floodplain refers to a portion of a river valley adjacent to the stream channel that is covered with water when the stream overflows its banks during flood stage.

Footings are the supporting base for the transmission towers. They are usually steel assemblies buried in the ground for lattice-steel towers.

Forb is any herbaceous plant that is not a grass or grasslike.

Ford is a travelway across a stream where water depth does not prevent vehicle movement. Ford construction can include grading and stabilizing streambanks at the approaches and adding coarse fill material within the channel to stabilize the roadbed.

GIS signifies Geographic Information System, a computer system that analyzes graphical map data.

Ground wire (overhead) is wire strung from the top of one tower to the next; it shields the line against lightning strikes.

HCP is Habitat Conservation Plan.

Hydrology addresses properties, distribution, and circulation of water.

Hydroperiod is the seasonal occurrence of flooding and/or soil saturation.

Insulators are ceramic or other nonconducting materials used to keep electrical circuits from jumping to ground.

Intermittent refers to periodic water flow in creeks or streams.

Internal drainage refers to streams that are not connected to the ocean by surface waters.

Jurisdictional wetlands are areas that are consistently inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions.

Kilovolt is one thousand volts.

Lattice steel refers to a transmission tower constructed of multiple steel members that are connected together to make up the tower's frame.

Low vegetation area is the area where vegetation is kept below a maximum reliable operation height.

Low-gradient refers to gentle slopes.

LWD is large woody debris, defined as any piece of downed wood larger than 4 in. in diameter and 6 ft. long.

Mitigation is the step(s) taken to lessen the potential environmental effects predicted for each resource impacted by the transmission project. Mitigation may reduce the impact, avoid it completely, or compensate for the impact. Some mitigation, such as adjusting the location of a tower to avoid a special resource, is enacted during the design and location process. Other mitigation, such as reseeding access roads with desirable grasses and avoiding weed proliferation, is taken after construction.

Monitor species are those species for which the State of Washington monitors status and distribution either because they have been listed as State-threatened, endangered or sensitive within the previous 5 years; they require a habitat that has limited availability during at least some portion of their life cycle; they are environmental indicators; or their taxonomy is in question and it is unclear whether they should be included as listed species.

Montane areas refer to those occurring in the biogeographic zone of relatively moist, cool upland slopes below timberline dominated by large coniferous trees.

National Environmental Policy Act (NEPA) requires an environmental impact statement on all major federal actions significantly affecting the quality of the human environment. (42 U.S.C. 4332 2(2)(C))

Noxious weeds are plants that are injurious to public health, crops, livestock, land, or other property.

Perennial streams and creeks have year-round water flows.

Permeability refers to the capability of various materials to transport liquids.

Pulling site is a staging area for machinery used to string conductors.

Revegetation is reestablishment of vegetation on a disturbed site.

Right-of-way (ROW) is an easement for a certain purpose over the land of another owner, such as a strip of land used for a road, electric transmission line, pipeline, etc.

Riparian habitat is a zone of vegetation that extends from the water's edge landward to the edge of the vegetative canopy. The term is associated with watercourses such as streams, rivers, springs, ponds, lakes, or tidewater.

Sensitive species are those species native to Washington State that are vulnerable or declining and are likely to become endangered or threatened in a significant portion of their range within the state without cooperative management or removal of threats, as defined in Washington Administrative Code 232-12-011.

Seral stage designates a given sere, which is a stage of ecological succession. Phases in the growth and development of plant communities from a disturbance or colonization event to the climax community are characterized as seres.

Silt is a designation referring to individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 mm) to the lower limit of very fine sand (0.05 mm).

Sole source aquifer is designated by the U.S. Environmental Protection Agency as an aquifer providing at least half of an area's drinking water.

Substation deadends are towers within the confines of the substation where incoming and outgoing transmission lines end. Deadends are typically the tallest structures in a substation.

Substation is the fenced site that contains the terminal switching and transformation equipment needed at the end of a transmission line.

Survey and manage is a mitigation measure adopted as a standard and guideline within the NFP Record of Decision that is intended to mitigate impacts of land management efforts on species that are closely associated with late-successional or old-growth forests whose long-term persistence is a concern. (U.S. Department of Agriculture, Forest Service, and U.S. Department of Interior, Bureau of Land Management 2000)

Survey protocols are interagency documents describing the survey techniques needed to have a reasonable chance of locating a species when it is present on a site, or needed to make an "equivalent effort" of locating the species when it is present on the site. Survey protocols also identify habitats needing surveys and may identify habitats or circumstances not needing surveys. (U.S. Department of Agriculture, Forest Service, and U.S. Department of Interior, Bureau of Land Management 2000)

Take is to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct (Federal Endangered Species Act, Section 3(18)).

Threatened species are those species listed as threatened either by the Federal Government or the State of Washington. Federally-listed threatened species are those officially designated by the U.S. Fish and Wildlife Service as being in danger of becoming endangered throughout all or a significant portion of their range. These species receive full protection under the Endangered Species Act. State-listed threatened species are those species native to the State of Washington that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range within the state without cooperative management or removal of threats, as designated in Washington Administrative Code 232-12-011.

Transmission deadend towers are the last transmission line towers on both the incoming and outgoing sides of the substation. These towers are structurally reinforced to reduce conductor tension on substation deadends and provide added reliability to the substation.

Transmission line includes the structures, insulators, conductors, and other equipment used to transmit electrical power from one point to another.

Water bars are smooth, shallow ditches excavated at an angle across a road to decrease water velocity and divert water off and away from the road surface.

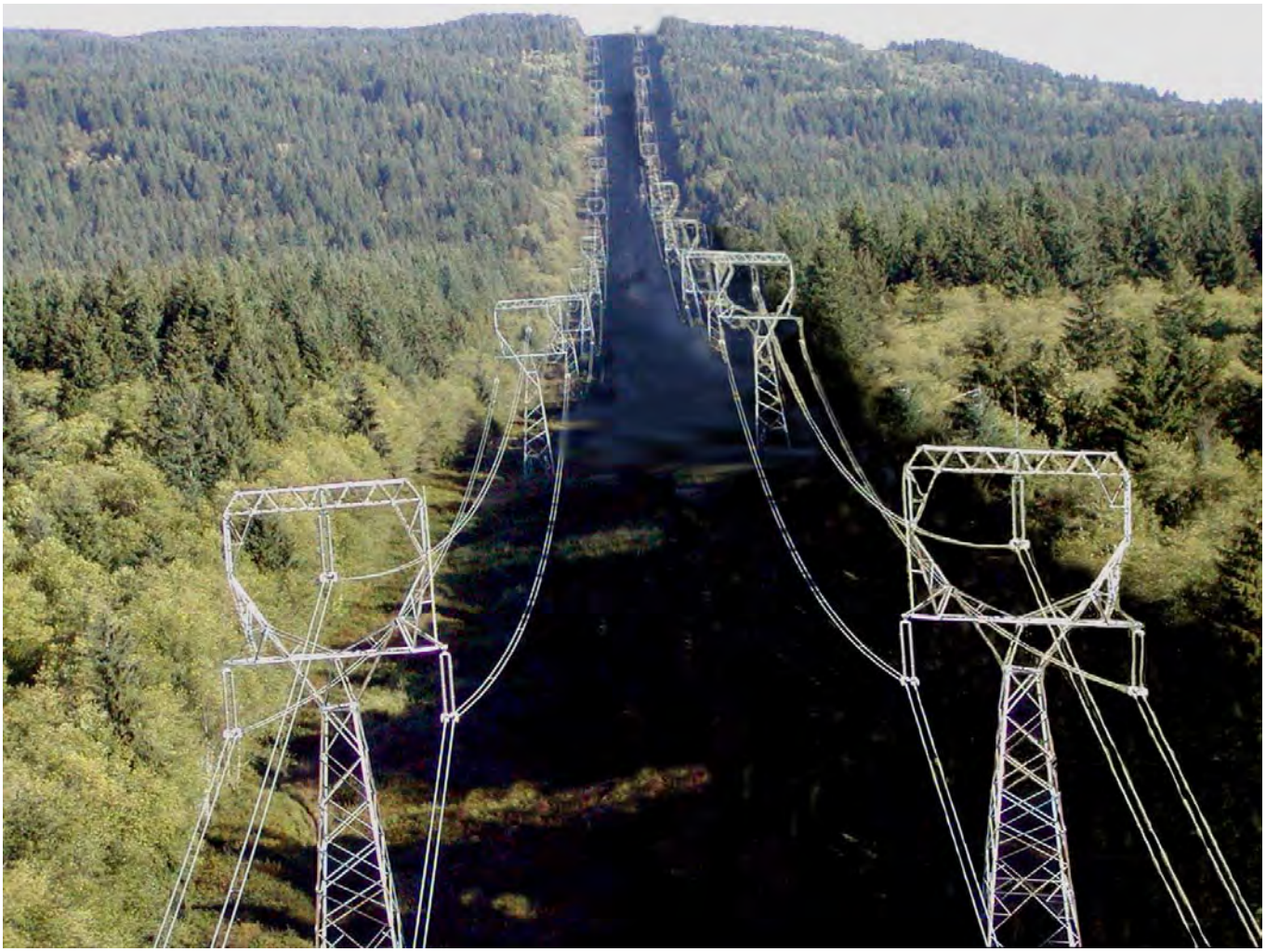
Wetlands are areas where the soil experiences anaerobic conditions because of inundation of water during the growing season. Indicators of a wetland include types of plants, soil characteristics, and hydrology of the area.

9.2 Acronyms and Abbreviations

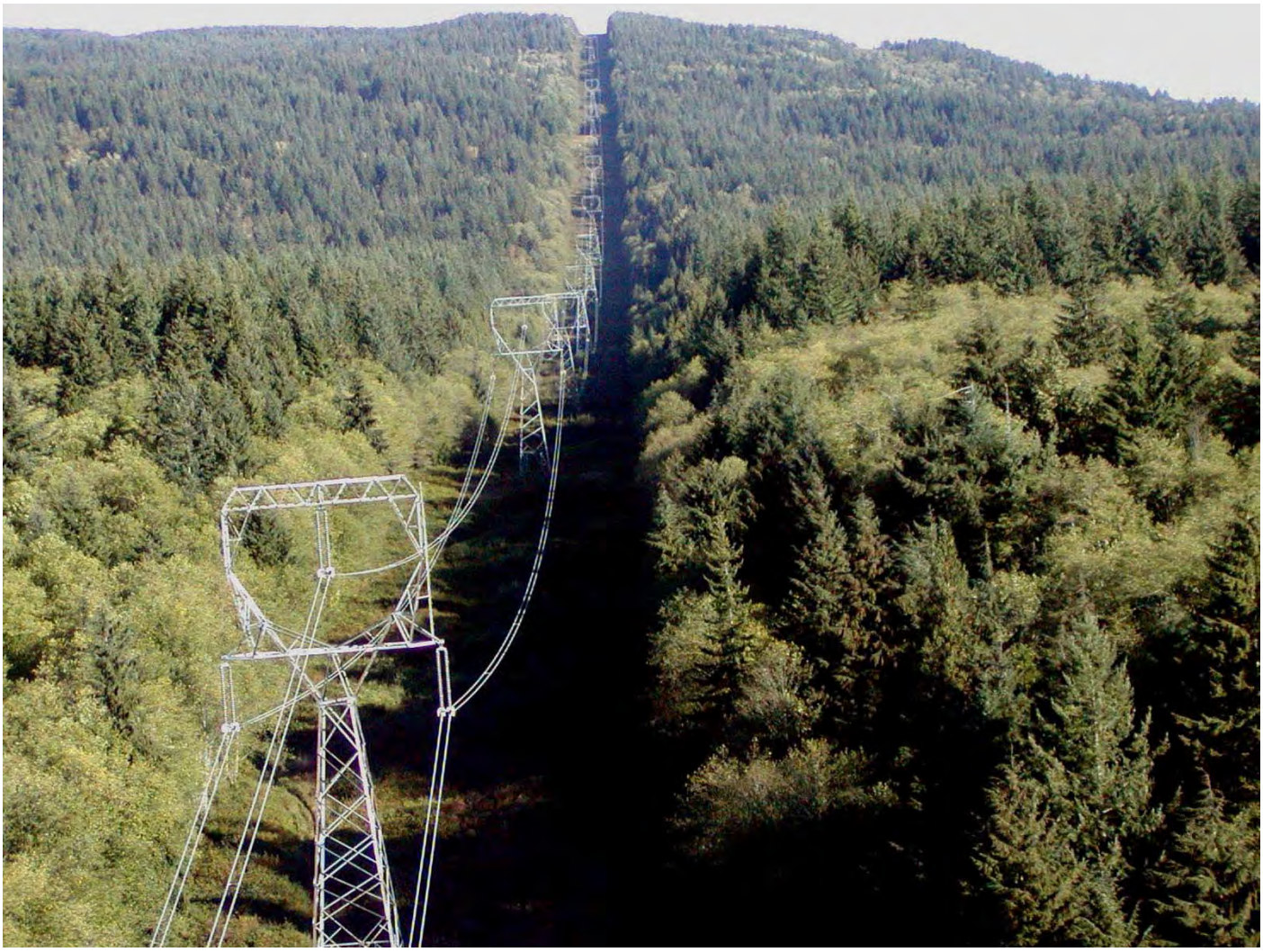
ac. ..... acre or acres
ACS ..... Aquatic Conservation Strategy
ACSO ..... Aquatic Conservation Strategy Objective
BLM ..... Bureau of Land Management
BMPs ..... Best Management Practices
BPA ..... Bonneville Power Administration
CFR ..... Code of Federal Regulations
Corps ..... U.S. Army Corps of Engineers
CWA ..... Clean Water Act
ft. ..... foot or feet
Ecology ..... Washington Department of Ecology
EIS ..... environmental impact statement
EPA ..... Environmental Protection Agency
GIS ..... Geographic Information System
in. ..... inch or inches
kV ..... kilovolt

mi. ..... mile or miles
NEPA ..... National Environmental Policy Act
NESC ..... National Electrical Safety Code
NWI ..... National Wetland Inventory
NPDES ..... National Pollutant Discharge Elimination System
RCW ..... Revised Code of Washington
ROD ..... Record of Decision
ROW ..... right-of-way
USFWS ..... U.S. Fish and Wildlife Service
USGS ..... U.S. Geological Survey
WAC ..... Washington Administrative Code
WDNR ..... Washington Department of Natural Resources
WRIA ..... Water Resource Inventory Area

Appendix R Visual Simulations for the Proposed Action



View looking north within the Cedar River Municipal Watershed of a simulation illustrating the proposed transmission line on the right, and the existing transmission line on the left.



View looking north in the Cedar River Municipal Watershed along the Raver-Echo Lake 500-kV Transmission Line

Before

View looking south from Brew Hill within the Cedar River Municipal Watershed along the Raver-Echo Lake Transmission Line.

After

View looking south of a simulation of the proposed transmission line (on the left) adjacent to the existing Raver-Echo Lake Transmission Line (on the right).

Appendix S Aesthetic Resources Technical Report

Kangley-Echo Lake

Transmission Line Project

Aesthetic Resources Technical Report

Prepared for

Bonneville Power Administration
Portland, Oregon

December 2002

Prepared by

CH2MHILL

Printed on Recycled and Recyclable Paper

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Photos

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1.0 Introduction

1.1 Background

The Bonneville Power Administration (BPA) is committed to providing reliable power to the Northwest region. BPA is proposing to build new infrastructure projects to improve the reliability of the transmission system and to meet future power needs. The Kangley-Echo Lake Transmission Line Project is the first of these infrastructure projects.

1.1.1 Proposal

The proposed 500-kilovolt (kV) transmission line would connect an existing line with BPA's Echo Lake Substation in the Maple Valley area of Washington. The proposed line is needed to improve system reliability in the King County area and to enhance the return of power to Canada as required by the Columbia River Treaty. Without system improvements, an outage on an existing BPA line in the area coupled with cold winter weather could cause voltage instability and a loss of power in the Puget Sound area as early as winter 2002-03.

BPA is considering a broad range of alternatives for this project. Project alternatives are described in Appendix A (as provided by BPA). Alternative routes considered in this technical study report and the report's overall purpose are described below.

1.1.2 Alternative Routes

BPA studied several alternative routes for the Kangley-Echo Lake Project in 2000 and 2001. These are described and analyzed in the Draft Environmental Impact Statement (DEIS) issued in June 2001 and are identified as the Preferred Route (Alternative 1), Alternative 2, Alternative 3, Alternative 4A, and Alternative 4B. Alternatives dropped from further analysis earlier due to costs and other considerations were resurfaced by BPA in early 2002 to address potential routes around the Cedar River Municipal Watershed. These routes are identified as Alternative A, Alternative B, Alternative C (Options C1 and C2), and Alternative D (Options D1 and D2). A description of these new alternatives is provided in Section 2 of this report.

1.1.3 Purpose of this Report

BPA plans to issue a supplemental DEIS (SDEIS) in early 2003. The SDEIS analyzes both the original routes evaluated in the DEIS (Routes 1 through 4) and the new alternatives identified in early 2002 (Routes A through D). This Aesthetic Resources Technical Report analyzes the impacts of the new alternative routes so that they can be considered along with the original routes in the SDEIS. This report provides the supporting technical material to be extracted and summarized in the SDEIS.

1.2 Resources Studied

Aesthetic resources are the natural and cultural features of the landscape that contribute to the public's appreciative enjoyment of their environment. Visual resource or aesthetic impacts are generally defined in terms of a project's physical characteristics and potential visibility and the ways in which the project's presence would change the perceived visual character and quality of the environment in which it would be located.

This report will serve as the basis for the aesthetics analysis in the SDEIS that BPA will prepare for the Kangley-Echo Lake Transmission Line Project. This report documents the visual conditions that now exist along each of the four additional alternative alignments that are now being considered. It evaluates the implications that development of the proposed transmission facilities on these alignments would have for the public's experience of the aesthetic qualities of the areas.

1.3 Study Approach

1.3.1 Overview of Approach

The purpose of this study is to provide a systematic assessment of the aesthetic effects that the proposed Kangley-Echo Lake Transmission Line Project would have if it were to be built on any of the four alignments now being considered. The intent is to provide both a qualitative understanding and, to the extent feasible, numerical indicators that will provide the public and the project decision-maker with a clear comprehension of the project's aesthetic effects on each of the alternative alignments. One of the study's intents is to generate information that will enable the alignments to be compared with each other in terms of aesthetic effects, and that will enable the aesthetic issues to be considered along with the issues in all of the other discipline areas to make a fully-informed decision in the final selection of the alignment to be used to meet the electric system needs the project is intended to serve.

For consistency with the aesthetic analysis prepared for BPA' s originally proposed route and Alternatives 1, 2, 3, 4A, and 4B (David Evans and Associates, February 2001), the approach followed by that study was reviewed and then modified to meet the needs of an analysis of the additional alternative routes that are also being considered. The methods used in the original aesthetics study needed to be modified and supplemented to deal with the fact that two of the alternatives being considered (B and D) are considerably longer than those which were originally evaluated, and also cross lands administered by the U.S. Forest Service, which has its own special analysis system for addressing aesthetic issues. Modifications were also needed to address the fact that that all of the new alternatives cross landscapes that are very different from those crossed by the alignments that were originally evaluated, pass in close vicinity to many more residences, and in general, have the potential to be seen by many more people.

1.3.2 Landscape Analysis Areas

The analysis began with study of descriptions and drawings of the transmission equipment and right of way treatments being proposed on each of the alternative routes, and field visits and review of maps and air photos to gain an understanding of the project area and potential project issues. Based on these initial assessments, the areas along each of the proposed alternative alignments were divided into landscape analysis areas—areas with generally similar landscape conditions that provide a convenient and meaningful structure for organizing the description and assessment of existing landscape conditions and the project's potential effects on them. The boundaries of these landscape areas are indicated on the maps presented as Map 2.

Within each of the landscape areas identified, systematic research and assessment was conducted to document and evaluate existing visual conditions and the degree of aesthetic sensitivity. This process entailed field visits, photo documentation of site conditions, review of air photographs and mapped resource data, review of plans and policies, interviews with resource planners and managers, and GIS mapping and analysis. The results of this effort are presented in Section 3.0 and on Maps 2 through 10. Section 3 consists of text and accompanying photographs that characterize existing aesthetic conditions and sensitivities within the various landscape units along each of the alternatives being evaluated. Maps 2, 3, and 4 are landscape context maps that provide coverage of the areas along the alternative routes, and present detailed information that is helpful in understanding landscape conditions and sensitivities. These maps also indicate the locations from which the photographs used to illustrate the text in Section 3.0 were taken. Maps 5, 6, and 7 identify existing scenic quality conditions along the proposed routes and Maps 8, 9, and 10 identify areas of varying visual sensitivity.

1.3.3 Assessment of Scenic Quality

To respond to the need to assess the scenic quality of the landscapes potentially affected by the proposed alternatives, the analyses of visual conditions in each of the landscape areas included an overall rating of the level of scenic quality prevailing in the unit. These ratings were developed based field observations made in May 2002, review of photos of the affected area, review of methods for assessment of visual quality, and review of research on public perception of the environment and scenic beauty ratings of landscape scenes. The final assessment of scenic quality was made based on professional judgement that took a broad spectrum of factors into consideration, including:

- Natural features, including topography, water courses, rock outcrops, and natural vegetation;
- The positive and negative effects of man-made alterations and built structures on visual quality; and
- Visual composition, including assessment of the complexity and vividness of patterns in the landscape.

The final ratings assigned fit within the rating scale summarized in Table 1. Development of this scale builds on a scale developed for use with an artificial intelligence system for evaluation of landscape visual quality (Buhyoff et al., 1994), and incorporates landscape assessment concepts applied by the U.S. Forest Service and the U.S. Department of Transportation.

Table 1. Landscape Scenic Quality Scale

Rating	Explanation
High Visual Quality	Landscapes that have high quality scenic value. This may be due to cultural or natural features contained in the landscape or to the arrangement of spaces contained in the landscape that causes the landscape to be visually interesting or a particularly comfortable place for people. These landscapes have high levels of vividness, unity, and intactness.
Moderately High Visual Quality	Landscapes which have above average scenic value but are not of high scenic value. The scenic value of these landscapes may be due to man-made or natural features contained within the landscape, to the arrangement of spaces, in the landscape or to the two-dimensional attributes of the landscape. Levels of vividness, unity, and intactness are moderate to high.
Moderate Visual Quality	Landscapes, that are common or typical landscapes which have, average scenic value. They usually lack significant man-made or natural features. Their scenic value is primarily a result of the arrangement of spaces contained in the landscape and the two-dimensional visual attributes of the landscape. Levels of vividness, unity, and intactness are average
Moderately Low Visual Quality	Landscapes that have below average scenic value but not low scenic value. They may contain visually discordant man-made alterations, but the landscape is not dominated by these features. They often lack spaces that people will perceive as inviting and provide little interest in terms of two-dimensional visual attributes of the landscape.
Low Visual Quality	Landscapes that have below average scenic value. They may contain visually discordant man-made alterations, and often provide little interest in terms of two-dimensional visual attributes of the landscape. Levels of vividness, unity, and intactness are below average

Note: Rating scale based on Buhyoff et al., 1994; U.S. DOT Federal Highway Administration, 1988, and United States Department of Agriculture Forest Service. 1995.

1.3.4 Assessment of Visual Sensitivity

For consistency with the aesthetic analysis prepared for BPA' s originally proposed route and Alternatives 1, 2, 3, 4A, and 4B (David Evans and Associates, February 2001), the analysis of viewers, viewing conditions, and viewer sensitivity in each landscape area was structured to consider residential viewers, recreational viewers, and roadway viewers. To summarize the insights developed through the analysis of viewer sensitivity, overall levels of visual sensitivity along the various sections of the alternative routes were identified and mapped.

Visual sensitivity was rated as **High** in situations where:

- Residential viewers are located in close proximity (1/4 mile or less) to the proposed transmission routes and have or could have unobstructed views toward the corridor

- The transmission route is potentially visible in near foreground views from public use areas in parks and from public trails where the emphasis is on appreciation of natural and scenic values
- The transmission route is potentially visible from major travel corridors along which policies been applied to preserve and enhance aesthetic values

Visual sensitivity was rated as **Moderate** in situations where:

- The transmission route is located within the foreground or middleground distance from an officially designated scenic route, but there is currently sufficient tree cover to at least partially screen the proposed transmission facility from view.
- The transmission route is located in the immediate foreground of views from locally important roadways
- The transmission route is located in middleground to background views from designated scenic routes but does not fall within the primary view cone of highway drivers
- The transmission route is located in foreground areas visible from trails or recreational facilities where the emphasis is not necessarily on appreciation of the environment's scenic qualities and/or where the setting already has a high degree of alteration.
- The transmission route is located in areas where it is potentially visible in the immediate foreground of views from commercial areas.

Visual sensitivity was rated as **Low** in all other situations.

1.3.5 Procedure for Assessment of Aesthetic Impacts

1.3.5.1 Information Used

This analysis of the visual effects of changes that might be brought about by the Kangley-Echo Lake Project on the four alternatives evaluated was based on field observations, and review of project maps and drawings, photographs of the project area, computer-generated visual simulations from a sampling of viewpoints,, and research on design measures for integrating electric facilities into their environmental settings. The analysis of the project's impacts was based on evaluation of the changes to the existing visual resources that would result from the project's construction and operation and the implications of those changes in light of the landscape's existing scenic quality and level of visual sensitivity. An important aspect of this analysis was evaluation of the "after" views provided by the computer-generated visual simulations, and comparison of them to the existing visual environment.

1.3.5.2 Visual Simulations

Page-size photographs are included to represent the "before" conditions from 15 viewpoints selected for development of simulated views of the appearance of the transmission line alternatives. The visual simulations produced to illustrate the "after" visual conditions from each of the 15 points, provide the viewer with a clear image of the potential location, scale, and visual appearance of the proposed project. The computer-generated visual simulations are the result of an objective analytical and computer modeling process. Computer

rendering techniques were used to produce the simulated images of the views of the site as they could appear after development of the project. The images are accurate within the constraints of the available site and project data. On the routes where the transmission line will be located in or parallel to an existing transmission line, it was possible to develop simulations that provide an accurate indication of the alternative's alignment. In the case of Alternative C and a portion of C1 where an entirely new transmission corridor would be developed, the location of the alignment portrayed is less precise. On these two routes (options), a 250-foot corridor has been defined within which a 150-foot-wide transmission line alignment will eventually be delineated. In developing the simulated views of the project on Alternative C, the alignment was located along the centerline of the 250-foot-wide study corridor. If Alternative C were selected for project development, the centerline could shift by up to 50 feet to either side. Because a detailed survey of the proposed alignment has not yet taken place, the precise locations of each of the transmission towers has not yet been determined. The potential locations of the towers depicted were inferred based on relationships to the existing towers and criteria for tower spacing. Because of these factors, the simulations presented provide a generalized understanding of the potential appearance of the project alternatives but should not be thought of as portraying the project's exact post-construction appearance.

Site reconnaissance was conducted to view the site and surrounding area, to identify potential key viewpoints, and to take representative photographs of existing visual conditions. A single lens reflex (SLR) 35-mm camera was used to shoot site photographs. Selection of the photographs to be used as the basis for the simulations was made in consultation with BPA.

For the views from viewpoints selected for simulation, computer modeling and rendering techniques were used to produce the simulation images. Existing topographic and site data provided the basis for developing an initial digital model. The project engineers provided site plans and digital data for the proposed generation facility, and site plans and elevations for the components of the transmission system. These were used to create three-dimensional (3-D) digital models of these facilities. These models were combined with the digital site model to produce a complete computer model of the generating facility and portions of the overhead transmission system.

For each viewpoint, viewer location was digitized from topographic maps and scaled aerial photos, using 5 feet as the assumed eye level. Computer "wire frame" perspective plots were then overlaid on the photographs of the views from the KOPs to verify scale and viewpoint location. Digital visual simulation images were produced as a next step based on computer renderings of the 3-D model combined with high-resolution digital versions of base photographs. The final "hardcopy" visual simulation images that appear in this document were produced from the digital image files using a color printer.

2.0 Added Alternatives

BPA identified new alternatives, in addition to the alternatives considered in the DEIS, to be evaluated in the SDEIS. The new alternatives are labeled A through D. Table 2 provides a description of the alternatives. Schematics depicting the tower and right-of-way

configurations for the existing and proposed conditions along each of these alternatives are presented in Appendix B of the Land Use Technical Report.

Table 2. Description of New Alternatives

Alternative A	Construct a new single-circuit 500-kV line in an existing right-of-way from a tap along the Schultz-Raver No. 2 line near Kangley to near BPA's Covington Substation in Covington. New ROW would be needed around the northeast side of the Covington Substation to where the new line would intersect the Covington-Maple Valley ROW. From Covington, rebuild a portion of BPA's existing Covington-Maple Valley single-circuit 230-kV transmission line with a double-circuit 500-kV line, operating one side at 500-kV and the other at 230-kV. The 500-kV circuit would terminate at Echo Lake Substation via a vacant circuit of the Maple Valley-Echo Lake double-circuit 500-kV transmission line. New double-circuit towers, about 175 feet tall, would support both circuits. With the exception of the new right-of-way that would need to be acquired around the Covington Substation, the new transmission lines would be built on existing rights-of-way. Alternative A consists of segments A1, A2, A3, and C2, as shown on Map 1. Segment C2 is common to a portion of Alternative C2 north of Raver Substation.
Alternative B	Rebuild about 38 miles of a portion of BPA's Rocky Reach-Maple Valley 345-kV transmission line to a double-circuit 500-kV line. The new towers would be about 175 feet. tall. The new 500-kV line would be connected to the existing Schultz–Raver No. 2 500-kV transmission line just east of Stampede Pass and to Echo Lake Substation at the west end. The line would cross I-90 twice. Almost all of this route would be on existing right-of-way. Alternative B consists of segments B-1, B-2, and B-3 as shown on Map 1.
Alternative C (Option C1)	Construct a new single-circuit 500-kV line from BPA's Raver Substation in a new 150-foot right-of-way adjacent to an existing right-of-way on segment C1 as shown in Figure 1. The remainder of this alternative, segment C as shown in Figure 1, would be on a new 150-foot-wide right-of-way. New towers would be about 135 feet tall. The new line would pass through the Ravensdale and Hobart areas and would be connected to an existing vacant (unused) circuit of the Maple Valley-Echo Lake double circuit 500-kV line. The vacant circuit would then need to be connected to a new bay in the Echo Lake Substation. This option would require the purchase of new right–of-way. Alternative C1 consists of segments C and C1 as shown on Map 1.
Alternative C (Option C2)	Construct a new single-circuit 500-kV line from near the community of Kangley in an existing right-of-way to a point just west of the Cedar River watershed. From here, the proposed route turns north and would require a new 150-foot-wide right-of-way. New towers would be about 135 feet tall. The new line would pass through the Ravensdale and Hobart areas and would be connected to an existing vacant (unused) circuit of the Echo Lake-Maple Valley 500-kV line. The vacant circuit would then need to be connected to a new bay in the Echo Lake Substation. This option would require the purchase of new right–of-way. Alternative C (Option C2) includes the route segments identified as C2 and C on Map 1.

Table 2. Description of New Alternatives

Alternative D	Construct a new single-circuit 500-kV transmission line from east of Stampede Pass to Echo Lake Substation. The new line would be adjacent to the existing Rocky Reach-Maple Valley 345-kV line. New towers would be about 135 feet tall. The line would cross I-90 twice. A new 150-foot-wide right-of-way would need to be acquired. There are two options for Alternative D. Option D1 proposes to build the new line on the south side of the existing Rocky Reach-Maple Valley 345-kV line. Option D2 proposes to construct the new line on the north side of the existing Rocky Reach-Maple Valley 345-kV line. These routes are shown as segments D1, D2, and D3 on Map 1.

3.0 Affected Environment

3.1 Alternative A

3.1.1 Landscape Area 1—Corridor North of 284th Avenue SE

Photos: 1 and 2

3.1.1.1 Landscape Description and Scenic Quality

This landscape area encompasses Alignment C2 as shown on Map 1, which is a part of Alternatives A and C2. The eastern portion of this area is a landscape of flat, mostly forested land located south of Seattle's Cedar River Watershed lands. A large, gravel pit is located at the eastern end of this area. In the area to the west of 292nd Avenue SE, the landscape includes sloped areas on the sides of small ridges. In this landscape area, the existing Covington-Columbia No. 3 line is carried on lattice steel towers that average 90 feet in height. The BPA right-of-way in this area is 375 feet wide, and the unused portions of the right-of-way have to some degree been cleared of taller trees. The overall scenic quality of this area is moderate, reflecting moderate levels of intactness and unity, and a low level of vividness.

Photo 1. Aerial view of residential area north of 284th Avenue SE

Photo 1 is an aerial view, looking northeast, of rural residential area north of 284th Avenue SE Homes along the Covington-Columbia No. 3 line have views of the existing line and of the partially cleared vacant right-of-way where the C2 segment of the proposed line would be located.

Photo 2: View toward Covington-Columbia No. 3 line from the Big Valley residential subdivision

Photo 2 is the view from the Big Valley residential subdivision (located in the area east of Landsburg Road SE and north of Kent-Kangley Road) toward the Covington-Columbia No. 3 line on the hillside above. The right-of-way that would be used by the proposed line is already cleared, and is visible in the area behind the existing line.

3.1.1.2 Viewer Sensitivity

Residential Viewers. In the vicinity of 230th Avenue SE, there is a series of private roads that serve a number of rural residences set among a heavily forested setting. Because of the heavy forest cover, the existing transmission line is visible from only the dozen or so residences located immediately adjacent to the right-of-way (see Photo 1). Additional residences in the vicinity of the line include those on the north side of the line in the area west of 292nd Avenue SE; from these residences, views toward the transmission corridor are generally screened by a buffer of tall trees. In the area along Landsburg Road SE, there is one home adjacent to the corridor that has an unscreened view of the corridor (this home is visible in Photo 2), and the corridor is also partially visible from the Big Valley subdivision, an 11-lot project that is now under development. Photo 2 is a view from this subdivision. In the residential areas where unscreened or partially screened views of the right-of-way have been identified, the degree of visual sensitivity is assumed to be high.

Recreational Viewers. The only recreational facility in this area of any note is the King County Shooting Sports Park which has been developed in and along the BPA right-of-way in the area on the east side of 292nd Avenue SE. Because this park has been developed for an activity that is not necessarily oriented toward appreciation of the landscape setting, the level of visual sensitivity of views from this facility is assumed to be moderate at most.

Roadway Viewers. In this landscape area, the proposed alignment does not cross any major highways, but does cross one locally important road, Landsburg Road SE. The visual sensitivity of views from this road is assumed to be moderate.

3.1.2 Landscape Area 2—Maple Valley

Photos: 3 and 4

3.1.2.1 Landscape Description and Scenic Quality

This landscape area encompasses the portion of Alternative A that extends from the proposed alignment for Alternative C to the western limits of the City of Maple Valley in the area west of 216th Avenue SE (segment A3 on map 1). This landscape area encompasses the western portion of the rural community of Georgetown, and a large block of forested land owned by the City of Kent and managed as the Clark Springs watershed area. From the area developed with small shopping centers at the intersection of Maple Valley-Black Diamond and Kent-Kangley Roads, westward to the western city limits of Maple Valley, the landscape consists of an area of flat to gently rolling terrain that has been developed with a mix of suburban land uses. In this landscape area, the existing Covington-Columbia No. 3 line is carried on lattice steel towers that average 90 feet in height. East of 216th Avenue SE, the Covington-Columbia No. 3 line is the only line occupying the right-of-way. At a point just west of 216th Avenue SE, the 375-foot-wide corridor is joined by an additional line, which has double-circuit lattice steel towers that average 165 feet in height. The overall scenic quality of this area is moderate, reflecting moderate levels of intactness and unity, and a low level of vividness.

Photo 3: View down the transmission corridor from the Elk Run Golf Course

Photo 3 is a view from the Elk Run Golf Course, looking west along existing transmission corridor. Proposed line would occupy an existing right-of-way located on the right side of the corridor.

Photo 4: View west along SE 280th Street in the Eastwood Forest residential subdivision

Photo 4 is a view looking west along SE 280th Street in the Eastwood Forest residential subdivision. The new line would be located in a vacant right-of-way located to the right of the existing transmission towers and behind the homes visible in this photo.

3.1.2.2 Viewer Sensitivity

Residential Viewers. In the area between 228th Avenue SE and the city's western limits, there are several subdivisions of single family homes that back up to the right-of-way. Photo 4, a view looking west along SE 280th Street in the Eastwood Forest residential subdivision, is typical of the views toward the transmission corridor from residential areas in this area. As this photo suggests, screening of views toward the corridors tends to be limited. In the portions of these residential areas in proximity to the transmission corridor, the degree of visual sensitivity is assumed to be high.

Recreational Viewers. Recreational facilities in this area include the private Elk Run Golf Course, which is located under and along the line in the area to the east and west of 228th Avenue SE. Photo 3 is a view from within the golf course, looking west along the transmission corridor. In the Eastwood Forest subdivision located west of 216th Avenue SE, there is a small children's playground operated by the homeowners' association that is located in the unused portion of the right-of-way. The visual sensitivity of views from these recreational areas is assumed to be high.

Roadway Viewers. In this landscape area, the proposed alignment does not cross any major highways, but locally important roads crossed include Maple Valley-Black Diamond Road, which is used by 16,000 vehicles per day, and by 216th Avenue SE. The visual sensitivity of views from these roads is assumed to be moderate.

3.1.3 Landscape Area 3—Corridor North of Covington-Sawyer Road

Photos: 5, 6, 7, 8, and 45 (Note: Photo 45 is presented in Section 4.)

3.1.3.1 Landscape Description and Scenic Quality

This landscape area includes the portion of Alternative A that extends from the City of Maple Valley in the area west of 216th Avenue SE to the Covington Substation (segment A2 on Map 1). It encompasses an unincorporated area of low density, primarily residential development located on the flat to rolling lands located south of the City of Covington and the western portion of the City of Maple Valley. In this area, the 375-foot-wide BPA transmission corridor is occupied by the Covington-Columbia No. 3 line, which is carried on lattice steel towers that average 90 feet in height, and by a line carried on double-circuit lattice steel towers that average 165 feet in height. The northern portion of the corridor is an undeveloped right-of-way that is now partially cleared. In much of this area, the right-of-way is now being used as horse pastures. The overall scenic quality of this area is moderate, reflecting moderate levels of intactness, unity, and vividness.

3.1.3.2 Viewer Sensitivity

Residential Viewers. Most of the proposed alignment in this area is bordered by low-density, single-family residential areas. Photos 5, 6, and 8 present views over or from residential neighborhoods in this area. In many portions of this area, tall trees provide effective screening of views toward the transmission corridor. However, in the portions of these residential areas that immediately adjoin the transmission corridor, the degree of visual sensitivity is assumed to be high.

Photo 5: View toward home in large lot residential area along SE 284th Street adjacent to transmission corridor

Photo 5 is a home in large lot residential area along SE 284th Street along north side of existing transmission corridor. Proposed line would be located in an existing vacant corridor located between the residential properties and the line visible in this view.

Photo 6: Aerial view looking west over the Winterwood residential subdivision

Photo 6 is an aerial view looking west over the Winterwood residential subdivision and the existing transmission corridor. The proposed line would be located in a vacant right-of-way located to the right of the existing towers. Tree removal would be required to make this right-of-way usable.

Photo 7: View looking west toward Ryan Brunner Park in the vacant transmission right-of-way

Photo 7 is the view looking west at Ryan Brunner Park, a private neighborhood association recreational facility located in the vacant right-of-way at 193rd Avenue SE.

Photo 8: View looking east down existing transmission corridor along 168th Avenue

Photo 8 is the view looking east along existing transmission corridor along 168th Avenue, where the existing lines pass adjacent to the Pleasant Valley Manor mobile home community. The proposed line would be located in the existing right-of-way in the area to the left of the towers seen in this view.

Recreational Viewers. The only recreational facility along this portion of the proposed route that could be considered to be public consists of the play fields associated with an elementary school located along Covington-Sawyer Road that back up to the existing transmission corridor. Much of the transmission corridor itself can be considered to be a private recreational facility that has been developed for equestrian use by residents of the Winterwood subdivision (Photos 7 and 45). The visual sensitivity of views from these recreational areas has been assumed to be high.

Roadway Viewers. In this landscape area, the proposed alignment does not cross any major highways, but a locally important road crossed by the route is Covington-Sawyer Road SE. The visual sensitivity of views from this road is assumed to be moderate.

3.1.4 Landscape Area 4—Covington

Photos: 9, 10, 11, 12, and 46

3.1.4.1 Landscape Description and Scenic Quality

This landscape area includes the portion of Alternative A that extends from the Covington Substation to the northern boundary of the City of Covington in the area north of 256th Street (the southern portion of segment A1 on Map 1). It encompasses an area of generally flat terrain that encompasses a mix of suburban residential and commercial uses In this area, the proposed alignment of Alternative A is the right-of-way that now contains the Covington-Maple Valley No. 2 transmission line. This line is located on a 150-foot-wide corridor, and is carried on single-circuit lattice steel towers that average 90 feet in height. In some areas, the transmission right-of-way has been integrated into the parking lots associated with adjacent commercial uses (Photo 10) and in others, the yards of adjacent residential properties (Photo 11). The overall scenic quality of this area is low to moderate, reflecting low to moderate levels of intactness, unity, and vividness.

3.1.4.2 Viewer Sensitivity

Residential Viewers. Much of the proposed alignment in this area is bordered by medium density single family residential areas. Photos 9, 10, and 12 present views from characteristic residential neighborhoods in this area. Because of the small size of the lots in many of these areas, there are fewer large trees along this portion of the route to provide screening than there tend to be in residential areas along other route segments. In the portions of these residential areas that are crossed by or in close proximity to the transmission corridor, the degree of visual sensitivity is assumed to be high.

Recreational Viewers. The only recreational facility along this portion of the proposed route that could be considered to be public consists of the play fields associated with the Covington Elementary School located along SE Wax Road that back up to the existing transmission corridor. Because views toward the corridor are now entirely screened from this facility by a thick forest of tall trees, the visual sensitivity of views from this recreational area has been assumed to be low.

Photo 9: View north on Covington-Sawyer Road along proposed new alignment

Photo 9 is the view north along Covington-Sawyer Road in the area in front of the Covington Substation. The proposed line would be routed on the east side of the street, requiring the removal of the residences now visible now in that area. The proposed line would turn northeast when reaching the existing Covington—Maple Valley line, which is visible in the middleground of this view. This line's existing 90-foot-high single-circuit towers would be replaced with 180-foot-high double-circuit towers.

Photo 10: View south along existing Covington-Maple Valley No. 2 line along Kent-Kangley Road

Photo 10 is the view south along existing Covington-Maple Valley No. 2 line in the commercial area along Kent-Kangley Road in the center of Covington. The proposed line would entail replacement of the existing 90-foot-high single-circuit towers with 180-foot-high double-circuit towers.

Photo 11: View south along existing Covington-Maple Valley No. 2 line along SE 261st Street

Photo 11 is the view south along existing Covington-Maple Valley No. 2 line in the single family residential area along SE 261st Street, where the right-of-way has been integrated into backyards.

Photo 12: View south along existing Covington-Maple Valley No. 2 line from 256th Street

Photo 12 is the view south along existing Covington-Maple Valley No. 2 line from 256th Street. A subdivision of new single family homes is visible behind the trees to the left of the transmission corridor.

Roadway Viewers. In this landscape area, the proposed alignment crosses Highway 18, which is used by an average of 23,000 vehicles per day, making it the most heavily traveled road in the study area after I-90. In this area, Highway 18 is a four lane freeway. Because both sides of Highway 18 in this area are lined by sound walls that restrict views from the road, the visual sensitivity of this travel corridor is considered to be low. Major local roadways crossed by the alignment include Kent-Kangley Road (Photo 10) and SE 256th Street (Photo 12). The visual sensitivity of views from these roads is considered to be moderate.

3.1.5 Landscape Area 5—North of Covington Rural District

Photos: 13, 14, 15, 16, and 47

3.1.5.1 Landscape Description and Scenic Quality

This landscape area includes the portion of Alternative A that extends from the northern boundary of the City of Covington in the area north of 256th Street to the southern edge of the deep valley through which the Cedar River runs (a large portion of segment A1 on Map 1). It encompasses an area of generally flat plateau lands with a landscape that is a mix of forested lands, small farms, and clusters of rural residences. In this area, the proposed alignment of Alternative A is the right-of-way that now contains the Covington-Maple Valley No. 2 transmission line. This line is located on a 150-foot-wide corridor, and is carried on single-circuit lattice steel towers that average 90 feet in height. In many areas along this portion of the route, the transmission right-of-way has been integrated into the yards and fields that are a part of the rural residential and small farm properties that the transmission corridor passes through (Photos 13, 14, 15, 16, and 47). The overall scenic quality of this area is moderately high, reflecting moderate to high levels of intactness, unity, and vividness.

3.1.5.2 Viewer Sensitivity

Residential Viewers. In a number of areas along the proposed alignment in this landscape area, there are clusters of rural residential properties. Many of these properties are crossed by the existing transmission line. Because the transmission corridor is, in many cases in close proximity to residences and their associated outdoor use areas (Photos 14, 16, and 47) and because there is often limited vegetative screening along the line in these cases, the sensitivity of views from these areas can assumed to be high.

Recreational Viewers. The only public recreational facility along the proposed route in this landscape area is the Peterson Lake Park Natural Area, which is a part of the King County Park system. The existing Covington-Maple Valley No. 2 transmission line crosses the lake (Photo 16) and is highly visible from much of the park. Views from this park are assumed to have a high level of sensitivity.

Roadway Viewers. In this landscape area, the proposed alignment does not cross any major highways, but four locally important roads are crossed; these are: SE 224th Street, Peter Grubb Road, 184th Avenue SE, and Petrovitsky Road. The visual sensitivity of views from these roads is assumed to be moderate.

Photo 13: View east along 240th Street

Photo 13 is the view east along 240th Street near Tahoma High School. The existing Covington-Maple Valley No. 2 line is visible in the area in front of the trees.

Photo 14: Aerial view over Covington-Maple Valley No. 2 line at Peter Grubb Road

Photo 14 is an aerial view looking east over the mixed forest, rural residential, and small scale-agricultural landscape at Peter Grubb Road. The Covington-Maple Valley No. 2 line is visible crossing through the landscape in the area behind the large barn.

Photo 15: View north along Covington-Maple Valley No. 2 line from 184th Street

Photo 16: Aerial view west over Covington-Maple Valley No. 2 line at 196th Avenue SE

Photo 15 is the view north along Covington-Maple Valley No. 2 line from 184th Street.

Photo 16 is an aerial view looking west over Covington-Maple Valley No. 2 line at 196th Avenue SE. The line's crossing of Peterson Lake is partially visible at the right side of the photo.

3.1.6 Landscape Area 6—Cedar River/Cedar Grove Road

Photos: 17, 18, 19, and 20

3.1.6.1 Landscape Description and Scenic Quality

This landscape area includes the portion of Alternative A that extends from the southern edge of the deep valley through which the Cedar River runs to the terminus of this alignment at the corridor occupied by the Rocky Reach—Maple Valley No. 1, Maple Valley – Echo Lake No. 1 & 2, and Sammamish-Maple Valley No. 1 lines (northern portion of segment A1 on Map 1). The southern portion of this landscape area consists of the deep, steep sided canyon through which the Cedar River flows (Photos 17, 18, and 19). The sides of the canyon are heavily forested, and the narrow plain at the bottom of the canyon is occupied by Highway 169 and rural residences. The northern portion encompasses an upland area along Cedar Grove Way that includes a mix of forested areas, rural residences, and a large landfill. In this landscape area, the proposed alignment of Alternative A is the right-of-way that now contains the Covington-Maple Valley No. 2 transmission line. This line is located on a 150-foot-wide corridor, and is carried on single-circuit lattice steel towers that average 90 feet in height. The overall scenic quality of the area in the Cedar River Canyon is moderately high, reflecting a high degree of vividness, and moderately high levels of unity and intactness. In the upland area along Cedar Grove Way, the overall level of scenic quality is low to moderate, reflecting moderate to low levels of unity, intactness, and vividness.

3.1.6.2 Viewer Sensitivity

Residential Viewers. In the Cedar River canyon, the proposed alignment crosses over or adjacent to three residential properties and is visible from several others (Photos 17 and 18) and because of the limited vegetative screening, the sensitivity of views from this area can assumed to be high. In the upland area, there are no residences located along the transmission corridor, and views from residences in the surrounding area are screened by dense tree cover. In the upland area, the sensitivity of residential views is low.

Recreational Viewers. The only public recreational facility along this portion of the proposed route is the Cedar River Trail, a regional trail, which in this area, follows along the edge of Highway 169. Because of the developed nature of the trail setting in this area, and the fact that the transmission line will span over the canyon, the sensitivity of this trail corridor is assumed to be moderate.

Roadway Viewers. In this landscape area, the proposed alignment crosses Highway 169, which is classes as a rural principal arterial, and which is used by an average of 18,000 vehicles per day. In this area, the transmission corridor has relatively low visibility form the roadway because the existing and proposed line span the canyon high above the roadway viewers and thus do not fall within the primary cone of vision of drivers. Because of the relatively low visual salience of the transmission corridor in this area, the visual sensitivity of this roadway is considered to be low.

Photo 17: Aerial view south over the Covington-Maple Valley No. 2 line's crossing of the Cedar River

Photo 17 is an aerial view looking south over the Covington-Maple Valley No. 2 line's crossing of the Cedar River Valley. Highway 169 is visible at the base of the escarpment.

Photo 18: View from Byers Road SE, north along the Covington-Maple Valley No. 2 line

Photo 18 is the view from Byers Road SE, looking north along the Covington-Maple Valley No. 2 line as it crosses a rural estate property, crosses the river, and ascends the bluff along the river's northern edge.

Photo 19: View from Byers Road SE, toward the Covington-Maple Valley No. 2 line transmission tower

Photo 19 is a view from Beyers Road SE toward the Covington-Maple Valley No. 2 line transmission tower located at the top of the bluff that defines the river valley.

Photo 20: Aerial view of location where Covington-Maple Valley No. 2 line turns west

Photo 20 is an aerial view of the point where the Covington-Maple Valley No. 2 line turns westward and joins the transmission corridor occupied by the Rocky Reach-Maple Valley No. 1, Echo Lake-Maple Valley 1 and 2, and Sammamish-Maple Valley No. 1 lines. This turning point on the Covington-Maple Valley No. 2 line is where the proposed rebuild of the existing line would terminate. The open area on the left side of the photo is a landfill.

3.2 Alternative C

3.2.1 Landscape Area 1—Corridor North of 284th Avenue SE

One of the options for Alternative C is for the initial segment of the alternative to consist of Alignment C2 instead of Alignment C1. The characteristics of Alignment C2 are assessed in the Analysis of Landscape Area 1—Corridor North of 284th Avenue SE, presented at the beginning of the analyses for Alternative A.

3.2.2 Landscape Area 7—Raver to Georgetown

Photos: 21, 22, 23, 24, and 48

3.2.2.1 Landscape Description and Scenic Quality

This landscape area encompasses Alignment C1, which is an optional alignment for the first segment of Alternative C. Most of this area is in a zone of rolling lands west of the Raver Substation that are owned by private resource companies and used for commercial forestry (Photo 21). A shorter segment in the northern portion of this area encompasses the small unincorporated community of Ravensdale (Photos 22, 23, and 48) and the western portion of the rural Georgetown community (Photo 24). In the southern portion of this area, the proposed alignment is located along a new right-of-way that would be located along the north side of an existing 472.5-foot-wide corridor that now includes three transmission lines. One of the existing lines is a single-circuit line carried on lattice steel towers that average 130 feet in height, another is a single-circuit line carried on lattice steel towers averaging 110 feet in height, and the third line is a double-circuit line carried on lattice steel towers averaging 165 feet in height (Photo 22).

Because the entire width of the right-of-way has been kept clear of all taller vegetation, it is now covered with low-growing vegetation. From the point where the proposed C1 alignment makes a 90-degree turn and heads north, it follows an entirely new right-of-way that BPA will have to establish as a part of this project. Between the existing transmission corridor and Kent-Kangley Road, this alignment passes through an area of large commercial forest holdings. North of Kent-Kangley Road, the alignment crosses an area that has a complex pattern of development that includes two long-established rural communities. Along the north-south portion of the C1 alignment, although the proposed right-of-way will be 150 feet in width, a 250-foot-wide corridor is now being evaluated as the location for a project centerline that would be defined with more precision later in the project development process, should Alternative C be selected as the preferred alternative. The overall scenic quality of the southern portion of this area is low, reflecting low levels of intactness and unity, and vividness, and in the area north of Kent-Kangley Road it is moderate, reflecting moderate levels of intactness, vividness, and unity.

Photo 21: Aerial view west along transmission corridor in area west of Raver Substation

Photo 21 is an aerial view looking west along the transmission corridor containing the Raver-Covington No. 1 line, Raver-Covington No. 2, and Tacoma-Raver No. 1 and 2 transmission lines in the area of timber company lands located west of Raver Substation. The proposed C1 alignment is located in this corridor, to the right of these existing lines.

Photo 22: View southwest along SE Ravensdale Way

Photo 22 is a view looking southwest along SE Ravensdale Way in the community of Ravensdale. The proposed C1 alignment crosses the road in the area just beyond the two parked vehicles seen in this view, and construction of this alternative would require the removal of several of the houses and the trees associated with them.

Photo 23: View north along proposed corridor along 268th Street in Ravensdale

Photo 23 is a view looking north along 268th Street in Ravensdale. The proposed C1 alignment is located along the right side of the street.

Photo 24: View north along 268th Street, north of Kent-Kangley Road

Photo 24 is looking north along 268th Street north of Kent-Kangley Road. The C1 alignment is located in the area to the immediate right of the road.

3.2.2.2 Viewer Sensitivity

Residential Viewers. The unincorporated community of Ravensdale is a former company town dating from the early 20th century, when it provided housing for workers at a nearby coal mine. The homes in the community are still intact and in use, and cluster in the area in the vicinity of the intersection of SE Ravensdale Way and 268th Avenue. (Photos 22, 23, and 48) Additional residences are located along the proposed alignment in the area north of Kent-Kangley Road, and a large lot subdivision is now under development on the west side of SE 268th Avenue, across from the area where the alignment is proposed. The sensitivity of the views from the existing residences in this area is high.

Recreational Viewers. In the area between SE Ravensdale Way and Kent-Kangley Road, the proposed alignment crosses the western edge of the playing fields associated with a school. The sensitivity of views from this area is considered to be high.

Roadway Viewers. In this landscape area, the proposed alignment does not cross any major highways, but crosses two locally important roads: Kent-Kangley Road, which is used by 8,000 vehicles per day, and SE Ravensdale Way. The visual sensitivity of views from these roads is assumed to be moderate.

3.2.3 Landscape Area 8—Landsburg/South Hobart

Photos: 25 and 26

3.2.3.1 Landscape Description and Scenic Quality

This landscape area encompasses the rural territory along the proposed route for Alternative C that extends from the C2 alignment located north of Georgetown, northward to 224th Street. To a large degree the landscape in this area is heavily forested, and has been partially developed with rural residences that are set within the forest context. Major features in the area include the Cedar River, and Big Bend Park adjacent to it, and a large closed landfill along 267th Avenue. In this area, Alternative C will be located in an entirely new, 150-foot-wide right-of-way that BPA will establish within the 250-foot-wide corridor that is now being evaluated. The overall scenic quality of this area in the immediate vicinity of the Cedar River is high, reflecting high levels of intactness, unity, and vividness. In the other portions of this area, the overall scenic quality is moderate, reflecting average levels of vividness and moderate to high levels of unity and intactness.

3.2.3.2 Viewer Sensitivity

Residential Viewers. There is a handful of rural residences in forest settings along the portion of the line in the area south of the Cedar River, and larger numbers in the area north of the river, including those in the large Maplewood Estates subdivision located to the west of the proposed alignment and south of 224th Avenue. From most of these residential areas, there is a thick forest screen that has now hides the right-of-way area from view (Photo 26). The sensitivity of views from these residential areas is high.

Photo 25: Aerial view north along 276th Avenue SE

Photo 25 is an aerial view looking north along 276th Avenue SE. The closed landfill is visible in the center of the view. The proposed C alignment would be located in the area to the left of it, crossing an area of forest and rural residences.

Photo 26: View from residential subdivision along SE 230th Street

Photo 26 is a view from residential subdivision along SE 230th Street, looking east toward proposed transmission line alignment, which is located in the forested area beyond the edge of the road.

Recreational Viewers. The only public park along the proposed route in this landscape area is Big Bend Park, a part of the County Park System, which encompasses land on both sides of the Cedar River in the area bordering the west side of the proposed alignment. In addition, the Cedar River regional trail follows a route along the river in this area, and is crossed by the proposed Alternative C alignment. Views from areas of the park in proximity to the proposed alignment and from areas of the trail that are within or in proximity to the alignment are assumed to have a high level of sensitivity.

Roadway Viewers. In this landscape area, the proposed alignment crosses SE Summit-Landsburg Road, a locally important road, views from which are assumed to be moderately sensitive.

3.2.4 Landscape Area 9—Hobart

Photos: 27, 28, 49, 50, and 51.

3.2.4.1 Landscape Description and Scenic Quality

This landscape area encompasses the rural territory along the proposed route for Alternative C that extends from SE 224th Street northward to the area north of SE196th Street The landscape in this area varies from rolling to flat, and has a highly rural character because of the presence of many open fields. The landscape pattern in this area includes a mix of small farms, rural residences, and equestrian facilities. (Photos 27, 28, 49, 50,and 51). The openness of the landscape permits expansive vistas toward the forested mountainsides in the distance (49), creating views with a high level of vividness. Because of the high levels of unity, intactness and vividness, the scenic quality of the landscape in this area is high. The Alternative C transmission line alignment proposed for this area will be located in an entirely new, 150-foot-wide right-of-way that BPA will establish within the 250-foot-wide corridor that is now being evaluated.

3.2.4.2 Viewer Sensitivity

Residential Viewers. In this area, there are 25 or more residential properties that are either crossed by the alignment or are in close proximity to it. Because of the generally open nature of the landscape the sensitivity of views from these residential areas is high.

Recreational Viewers. No publicly owned recreational facilities are located in this area.

Roadway Viewers. In this landscape area, the proposed alignment crosses SE 216th Street, a locally important road, views from which are assumed to be moderately sensitive.

Photo 27: Aerial view north along 267th Street from 224th Street

Photo 27 is an aerial view looking north along 267th Street from 224th Street. The proposed Alternative C alignment is located in the partially open corridor running north-south that is visible on the left side of the photo.

Photo 28: View southeast from 200th Avenue

Photo 28 is the view looking southeast from 200th Avenue. The proposed Alternative C alignment passes behind the line of trees to the left behind the Christmas tree farm visible in the foreground of this photo.

3.2.5 Landscape Area 10—Tiger Mountain

Photos: 29 and 30

3.2.5.1 Landscape Description and Scenic Quality

This landscape zone encompasses the area along the proposed route for Alternative C that extends from SE196th Street northward to the terminus of the Alternative C alignment at the point at which it connects with an existing east-west transmission line on the slopes of Tiger Mountain. The landscape in this area includes the forested slopes of Tiger Mountain (Photo 30), as well as an area of flat forest and farmland at its base (Photo 29). The lands on Tiger Mountain are part of the Tiger Mountain State Forest, and are managed for resource conservation and recreational use. The vividness of the landscape in this area is reasonably high, and the levels of unity and intactness are moderately high as well, giving this area a moderate to high level of visual quality. The Alternative C transmission line alignment proposed for this area would be located in an entirely new, 150-foot-wide right-of-way that BPA would establish within the 250-foot-wide corridor that is now being evaluated.

3.2.5.2 Viewer Sensitivity

Residential Viewers. In this area, there is a small number of residential properties located in the flat area at the base of Tiger Mountain that are either crossed by the alignment or are in close proximity to it. The sensitivity of views from these residences is high.

Recreational Viewers. The lands in the Tiger Mountain State Forest that are crossed by or in proximity to the proposed alignment in this area are managed for recreational use as well as resource conservation, and include trails and a viewpoint used by the public. The sensitivity of views in this area is high.

Roadway Viewers. In this landscape area, the proposed alignment crosses Highway 18, which because of its high traffic volumes (18,000 vehicles per day), is considered to be a major roadway. In this area, Highway 18 is a four-lane freeway. Because Highway 18 in this area provides views of attractive forest scenery as well as vistas toward the slopes of Tiger Mountain (Photo 30) the visual quality of views from the road and viewer sensitivity are considered to be high. A major local roadway that crosses the proposed alignment is the Issaquah Hobart Road. The visual sensitivity of views from this road is considered to be moderate.

Photo 29: Aerial view north toward Highway 18

Photo 29 is an aerial view looking north toward Highway 18. The proposed Alternative C alignment crosses Highway 18 in the area of the small overpass visible in this photo.

Photo 30: View east on Hwy 18 toward location of proposed Alternative C crossing

Photo 30 is a view looking east on Highway 18. The proposed Alternative C alignment crosses the highway at the overpass visible in this photo, and then turns, travelling up the slope Tiger Mountain and connecting with the transmission line visible in this view.

3.3 Alternatives B and D

3.3.1 Introduction

The proposed routes for Alternative B is the same alignment now used by the Rocky Reach-Maple Valley No. 1 line from the Stampede Pass area to the Echo Lake Substation, and the route for Alternative D would parallel this line in this area on either its northern or southern side. Along almost all of the route between the Stampede Pass area and the Echo Lake Substation, the existing Rocky Reach-Maple Valley No. 1 line is strung on mostly lattice steel double-circuit towers that average 150 feet in height (Photo 32). The exception is in a three mile-long area where the line crosses the Snoqualmie Summit; in this area, the line is carried on single-circuit towers that average 90 feet in height. In the Snoqualmie Summit area where the single-circuit towers are located, the existing right-of-way is 300 feet wide. Along the rest of the Rocky Reach-Maple Valley No. 1 line , the right-of-way is 150 feet wide. Under Alternative B, the existing transmission line would be replaced by a double-circuit 500 kV line carried by double-circuit lattice steel towers that average 180 feet in height. Under Alternative D, the existing right-of-way would be widened to 300 feet in all areas, and the existing line would be paralleled by a new line carried by lattice steel, single-circuit "banjo" style towers that average 150 feet in height.

3.3.2 Landscape Area 11—Upper Yakima River

Photos: 31, 32, 33, and 34

3.3.2.1 Landscape Description and Scenic Quality

This landscape zone encompasses the area along the Rocky Reach-Maple Valley No. 1 line, that extends from this Alternative's starting point near Stampede Pass, eastward to Keechelus Lake. This area includes the flat land along the upper reaches of the Yakima River as well as lands on nearby slopes. The area is heavily forested and major features include the existing transmission corridor, I-90, the Yakima River, and a small area of private dwellings (Photos 31 and 32). The overall level of visual quality in this area is high, reflecting the vividness of the topographic setting and the natural to near-natural appearance of most of the vegetative cover Most of the land in this area is a part of the Wenatchee National Forest, which has included it in an Inventoried Viewshed area, and has assigned Retention and Partial Retention Visual Quality Objectives to guide its management.

3.3.2.2 Viewer Sensitivity

Residential Viewers. The only residences in the area consist of a handful of dwellings on an area of privately owned land located along the Rocky Reach-Maple Valley No. 1 corridor in the area along Forest Arterial Road 54 (Photo 32). Trees on the residential properties and along the transmission corridor provide a substantial level of screening of the proposed alignment. The visual sensitivity of views from these dwellings is moderately high.

Recreational Viewers. The Iron Horse State Park/John Wayne Trail, a major inter-regional trail created through use of the abandoned Milwaukee Road railroad right-of-way passes through this landscape area and crosses the Rocky Reach-Maple Valley No. 1 corridor in the area close to the cluster of private dwellings (Photo 32). From most portions of the trail, views toward the proposed Alternative B and D alignment are substantially screened by

intervening trees (Photo 34). Because of the trail's character as an engineered right-of-way that has a wide gravel bed and is paralleled by wood pole utility lines, its visual sensitivity is assumed to be lower than that of more conventional forest trails; as a consequence, the visual sensitivity of this trail in this area is rated as moderate. In addition to use of the John Wayne Trail, other recreational use in this area includes dispersed recreational activity, particularly winter snowmobiling and cross-country ski use emanating from several snow parks located nearby, particularly the Rock Pit Sno Park, which is located just to the east of the area with the cluster of private residences. The cluster of snow parks along Interstate 90 in this area constitutes one of the most popular snowmobile areas in the state, and is used by snowmobilers who use these snow parks as staging areas into remote high country areas (USDA Forest Service, 1997). Because of this dispersed recreational use, all of the landscape in this area has at least a moderate level of sensitivity to visual change.

Photo 31: Aerial view east along I-90 and the Rocky Reach-Maple Valley No. 1 line

Photo 31 is an aerial view looking east along I-90 and the Rocky Reach-Maple Valley No. 1 line. Even though the transmission line runs close to I-90 in this area, the tall trees screen the towers and conductors in most views from the freeway.

Photo 32: Aerial view of the Rocky Reach-Maple Valley No. 1 line crossing Forest Road No. 54

Photo 32 is an aerial view of the Rocky Reach-Maple Valley No. 1 line's crossing of Forest Road No. 54. Several residences are visible in the vicinity of the line. The John Wayne Trail's crossing of the transmission corridor is visible near the right edge of the photo.

Photo 33: View from Forest Road No. 54 looking west along transmission corridor

Photo 33 is a view from Forest Road No. 54, looking west, depicting the appearance of the Rocky Reach-Maple Valley No. 1 line and its right-of-way as seen from road crossings in this area.

Photo 34: View north from the John Wayne trail near Forest Road No. 54

Photo 34 is a view looking north from the John Wayne trail near Forest Road No. 54, indicating the role played by trees in screening views from the trail toward the existing transmission line.

intervening trees (Photo 34). Because of the trail's character as an engineered right-of-way that has a wide gravel bed and is paralleled by wood pole utility lines, its visual sensitivity is assumed to be lower than that of a more conventional forest trails; as a consequence, the visual sensitivity of this trail in this area is rated as moderate. In addition to use of the John Wayne Trail, other recreational use in this area includes dispersed recreational activity, particularly winter snowmobiling and cross country ski use emanating from the several snow parks located nearby, particularly the Rock Pit Sno Park, which is located just to the east of the area with the cluster of private residences. The cluster of snow parks along Interstate 90 in this area constitutes one of the most popular snowmobile areas in the state, and is used by snowmobilers who use these snow parks as staging areas into remote high country areas (USDA Forest Service, 1997). Because of this dispersed recreational use, all of the landscape in this area has at least a moderate sensitivity to visual change.

Roadway Viewers. In this landscape area, the most important road is Interstate 90, which, on average, is used by 25,000 vehicles per day. As can be seen in Photo 31, a band of tall trees lies between the highway and the transmission corridor. At present, these trees effectively screen views toward the corridor and the transmission towers on it. Because the I-90 corridor is recognized for its natural beauty, because it is a part of the Mountain to Sound Greenway, because it is a designated Scenic Byway, and because its viewshed is managed by the Wenatchee National Forest to protect its scenic qualities, views from this area are considered to be sensitive. At the point at which the Rocky Reach-Maple Valley No. 1 corridor is crossed by Forest Arterial 54, the existing transmission line and cleared corridor is highly visible (Photo 33). The visual sensitivity of views from this portion of this road is considered to be moderate.

3.3.3 Landscape Area 12—Keechelus Lake Viewshed

Photos: 35, 36, 52, and 55

3.3.3.1 Landscape Description and Scenic Quality

This landscape zone includes Keechelus Lake, the slopes on the western side of lake on which the Rocky Reach-Maple Valley No. 1 line is located, and the segment of I-90 that runs along the lake's eastern edge. This area also includes the territory in the Mill Creek to Snoqualmie Summit area that the Rocky Reach-Maple Valley No. 1 line runs through, but which is, to some degree, outside of the Keechelus Lake viewshed. The presence of the lake and its steeply sloped backdrop provide views in this area with a high level of vividness. Because of the presence of infrastructure facilities and the disturbed vegetative pattern related to past timber harvest activities, the levels of visual intactness and unity are moderate. Even though the levels of these two visual qualities are not particularly high, they are counterbalanced to some degree by the very high levels of vividness to create a landscape that has a moderately high level of visual quality. Most of the land in this area is a part of the Wenatchee National Forest, which has included it in an Inventoried Viewshed area, and has assigned Retention and Partial Retention Visual Quality Objectives to guide its management. The Forest Service anticipates that over time, with the implementation of its visual management policies for this area, the forest cover will be reestablished and that the landscape will gradually become more natural appearing.

Photo 35: Aerial view west along the alignment of the Rocky Reach-Maple Valley No. 1 line

Photo 35 is an aerial view looking west along the alignment of the Rocky Reach-Maple Valley No. 1 line as it passes along the slope along the south side of Keechelus Lake. The alignment of the John Wayne Trail is visible as the snow-covered strip along the lake's edge.

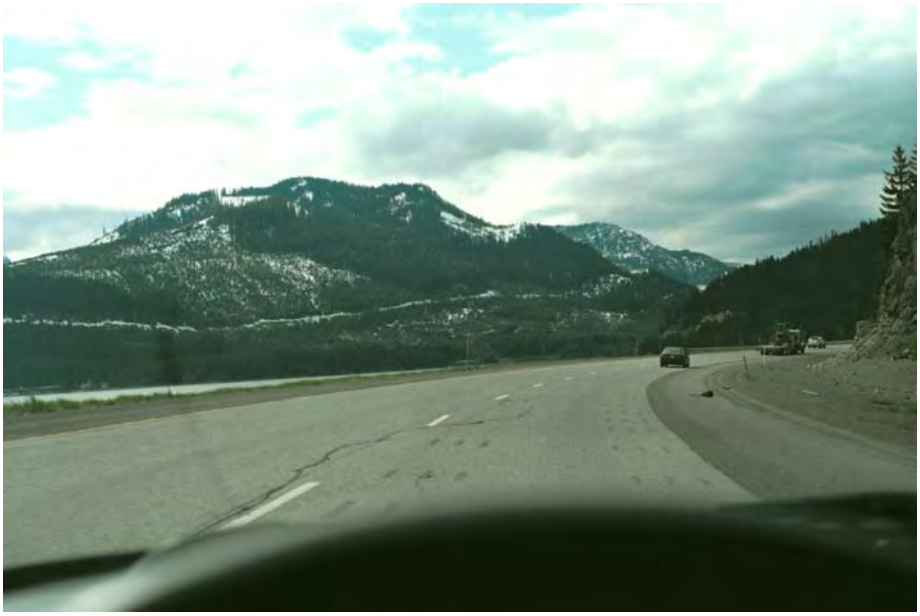

Photo 36: View southwest from I-90 westbound

Photo 36 is a view looking southwest from I-90 westbound. The right-of-way of the existing Rocky Reach-Maple Valley No. 1 line is visible as the snow-covered corridor that creates what appears to be a line across the side of the slope.

3.3.3.2 Viewer Sensitivity

Residential Viewers. Because most of the land in this area is under the control of the U.S. Forest Service, there are few places where there are residential viewers. The primary concentration of residences in is on the private lands Snoqualmie Pass at the north end of the lake. Because of the topography, the views from these residences toward the transmission corridor are generally limited, and as a consequence of the low levels of visibility and the viewing distances (a mile or more), the sensitivity to any visual changes that might be associated with Alternatives B and D would be low.

Recreational Viewers. In this area, the transmission corridor lies upslope of the Iron Horse/John Wayne Trail and is separated from it by an area of thick forest (Photo 35). As a consequence, the corridor is not readily visible from the trail. In addition, in this area, there are no places where the trail and corridor cross. Because of these conditions, the sensitivity of views from the John Wayne trail toward the proposed Alternative B and D alignments is low in this area. The existing transmission corridor, including a skylined tower is readily visible from the Keechelus Lake boat launch facility (Photo 52) and from all areas of the lake, which receives a moderate level of recreational boating use. For this reason, views from the lake toward the transmission corridor are assumed to have a high level of sensitivity. The area at Snoqualmie Pass has a major concentration of recreational facilities that include the Snoqualmie Summit, Ski Acres, and Hyak downhill ski areas, a Mountaineers lodge and ski slope, and a variety of supporting commercial services. This cluster of ski facilities is one of the most important centers of ski activity in the state of Washington. Figures cited in the 1997 Yakima Watershed Analysis (USDA Forest Service, 1997) indicate that the downhill and cross country ski facilities at Snoqualmie Pass generate 445,000 visits a year. Because of the topography, the transmission corridor is not visible from most of these ski areas. The exception is the Hyak Ski Area, which has ski slopes and a ski lift that extends down into the valley formed by Mill Creek. Here, the ski slopes and ski lift extend into the area under the Rocky Reach-Maple Valley No. 1 line, which passes through this valley on its way up to Snoqualmie Peak. From this portion of the Hyak Ski area, views of the transmission corridor can be considered to be visually sensitive because of the corridor's location in the midst of an area that receives heavy winter use.

Roadway Viewers. In this area, Interstate 90 is used on average by 25,000 vehicles per day. From this roadway, there are unobstructed views across the lake, where the corridor accommodating the Rocky Reach-Maple Valley No. 1 line is clearly visible on the side of the ridge that forms the lake's western backdrop (Photos 36 and 55). Because the I-90 corridor is recognized for its natural beauty, efforts are being made by the Forest Service and other governmental agencies to protect and enhance its scenic qualities, views from this highway in this area are considered to have a high level of sensitivity.

3.3.4 Landscape Area 13—Western Side of Snoqualmie Pass

Photos: 37, 38, 39, 40, 53, and 57

3.3.4.1 Landscape Description and Scenic Quality

This landscape zone includes the area extending along the South Fork of the Snoqualmie River from Snoqualmie Peak westward to a point near Twin Falls State Park. The landscape consists of a deep valley bordered on both sides by steep, forested slopes.

Photo 37: Aerial view of the Rocky Reach-Maple Valley No. 1 line and I-90

Photo 37 is an aerial view of the Rocky Reach-Maple Valley No. 1 line and I-90 just west of the summit of Snoqualmie Pass. In this area, the John Wayne Trail is located upslope of the transmission line and is separated from it by a strip of tall trees.

Photo 38: View from west I-90 just east of Exit 47

Photo 38 is a view from westbound I-90 in the area just east of Exit 47. One of the towers of the Rocky Reach-Maple Valley No. 1 line is visible on the hillside ahead in the center of the driver's cone of vision. The alignment of the John Wayne tail is detectable as the linear break in the vegetative pattern visible above the transmission tower.

Photo 39: Aerial view west along the Rocky Reach-Maple Valley No. 1 line just west of Exit 38 East

Photo 39is an aerial view looking west along the Rocky Reach-Maple Valley No. 1 line in the area just west of Exit 38 East where it crosses onto the ridge along the north side of I-90.

Photo 40: View east along I-90 east of Exit 34

Photo 40 is a view looking east along I-90 in the area east of Exit 34, where the Rocky Reach-Maple Valley No. 1 line crosses the freeway.

(Photo 37). Interstate 90, which travels along the floor of the valley on its way to and from Snoqualmie Pass, provides views of the surrounding valley and mountain landscape (Photos 38, 40, 53, and 57). The Rocky Reach-Maple Valley No. 1 line follows an alignment on the slopes along the sides of the valley, first running along the south side of the valley for about 8.5 miles from Snoqualmie Summit (Photos 37 and 53)to the area near Exit 38 East where it crosses to the north side of I-90 (Photo 57). It then travels across the top of a plateau on the north side of the highway for about four miles (Photo 39) before crossing the freeway again at a point near Twin Falls State Park (Photo 40). Although there is some level of visual disturbance in this area related tot he presence of infrastructure and past timber harvest activities, the overall level of scenic quality is high, reflecting the landscape's dramatic topography and the presence of a natural-appearing forest cover on many of the slopes visible from I-90. Much of the land in the area to the east and south of Exit 42 is a part of the Mount Baker-Snoqualmie National Forest, where the landscape visible from I-90 has been designated as an Assigned Viewshed Corridor in the Mount Baker-Snoqualmie National Forest Plan. Retention and Partial Retention Visual Quality Objectives have been assigned to the lands in the foreground and middleground of views from I-90, restricting the degree of visual change permitted. In the portions of this landscape area to the north and west of the Mount Baker-Snoqualmie National Forest's boundaries, much of the land is under the control of the Washington Department of Natural Resources.

3.3.4.2 Viewer Sensitivity

Residential Viewers. Because most of the land in this area is under the control of the U.S. Forest Service and the DNR, there are few, if any residences in this area, and thus the there would be little residential sensitivity to any visual changes that might be associated with Alternatives B and D.

Recreational Viewers. This landscape area encompasses a number of important recreational facilities. The USFS operated Asahel Curtis picnic area and Tinkham campgrounds are located in the valley floor area along I-90. Because of the dense forest cover in the areas surrounding these facilities, the Alternative B and D alignment is not visible, and the project-related visual sensitivity of views from these areas is thus low. From Ollalie State Park, which is located along the South Fork Snoqualmie River in the area south of I-90 in the area between Exits 38East and 38 West, the towers on the Rocky Reach-Maple Valley No. 1 line can be seen from the picnic area; the sensitivity of views toward the project from this area is high. In this landscape area, the Iron Horse/John Wayne Trail travels along the slope on the south side of the valley. In most areas, the trail is a quarter mile or more from the transmission corridor and views toward the corridor are screened by forest. The trail crosses the transmission corridor at three locations, and in these areas, views toward the Alternative B and D alignments are moderately sensitive. The heavily used Pacific Crest Trail intersects with the Rocky Reach-Maple Valley No. 1 line at a point just west of Snoqualmie Summit, and the trail follows the transmission corridor for a distance of about a quarter mile. Along this stretch of the trail, the level of project-related visual sensitivity is high.

Roadway Viewers. From I-90, there are attractive views toward the steeply sloped forest lands that define the river valley, and to the mountain peaks beyond. From most stretches of I-90 in this area, the corridor accommodating the Rocky Reach-Maple Valley No. 1 line is clearly visible on the valley's sides (Photos 38 and 53), and in the two places where the line

crosses the freeway, the existing transmission towers are visible in the near foreground next to the road (Photos 40 and 57). Because the I-90 corridor is recognized for its natural beauty and efforts are being made by the Forest Service and other governmental agencies to protect and enhance its scenic qualities, views from I-90 toward the Alternative A and B alignment in this area are considered to have a high level of sensitivity.

3.3.5 Landscape Area 14—Edgewick Area

Photos: 41, 42, 54, and 58

3.3.5.1 Landscape Description and Scenic Quality

This landscape zone encompasses the area extending along the Rocky Reach-Maple Valley No. 1 transmission line from I-90 and Twin Falls State Park, westward to the area west of Cedar Falls Road. The landscape in this area consists of level to rolling lands in the eastern portion of the area close to the South Fork of the Snoqualmie, and an elevated, generally level plateau area along SE 160th and SE 159th Streets east of Cedar Falls Road. This region is heavily forested and in places, has been developed with pockets of rural residences (Photos 41, 42, 54, and 58). In most of this area, the visual quality of the landscape is moderately high.

3.3.5.2 Viewer Sensitivity

Residential Viewers. Substantial concentrations of rural residences are located in the areas along and near the Rocky Reach-Maple Valley No. 1 transmission corridor in the vicinity of 468th Avenue SE (Photo 41) and east of Cedar Falls Road SE (Photo 42). The visibility of the existing transmission corridor in these areas ranges from fully visible to partially screened. Because of the close proximity of the residences to the corridor, the level of visual sensitivity is high.

Recreational Viewers. The Rocky Reach-Maple Valley No. 1 transmission corridor passes through the northern edge of the Twin Falls State Park, but the transmission line is not near or visible from the primary trail system or from the falls themselves, which are the park's main attraction. Because of this park's proximity to and ready access from the Seattle metropolitan area, it is heavily used. The sensitivity of views from the park toward the transmission line is moderate at most because of the heavy screening that is available, but the views from SE 159th Street, which is outside the park, but which serves as the only access road into are highly sensitive, because they run right along the transmission corridor. Camp Waskowitz, a facility operated by the Highland School District owns property along the South Fork used for hiking an outdoor educational sites that abuts the existing transmission right-of-way. On the portions of this property in close proximity to the right-of-way, the level of visual sensitivity is high. The Snoqualmie Valley Trail, which provides access from North Bend and the I-90 corridor to Rattlesnake Lake and the trailhead for the John Wayne/Iron Horse Trail crosses the Rocky Reach-Maple Valley No. 1 transmission corridor at one location. At this crossing, the level of visual sensitivity is high.

Photo 41: View west along SE 159th Street east of 468th Avenue SE

Photo 41 is a view looking west along SE 159th Street east of 468th Avenue SE. This street serves at the access road to Twin Falls State Park. The Rocky Reach-Maple Valley No. 1 line is visible on the north side of the street, at the right edge of the view. Rural residences behind a screen of trees line the south side of the road.

Photo 42: View east on SE 159th Street east of Cedar Falls Road SE

Photo 42 is a view looking east on SE 159th Street east of Cedar Falls Road SE, where the Rocky Reach-Maple Valley No. 1 line passes through a rural residential area.

Roadway Viewers. From I-90, the visibility of the Rocky Reach-Maple Valley No. 1 transmission line varies. In the flat areas in the vicinity of Exit 34, the transmission corridor is screened by trees. Further west, where the line crosses terrain with a higher elevation, the lines are more visible, but their visual salience in views from the road is minimized by their partial screening and their location nearly a mile from the road. In this area, views from I-90 toward the Alternative A and B alignment have a low level of sensitivity.

3.3.6 Landscape Area 15—Rattlesnake Mountain

Photos: 43, 44, and 59

3.3.6.1 Landscape Description and Scenic Quality

This landscape zone encompasses the area extending from the area west of Cedar Falls Road to the terminus of the proposed route for Alternatives B and D at the Echo Lake Substation (Photo 44). In this area, the Rocky Reach-Maple Valley No. 1 transmission corridor travels along the flanks of Rattlesnake Mountain, the 3,200-foot-high ridge that defines the south-western edge of the Snoqualmie Valley (Photo 43). Because of past logging activity, the sides of Rattlesnake Mountain are now covered with a mosaic of timber stands of varying ages, creating a landscape with a highly altered appearance. A large portion of the upper slopes of Rattlesnake Mountain in this area fall within the boundaries of the Rattlesnake Mountain Scenic Area, an area consisting of Washington Department of Natural Resources and King County Park System lands that are managed to "…protect and enhance wildlife habitat and corridors, scenic views, and the generally undeveloped character of the mountain." (King County Department of Parks and Recreation and Washington State Department of Natural Resources, 1998). Although the topography of this landscape area has a high level of vividness, the pattern of clearcutting on the mountain's slope detract from the area's visual unity and intactness, reducing the overall level of scenic quality to moderately high.

3.3.6.2 Viewer Sensitivity

Residential Viewers. In this area, there are relatively few residences that are in close proximity to the transmission corridor. However, there are large numbers of residences on the valley floor, particularly in the community of North Bend, from which the transmission corridor is visible on the mountainside 1 to 2 miles in the distance. Although the views toward the transmission corridor are generally unobstructed, the visibility of the transmission line is attenuated by the viewing distance involved and by the fact the towers tend to be visually absorbed into the backdrop (Photo 59). The sensitivity of views from these residential areas is moderate at most.

Recreational Viewers. The Rocky Reach-Maple Valley No. 1 transmission corridor passes along the edge of the Rattlesnake Mountain Scenic Area for about a mile and a half, and then cuts through the Scenic Area for an additional 4.5 miles. At present, public use levels in the Rattlesnake Mountain Scenic Area are low, reflecting limited public access and limited parking availability. Hiking on the Rattlesnake Mountain Trail is the primary recreational activity that takes place in the Scenic Area. From most of its distance through the Scenic Area, the transmission corridor lies some distance away and well downslope from the trail, which follows along the top of the ridgeline. Given this arrangement, from most areas of the trail the sensitivity of views toward the transmission corridor is moderate.

Photo 43: View west along Rocky Reach-Maple Valley No. 1 line crossing the Rattlesnake Mountain Scenic Area

Photo 43 is a view looking west along Rocky Reach-Maple Valley No. 1 line as it crosses through the Rattlesnake Mountain Scenic Area.

Photo 44: Aerial view of the Rocky Reach-Maple Valley No. 1 line approaching Echo Lake Substation

Photo 44 is an aerial view of the Rocky Reach-Maple Valley No. 1 line (in the middle foreground) and its approach to the Echo Lake Substation.

However, at the northern end of the ridge, the trail travels under the transmission line for about 0.25 mile. In the area within and in proximity to the transmission corridor, the level of visual sensitivity is high.

Roadway Viewers. From I-90, the visibility of the Rocky Reach-Maple Valley No. 1 transmission corridor is reduced by the corridor's distance 0.5 mile or more away from the roadway, the fact that in most areas along the road it does not fall within the driver's primary cone of vision, and the fact that in most views the towers are visually absorbed by the mountain backdrop. For these reasons, in this area views from I-90 toward the Alternatives A and B alignment have a low level of sensitivity. The Rocky Reach-Maple Valley right-of-way is also visible in the views seen by southbound motorists on North Bend Boulevard in North Bend, who can see the transmission line as they drive toward the intersection with I-90. In this view (Photo 59), the transmission line is in the center of the cone of vision, but the transmission line's degree of visual salience is attenuated by the highly textured hillside backdrop, which provides a good level of visual absorption. The overall level of visual sensitivity is moderate.

4.0 Environmental Consequences

4.1 Impact Levels

Aesthetic impacts would be considered **High** where transmission facilities would:

- Result in a visually prominent change in the scenic quality of immediate foreground views (within 300 feet) from residences, including but not restricted to an increased contrast in scale between residential features and close-by power line structures.
- Result in a substantial adverse visual change in the quality of views from residence located from 300 feet to ¼ mile from the transmission line.
- Result in a substantial adverse visual change in the quality of views from schools located within ¼ mile of the transmission line.
- Have a substantial adverse effect on the existing character and quality of views from parks, recreation facilities, public trails, and public lands and waters used for dispersed recreation where the appreciation of natural and scenic resources is a valued part of the use.
- Have a substantial adverse effect on the character and quality of views visible from major travel corridors along which existing scenic quality is high and/or policies been applied to preserve and enhance aesthetic values

Aesthetic impacts would be considered **Moderate** where transmission facilities would:

- Result in a moderate level of adverse change in the visual quality of views from homes located within ¼ mile of the transmission line.
- Result in a moderate level of adverse visual change in the quality of views from schools located within ¼ mile of the transmission line.

- Result in a moderate level of adverse change in the existing character and quality of views from parks, recreation facilities, public trails, and public lands and waters used for dispersed recreation where the appreciation of natural and scenic resources is a valued part of the use.
- Result in a moderate level of adverse change on the scenic quality of views visible from major travel corridors along which existing scenic quality is high and/or policies been applied to preserve and enhance aesthetic values.
- Result in a substantial level of adverse change on the scenic quality of locally important roads along which visual quality is not high and which have not been designated for scenic protection.

Aesthetic impacts would be considered to be **Low** in all other situations.

4.2 Mitigation Measures

In evaluating the potential aesthetic impacts that the proposed transmission facility would have if built on any of the alternative routes, account was taken of the standard aesthetic mitigation measures that BPA would apply as a matter of course. These standard mitigation measures include:

- Use of darkened towers to reduce light reflectivity and overall tower visibility
- Use of non-specular conductors
- Use of non-reflective, non-refractive insulators
- Setting towers back from road crossings to minimize intrusion on views along road corridors
- Vegetation management practices that revegetate areas disturbed during construction and which maintain as much vegetation in the corridor as is consistent with safety and line reliability to reduce the right-of-way's contrast with its backdrop and to the extent feasible, provide visual screening.
- Installation of height-appropriate plantings at road crossings to screen views of towers and to screen views down long transmission corridors.
- In cases where the new line is sited along an existing line, placement of the new towers close to existing towers so that existing access roads can be taken advantage of, reducing the potential for visual impacts related to road construction.

Once a specific alignment is selected, detailed studies can be undertaken to identify further tower-specific siting, design, vegetation management, and planting measures that can potentially provide further mitigation of aesthetic impacts.

4.3 Short-Term Construction Impacts

Short-term construction-related impacts on aesthetics would vary from alternative to alternative, reflecting the degree to which corridor clearing will be required, the extent to which access roads will need to be developed or reactivated, and the degree to which the

construction activities will be occurring in areas where they would be visible to sensitive viewers. In all cases, the construction impacts would be short-lived. In general, the longer the length of line constructed, the longer the period of time for construction. It is likely that Alternatives B and D would take the longest to construct, possibly more than 1 year. Once construction of the project is complete, all construction-related debris will be removed and any disturbed ground surfaces will be regraded and revegetated, Because of the short time that the construction impacts would be present in any given area, the overall degree of impact would not be high.

4.4 Long-Term Impacts During the Project Operation Phase

Long-term aesthetic impacts during the project operation phase would consist of any substantial adverse aesthetic effects brought about by the presence of additional transmission towers along existing or new rights of ways, the presence of taller and bulkier transmission towers in cases where existing transmission lines have been rebuilt, the increased numbers of conductors (transmission line wires) that would be larger in diameter and thus more visible than the conductors now used on the existing lines, the vegetation clearing associated with new or widened rights-of-ways, and any new access roads that might be required for line construction and maintenance.

Table 3 summarizes the numbers of line mile associated with each of the alternatives that would create various levels of visual impact during project operation. The data presented in Table 3 are the end result of the application of the study methods described in Section 1.3. Table 4, presented in the next section, provides a summary of the specific visual effects that the project would have that would create high and moderate levels of aesthetic impacts. This table is keyed to Maps 11, 12, 13, 14, and 15, which indicate the locations of the areas where these impacts will take place.

It should be mentioned that Alternative D has two variants: one entails development of a new transmission line in an expansion of the existing corridor to the south (Alternative D1), and the other entails development of the transmission line in an expansion of the existing corridor to the north (Alternative D2). The visual simulations prepared for Alternative D depict this alternative as it would appear with the new line located on the south side of the existing alignment. Although there would be some differences between the alternatives, their overall aesthetic effects would be fairly similar, and as a consequence, only one set of data is presented to represent the visual impacts of both variants.

Table 3. Summary of Aesthetic Impacts by Alternative

Alternative	Total Miles	Aesthetic Impacts		
		High	Medium	Low
A	19.8	5.2	8.4	6.2
C with C1	10.1	5	2	3.1
C with C2	10.4	4.1	4.1	2.2
B	35.8	0	4.8	31
D	35.8	5.3	28.7	1.8

4.5 Summary of Analyses of High and Moderate Impacts on Aesthetic Resources

Table 4. High and Moderate Aesthetic Impacts During Project Operation

Landscape Area Impact Segment	Character Photos and Simulations (Simulated Views are noted in bold)	Aesthetic Effects	Impact Level Miles	
			High	Moderate
Alternative A:				
Landscape Area 1—Corridor North of 284th Avenue SE (Alternative A/C2)				
A/C2-1	Photo 1	Removal of vegetation in the right-of-way and addition of a set of new towers would be visible in the immediate foreground of views from residences adjacent to the transmission corridor. Screening provided by outbuildings and trees on lots will attenuate impacts to some degree.		X
A/C2-2	Photo 2	Removal of vegetation in the right-of-way and addition of a set of new towers would be visible from residences immediately adjacent and in the near vicinity of the transmission corridor, as well as from Landsburg Road SE. The towers would be set back and screened enough from most residences to reduce effects on views from residences to a moderate level of impact		X
Landscape Area 2—Maple Valley				
A-1	Photo 3	Addition of a third transmission tower in the existing corridor would reduce the visual quality of views experienced by viewers using the Elk Run Golf Course. The towers would be set back and screened enough from nearby residences to reduce effects on views from residences to a moderate level of impact.		X
A-2	Photo 4	The additional transmission line would be located in close proximity to residences creating further conflicts in visual scale and character, and could require removal of vegetation that now plays a role in screening the existing corridor, compounding the visual effects.	X	

Table 4. High and Moderate Aesthetic Impacts During Project Operation

Landscape Area Impact Segment	Character Photos and Simulations (Simulated Views are noted in bold)	Aesthetic Effects	Impact Level Miles	
			High	Moderate
Landscape Area 3—Corridor North of Covington-Sawyer Road				
A-3	Photos 5, 6, 7, 8, 45a, **45b**	Further clearing and addition of a third transmission line to the existing corridor would have a moderate adverse effect on the visual quality of views from the many roads that cross, and the recreational facilities located in, the transmission right-of-way in this area. The clearing of trees that could open up views from adjacent residences toward the corridor, and the location of 150-foot-high towers in close proximity to residences would create further issues related to scale and character contrasts.	X	
Landscape Area 4—Covington				
A-4	Photo 9	In the area along Covington-Sawyer Road across from the substation, removal of homes and insertion of an entirely new transmission line would substantially change existing visual character and quality. Along the segment of the existing transmission line in this area that would be replaced, the increased height would create increased visibility and scalar issues for views from the homes located in close proximity.	X	
A-5	Photos 11,12, 46a, **46b**	Doubling of the height of the existing towers would increase the visibility of the transmission line in this area of small lots where screening is limited, and would create scalar issues for the many viewers who live in close proximity to the line.	X	
A-6		Because homes are set further back from the transmission line corridor in this area, and because there is more screening vegetation, impacts on residential views would be moderate.		X

Table 4. High and Moderate Aesthetic Impacts During Project Operation

Landscape Area Impact Segment	Character Photos and Simulations (Simulated Views are noted in bold)	Aesthetic Effects	Impact Level Miles	
			High	Moderate
Landscape Area 5—North of Covington Rural District				
A-7	Photos 13, 14, 15, 16, 47a, **47b**	The doubling of the tower height would increase transmission line visibility and scalar issues in views from the farms, residential clusters, and local roads in this area, but these effects would be attenuated by the fact that with some exceptions, homes are set back from the transmission corridor, and in most areas, trees are available to provide at least partial screening.		X
Landscape Area 6—Cedar River/Cedar Grove Road				
A-8	Photos 17, 18, 19	The doubled height of the towers on the ridgelines on both sides of the valley in which the Cedar River is located would increase the visibility of the towers and would lead to slightly elevated impacts on landscape character and quality in views seen from the three residences located in this portion of valley and from the Cedar River Trail.		X
Alternative C:				
Note: The first segment of Alternative C would entail use of Alternative C1 evaluated below, or Alternative A/C2 evaluated as Landscape Area 1 – Corridor North of 284th Avenue SE, in the assessment of Alternative A.				
Landscape Area 7—Raver to Georgetown (Alternative C-1)				
C1-1	Photos 21-24, 48a, **48b**	Removal of homes and introduction of cleared right-of way and 150-foot-high towers would disrupt the visual unity and conflict with the scale of the Ravensdale community, and in addition, towers and cleared right-of-way would adversely affect views in the immediate foreground from 268th Street SE, Kent-Kangley Road, and the school recreation area the line crosses.	X	

Table 4. High and Moderate Aesthetic Impacts During Project Operation

Landscape Area Impact Segment	Character Photos and Simulations (Simulated Views are noted in bold)	Aesthetic Effects	Impact Level Miles	
			High	Moderate
Landscape Area 8—Landsburg / South Hobart				
C-1		The cleared right-of-way and towers have the potential to be visible in and adversely affect foreground views from residences located in adjacent forest rural residential areas. These effects will be attenuated to some degree by distance and the presence of trees providing partial to full screening. Views down the cleared right-of-way could adversely affect views from SE Landsburg-Summit Road.		X
C-2		The cleared right-of-way and 150-foot-high towers would have an adverse effect on the existing visual qualities of the forested area along the Cedar River that is adjacent to the Big Bend Park and crossed by the Cedar River Trail and an extension of the park.	X	
C-3	Photos 25, 26	The cleared right-of-way and towers would have the potential to be visible in and adversely affect foreground views from residences located in adjacent forest rural residential areas. These impacts will be attenuated to some degree by distance and the presence of trees providing partial to full screening		X
Landscape Area 9—Hobart				
C-4	Photos 27, 28, 49a, **49b,** 50a, **50b,** 51a, **51b**	The removal of vegetation and structures would disrupt the existing landscape pattern. The introduction of 150-foot-tall transmission structures in close proximity to dwellings and roads in areas where the landscape has an open character would diminish this area's currently high scenic qualities.	X	
Landscape Area 10—Tiger Mountain				
	Photos 29, 30	The creation of a cleared right-of-way through the forest and the introduction of the 150-foot-tall towers would adversely affect the quality of foreground and middleground views from Highway 18, and would adversely affect the visual experience from trails in the Tiger Mountain Natural Resource Conservation Area that lie within and in the immediate vicinity of the proposed corridor.	X	

Table 4. High and Moderate Aesthetic Impacts During Project Operation

Landscape Area Impact Segment	Character Photos and Simulations (Simulated Views are noted in bold)	Aesthetic Effects	Impact Level Miles	
			High	Moderate
Alternative B:				
Landscape Area 11—Upper Yakima River				
B-1	Photos 32, 33, 34	Because of the modest change in tower height and the fact that there would be little or no change to the right-of-way, the impacts of Alternative B in this area would be limited to the area where there are nearby residences, a crossing of a Forest Arterial Road, and a crossing of the John Wayne/Iron Horse Trail. In this area, the visual effects would be moderate.		X
Landscape Area 12—Keechelus Lake Viewshed				
B-2	Photo 35, 52a, **52b,** 55	In most of the area in the viewshed of the lake and I-90, the slightly taller and more massive transmission towers would be visually absorbed into the mountainside backdrop, reducing their visual salience. At the crest of a ridge where one of the new towers would be skylined, the new tower would create a moderate level of impact on visual quality.		X
B-3		Because of the location of this segment of the line in the middle of the back ski slope at the Hyak Ski Area, the taller and somewhat more massive transmission towers may have a moderately adverse effect on views experienced by the large numbers of recreational users in this area.		X
Landscape Area 13—Western Side of Snoqualmie Pass				
B-3		At the point where the Pacific Crest Trail crosses the transmission corridor, the taller and somewhat more massive towers may be to some degree more visually salient to trail users, potentially creating a moderate level of visual impact.		X
B-5		At this point where the transmission corridor crosses the John Wayne/Iron Horse Trail, the taller and somewhat more massive towers may be to some degree more visually salient to trail users, potentially creating a moderate level of visual impact.		X

Table 4. High and Moderate Aesthetic Impacts During Project Operation

Landscape Area Impact Segment	Character Photos and Simulations (Simulated Views are noted in bold)	Aesthetic Effects	Impact Level Miles	
			High	Moderate
B-6		At this crossing of the John Wayne/Iron Horse Trail, the taller and somewhat more massive towers may create a moderate level of visual impact.		X
B-7	Photo 57a	At this point where the transmission corridor crosses I-90, the taller and somewhat more massive towers located in the near foreground of views from the road may be to some degree more visually salient to road users, creating a slight reduction in the perceived level of visual intactness.		X
B-8	Photo 40	At this point where the transmission corridor crosses I-90, the taller and somewhat more massive towers located in the near foreground of views from the road may be to some degree more visually salient to road users, creating a slight reduction in the perceived level of visual intactness.		X
Landscape Area 14—Edgewick Area				
B-9	Photo 41, 54a, **54b**	The taller and somewhat more massive towers located in the immediate foreground of views from the road providing access into Twin Falls State Park and visible in views from surrounding rural residences could create a perception of a moderate decrease in overall visual quality, particularly in views toward the mountain in the backdrop.		X
B-10	Photo 42	In this rural residential area, the taller and somewhat more massive towers located in the immediate foreground of views from the road and from surrounding residences could create a perception of a moderate decrease in overall visual quality, particularly in views toward the mountain in the backdrop.		X
Landscape Area 15—Rattlesnake Mountain				
B-11		At the point where the transmission corridor crosses the Rattlesnake Mountain Trail, the taller and somewhat more massive towers may be to some degree more visually salient to trail users, potentially creating a moderate level of visual impact.		X

Table 4. High and Moderate Aesthetic Impacts During Project Operation

Landscape Area Impact Segment	Character Photos and Simulations (Simulated Views are noted in bold)	Aesthetic Effects	Impact Level Miles	
			High	Moderate
Alternative D:				
Landscape Area 11—Upper Yakima River				
D1	Photos 31,33, 34	In this area, the doubled width of the cleared right-of-way, and the addition of a second transmission tower would be seen by dispersed recreational users, users of the forest roads, and to some degree by hikers on the John Wayne Trail and residents of the cluster of cabins near Forest Arterial Road. These changes would reduce the area's perceived degree of visual intactness to some degree, creating a moderate reduction in the area's visual quality.		X
Landscape Area 12—Keechelus Lake Viewshed				
D-2	Photo 35, 52a, 55a, **55b**	In most of the area in the viewshed of the lake and I-90, the second set of transmission towers would be visually absorbed into the mountainside backdrop, reducing their visual salience. The primary visual change would be that associated with the vegetative clearing required for the widened right-of-way. This clearing would have the effect of increasing the noticeability of the horizontal line across the side of the mountain created by the existing corridor, and would lead to a modest decrease in the degree of natural visual character and the overall visual quality of the scene. This alternative's effect on the visual quality of the area in the Hyak Ski Area would be moderate.		X
Landscape Area 13—Western Side of Snoqualmie Pass				
D-3		At the point where the Pacific Crest Trail crosses the transmission corridor, the presence of the second tower, and in particular, the widened area of cleared right-of-way would have the potential to create a high level of impact on that portion of the trail.	X	

Table 4. High and Moderate Aesthetic Impacts During Project Operation

Landscape Area Impact Segment	Character Photos and Simulations (Simulated Views are noted in bold)	Aesthetic Effects	Impact Level Miles	
			High	Moderate
D-4	Photos 56a, **56b**	In this area, and in much of the area in this landscape zone, in views from I-90 and the trails and Alpine Lakes Wilderness Area on the north side of the valley, the second set of transmission towers would be visually absorbed into the mountainside backdrop, reducing their visual salience. The primary visual change would be increased tower visibility at ridge tops and some increase in the visibility of cleared right-of-way areas. These changes would have a moderate effect on the overall quality and character of most views from the interstate.		X
D-5		In the area where the Pacific Crest Trail crosses the transmission corridor, the presence of the second tower, and in particular, the widened area of cleared right of-way, would have the potential to create a high level of impact on that portion of the trail.	X	
D-6		In views from this portion of the viewshed from I-90 and the trails and Alpine Lakes Wilderness Area on the north side of the valley, the second set of transmission towers would be visually absorbed into the mountainside backdrop, reducing their visual salience. The primary visual change would be some increase in the visibility of cleared right-of-way areas, which would have a moderate effect on the overall quality and character of views from the highway.		X
D-7		At this point where the John Wayne/Iron Horse Trail crosses the transmission corridor, the presence of the second tower, and in particular, the widened area of cleared right of-way would have the potential to create a high level of impact on that portion of the trail.	X	

Table 4. High and Moderate Aesthetic Impacts During Project Operation

Landscape Area Impact Segment	Character Photos and Simulations (Simulated Views are noted in bold)	Aesthetic Effects	Impact Level Miles	
			High	Moderate
D-8		In this portion of the I-90 viewshed, the second set of transmission towers would be visually absorbed into the mountainside backdrop, reducing their visual salience. The primary visual change would be some increase in the visibility of cleared right-of-way areas, which would have a moderate effect on the overall quality and character of views from the highway.		X
D-9		At this crossing of the John Wayne/Iron Horse Trail, the presence of the second tower, and in particular, the widened area of cleared right of-way would have the potential to create a high level of impact on the immediately adjacent portions of the trail.	X	
D-10	Photo 57a, **57b**	At this point where the transmission corridor crosses I-90, the second transmission tower located in the near foreground of views from the road, and the additional right-of-way clearing may have the potential to intrude in views from the road, reducing the overall degree of unity and intactness in the scene, creating noticeable decrease in overall visual quality.	X	
D-11		In this area of the I-90 viewshed, the tops of the second set of transmission towers would be visible against the sky in views toward the plateau area at the top of the ridge that runs along the north side of the Interstate. This visual change could have a moderate effect on the overall quality and character of views from the road in this area.		X
D-12	Photo 40	At this point where the transmission corridor crosses I-90, the second transmission tower located in the near foreground of views from the road, and the additional right-of-way clearing would have the potential to intrude in views from the road, reducing the overall degree of unity and intactness in the scene, creating a noticeable decrease in overall visual quality.	X	

Table 4. High and Moderate Aesthetic Impacts During Project Operation

Landscape Area Impact Segment	Character Photos and Simulations (Simulated Views are noted in bold)	Aesthetic Effects	Impact Level Miles	
			High	Moderate
Landscape Area 14—Edgewick Area				
D-13	Photos 41, 42, 58a, **58b**	In this area, the second set of towers and the doubling of the cleared right-of-way would be highly visible in views in the immediate foreground from the portions of SE 159th Street that provide access into Twin Falls State Park and that serve the rural residential area in the area east of Cedar Falls Road. If the new transmission line were to be located on the southern side of the existing line, SE 159th Street would appear to be located in the middle of a transmission corridor. If the new line were located on the northern side of the existing line, the trees that now screen views from residences adjoining the corridor to the north would be removed, creating impacts for those viewers and near-foreground views from the street that have a more disturbed appearance. The new towers, and in particular, the widened right-of-way, would have an adverse effect on views from the Snoqualmie Valley Trail at the point the route crosses the trail.	X	
Landscape Area 15—Rattlesnake Mountain				
D-14	43, 59	In this portion of the I-90 viewshed, the second set of transmission towers would be visually absorbed into the mountainside backdrop, reducing their visual salience. The primary visual change would be some increase in the visibility of cleared right-of-way areas, which would have a moderate effect on the overall quality and character of views from I-90 and from North Bend.		X
D-15		At the point where the transmission corridor crosses the Rattlesnake Mountain Trail, the presence of the second tower, and the widened area of cleared right-of-way would have the potential to create a high level of impact on that portion of the trail.	X	

Table 4. High and Moderate Aesthetic Impacts During Project Operation

Landscape Area Impact Segment	Character Photos and Simulations (Simulated Views are noted in bold)	Aesthetic Effects	Impact Level Miles	
			High	Moderate
D-16	44	In this portion of the I-90 viewshed, the second set of transmission towers would be visually absorbed into the mountainside backdrop, reducing their visual salience. The primary visual change would be some increase in the visibility of cleared right-of-way areas, which would have a moderate effect on the overall quality and character of views from I-90.		X

4.6 Cumulative Impacts

Cumulative impacts are defined as two or more effects that when considered together, are considerable, or which compound or increase other environmental impacts.

Alternatives A and C and the western segments of B and D (those in the Edgewick and Rattlesnake Mountain Landscape Areas) lie at the eastern edge of the Seattle metropolitan region, which is growing and expanding outward, creating strong pressures for land use alteration and concomitant visual change. During the short and mid-term time frame, it is inevitable that these pressures will result in more residential, and in some cases commercial and infrastructure facility development in the areas along each of the Alternatives being considered. The result will be that those portions of the study area that are already suburban in character (primarily Covington and Maple Valley along Alternative A) will gradually become more intensively developed. If this intensification of development is not managed properly, it could create visually discordant effects. Such effects could combine with the aesthetic impacts associated with the proposed transmission line to create a noticeable degradation in the visual quality of the portions of these communities close to the proposed alignments. In areas that are now rural and rural residential, primarily along the northern portion of Alternative A (the North of Covington Rural District), all of the areas along Alternative C, and the Edgewick landscape area along Alternatives B and D, the growth pressures are likely to lead to continued development of rural residences, and eventually, road widening to accommodate the increased traffic. Over time, these changes would have the effect of degrading the rural qualities of these areas. If the proposed transmission line were to be built on one of the alignments through these areas, it would contribute to the overall pattern of visual change that is now underway.

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FIGURE 45a

View from 180th Avenue SE, Looking East Down Right-of-Way

FIGURE 45b

View from 180th Avenue SE, Looking East Down Right-of-Way, Illustrating the Appearance of Transmission Alternative A

FIGURE 46a

View from 172nd Avenue SE, Looking Northwest

FIGURE 46b

Simulated View from 172nd Avenue SE, Looking Northwest, Illustrating the Appearance of Transmission Alternative A

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FIGURE 47a

View from Peter Grubb Road SE, Looking Northeast Along Alignment

FIGURE 47b

Simulated View from Peter Grubb Road SE, Looking Northeast Along Alignment, Illustrating the Appearance of Transmission Alternative A

FIGURE 48a

View from Black Diamond Ravensdale Road at 268th Avenue SE, Looking Northeast

FIGURE 48b

Simulated View from Black Diamond Ravensdale Road at 268th Avenue SE, Looking Northeast, Illustrating the Appearance of Transmission Alternative C1

FIGURE 49a

View from SE 208th Street, Looking North Along the Proposed Alignment

FIGURE 49b

Simulated View from SE 208th Street, Looking North Along the Proposed Alignment, Illustrating the Appearance of Transmission Alternative C

FIGURE 50a

View from SE 200th Street, Looking East, at a 90 Degree Angle to the Proposed Alignment

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FIGURE 50b

Simulated View from SE 200th Street, Looking East, at a 90 Degree Angle to the Proposed Alignment, Illustrating the Appearance of Transmission Alternative C

FIGURE 51a

View from 268th Avenue SE Looking North

FIGURE 51b

Simulated View from 268th Avenue SE Looking North, Illustrating the Appearance of Transmission Alternative C

FIGURE 52a

View from Boat Ramp at Keechelus Lake, Looking Southeast

FIGURE 52b

Simulated View from Boat Ramp at Keechelus Lake, Looking Southeast, Illustrating the Appearance of Transmission Alternative B

FIGURE 53a

View from I-90 West of Snoqualmie Pass, Looking East

FIGURE 53b

Simulated View from I-90 West of Snoqualmie Pass, Looking East, Illustrating the Appearance of Transmission Alternative B

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FIGURE 54a

View from SE 159th Street Looking East

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FIGURE 54b

Simulated View from SE 159th Street Looking East, Illustrating the Appearance of Transmission Alternative B

FIGURE 55a

View at Curve Along I-90, Looking West Toward Transmission Corridor Along Lower Ridge

FIGURE 55b

Simulated View at Curve Along I-90, Looking West Toward Transmission Corridor Along Lower Ridge, Illustrating the Appearance of Transmission Alternative D

FIGURE 56a

View from I-90 West of Snoqualmie Pass, Looking East

FIGURE 56b

Simulated View from I-90 West of Snoqualmie Pass, Looking East, Illustrating the Appearance of Transmission Alternative D

FIGURE 57a

View from I-90 at Transmission Line Crossing Near Mine Creek, Looking Southeast

FIGURE 57b

Simulated View from I-90 at Transmission Line Crossing Near Mine Creek, Looking Southeast, Illustrating the Appearance of Transmission Alternative D

FIGURE 58a

View from SE 159th Street Looking East

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FIGURE 58b

Simulated View from SE 159th Street Looking East, Illustrating the Appearance of Transmission Alternative D

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FIGURE 59a

View from North Bend Boulevard, Looking South

FIGURE 59b

Simulated View from North Bend Boulevard, Looking South, Illustrating the Appearance of Transmission Alternative D

Along the segments of Alternatives B and D that pass through the Okanogan-Wenatchee and Mount Baker-Snoqualmie National Forests, the potential for cumulative aesthetic impacts would generally be much lower. Under the stringent regulations of the Forest Plans and the AMA, urban development is of course precluded, and now even recreational development and timber harvesting is severely restricted to achieve endangered species protection objectives. As a result of the current management policies, the areas of cutover forest in the viewshed along the USFS managed portions of I-90 will gradually be growing back and becoming more natural appearing. One result of this evolving landscape change is that the aesthetic impacts of Alternatives B and D in this area may be reduced over time as the forest grows back and provides more potential screening for towers and cleared rights-of-way. One potential project in this area that could produce cumulative impacts is the proposed widening of I-90 in the Upper Yakima and Keechelus Lake watershed areas. This widening could lead to elimination of trees along the highway and increased visibility of additional or taller towers associated with development of Alternatives B and D.

4.7 No Build Alternative

There would be no direct impacts to aesthetics from the No Action Alternative, and no mitigation would be required.

4.8 Unavoidable Adverse Effects and Irreversible and Irretrievable Impacts

Unavoidable effects are adverse impacts that are expected to occur despite mitigation, or for which there is no feasible mitigation.

The presence of the transmission towers, line, and cleared right-of-way would be a permanent landscape alteration that would in some cases detract from the forested and residential character of the landscape. Because the transmission line right-of-way is kept clear of tall-growing vegetation, and tree and shrub height is limited adjacent to the right-of-way, screening from close-up views is not possible. Therefore, the proposed project would have an unavoidable adverse impact on close-up views. In some cases, particularly when cleared rights of way are visible on hillsides in scenic corridors, or when new transmission towers intrude in views that now have high levels of scenic quality, the transmission line could have adverse effects on views in the far foreground and the middleground as well.

Irreversible commitments of resources refer to the use of nonrenewable resources such as minerals and petroleum-based fuels, but these impacts do not relate specifically to aesthetics.

Irretrievable commitments of resources are those which cause the lost production of renewable resources such as timberland. Irretrievable commitments of visual resources would occur if land is permanently removed from recreational use by conversion to the transmission corridor right-of-way. Although the alternative transmission line routes pass over a number of recreational facilities and areas used for dispersed recreation, the presence of the line will not necessarily displace these activities that take place there. However, the presence of the line could change the aesthetic character and quality of these settings to some degree, and in some cases, produce a noticeable reduction in qualities that are valued.

5.0 Environmental Consultation, Review, and Permit Requirements Specific to Aesthetic Resources

Section 5 of the Land Use, Transportation, and Recreation Technical Report documents federal, state, areawide, and local requirements for construction and operation of the proposed alternatives. Specific resource information is provided.

6.0 Individuals and Agencies Contacted

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9.0 Glossary and Acronyms

9.1 Acronyms and Abbreviations

AMA	adaptive management area
BPA	Bonneville Power Administration
DEIS	draft environmental impact statement
DNR	Department of Natural Resources (Washington)
EIS	environmental impact statement
GIS	geographic information system
NEPA	National Environmental Policy Act
NRCA	Natural Resource Conservation Area
RMSA	Rattlesnake Mountain Scenic Area
SDEIS	supplemental draft environmental impact statement
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USFS	U. S. Forest Service
VQO	Visual Quality Objective

9.2 Technical Terms

Aesthetics (Esthetics). Generally, the study, science, or philosophy dealing with beauty and with judgements concerning beauty. In scenery management, it describes landscapes that give visual and sensory pleasure.

Background. The distant part of a landscape. The landscape area located from 4 miles to infinity from the viewer.

Conductor. A material, usually in the form of a wire, cable, or bus bar, suitable for carrying an electric current.

Contrast. Diversity or distinction of adjacent parts. Effect of striking differences in form, line, color, or texture of a landscape.

Corridor. A linear strip of land which accommodates or is expected to accommodate a utility or all the utilities with similar orientation passing through a given land area. Its width can be variable and it normally measured in feet.

Dispersed Recreation. Managed primarily in an unroaded condition, with emphasis on dispersed recreation, scenic, wildlife or other amenity values.

Distance Zones. Landscape areas denoted by specific distances from the observer. Used as a frame of reference in which to discuss landscape attributes or the scenic effect of human activities in a landscape.

Foreground. The detailed feature landscape generally found from the observer to ½ mile away. See also immediate foreground.

Immediate Foreground. The detailed feature landscape found within the first few hundred feet of the observer, generally from the observer to 300 feet away.

Intactness. The integrity of visual order in the natural and man-built landscape, and the extent to which the landscape is free from visual encroachment.

kV. Kilovolt (1,000 volts).

Landscape. An area composed of interacting ecosystems that are repeated because of geology, land for, soils, climate, biota, and human influences throughout the area. Landscapes are generally of a size, shape, and pattern which is determined by interacting ecosystems.

Landscape Character. Particular attributes, qualities, and traits of a landscape that give it an image and make it identifiable or unique.

Middleground. The one between the foreground and the background in a landscape. The area located from ½ mile to 4 miles from the observer.

Natural-Appearing Landscape Character. Landscape character that has resulted from human activities, yet appear natural, such as historic conversion of native forests into farmlands, pastures, and hedgerows that have reverted back to forests through reforestation activities or natural regeneration.

Nonspecular. Nonreflective. A nonspecular surface (for example, an airblast-abraded conductor) does not shine.

Partial Retention VQO. A visual quality objective designation for areas in which changes to the landscape may be noticed by the average forest visitor but they do not attract attention. The natural appearance of the landscape still remains dominant. The changes should appear to be minor disturbances.

Retention VQO. A visual quality objective designation for areas in which changes to the landscape should not be evident to the average person unless pointed out. The changes should appear to be natural.

Right-of-way. (Abbreviated: ROW; plural: rights-of-way) An accurately located strip of land with defined width, point of beginning, and point of ending. The area within which the user has the authority to conduct operations approved or granted by the land owner in an authorizing document such as a permit, easement, lease, license, memorandum, or understanding.

Scale. Visual scale is the apparent size relationships between landscape components or features and their surroundings.

Scenic. Of or relating to landscape scenery; pertaining to natural or natural appearing scenery; constituting or affording pleasant views of natural landscape attributes or positive cultural elements.

Scenic Attractiveness. The scenic importance of a landscape based on human perceptions of the intrinsic beauty of landform, rockform, waterform, and vegetation pattern. Reflects varying visual perception attributes of variety, unity, vividness, intactness, coherence, mystery, uniqueness, harmony, balance, and pattern.

Visual Absorption Capability. Relative ability of a landscape to accept human alterations without loss of character of scenic quality.

Typical or Common Landscape. Refers to prevalent, usual, or widespread landscapes within a landscape province. It also refers to landscapes with ordinary and routine scenic attractiveness.

Unity. The degree to which the visual resources of the landscape join together to form a coherent, harmonious visual pattern. Unity refers to the compositional harmony of intercompatibility between landscape elements.

View. A scene observed from a given vantage point.

View Cone/Cone of Vision. The observer's field of view. For drivers of cars, the effective width of the view cone is inversely related to speed. For drivers travelling at 60 miles per hour, a standard estimate is that the view cone is 45 degrees.

Viewshed. Total visible area from a single observer position, or the total visible area from multiple observer positions. Viewsheds are accumulated seen-areas from highways, trails, campgrounds, towns, cities, or other viewer locations. Examples are corridor, feature, or basin viewsheds.

Visual Salience. The degree to which an object, feature, or condition is noticeable or prominent in a landscape scene

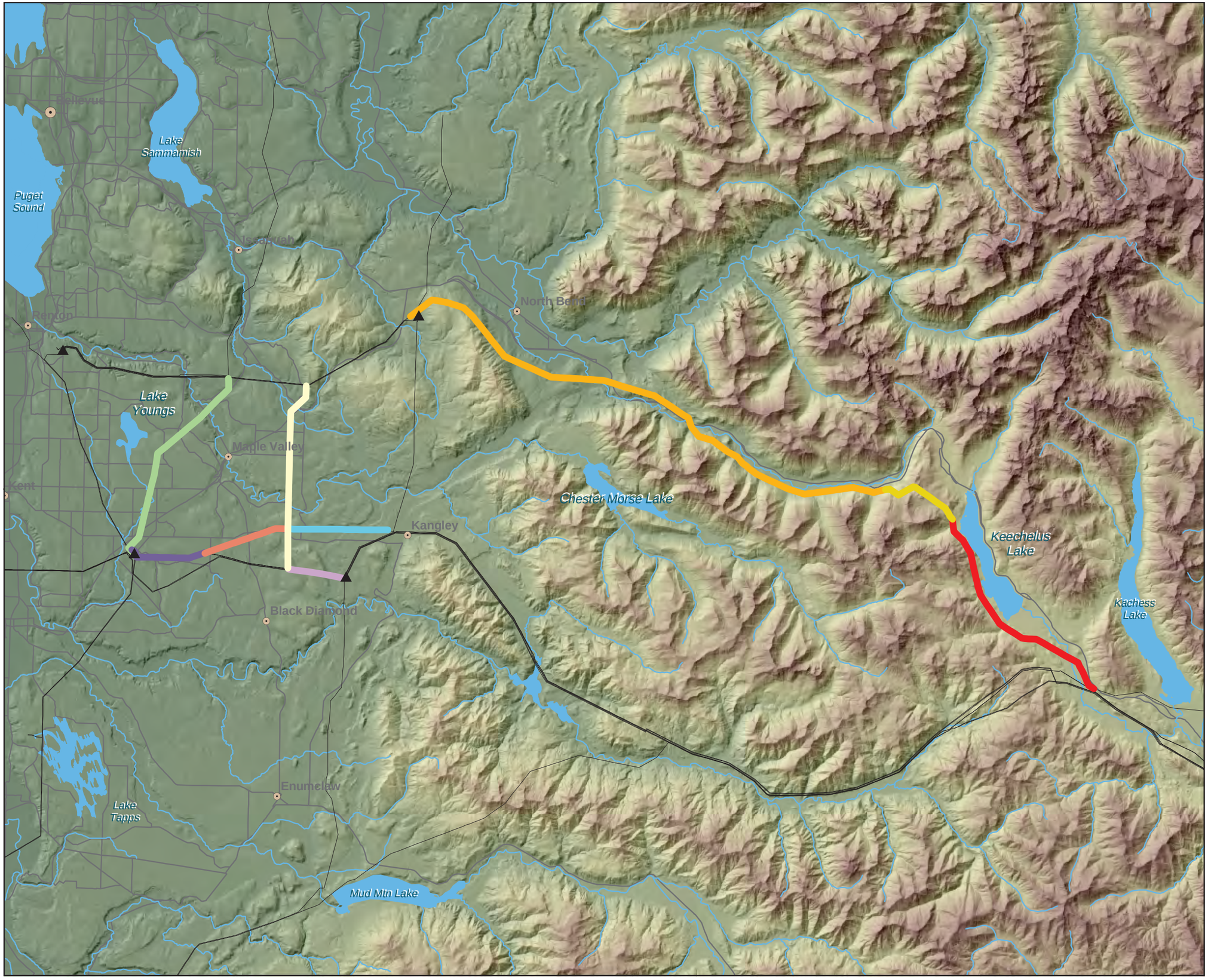
Vividness. The memorability of the visual impression received from contrasting landscape elements as they combine to form a striking and distinctive visual pattern.

Maps

Map 1
Project Vicinity

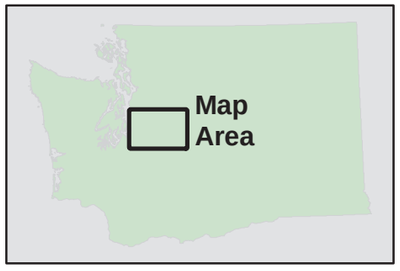
Kangley - Echo Lake Transmission Line Project

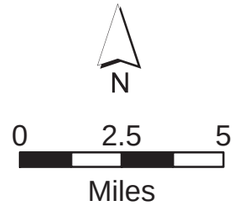
Legend



Land Use Impact Area

- A1
- A2
- A3
- C
- C1
- C2
- B-1, D1-1, D2-1
- B-2, D1-2, D2-2
- B-3, D1-2, D2-3
- BPA Substations
- Existing BPA Lines
- Highways/Interstates





Map 2
Landscape Context Alternatives A, C, C1 and C2
Kangley - Echo Lake Transmission Line Project

Legend

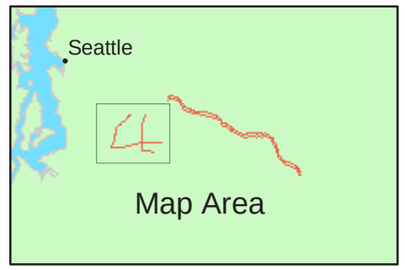
- Alternatives
- BPA Substations
- Existing BPA Lines
- Highways/Interstates
- Arterial Roads
- Potential Trail
- Trails
- National Forest

Ownership

- Other Public
- Private Natural Resource Production Lands

Land Use

- Rural Residential
- Urban Residential
- Parks
- Watershed
- Other
- Photo Viewpoint
- Viewpoint of Photo and Simulation
- Landscape Area Boundary



N

0 1 2

Miles

Map 3
Landscape Context
Alternatives B and D, East Half
Kangley - Echo Lake Transmission Line Project

Legend

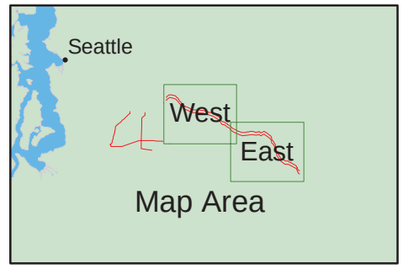
- Alternatives
- BPA Substations
- Existing BPA Lines
- Highways/Interstates
- Arterial Roads
- Trails

Ownership

- Other Public
- Private Natural Resource Production Lands

Land Use

- Rural Residential
- Parks
- Watershed
- Other
- Photo Viewpoint
- Viewpoint of Photo and Simulation
- Landscape Area Boundary



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Miles

Map 4
Landscape Context
Alternatives B and D, West Half
Kangley - Echo Lake Transmission Line Project

Legend

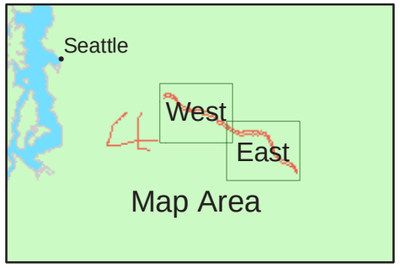
- Alternatives
- BPA Substations
- Existing BPA Lines
- Highways/Interstates
- Arterial Roads
- Potential Trail
- Trails
- National Forest

Ownership

- Other Public
- Private Natural Resource Production Lands

Land Use

- Rural Residential
- Urban Residential
- Rural Community
- Parks
- Watershed
- Other
- Photo Viewpoint
- Viewpoint of Photo and Simulation
- Landscape Area Boundary



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Miles

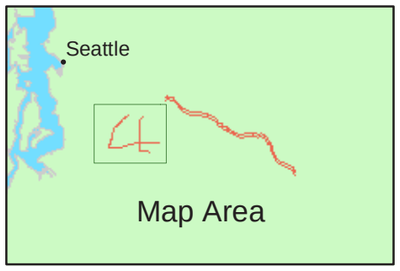
Map 5
Scenic Quality Alternatives A, C, C1, and C2
Kangley - Echo Lake Transmission Line Project

Legend

- Alternatives
- BPA Substations
- Existing BPA Lines
- Highways/Interstates
- Arterial Roads
- Railroads
- Landscape Area Desinations
- Photo Viewpoint
- Viewpoint of Photo and Simulation

Scenic Quality

- High
- Moderate High
- Moderate
- Low



N

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Miles

Map 6
Scenic Quality
Alternatives B and D
East Half

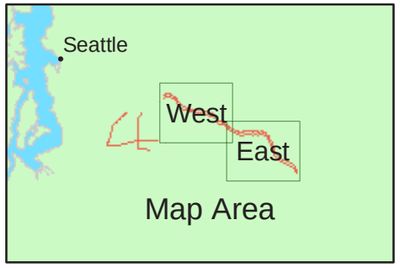
Kangley - Echo Lake
Transmission Line Project

Legend

- Alternatives
- BPA Substations
- Existing BPA Lines
- Highways/Interstates
- Arterial Roads
- Railroads
- Landscape Area Desinations
- Photo Viewpoint
- Viewpoint of Photo and Simulation

Scenic Quality

- High
- Moderately High
- Moderate
- Low



N

0 1 2

Miles

Map 7
Scenic Quality
Alternatives B and D
West Half

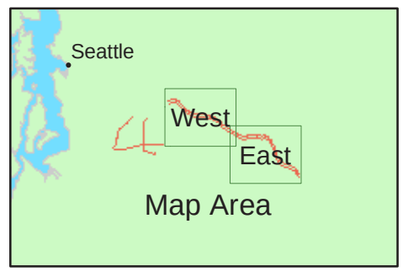
Kangley - Echo Lake Transmission Line Project

Legend

- Alternatives
- BPA Substations
- Existing BPA Lines
- Highways/Interstates
- Arterial Roads
- Railroads
- Landscape Area Desinations
- Photo Viewpoint
- Viewpoint of Photo and Simulation

Scenic Qaulity

- High
- Moderately High
- Moderate
- Low



N

0 1 2

Miles

Map 8
Visual Sensitivity Alternatives A, C, C1, and C2

Kangley - Echo Lake Transmission Line Project

Legend

- Alternatives
- BPA Substations
- Existing BPA Lines
- Highways/Interstates
- Arterial Roads
- Railroads
- landscape Area Desinations
- Photo Viewpoint
- Viewpoint of Photo and Simulation

Visual Sensitivity

- High
- Moderate

Seattle

Map Area

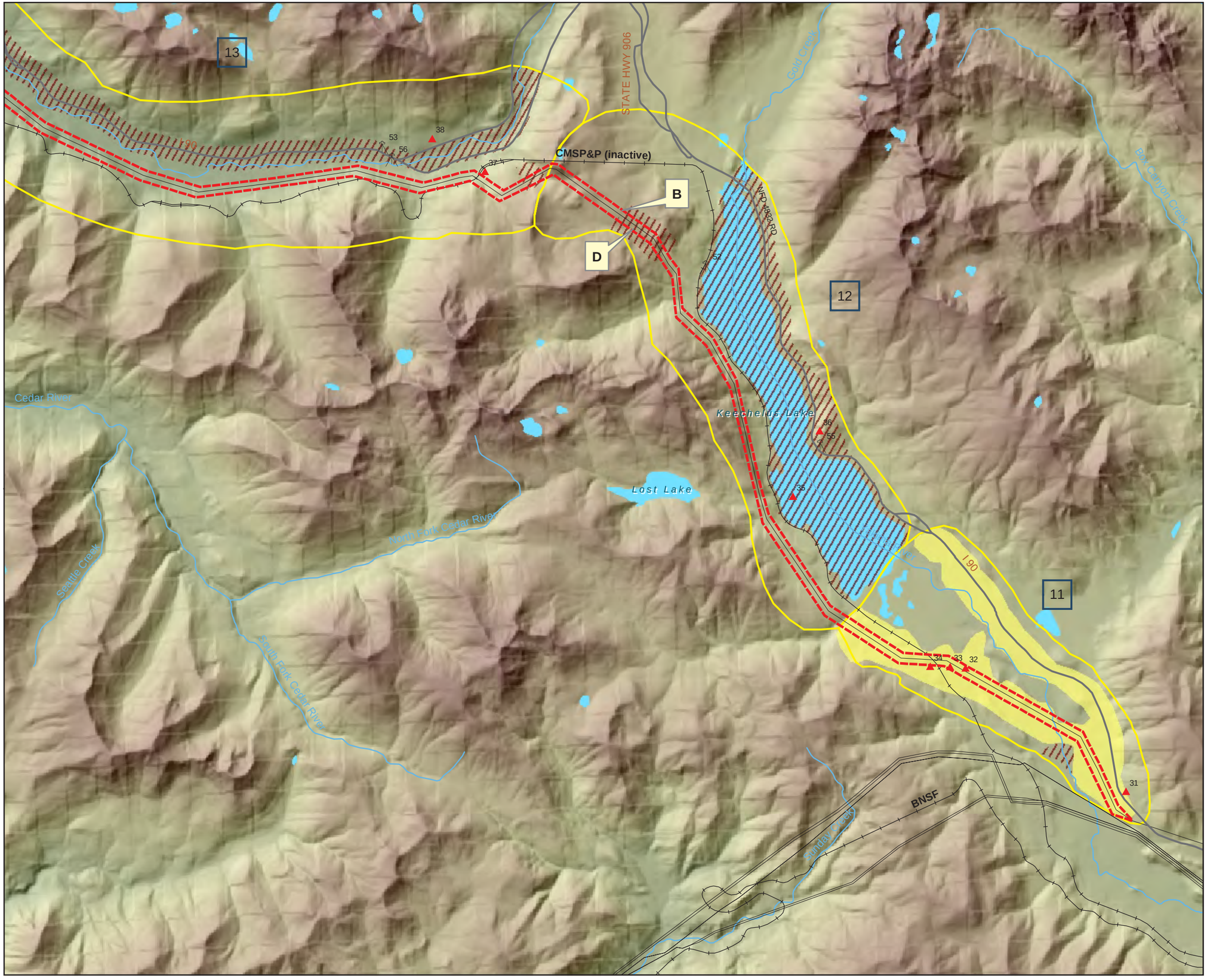
N

0 1 2

Miles

Map 9
Visual Sensitivity
Alternatives B and D
East Half

Kangley - Echo Lake Transmission Line Project

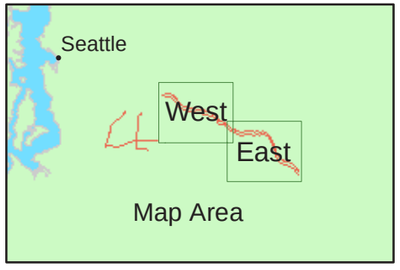


Legend

- Alternatives
- BPA Substations
- Existing BPA Lines
- Highways/Interstates
- Arterial Roads
- Railroads
- Landscape Area Desinations
- Photo Viewpoint
- Viewpoint of Photo and Simulation

Visual Sensitivity

- High
- Moderate



N

0 1 2

Miles

Map 10
Visual Sensitivity
Alternatives B and D
West Half

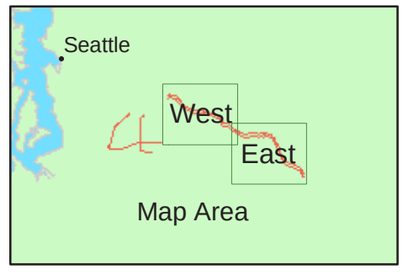
Kangley - Echo Lake Transmission Line Project

Legend

- Alternatives
- BPA Substations
- Existing BPA Lines
- Highways/Interstates
- Arterial Roads
- Railroads
- landscape Area Desinations
- Photo Viewpoint
- Viewpoint of Photo and Simulation

Visual Sensitivity

- High
- Moderate



N

0 1 2

Miles

Map 11
Aesthetic Impacts Alternatives A, C, C1, and C2
Kangley - Echo Lake Transmission Line Project

Legend

- BPA Substations
- Existing BPA Lines
- Highways/Interstates
- Arterial Roads
- Trails
- Landscape Area Designations
- Photo Viewpoint
- Viewpoint of Photo and Simulation

Aesthetic Impacts

- High
- Moderate
- Low

Seattle

Map Area

N

0 1 2

Miles

Map 12
Aesthetic Impacts
Alternative B
East Half

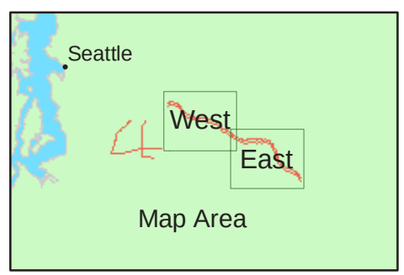
Kangley - Echo Lake Transmission Line Project

Legend

- BPA Substations
- Existing BPA Lines
- Highways/Interstates
- Arterial Roads
- Trails
- Landscape Area Designations
- Photo Viewpoint
- Viewpoint of Photo and Simulation

Aesthetic Impacts

- High
- Moderate
- Low



N

0 1 2

Miles

Map 13
Aesthetic Impacts
Alternative B
West Half

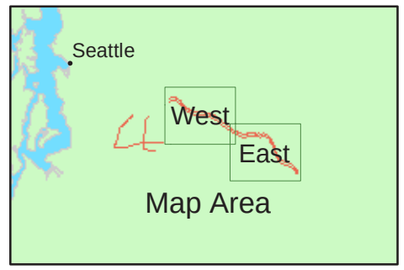
Kangley - Echo Lake Transmission Line Project

Legend

- BPA Substations
- Existing BPA Lines
- Highways/Interstates
- Arterial Roads
- Trails
- Landscape Area Designations
- Photo Viewpoint
- Viewpoint of Photo and Simulation

Aesthetic Impacts

- High
- Moderate
- Low



N

0 1 2

Miles

Map 14
Aesthetic Impacts
Alternative D
East Half

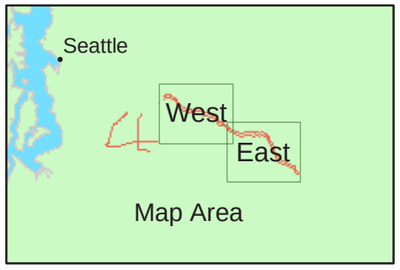
Kangley - Echo Lake Transmission Line Project

Legend

- BPA Substations
- Existing BPA Lines
- Highways/Interstates
- Arterial Roads
- Trails
- Landscape Area Designations
- Photo Viewpoint
- Viewpoint of Photo and Simulation

Aesthetic Impacts

- High
- Moderate
- Low



N

0 1 2

Miles

Map 15
Aesthetic Impacts
Alternative D
West Half

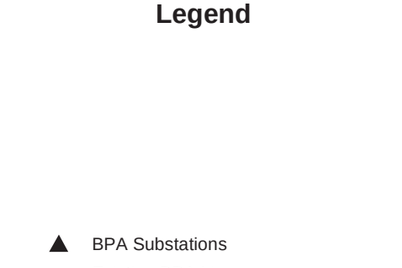
Kangley - Echo Lake Transmission Line Project

Legend

- BPA Substations
- Existing BPA Lines
- Highways/Interstates
- Arterial Roads
- Trails
- Landscape Area Designations
- Photo Viewpoint
- Viewpoint of Photo and Simulation

Aesthetic Impacts

- High
- Moderate
- Low



N

0 1 2

Miles

Appendix T Socioeconomics Technical Report

Socioeconomics Technical Report

Prepared for

Bonneville Power Administration
Portland, Oregon

December 2002

Prepared by

CH2MHILL

USR/021640033.DOC

Printed on Recycled and Recyclable Paper

Table of Contents

Tables

Figures

1.0 Introduction

1.1 Background

The Bonneville Power Administration (BPA) is committed to providing reliable power to the Northwest region. BPA is proposing to build new infrastructure projects to improve the reliability of the transmission system and to meet future power needs. The Kangley-Echo Lake Transmission Line Project is the first of these infrastructure projects.

1.1.1 Proposal

The proposed 500-kilovolt (kV) transmission line would connect an existing line with BPA's Echo Lake Substation in the Maple Valley area of Washington. The proposed line is needed to improve system reliability in the King County area and to enhance the return of power to Canada as required by the Columbia River Treaty. Without system improvements, an outage on the existing BPA line coupled with cold winter weather could cause voltage instability and a loss of power in the Puget Sound area as early as the winter 2002-03. BPA is considering a broad range of alternatives for this project. Project alternatives are described in Appendix A of the Land Use, Transportation, and Recreation Technical Report. Alternative routes considered in this technical study report and the report's overall purpose are described below.

1.1.2 Alternative Routes

BPA studied several alternative routes for the Kangley-Echo Lake Project in 2000 and 2001. These are described and analyzed in the Draft Environmental Impact Statement (DEIS) issued in June 2001 and are identified as the Preferred Route (Alternative 1), Alternative 2, Alternative 3, Alternative 4A, and Alternative 4B. Alternatives dropped from further analysis earlier due to costs and other considerations were resurfaced by BPA in early 2002 to address potential routes around the Cedar River Municipal watershed. These routes are identified as Alternatives A, B, C (Options 1 and 2), and D (Options 1 and 2). A description of these alternatives is provided in Section 2 of this report.

1.1.3 Purpose of this Report

BPA plans to issue a supplemental DEIS (SDEIS) in early 2003. The SDEIS will include analysis of the original routes evaluated in the DEIS (Routes 1 through 4) and the new alternatives identified in early 2002 (Routes A through D). This Technical Report describes the impacts of the new alternative routes so that they can be considered along with the original routes in the SDEIS. This report provides the supporting technical material to be extracted and summarized in the SDEIS.

1.2 Resources Studied

The direct impact area for this project covers the width of the existing right-of -way (ROW) and the proposed additional ROW along the alternative transmission line alignments, with the exception of Alternative C. The study corridor for Alternative C encompasses a 250-foot-wide corridor along the potential alignment currently identified by BPA. A wider corridor is considered because the alignment of the transmission line in this area does not follow any existing alignment and has not yet been selected with the specificity necessary to

consider only a 150-foot-wide corridor. As discussed in Section 2, the proposed actual ROW width for Alternative t C is 150 feet, which is consistent with the ROW widths for other alternatives.

Socioeconomics impacts in the vicinity of the project are described in this report.

1.3 Methods Used

Data were gathered from publicly available sources. These sources were used to collect and process all available employment, economic, demographic data. Hard copies of land use information were also used, and all other data were collected in electronic format.

2.0 Added Alternatives

The new alternatives identified by BPA are labeled A through D. They are shown in Figure 1 and described in Table 1. Schematics depicting the tower and right-of-way configurations for the existing and proposed conditions along each of these alternatives are presented in Appendix B of the Land Use, Transportation, and Recreation Technical Report.

Table 1. Description of New Alternatives

Alternative A	Construct a new single-circuit 500-kV line in an existing right-of-way from a tap along the Schultz-Raver No. 2 line near Kangley to BPA's Covington Substation in Covington. New ROW would be needed around the northeast side of the Covington Substation to where the new line would intersect the Covington-Maple Valley ROW. From Covington, rebuild a portion of BPA's existing Covington-Maple Valley single-circuit 230-kV transmission line with a double-circuit 500-kV line, operating one side at 500-kV and the other at 230-kV. The 500-kV circuit would terminate at Echo Lake Substation via a vacant circuit of the Maple Valley-Echo Lake double-circuit 500-kV transmission line. New double-circuit towers, about 175 feet tall, would support both circuits. With the exception of the new right-of-way that would need to be acquired around the Covington Substation, the new transmission lines would be built on existing rights-of-way. Alternative A consists of segments A1, A2, A3, and C2, as shown in Figure 1. Segment C2 is common to a portion of Alternative C2 north of Raver Substation
Alternative B	Rebuild about 38 miles of a portion of BPA's Rocky Reach-Maple Valley 345-kV transmission line to a double-circuit 500-kV line. The new towers would be about 175 feet. tall. The new 500-kV line would be connected to the existing Schultz–Raver No. 2 500-kV transmission line just east of Stampede Pass and to Echo Lake Substation at the west end. The line would cross I-90 twice. Almost all of this route would be on existing right-of-way. Alternative B consists of segments B-1, B-2, and B-3 as shown in Figure 1.

Table 1. Description of New Alternatives

Alternative C (Option C1)	Construct a new single-circuit 500-kV line from BPA's Raver Substation in a new 150-foot right-of-way adjacent to an existing right-of-way on segment C1 as shown in Figure 1. The remainder of this alternative, segment C as shown in Figure 1, would be on a new 150-foot-wide right-of-way. New towers would be about 135 feet tall. The new line would pass through the Ravensdale and Hobart areas and would be connected to an existing vacant (unused) circuit of the Maple Valley-Echo Lake double circuit 500-kV line. The vacant circuit would then need to be connected to a new bay in the Echo Lake Substation. This option would require the purchase of new right–of-way. Alternative C1 consists of segments C and C1 as shown in Figure 1.
Alternative C (Option C2)	Construct a new single-circuit 500-kV line from near the community of Kangley in an existing right-of-way to a point just west of the Cedar River watershed. From here, the proposed route turns north and would require a new 150-foot-wide right-of-way. New towers would be about 135 feet tall. The new line would pass through the Ravensdale and Hobart areas and would be connected to an existing vacant (unused)circuit of the Echo Lake-Maple Valley 500-kV line.. The vacant circuit would then need to be connected to a new bay in the Echo Lake Substation. This option would require the purchase of new right–of-way. Alternative C (Option C2) includes the route segments identified as C2 and C in Figure 1.
Alternative D	Construct a new single-circuit 500-kV transmission line from east of Stampede Pass to Echo Lake Substation. The new line would be adjacent to the existing Rocky Reach-Maple Valley 345-kV line. New towers would be about 135 feet tall. The line would cross I-90 twice. A new 150-foot-wide right-of-way would need to be acquired. There are two options for Alternative D. Option D1 proposes to build the new line on the south side of the existing Rocky Reach-Maple Valley 345-kV line. Option D2 proposes to construct the new line on the north side of the existing Rocky Reach-Maple Valley 345-kV line. These routes are shown as segments D1, D2, and D3 in Figure 1.

3.0 Affected Environment

3.1 Existing Population

The project area is located within the rural area of King and Kittitas counties and the incorporated cities of Covington and Maple Valley. All of the project alternatives are located within small urban and rural residential areas and forestlands managed for commercial production, habitat, and recreation.

King County is the most populated county in Washington. King County and the state have both experienced substantial increases in their populations since 1960, with growth rates exceeding the national average. Population and population growth is distributed unevenly throughout King County. Most King County residents are concentrated in the western

portion of the county. According to the King County Office of Regional Policy and Planning, the county's population growth can be largely attributed to in-migration from other areas (as opposed to natural increase), and most growth is in suburban areas, outside of Seattle.

Table 2 shows the historical population levels of Washington State as well as King and Kittitas Counties.

Table 2. Historical Population, 1970 to 2000

	1970	1980	1990	2000
State of Washington	3,413,250	4,132,353	4,866,663	5,894,121
King County	1,159,375	1,269,898	1,507,305	1,737,034
Kittitas County	25,039	24,877	26,725	33,362
Source: State of Washington Office of Financial Management				

Alternatives A, and C (Options C1 and C2) are located in or near small urban areas characterized by a rural residential development pattern. Alternative A crosses unincorporated land and the cities of Covington and Maple Valley. Alternative C (Options C1 and Cs) does not cross any incorporated cities. Alternative C (Options 1 and 2), and the unincorporated portions of Alternative A are located in areas zoned primarily for rural residential uses with a range of permitted parcel sizes from 2.5 acres to 10 acres in size. The predominant residential parcel size is 5 acres.

Segment C2 crosses alongside two existing unincorporated subdivisions east of Maple Valley. Alternative A then passes to the north of another small unincorporated subdivision and crosses the City of Kent Clark Springs parcel before entering into the City of Maple Valley. The unincorporated area along the existing right-of-way between Maple Valley and Covington is an area of well-established unincorporated subdivisions. At the Covington Substation Alternative A turns north and enters the City of Covington. The rural residential area north of Covington consists of a mix of parcel sizes. These properties are generally privately owned and larger than lots found in the subdivisions in unincorporated areas between Covington and Kangley.

The two incorporated areas crossed by Alternative A contain established and proposed commercial areas, existing and proposed subdivisions and apartments, and park spaces. Both Maple Valley and Covington are experiencing rapid growth.

Within a quarter mile of Alternative A, in Maple Valley, at least nine new subdivisions (approximately 1,053 new residential units) are either planned or already permitted. The exact route Alternative A will take around the Covington Substation has not been decided but it will pass by or through the existing residential subdivisions at the intersection of SE Wax Road and Covington Way SE. The Covington Apartments are currently under construction along the existing right-of-way. Along Alternative A north of State Route (SR) 18 in Covington, a four-lot short plat called Fox Wood is proposed along the right-of-way. Three pending subdivisions or short plats (216 units) are located within 1/4 mile of Alternative A.

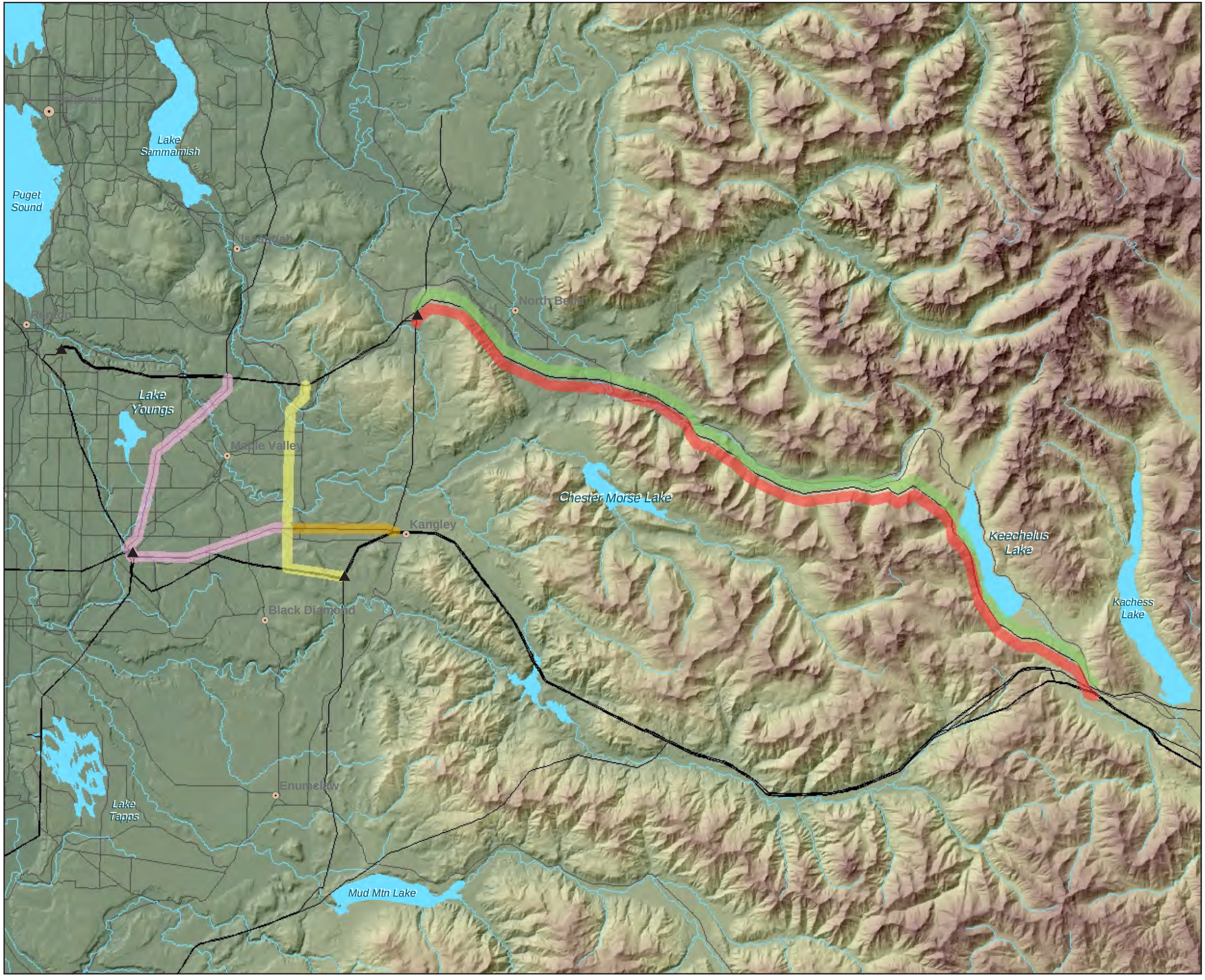


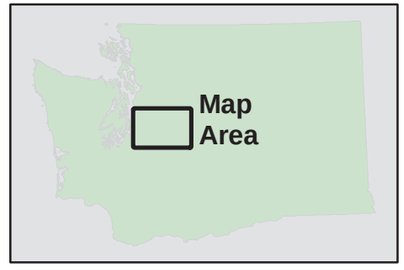
Figure 1
Project Vicinity

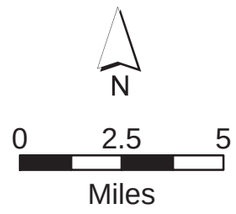
Kangley - Echo Lake Transmission Line Project

Legend

Alternatives

- A
- C
- C1
- C2
- B
- D
- BPA Substations
- Existing BPA Lines
- Highways/Interstates





Alternatives B and D are located along the I-90 corridor and do not cross any incorporated areas. The length of these alternatives is predominantly designated for forest use, with some small pockets of rural residential uses just south of North Bend and near the recreational development at Snoqualmie Pass. The length of Alternatives B and D south of North Bend, from the point at which the alternatives cross back to the south side of I-90 to where the alternatives meet the edge of the Rattlesnake Mountain Recreation area, crosses through some areas of rural residential subdivision. Rural residential uses evident near Lake Keechelus are located on private land and appear to be cabins used primarily as recreational residences.

3.2 Forecast Population

The population and employment forecast prepared by the state of Washington Office of Financial Management (OFM) anticipates that recent growth will likely continue for the state, but at a slower rate than recent decades (see Table 3). The OFM forecast assumes that Washington's growth rate will likely continue at a faster rate than the United States as a whole, but that the difference between the state and national rates will likely decrease over time. The OFM methodology assumes this convergence of growth rates because of the physical constraints of any area to sustain growth rates beyond the national average for long periods of time. These constraints include availability of land and infrastructure limitations.

Table 3. Population Growth Rate (Actual and Forecast), King and Kittitas Counties

	1970-80	1980-90	1990-2000	2000-10	2010-20
State of Washington	21.1%	17.8%	21.1%	12.8%	13.5%
King County	9.5%	18.7%	15.2%	7.1%	8.5%
Kittitas County	-0.6%	7.4%	24.8%	10.1%	13.7%

Source: State of Washington Office of Financial Management

3.3 Lodging

For the proposed project, BPA would use contractors to clear the right-of-way, create new access roads, and construct the transmission line. Because transmission line construction is highly specialized work, a company from outside the local area would likely be hired, although a company from the Seattle/Tacoma area could also be selected to be the prime contractor on the project. If a contractor were to be retained from outside the local area, sufficient lodging and recreational vehicle (RV) sites are available within 20 miles. Table 4 lists hotel and motel rooms in the project vicinity.

Table 4. Lodging in the Project Vicinity

City	# of Hotels/Motels	Total # of Rooms
Auburn	3	197
Enumclaw	1	40
Issaquah	2	203
Kent	7	639
North Bend	3	74
Renton	4	539
Snoqualmie	1	101
Total	22	1,793

Source: David Evans and Associates, Socioeconomics Technical Report, February 2001

In addition to the lodging shown in Table 4, the Sunrise Resorts/Lake Sawyer RV Park in Black Diamond has 109 RV sites and the Seattle/Tacoma KOA has 116 RV sites. There is one RV park in North Bend and one in Issaquah. There are also hundreds of additional hotel and motel rooms in the Seattle/Tacoma metropolitan area that are within convenient driving distance of the project site.

3.4 Social Characteristics

In general, the age breakdown in King County parallels that of the state. According to estimates provided by OFM, the average annual covered wage in King County of $47,241 was above the state average annual covered wage of $37,038 in 1999, the latest information available. Annual average covered wage in Kittitas County was $22,427, significantly lower than the state annual covered wage. Household income in the incorporated communities near the project alternatives had fewer households below the poverty level than did King and Kittitas counties as a whole. Eight percent of King County residents and almost twenty percent of Kittitas County residents fell below the poverty level in 1999, the latest information available. This compares to 6.5 percent in North Bend, 4 percent in Covington, and 1.7 percent in Maple Valley.

The ethnicity of the project vicinity is predominantly Caucasian and the remainder primarily African-American, American Indian, Pacific Islander, and Asian (Table 5). King County as a whole has a higher minority population (greater than 20 percent) than does Kittitas County (11 percent) and the project vicinities all have lower percentages of minorities than their respective counties.

Table 5. Racial Composition By Project Area and County, 2000

Alternative	% Black	% Am. Indian, Eskimo, Aleut	% Asian, Pacific Islander	% Other	% Two or more races	% Hispanic or Latino	All Minorities As % of Total Population
B & D *	0.54%	1.07%	1.46%	0.12%	1.75%	2.72%	7.65%
A *	2.01%	0.79%	4.01%	0.29%	2.64%	3.48%	13.22%
C1 & C2 *	0.50%	0.72%	1.14%	0.25%	2.11%	1.81%	6.53%
King	5.28%	0.82%	11.25%	0.26%	3.49%	5.48%	26.59%
Kittitas	0.68%	0.86%	2.27%	0.16%	1.63%	5.00%	10.60%

Source: US bureau of Census, 2000 Census, Tract and County Series

* Project Area Vicinity defined by proximity of each route to specific census tracts

3.5 Employment

The main economic activities in King County are manufacturing, shipping and trade, agriculture, business services, shipbuilding, fishing, wood products, and tourism. Total employment in King County has grown gradually over the past six years, with unemployment rates dropping from their high rates of 6.4 percent in 1992 and 1993. Table 6 compares the unemployment rates for King County to the statewide average from 1989 through 1999. King County has consistently had lower rates of unemployment than the statewide average during the last decade.

Year	State of Washington	King County	Kittitas County
1990	4.9%	3.5%	7.6%
1991	6.4%	4.9%	9.7%
1992	7.6%	6.4%	12.7%
1993	7.6%	6.4%	10.7%
1994	6.4%	5.5%	8.4%
1995	6.4%	5.2%	8.7%
1996	6.5%	4.9%	8.6%
1997	4.8%	3.3%	6.0%
1998	4.8%	3.1%	6.0%
1999	4.7%	3.2%	5.6%
2000	5.2%	3.6%	5.8%

Source: State of Washigton Employment Security Department

Table 6. Unemployment Rate Comparison, King and Kittitas Counties, 1990 to 2000

Total employment has generally expanded during the 1990s, with the economy recovering strongly from the lag at the end of the 1980s. The current economic slowdown does not

show in this data set, but overall unemployment does tip up in 2000, as shown in Table 6. Total employment for King County reached 1,151,000 and 12,380 for Kittitas County in 1999, as shown in Table 7.

Table 7. Total Employment, King and Kittitas Counties, 1989 to 1999

Year	State of Washington		King County		Kittitas County	
	Employment	Growth Rate	Employment	Growth Rate	Employment	Growth Rate
1989	2,046,000		903,800		9,900	
1990	2,142,600	4.7%	942,900	4.3%	10,160	2.6%
1991	2,177,400	1.6%	942,700	0.0%	10,340	1.8%
1992	2,221,900	2.0%	952,200	1.0%	10,530	1.8%
1993	2,251,800	1.3%	948,700	-0.4%	10,790	2.5%
1994	2,304,300	2.3%	957,400	0.9%	11,310	4.8%
1995	2,347,000	1.9%	978,300	2.2%	11,990	6.0%
1996	2,416,000	2.9%	1,018,300	4.1%	12,060	0.6%
1997	2,514,000	4.1%	1,073,300	5.4%	12,310	2.1%
1998	2,594,700	3.2%	1,119,700	4.3%	12,280	-0.2%
1999	2,648,700	2.1%	1,151,000	2.8%	12,380	0.8%

Source: State of Washigton Employment Security Department

The distribution of jobs in King and Kittitas Counties is displayed in Table 8. Employment in King County is nearly one-third in services, slightly higher than the distribution of employment for the state of Washington as a whole, with nearly 28 percent of all jobs in the state attributable to the services sector. This sector is dominated by the business services industry, which accounts for nearly one-third of King County's services sector jobs.

	Construction & Mining	Manufacturing	Trans., Comm., & Utilities	Trade	Finace, Insurance, Real Estate	Services	Government	Total
State of Washington	157,000	364,200	139,800	636,100	137,600	739,700	474,300	2,648,700
Kittitas County	460	700	530	2,400	270	2,110	4,900	11,370
King County	62,400	152,800	76,900	273,500	73,800	360,600	150,900	1,150,900

Source: State of Washington Employment Security Department

Government employment is the dominant sector in Kittitas County.

Table 8. Non-Agricultural Employment by Industry Group, King and Kittitas Counties, 1999

According to forecasts by the Office of Financial Management, net job growth in the state of Washington will likely be primarily in the non-manufacturing industry groups, especially within the services and retail trade sectors. Although growth is expected in the state's manufacturing sector, it is expected to lag behind growth in non-manufacturing sectors. The employment forecast data provided by the Office of Financial Management indicates that the services industry group, the fastest-growing industry group, is expected to account for more than 40 percent of the net new jobs created between 2000 and year 2020 (Table 9).

Table 9. Non-Agricultural Employment Forecast, 2000 to 2020

	2005		2010		2015		2020
Industry Type	Employees	05-10 Growth	Employees	10-15 Growth	Employees	15-20 Growth	Employees
Manufacturing	351,300	3.0%	361,800	1.6%	367,600	0.6%	369,800
Mining	3,800	5.3%	4,000	2.5%	4,100	2.4%	4,200
Construction	173,200	4.8%	181,600	3.7%	188,300	3.0%	193,900
Transport, Comm., Util.	157,700	6.8%	168,500	6.6%	179,600	4.9%	188,400
Wholesale Trade	164,800	7.5%	177,100	6.9%	189,300	4.9%	198,500
Retail Trade	525,100	6.3%	558,100	5.7%	590,100	5.0%	619,800
Financial, Insur., Real Estate	152,400	7.2%	163,300	6.2%	173,500	5.6%	183,200
Services	909,500	12.8%	1,025,800	9.2%	1,120,200	4.9%	1,174,600
Government	520,600	8.4%	564,300	5.6%	595,700	4.4%	621,700
Employment	2,961,400	8.2%	3,204,500	6.4%	3,408,300	4.3%	3,554,000
Total (Weighted Average)	5,919,800	8.3%	6,409,000	6.4%	6,816,700	4.3%	7,108,100

Source: State of Washington Emplyment Security Department

4.0 Consequences

Proposed alternatives would impact their respective project area vicinities differently. The following is a discussion of issues associated with each alternative.

4.1 Impacts that Apply to All Alternatives

Certain impacts are common to each alternative, as are the impact criteria used to evaluate impact levels. This section defines common impacts and impact criteria.

4.1.1 Short-Term Impacts

- Increases in jobs and local spending
- Increases in demand for local lodging by construction workers
- Impaired access to local businesses during business hours. (Impaired access means obstacles placed in the way of reaching the business in the customary way, e.g., street closures, substantial traffic delays, or construction equipment blocking customer access.)

4.1.2 Long-Term Impacts

- Increases in population that can negatively affect the local housing market by creating housing shortages or driving up housing prices, or that can negatively affect the provision of local services until new facilities (e.g., schools, fire and police substations, water treatment plants) can be funded and built.
- Adverse social impacts, such as the perception by residents of affected communities that the project has an undesirable effect on their community or way of life, especially for those who would loose their homes, or property as result of the new line crossing their land.
- Continuing operation and maintenance of the transmission line, which would maintain or increase jobs and local spending associated with those activities.
- The loss of timberland removed from production within the transmission line right-of-way and cleared for access roads could have a twofold economic impact: (1) loss of revenue from the loss of future timber production and harvest on lands within the right-of-way, and (2) potential loss of county tax revenues due to decreased land value from changing the classification of timberland within the right-of-way. None of the alternatives would result in significant loss of marketable timberland.
- The loss of tax revenue to the local taxing districts from the demolition of residences that would need to be removed.

4.1.3 Compensation for Loss

The acquisition process may differ among different uses. For forestland, fair market value is paid for all merchantable timber that would be cut on new right-of-way, as well as for any trees out of the right-of-way that need to be cut for construction purposes or that pose a danger of falling into the line or across roads. A transmission line crossing forestland generally leaves little value to the property for its intended use; therefore, fair market compensation for a transmission line right-of-way across forestland would be close to full-fee value.

New land rights needed across private landowners' property are acquired as easements. Landowners are offered a fair market value for the easements, established through a standard appraisal process. The appraisal process takes into consideration all factors affecting value. The appraisal is an individual analysis of the property, using neighborhood-specific market data to determine fair market value. The owner is compensated at 100 percent of market value. This compensation recognizes that future use of the easement is limited, because the right-of-way eliminates the ability to build structures and plant certain vegetation due to height limitations. A transmission line may also diminish the use and value of a portion of the property if the line effectively severs the areas from the remaining property. It is BPA policy to purchase the entire property including any improvements at fair market value, if the parcel's value would be found to be effectively destroyed.

4.1.4 Environmental Justice

Per the criteria articulated in Executive Order 12898, none of the proposed alternatives would have a disproportionate adverse effect on minority and low-income populations. As indicated in Section 3.4, the population of the project area has fewer people who identify themselves as a minority than do the populations of their respective counties (King and Kittitas). As indicated in Section 3.5, poverty levels in the incorporated communities near the project areas are also lower than their respective counties as a whole. Therefore, per Executive Order 12898, there would be no impacts to environmental justice concerns, as project impacts are focused in an area with a relatively small population of minority and low-income residents.

Per King County Comprehensive Plan Policy F-221, the degree to which the alternatives create disproportionate public facility burdens to specific communities, there are **no** impacts to environmental justice concerns for Alternatives A, B, or C (Options C1 or C2),.

4.1.5 Impact Criteria

An impact would be **high** if an action:

- Increases jobs or spending in a county by more than 1 percent
- Impairs access to a particular business for up to one week of regular business days
- Creates demand for hotel/motel rooms and RV sites in a county that is more than 5 percent of the available supply
- Produces changes in population totaling more than 5 percent of any local community's population (where the population increase is projected to occur)
- Permanently removes from production more than 2 percent of the land designated for forest uses in King County

An impact would be **moderate** if an action:

- Increases jobs or spending in a county by between 0.5 and 1 percent
- Impairs access to a particular business for more than one business day but less than one week
- Creates demand for hotel/motel rooms and RV sites in a county that is between 1 and 5 percent of the available supply
- Produces changes in population totaling between 1 and 5 percent of any local community's population (where the population increase is projected to occur)
- Permanently removes from production between 1 and 2 percent of the land designated for forest uses in King County

An impact would be **low** if an action:

- Increases jobs or spending in a county by less than 0.5 percent
- Impairs access to a particular business for less than one regular business day

- Creates demand for hotel/motel rooms and RV sites in a county that is less than 1 percent of the available supply
- Produces changes in population totaling less than 1 percent of any local community's population (where the population change is projected to occur)
- Permanently removes from production less than 1 percent of the land designated for forest uses in King County

4.2 Alternative A

4.2.1 Potential Short-Term Impacts

4.2.1.1 Lodging

BPA's Furnish and Install contractor would use a specialized company, likely drawn from a large metropolitan area, to construct the project. Although local crews may be employed for right-of-way clearing and road building activities, the main subcontractor would likely come from outside the local area. Adequate lodging is available within a convenient 20-mile distance from proposed construction areas to accommodate these workers. Therefore, there would be **no** lodging impact from construction activities associated with the proposed project.

4.2.1.2 Local Spending and Employment

The contractors who would be responsible for constructing the new transmission line would be paid rates determined by BPA for this work. The economic impact from this construction activity would be **low** because no new jobs are expected to be created by this project. Although construction workers, whether drawn from the Seattle metropolitan area or other region(s),would use some temporary lodging and would purchase meals and other incidentals from local businesses, the impact to the local economy would be expected to be negligible relative to the economic base of King County. Also, the contractors would pay use tax on materials used during project construction, which would be a minor benefit to local and state revenues. In summary, any minor increased economic impact would be limited to the construction period and be considered a beneficial impact.

4.2.1.3 Community Values and Concerns

Construction of Alternative A within existing rights-of-way may block access to some local businesses in the incorporated cities of Maple Valley and Covington during the construction period. Within Maple Valley, commercial establishments immediately impacted may include Les Schwab Tire, Safeway Plaza I and II, and Four Corners Storage. The portion of Alternative A that passes through Covington crosses through the city's commercial area near the SR 18, Kent-Kangley interchange. Depending on the route Alternative A would take around the Covington Substation, access to existing developments, including a composting and topsoil business, and a commercial plaza anchored by Safeway may be impacted during construction. Other proposed and planned commercial uses, including a regional commercial center, may also be impacted during construction. Based on the nature of construction plans at this time, these short-term construction-related impacts would likely be **low**.

4.2.2 Potential Long-Term Impacts

4.2.2.1 Population

Alternative A would have **no** long-term impacts on population because it would not cause population in-migration. The project would serve the broader King County area and parts of Canada rather than the project area specifically. It would be a transmission facility, would not serve specific developments, and would not lead to increased development in the project vicinity. Adequate electric power is considered a basic necessity to maintain human health and safety in a modern society and it is not a commodity that would disproportionately attract growth and development to a specific area due to its availability.

4.2.2.2 Economic Factors

Because the proposed transmission line alternative would not displace any businesses or materially affect the operations of any businesses, **no** long-term impacts on local businesses are anticipated.

The proposed alternative would have **no** impact on the timber resource in King County, as no merchantable timber would be removed within the existing right-of-way.

4.2.2.3 Community Values and Concerns

This alternative could require displacement of up to 25 homes and an additional two building lots to enable BPA to bypass existing electrical infrastructure in one portion of the route. The remainder of the proposed alternative is through unincorporated rural residential areas and existing and proposed commercial and residential areas within the incorporated cities of Maple Valley and Covington.

Alternative A would require the removal of approximately 25 homes in the City of Covington. This action has the potential to affect some of the smaller relevant taxing districts. Potential impacts to relevant local taxing districts are shown in Table 10.

Table 10. Comparison of Impacts to Relevant Taxing Districts

District	Assessed Value of 25 Homes Displaced	Total Assessed Value for Tax District	Assessed Value Removed From Tax Base	Impact to Tax District
Kent School District	$4,815,000	$10,886,381,014	0.04%	Low
Fire District 37	$4,815,000	$3,084,401,014	0.16%	Low
City of Covington	$3,812,500	$951,734,326	0.4%	Low

Source: King County Department of Assessments and Fire District 37.

As shown, displacements resulting from the proposed action would remove much less than one percent of the tax base of the smallest relevant taxing districts in the area. Thus, the impact to relevant local taxing districts is **low**. In Table 10, assessed values for typical homes are based on King County Department of Assessments' averages for Kent School District ($192,600) and City of Covington ($152,500). Average Assessed Values for Fire District 37 could not be specifically identified, so the average for Kent School District is used

as a proxy. The majority of Fire District 37 lies within the Kent School District and encompasses parts of several Kent School District cities.

4.2.2.4 Local Spending and Employment

BPA would be responsible for ongoing maintenance, which involves such tasks as maintaining access roads and vegetation management. This work would be similar in scope to what is currently required. It would be accomplished using existing BPA personnel and contractors, and BPA does not anticipate that additional workers would be hired for the operation and maintenance of the proposed transmission line and facilities. There is **no** employment impact because no new workers would be hired.

4.2.3 Mitigation Measures

BPA would pay relocation expenses for those whose homes would be taken as a result of the proposed action.

4.2.4 Cumulative Impacts

There would be no cumulative impacts resulting from construction and operation of Alternative A.

4.3 Alternative B

4.3.1 Potential Short-Term Impacts

4.3.1.1 Lodging

BPA's Furnish and Install Contractor would use a specialized company, likely drawn from a large metropolitan area, to construct the project. Although local crews may be employed for right-of-way clearing and road building activities, the main subcontractor would likely come from outside the local area. Adequate lodging is available within a convenient 20-mile distance from proposed construction areas to accommodate these workers. Therefore, there would be **no** lodging impact from construction activities associated with the proposed project.

4.3.1.2 Local Spending and Employment

The contractors who would be responsible for constructing the new transmission line would be paid rates determined by BPA for this work. The economic impact from this construction activity would be **low** because no new permanent jobs would be expected to be created by this project. Although construction workers, whether drawn from the Seattle metropolitan area or other regions, would use some temporary lodging and would purchase meals and other incidentals from local businesses, the impact to the local economy would be expected to be negligible relative to the economic base of King County and Kittitas County. Also, the contractors would pay use tax on materials used during project construction, which would be a minor benefit to local and state revenues. In summary, any minor increased economic impact would be limited to the construction period and be considered a beneficial impact.

4.3.1.3 Community Values and Concerns

Construction of Alternative B may result in short-term construction impacts to commercial forestlands, recreation areas, and rural residential areas within and adjacent to the existing right-of-way. These short-term construction-related impacts are considered to be **low**.

4.3.2 Potential Long-Term Impacts

4.3.2.1 Population

Alternative B would have **no** long-term impacts on population because it would not cause population in-migration. The project would serve the King County area and parts of Canada rather than the project area specifically. It would be a transmission facility, would not serve specific developments, and would not lead to increased development in the project vicinity.

4.3.2.2 Economic Factors

Due to the location of the proposed transmission line alternative within existing rights-of-way in rural areas that support a limited amount of residential development, **no** long-term impacts to local business access are anticipated.

Because almost all of the route would be on existing right-of-way, the proposed alternative would have **negligible** impact on the timber resource in King County or Kittitas County.

4.3.2.3 Community Values and Concerns

The proposed alternative would have **no** impacts because the new transmission lines would be built almost entirely on existing rights-of-way. Alternative B does not cross any incorporated areas and crosses primarily forestlands managed for commercial forestry, and recreational and habitat values within existing rights-of-way. Rural residential uses are present in the area south of North Bend, near Lake Keechelus, and in the recreation areas at Snoqualmie Pass. No homes would be displaced by construction of Alternative B.

4.3.2.4 Local Spending and Employment

BPA would be responsible for ongoing maintenance, which involves such tasks as maintaining access roads and vegetation management. This work would be accomplished using existing BPA personnel and contractors, and BPA does not anticipate that additional workers would be hired for the operation and maintenance of the proposed transmission line and facilities. The contractors who would be responsible for constructing the new transmission line would be paid rates determined by BPA for this work. The economic impact from this construction activity would be **low** because no new jobs are expected to be created by this project.

4.3.3 Mitigation Measures

There are no mitigation measures identified for Alternative B.

4.3.4 Cumulative Impacts

The proposed widening of I-90 in the Upper Yakima and Keechelus Lake area may result in a cumulative effect on jobs and temporary housing requirements in the region during project construction. The impact of that project is likely to be **very small**.

4.4 Alternative C (Options C1 and C2)

4.4.1 Potential Short-Term Impacts

4.4.1.1 Lodging

BPA's Furnish and Install Contractor would use a specialized company, likely drawn from a large metropolitan area, to construct the project. Although local crews may be employed for right-of-way clearing and road building activities, the main subcontractor would likely come from outside the local area. Adequate lodging is available within a convenient 20-mile distance from proposed construction areas to accommodate these workers. Therefore, there would be **no** lodging impact from construction activities associated with the proposed project.

4.4.1.2 Local Spending and Employment

The contractors who would be responsible for clearing the right-of-way and constructing the access roads and transmission line would be paid rates determined by BPA for this work. The economic impact from this construction activity would be **low** because no new jobs are expected to be created by this project. Although construction workers, whether drawn from the Seattle metropolitan area or other regions, would use some temporary lodging and would purchase meals and other incidentals from local businesses, the impact to the local economy would likely be negligible relative to the economic base of King County and Kittitas County. Any minor increased economic impact would be limited to the construction period and considered a beneficial impact.

4.4.2 Potential Long-Term Impacts

4.4.2.1 Population

The proposed project would have **no** long-term impacts on population because it would not cause population in-migration. The project would serve the King County area and parts of Canada rather than the project area specifically. It would be a transmission facility, would not serve specific developments, and would not lead to increased development in the project vicinity.

4.4.2.2 Economic Factors

Alternative C would require the purchase of new right-of-way. Option C1 runs through an area designated for commercial forest use. Alternative C runs through forestland and rural residential areas. In each of these options (C1 and C2), a 150-foot-wide right-of-way would be cleared. Additional areas outside of the right-of-way would be cleared for construction of access roads and removal of danger trees.

The proposed alternative would have a minimal impact on the total timber resource in King County. Relative to the stock of merchantable timber in King County, the amount of

merchantable timber that would be removed within the right-of-way, and additional timber cleared for removal of danger trees and for construction of access roads, would be negligible. Similarly, lost tax revenues due to removal of merchantable timber would also be negligible. The impact would be **low.**

Local taxing districts would experience a small reduction in tax base resulting from the displacement of 30 to 35 homes. On the basis of the analysis discussed in Alternative A (Table 10), this impact is likely to be **low**.

4.4.2.3 Community Values and Concerns

Purchase of new right-of-way and construction of the new transmission line for the proposed Alternative C would require displacement of 30 to 35 residences within a 250-foot-wide corridor. While land use impacts due to relocation of displaced residences is rated high impact, the socioeconomic impact to community values and concerns of these proposed alternatives may be considered **low**.

4.4.2.4 Local Spending and Employment

BPA would be responsible for ongoing maintenance, which involves such tasks as maintaining access roads and its rights-of-way. This work would be similar in scope to what is currently required. It would be accomplished using existing BPA personnel and contractors, and BPA does not anticipate that additional workers would be hired for the operation and maintenance of the proposed transmission line and facilities. Therefore, there would be **no** employment impact because no new workers would be hired.

4.4.3 Mitigation Measures

BPA would pay relocation expenses for those whose homes would be taken as a result of the proposed action.

4.4.4 Cumulative Impacts

The removal of timberland within the portions of the proposed transmission line right-of-way that support timber production would contribute to a relatively minor cumulative adverse effect on timber harvests, which have declined due to a number of factors, including the need to protect habitat for endangered species. This cumulative effect on timber harvests would have a minimal adverse economic impact on rural communities in King County that have suffered employment and income losses due to declining harvest levels.

4.5 Alternative D (Options D1 and D2)

4.5.1 Potential Short-Term Impacts

4.5.1.1 Lodging

BPA's Furnish and Install Contractor would use a specialized company, likely drawn from a large metropolitan area, to construct the project. Although local crews may be employed for right-of-way clearing and road building activities, the main subcontractor would likely come from outside the local area. Adequate lodging is available within a convenient 20-mile distance from proposed construction areas to accommodate these workers. Therefore, there

would be **no** lodging impact from construction activities associated with the proposed project.

4.5.1.2 Local Spending and Employment

The contractors who would be responsible for constructing the new transmission line would be paid rates determined by BPA for this work. The economic impact from this construction activity would be **low** because no new jobs are expected to be created by this project. Although construction workers, whether drawn from the Seattle metropolitan area or other regions, would use some temporary lodging and would purchase meals and other incidentals from local businesses, the impact to the local economy would be expected to be negligible relative to the economic base of King County and Kittitas County. Also, the contractors would pay use tax on materials used during project construction, which would be a minor benefit to local and state revenues. In summary, any minor increased economic impact would be limited to the construction period and be considered a beneficial impact.

4.5.1.3 Community Values and Concerns

Construction of this alternative may result in short-term construction impacts to commercial forestlands, recreation areas, and rural residential areas within and adjacent to the existing right-of-way. These short-term construction-related impacts are considered to be **low**.

4.5.2 Potential Long-Term Impacts

4.5.2.1 Population

Alternative D (Options D1 and D2) would have **no** long-term impacts on population because they would not cause population in-migration. The project would serve the King County area and parts of Canada rather than the project area specifically. It would be a transmission facility, would not serve specific developments, and would not lead to increased development in the project vicinity.

4.5.2.2 Economic Factors

Owing to the location of the proposed transmission line alternative in rural areas that support a limited amount of residential development, **no** long-term impacts on local business access are anticipated.

Alternatives D (Options D1 and D2) would require the purchase of new right-of-way in areas primarily designated for commercial forest use. A 150-foot-wide right-of-way would be cleared. Additional areas outside of the right-of-way would be cleared for construction of access roads and removal of danger trees.

The proposed alternative would have a minimal impact on the total timber resource in King and Kittitas counties, relative to the stock of merchantable timber in both counties (less than .05 percent). A total of 409 acres of merchantable timber would be removed within the right-of-way, and additional timber cleared for removal of danger trees and for construction of access roads would be negligible. Similarly, lost tax revenues due to removal of merchantable timber would also be negligible. The impact would be **low**.

Local taxing districts would experience a small reduction in tax base resulting from the displacement of 11-14 homes and five additional tax lots. On the basis of the analysis discussed in Alternative A (Table 10), this impact is likely to be **low**.

4.5.2.3 Community Values and Concerns

Purchase of new right-of-way and construction of the new transmission line for the proposed Option D1 would require displacement of 11 to 14 residences and five additional tax lots. Option D2 would require displacement of eight houses within the new right-of-way Designated forestlands within both of these options would be removed from production. While land use impacts to residential relocation associated with these alternatives would be high, the socioeconomic impact to community values and concerns would be **low**.

4.5.2.4 Local Spending and Employment

BPA would be responsible for ongoing maintenance, which involves such tasks as maintaining access roads and rights of way.. This work would be accomplished using existing BPA personnel and contractors, and BPA does not anticipate that additional workers would be hired for the operation and maintenance of the proposed transmission line and facilities. There would be **no** employment impact because no new workers would be hired.

4.5.3 Mitigation Measures

BPA would pay relocation expenses for those whose homes would be taken as a result of the proposed action.

4.5.4 Cumulative Impacts

The removal of timberland within the portions of the proposed transmission line right-of-way that support timber production would contribute to a relatively minor cumulative adverse effect on timber harvests, which have declined due to a number of factors, including the need to protect habitat for endangered species. This cumulative effect on timber harvests would have a minimal adverse economic impact on rural communities in King County and Kittitas County that have suffered employment and income losses due to declining harvest levels.

The proposed widening of I-90 in the Upper Yakima and Keechelus Lake area may result in a cumulative effect on jobs and temporary housing requirements in the region during project construction. The impact of that project is likely to be **very small**.

4.6 No Action Alternative

4.6.1 Short-Term Impacts

Under the No Action Alternative, local communities would not receive the short-term economic benefits associated with construction, i.e., local spending by construction workers. There are **no** short-term adverse impacts associated with the No Action Alternative.

4.6.2 Long-Term Impacts

Timberland would not be removed from production for the transmission line right-of-way and the tax revenues of King County and Kittitas County would not be reduced as a result.

The No Action Alternative could lead to brownouts or blackouts if a critical line is lost on the system. The chance that service would be disrupted increases with time as load grows. Commerce and industry would be adversely affected as the quality and reliability of power decreased. Some businesses and their employees could decide to relocate to an area where the power supply is more reliable. Loss of business and an unstable power supply could make the area less attractive the potential developers and residents.

There would be **moderate** long-term socioeconomic impacts on population, housing, or employment from the No Action Alternative.

5.0 Environmental Consultation, Review, and Permit Requirements

No consultation or permits are required for socioeconomic issues.

6.0 Agencies Contacted

City Hall Reception. City of Maple Valley. Telephone conversation—June 9, 2002.

Claussen, Sharon. Project Manager. King County Department of Natural Resources and Parks. Telephone conversation—July 2, 2002.

Claussen, Sharon. Project Manager. King County Department of Natural Resources and Parks. Telephone conversation—July 2, 2002.

Delph, David. 2002. City of Covington, Washington. Public Works Department. Personal communication on June 2002.

Erickson, David. Parks Director, City of Covington. Telephone conversation—July 2, 2002.

Fisher, Jim. Field Manager, Bureau of Land Management, Wenatchee Regional Office. Telephone conversation—June 10, 2002.

Flemm, Lori. Superintendent, City of Kent Parks Planning and Development. Telephone conversation—June 11, 2002.

Flemm, Lori. Superintendent, City of Kent Parks Planning and Development. Telephone conversation—June18, 2002.

Giles, Randy. Project Engineer. Washington Department of Transportation. Telephone conversation—June 25, 2002.

Hansen, Robin. Director of Operations, Cadman, North Bend Gravel Operation. Telephone conversation—June 18, 2002.

Hansen-Murray, Jamia. Environmental Coordinator, Mt. Baker--Snoqualmie National Forest. Telephone conversation—June 10, 2002.

Haysley, Linda. Right-of-way Specialist, Washington Department of Natural Resources, Ellensburg Office. Telephone conversation—June 7, 2002.

Humphreys, Roy. Manager, Elk Run Golf Course, Maple Valley. Telephone conversation—June 14, 2002.

Johnson, Gary. Cascade Unit Manager, Plum Creek Timber Company. Telephone conversation—June 27, 2002.

Kombol, Bill. Manager, Palmer Coking Coal Company. Telephone conversation—June 26, 2002.

Konigsmark, Ken. Director of Special Projects, Mountains to Sounds Greenway Trust. Personal communication. June 6, 2002.

Konigsmark, Ken. Director of Special Projects, Mountains to Sounds Greenway Trust. Telephone conversation. July 9, 2002.

Korve, Hans A. Associate Planner, City of Covington. Personal communication. June 6, 2002.

Lantz, Lisa. Resource Steward, Washington State Parks and Recreation Commission. Telephone conversations—June 11 and 21, 2002.

McCloud, Margaret. Park Planner and Interagency Coordinator, City of Issaquah Parks and Recreation. Personal communication. June 6, 2002.

Miller, Tina. Volunteer and Program Coordinator, King County Department of Natural Resources and Parks. Telephone conversation—July 3, 2002.

Pennala, Eric. Planner, City of Maple Valley. Personal communication. June 6, 2002.

Person, Randy. Puget Sound Region Planner, Washington State Parks and Recreation Commission. Telephone conversation—June 18, 2002.

Peterson, Kelly. Environmental Engineer Wellhead Protection, City of Kent. Telephone conversation—June 13, 2002.

Phillips, Chuck. Fisheries Biologist, Washington Department of Fish and Wildlife, Region 4. Telephone conversation—June 14, 2002.

Pray, Mark. Parks Lead, City of North Bend. Telephone conversation—June 26, 2002.

Pruitt, Brad. Forest Legacy Program Administrator, DNR. Telephone conversation—July 9, 2002.

Rankin, Linda. Federal Consistency Specialist. Washington Department of Ecology. Telephone conversation—June 27, 2002.

Reeves, Walter. Planner, City of North Bend. Personal communication on June 7, 2002.

Rogalski, Floyd. Planning and Environment, USDA Forest Service, Wenatchee National Forest. Personal communication. June 7, 2002.

Sandin, Randy. Supervising Engineer, Land Use Services Division, King County Department of Development and Environmental Services. Personal communication on June 6, 2002.

Schutz, Jerry. Transportation Planning Manager, Washington Department of Transportation. Telephone conversation—June 18, 2002.

Scott, Sharon. 2002. City of Covington, Washington. Planning Department. Personal communication on June 2002.

Sinsky, Michael. Senior Deputy Attorney, King County, Washington. Telephone conversation—June 27, 2002.

Stangle, Julie. Land User Forester, Weyerhaeuser Company. Telephone conversation—June 27, 2002.

Starbord, John. City Manager, City of Maple Valley. Personal communication on June 6, 2002.

Taylor, Steve AICP. Director of Community Development, City of Maple Valley. Personal communication on June 6, 2002.

Van Gelder, Doug. 2002. City of Covington, Washington. Public Works Department. Personal communication on June 2002.

White, Clay. Planner, Kittitas County. Telephone conversation—June 13, 2002.

White, Everett. Land Adjustment Team Leader, USDA Forest Service. Telephone conversation—July 9, 2002.

Yager, Mike. Director of Real Estate, Plum Creek Timber Company. Telephone conversation—July 1, 2002.

Young, Curt. Snoqualmie Wildlife Area Manager, Washington Department of Fish and Wildlife, Region 4. Telephone conversation—June 12, 2002.

Emails/Faxes

Blumen, Connie. King County Department of Natural Resources and Parks. Electronic mail—June 21, 2002.

Lantz, Lisa. Resource Steward, Washington State Parks and Recreation Commission. Electronic fax—June 24, 2002.

Pruitt, Brad. Forest Legacy Program Administrator, DNR. Electronic mail—July 12, 2002.

Schmidt. Park Manager, Washington State Parks and Recreation Commission. Electronic mail—June 26, 2002.

7.0 List of Preparers

John Hoey, Socioeconomic Analysis. Experience: Environmental impact assessment and land use planning. Education: B.A. in Government, M.A. in Urban and Environmental Policy. With CH2M HILL since 1998.

Bill Kitto, Project Manager. Experience: Conservation and renewable energy, with a focus on engineering and environmental aspects of high-voltage transmission lines. Education: M.A. in Civil Engineering. With CH2M HILL since 2000.

Darrin Morgan, Socioeconomic Analysis. Experience: Financial and economic cost-benefit analysis on infrastructure projects. Education: B.A. in Finance. With CH2M HILL since 2002.

Dan Pitzler, Senior Economist. Experience: Social and economic analysis of infrastructure projects. Education: M.A. in Economics. With CH2M HILL since 1985.

8.0 References

David Evans and Associates. February, 2001. "Socioeconomic Technical Report for Kangley-Echo Lake Transmission Line Project"

King County Office of Regional Policy and Planning. url: www.metrokc.gov/exec/orpp

Puget Sound Regional Council. url: www.psrc.org

State of Washington Office of Financial Management. url: www.ofm.wa.gov

U.S. Census Bureau. Census 2000. url: www.census.gov

9.0 Acronyms and Glossary

9.1 Acronyms and Abbreviations

ac	acre(s)
BN	Burlington Northern Santa Fe Railway Company
BPA	Bonneville Power Administration
DNR	Washington Department of Natural Resources
DOR	Washington Department of Revenue
EIS	Environmental Impact Statement
EO	Executive Order
FIRE	Finance, Insurance, and Real Estate
ft	foot/feet
I-90	Interstate 90
mi	mile(s)
OFM	State of Washington Office of Financial Management
RV	Recreational Vehicles
SR	State Route

TCPU Transportation, Communications, and Public Utilities

9.2 Technical Terms

Access Impairment—Obstacles in the way of reaching the business in the customary manner.

Access Road—Roads constructed to each structure site, first to build the tower and line and later to maintain and repair it.

Average Annual Payroll—Total covered payroll divided by total number of employees in that industry group.

Kilovolt—One thousand volts.

Stumpage Value—Price of timber at the time of harvest.

Substation—The fenced site that contains the terminal switching and transformation equipment needed at the end of a transmission line.

Transmission Line—A high-voltage power line used to carry electric power efficiently over long distances.

Appendix U Letters from the National Marine Fisheries Service

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

January 28, 2002

Mr. Gene Lynard
Bonnevi11e Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

Re: Endangered Species Act Section 7 Informal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Kangley-Echo Lake: Transmission Project (NMFS No. WSB-01-331)

Dear Mr. Lynard

This correspondence is in response to your request for consultation under the Endangered Species Act (ESA). Additionally, this letter serves to meet the requirements for consultation under the Magnuson Stevens Fishery Conservation and Management Act (MSA).

Endangered Species Act

National Marine Fisheries Service (NMFS) has reviewed the above referenced Biological Assessment (BA) dated July 2001. According to the submitted BA, Bonneville Power Administration (BPA) is proposing to construct another high-voltage electrical transmission line, parallel to the existing line, for some nine miles across the Cedar and Raging River watersheds. The proposed action would essentially double the existing 150 feet wide cleared corridor to 300 feet wide. Existing and new access roads would have a total of 96 culverts, with 41 of these needing improvement for passing water or fish, according to the BA.

Some streams in the action area have been identified as habitat for Puget Sound (PS) chinook *(Oncorhynchus tshawytscha).* This species is listed as threatened under the (ESA). Designated critical habitat includes the Cedar River about five miles below the action area, and streams in the Raging River watershed.

In addition to the BA, NMFS has reviewed the information provided by Michael Shank of the Pacific Crest Biodiversity Project (fax of 11 pages, dated January 9, 2002).

The potential effects of this project are described in the BA and in summary , the proposed action is expected to cause slight, local diminution of riparian functions, *i.e.*, recruitment of woody material and vegetative shade. Conservation measures to avoid and minimize potential adverse affects are described in the BA and include: no towers in the riparian areas; retaining topped trees along the Cedar River riparian area; and ensuring fish passage at all of the fish-bearing streams crossed by access roads. For the reaches of streams inhabited by PS chinook now or in the near future, the overall effect, *i.e.*, magnitude and area of these localized impacts, is expected to be negligible.

Since the proposed action incorporates avoidance and minimization measures into this project, NMFS can expect the effects of the action to be discountable or insignificant. Therefore, NMFS concurs with your effect determination of "may affect, but not likely to adversely affect" for PS chinook and their designated critical habitat.

This concludes informal consultation on these actions in accordance with 50 CFR 402.14(b)(1). The BPA must re-analyze this ESA consultation: (1) if new information reveals effects of the action that may affect listed species in a way not previously considered; (2) if the action is modified in a manner that causes an effect to the listed species that was not previously considered; or (3) if a new species is listed or critical habitat designated that may be affected by the identified actions.

Magnuson-Stevens Fishery Conservation and Management Act

Federal agencies are required, under §305(b)(2) of the MSA and its implementing regulations (50 CFR 600 Subpart K), to consult with NMFS regarding actions that are authorized, funded, or undertaken by that agency that may adversely affect Essential Fish Habitat (EFH). The MSA (§3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." If an action would adversely affect EFH, NMFS is required to provide the Federal action agency with EFH conservation recommendations (MSA §305(b)(4)(A)). This consultation is based, in part, on information provided by the Federal action agency and descriptions of EFH for Pacific salmon contained in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (August 1999) developed by the Pacific Fishery Management Council and approved by the Secretary of Commerce (September 27, 2000).

The proposed action and action area are described in the HA submitted by WSDOT. The project area includes habitat which has been designated as EFH for various life stages of: chinook *{Oncorhynchus tshawytscha),* and coho (*O. kisutch).*

Because the habitat requirements *(i.e.,* EFH) for the MSA-managed species in the project area BPA included as part of the proposed action to address ESA concerns are also adequate to avoid, minimize, or otherwise offset potential adverse effects to designated EFH, conservation recommendations pursuant to MSA (§305(b)(4)(A)) are not necessary. Since NMFS is not providing conservation recommendations at this time, a 30-day response from the BP A is not required (MSA §305(b)(4)(B)).

This concludes consultation under the MSA. If the proposed action is modified in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations.

The BP A will need to reinitiate EFH consultation with NMFS in accordance with NMFS implementing regulations for EFH at 50 CFR 600.920(k).

NMFS recognizes that BPA has been asked by the City of Seattle and other stakeholders, including the Pacific Crest Biodiversity Project, to do more NEPA review of the proposed action. And, in keeping with NMFS' support of the City's Cedar River Watershed Habitat Conservation Plan (HCP), which is expected to contribute substantially to conservation of Cedar River salmonids, NMFS believes the proposed action will have a negligible affect to the HCP for NMFS-covered species. If you have any questions, please contact Matt Longenbaugh of the Washington State Habitat Branch Office at (360) 753-7761.

Sincerely,

D. Robert Lohn

Regional Administrator

cc: Jim Erckmann, Seattle Public Utilities
Michael Shank, Pacific Crest Biodiversity Project

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
WASHINGTON HABITAT BRANCH OFFICE
510 Desmond Drive SE/Suite 103
LACEY, WASHINGTON 98503

November 26, 2002

Mr. Gene Lynard
Project Environmental Lead
Bonneville Power Administration
P. 0. Box 3621
Portland, Oregon 97208-3621

Re: Follow-up to Endangered Species Act Section 7 Informal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Kanglcy-Echo Lake Transmission Project (NOAA Fisheries No. WSB-0I-331)

Dear Mr. .Lynard:

This correspondence is a fo11ow-up to the completed consultations (signed January 24, 2002) under the Endangered Species Act (ESA) and the Magnuson Stevens Fishery Conservation and Management Act (MSA).

The National Marine Fisheries Service (NOAA-Fisheries) consulted in fall of 2001 with the Bonneville Power Administration (BPA) regarding their proposal to consb1lct a second high-voltage electrical transmission line, parallel to the existing Kangley-Echo Lake line, for approximately nine miles. The preferred alternative crosses the Cedar and Raging River watersheds The proposed action would essentially double the existing 150 feet wide cleared corridor to 300 feet wide. Some streams in the action area have been identified as habitat for Puget Sound (PS) chinook *(Oncorhynchus tshawytscha).* This species is listed as threatened under the ESA.

As the NOAA-Fisheries Letter of Concurrence {January 24, 2002) stated, "the proposed action is expected to cause slight, local diminution of riparian functions, *i.e.*, recruitment of woody material and vegetative shade. ConservatlOJ1 measures to avoid and minimize potential adverse affects are described in the (BP A '$) Biological Assessment and include; no towers in the riparian areas; retaining topped trees along the Cedar River riparian area; and ensuring fish passage at all of the fish-bearing streams crossed by access roads. For the reaches of streams inhabited by PS chinook now or in the near future, the overall effect, *i.e.*, magnitude and area of these localized impacts, is expected to be negligible. "

As a party to the City of Seattle's Cedar River Habitat Conservation Plan (HCP} (signed April 2000), NOAA-Fisheries has been working closely with the Anadromous Fish Committee sponsored by the City's Seattle Public Utility to design and schedule the restored access of anadromous fish above the City's Landsburg Dam. PS chinook salmon are expected to regain access to the area of the Cedar River near the proposed powerline corridor expansion at about the time, or perhaps before the time that BP A would construct the powerline. The question has therefore come before NOAA-Fisheries, would the ESA (consultation have a different determination of affects given the fact the completion of the Landsburg Dam fish ladder will likely introduce the presence of PS chinook? The answer is no, the overa1l effect is expected to be negligible, and therefore the January 2002 consultation determination of "not likely to adversely affect" the PS chinook remains without change.

NOAA-Fisheries recognizes that BPA has been asked by the City of Seattle and other stakeholders, including the Pacific Crest Biodiversity Project, to do more NEPA review of the proposed action. And NOAA-Fisheries continues to support the City's HCP, which is expected to contribute substantially to conservation of Cedar River salmonids. If you have any questions, please contact Matt Longenbaugh of the Washington Habitat Branch Office at (360) 753-7761.

Sincerely,

Steven W. Landino
Washington State Habitat Branch Chief

cc:
Jim Erckmann,. Seattle Public Utilities
Michael Shank, Pacific Crest Biodiversity Project
Tim Romanski, USFWS

Appendix V Washington Department of Ecology Shoreline Consistency Letter

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47600 • Olympia, Washington 98504-7600
(360) 407-6000 • TDD Only (Hearing Impaired) (360) 407-6006

February 14, 2002

Mr. Gene Lynard
Department of Energy
Bonneville Power Administration
P. O. Box 3621
Portland, OR 97208-3621

RE: Federal Consistency
Kangley-Echo Lake Transmission Line Project

Dear Mr. Lynard:

The Department of Ecology, Shorelands and Environmental Assistance Program received your Coastal Zone Consistency Determination to construct nine miles of new 500 kilovolt transmission line, and expand an existing BPA substation within central King County, Washington.

Upon review of this proposal, Ecology agrees with your determination and assessment that the proposed action is consistent to the maximum extent practicable with the enforceable policies of Washington ' s Coastal Zone Management Program and will not result in any significant impacts to the State's coastal resources.

If you have any questions regarding this letter please contact Linda Rankin our federal consistency specialist at (360) 407 -6527.

Sincerely,

Gordon White
Program Manager
Shorelands and Environmental Assistance Program

Appendix W Consultation Record

Documentation of Consultation with the Muckleshoot Indian Tribe, Stillaquamish Tribe, Upper Skagit Indian Tribe, Swinomish Tribe, Sauk-Suiattle Indian Tribe, Tulalip Indian Tribes, Suquamish Tribe, Colville Confederated Tribes, Kalispel Tribe, Yakama Nation, Duwamish Tribe, Puyallup Tribe, Snoqualmie Tribe, Squaxin Island Indian Tribe, the Washington State Office of Archaeology and Historic Preservation, and Seattle Public Utilities.

DATE	CORRESPONDING PARTIES	TYPE OF CORRESPONDENCE
4/19/00	Melissa Calvert, Muckleshoot Indian Tribe to Lou Driessen, BPA	Letter
9/11/00	Gene Lynard, BPA to Patrice Kemph, Stillaquamish Tribe	Letter
9/11/00	Gene Lynard, BPA to Michelle Robbins, Upper Skagit Indian Tribe	Letter
9/11/00	Gene Lynard, BPA to Diane Edwards, Swinomish Tribe	Letter
9/11/00	Gene Lynard, BPA to Ernest Decoteau, Sauk-Suiattle Indian Tribe	Letter
9/11/00	Gene Lynard, BPA to Walter Pacheco, Muckleshoot Indian Tribe	Letter
9/11/00	Gene Lynard, BPA to Hank Gobin, Tulalip Indian Tribes	Letter
9/11/00	Gene Lynard, BPA to Marilyn Jones, SuquamishTribe	Letter
9/11/00	Gene Lynard, BPA to Adeline Fredin, Colville Confederated Tribes	Letter
9/11/00	Gene Lynard, BPA to Deane Osterman, Kalispel Tribe	Letter
9/11/00	Gene Lynard, BPA to Johnson Meninick, Yakama Nation	Letter
9/11/00	Gene Lynard, BPA to Cecile Maxwell-Hansen, Duwamish Tribe	Letter
9/11/00	Gene Lynard, BPA to Connie McLoud, Puyallup Tribe	Letter
9/11/00	Gene Lynard, BPA to Maryann Hinzman, Snoqualmie Tribe	Letter
10/26/00	Gene Lynard, BPA to Ed Goodridge, Jr., Stillaquamish Tribe	FAX
10/30/00	Donna Hogerhuis, Muckleshoot Indian Tribe to Lou Driessen, BPA	Letter
11/20/00	Gene Lynard, BPA to Ray Mullen, Snoqualmie Tribe	Letter
11/20/00	Gene Lynard, BPA to Melissa Calvert, Muckleshoot Indian Tribe	Letter
11/20/00	Gene Lynard, BPA to Joe Peone, Colville Confederated Tribes	Letter
11/20/00	Gene Lynard, BPA to Adeline Fredin, Colville Confederated Tribes	Letter
11/20/00	Gene Lynard, BPA to Matt Mattson, Snoqualmie Tribe	Letter
11/20/00	Gene Lynard, BPA to Isabell Tinoco, Muckleshoot Indian Tribe	Letter
11/20/00	Gene Lynard, BPA to Scott Schuyler, Upper Skagit Indian Tribe	Letter
11/20/00	Gene Lynard, BPA to Ernest Decoteau, Sauk-Suiattle Indian Tribe	Letter
11/28/00	BPA, HRA, Snoqualmie Tribe Cultural Resources, and the Muckleshoot Indian Tribe Cultural Committee	Scoping Meeting
12/5/00	Melissa Calvert, Muckleshoot Indian Tribe to Gene Lynard, BPA	Letter
12/8/02	Donna Hogerhuis, Muckleshoot Indian Tribe to Lou Driessen, BPA	Letter
12/26/00	Gene Lynard, BPA to Johnson Meninick, Yakama Nation	Letter
12/26/00	Gene Lynard, BPA to Scott Schuyler, Upper Skagit Indian Tribe	Letter
12/26/00	Gene Lynard, BPA to Donna Hogerhuis, Muckleshoot Indian Tribe	Letter
12/26/00	Gene Lynard, BPA to Adeline Fredin, Colville Confederated Tribes	Letter
12/26/00	Gene Lynard, BPA to Rhonda Foster, Squaxin Island Indian Tribe	Letter
12/26/00	Gene Lynard, BPA to Ernest Decoteau, Sauk-Suiattle Indian Tribe	Letter
12/26/00	Gene Lynard, BPA to Matt Mattson, Snoqualmie Tribe	Letter
1/2/01	Melissa Calvert, Muckleshoot Indian Tribe to Gene Lynard, BPA	Letter
1/4/01	Melissa Calvert, Muckleshoot Indian Tribe to Gene Lynard, BPA	FAX
1/17/01	Trent DeBoer, HRA to Tom Minichillo, Seattle Public Utilities	Telephone Conversation
1/17/01	BPA, HRA, Muckleshoot Indian Tribe Cultural Committee	Meeting
1/23/01	Gene Lynard, BPA to Melissa Calvert, Muckleshoot Indian Tribe	Letter
1/24/01	Gene Lynard, BPA to James Joseph, Sauk-Suiattle Indian Tribe	Letter
1/31/01	BPA, HRA, Sauk-Suiattle Indian Tribe Cultural Resources Department	Scoping Meeting
2/5/01	BPA, HRA, Muckleshoot Indian Tribe Cultural Committee, Sauk-Suiattle Indian Tribe Cultural Resources Representative	Project Area Tour
2/15/01	Trent DeBoer, HRA to Tom Minichillo, Seattle Public Utilities	Telephone Conversation
2/16/01	Dennis Anderson, Muckleshoot Indian Tribe to Gene Lynard, BPA	Letter
2/16/01	Tom Minichillo, Seattle Public Utilities to Gene Lynard, BPA	Letter
3/8/01	Gene Lynard, BPA to Dennis Anderson, Muckleshoot Indian Tribe	Letter

DATE	CORRESPONDING PARTIES	TYPE OF CORRESPONDENCE
3/30/01	Trent DeBoer, HRA to Donna Hogerhuis, Muckleshoot Indian Tribe	Telephone Conversation
4/20/01	Gene Lynard, BPA to Bill Mullin, Snoqualmie Tribe	Letter
4/20/01	Gene Lynard, BPA to Shari Brewer, Sauk-Suiattle Indian Tribe	Letter
4/20/01	Gene Lynard, BPA to Michelle Robbins, Upper Skagit Indian Tribe	Letter
4/20/01	Gene Lynard, BPA to Melissa Calvert, Muckleshoot Indian Tribe	Letter
5/8/01	BPA, HRA, Muckleshoot Indian Tribe Cultural Committee	Meeting
5/8/01	Gene Lynard, BPA to Melissa Calvert, Muckleshoot Indian Tribe	FAX- Draft Meeting Notes
5/16/01	Gene Lynard, BPA to Melissa Calvert, Muckleshoot Indian Tribe	FAX
5/23/01	Cathy Bialas, HRA to Melissa Calvert, Muckleshoot Indian Tribe	Voicemail Message
5/23/01	BPA, HRA, Snoqualmie Tribe Cultural Resources Department	Meeting
5/24/01	Cathy Bialas, HRA to Donna Hogerhuis, Muckleshoot Indian Tribe	Telephone Conversation
5/25/01	Cathy Bialas, HRA to Tom Minichillo, Seattle Public Utilities	Telephone Conversation
6/5/01	Cathy Bialas, HRA to Donna Hogerhuis, Muckleshoot Indian Tribe	Telephone Conversation
6/12/01	Muckleshoot Indian Tribe to BPA	Letter
6/27/01	Gene Lynard, BPA to Donna Hogerhuis, Muckleshoot Indian Tribe	FAX
9/4/01	Melissa Calvert, Muckleshoot Indian Tribe to Lou Driessen, BPA	Letter
9/19/01	Donna Hogerhuis, Muckleshoot Indian Tribe to Gene Lynard, BPA	Letter
9/19/01	Gene Lynard, BPA to Donna Hogerhuis, Muckleshoot Indian Tribe	FAX
9/20/01	Gene Lynard, BPA to Melissa Calvert, Muckleshoot Indian Tribe	Letter
9/20/01	Gene Lynard, BPA to Ray Mullen, Snoqualmie Tribe	Letter
9/20/01	Gene Lynard, BPA to Shari Brewer, Sauk-Suiattle Indian Tribe	Letter
9/20/01	Donna Hogerhuis, Muckleshoot Indian Tribe to Gene Lynard, BPA	Letter
10/5/01	Gene Lynard, BPA to Ray Mullen, Snoqualmie Tribe	Letter
10/5/01	Gene Lynard, BPA to Melissa Calvert, Muckleshoot Indian Tribe	Letter
10/5/01	Gene Lynard, BPA to Shari Brewer, Sauk-Suiattle Indian Tribe	Letter
10/8/01	Melissa Calvert, Muckleshoot Indian Tribe to Gene Lynard, BPA	Letter
10/22/01	BPA, HRA, Muckleshoot Indian Tribe Cultural Committee	Meeting
10/30/01	Tom Minichillo, SPU to Gene Lynard, BPA	Letter
11/2/01	Donna Hogerhuis, Muckleshoot Indian Tribe to Gene Lynard, BPA	Letter
11/21/01	Donna Hogerhuis, Muckleshoot Indian Tribe to Gene Lynard, BPA	Letter
11/26/01	Gene Lynard, BPA to Warren KingGeorge, Muckleshoot Indian Tribe	Letter
12/8/01	Donna Hogerhuis, Muckleshoot Indian Tribe to Lou Driessen, BPA	Letter
12/12/01	Gene Lynard, BPA to Warren KingGeorge, Muckleshoot Indian Tribe	Letter
12/12/01	Gene Lynard, BPA to Rob Whitlam, Washington State Office of Archaeology and Historic Preservation	Letter
12/13/01	Gene Lynard, BPA to Donna Hogerhuis, Muckleshoot Indian Tribe	Letter
12/18/01	Robert Whitlam, OAHP to Gene Lynard, BPA	Letter
1/17/02	Donna Hogerhuis, Muckleshoot Indian Tribe to Gene Lynard, BPA	Letter
1/28/02	Gene Lynard, BPA to Donna Hogerhuis, Muckleshoot Indian Tribe	Telephone Conversation
2/7/02	Donna Hogerhuis, Muckleshoot Indian Tribe to Gene Lynard, BPA	Letter
2/11/02	Gene Lynard, BPA to Donna Hogerhuis, Muckleshoot Indian Tribe	FAX- regarding proposed boring
2/20/02	Cathy Bialas, HRA to Donna Hogerhuis, Muckleshoot Indian Tribe	Voicemail Message
2/21/02	Donna Hogerhuis, Muckleshoot Indian Tribe to Cathy Bialas, HRA	Telephone Conversation
2/26/02	Cathy Bialas, HRA to Melissa Calvert, Muckleshoot Indian Tribe	Voicemail Message
2/28/02	Cathy Bialas, HRA to Melissa Calvert, Muckleshoot Indian Tribe	Voicemail Message
3/1/02	Cathy Bialas, HRA to Warren KingGeorge, Muckleshoot Indian Tribe	Voicemail Message
3/2/02	Jamia HansenMurray, Mt. Baker Snoqualmie National Forest to Gail Thompson, HRA	Email
3/5/02	Cathy Bialas, HRA to Warren KingGeorge, Muckleshoot Indian Tribe	Voicemail Message
3/5/02	Cathy Bialas, HRA to Donna Hogerhuis, Muckleshoot Indian Tribe	Voicemail Message
3/7/02	Donna Hogerhuis, Muckleshoot Indian Tribe to Cathy Bialas, HRA	Voicemail Message
3/7/02	Cathy Bialas, HRA to Donna Hogerhuis, Muckleshoot Indian Tribe	Voicemail Message
3/8/02	Gail Thompson, HRA; Gene Lynard and John XXXX, BPA; with Allyson Brooks, Rob Whitlam, and Stephenie Kramer, OAHP	Meeting
3/15/02	Donna Hogerhuis, Muckleshoot Indian Tribe to Cathy Bialas, HRA	Telephone Conversation

DATE	CORRESPONDING PARTIES	TYPE OF CORRESPONDENCE
3/25/02	Donna Hogerhuis, Muckleshoot Indian Tribe to Cathy Bialas, HRA	Telephone Conversation
4/1/02	BPA, HRA, Muckleshoot Indian Tribe Cultural Committee	Meeting
4/1/02	Cathy Bialas, HRA to Donna Hogerhuis, Muckleshoot Indian Tribe	Telephone Conversation
4/2/02	Jamia HansenMurray, Mt. Baker Snoqualmie National Forest to Gail Thompson, HRA	Letter
4/2/02	Cathy Bialas, HRA to Donna Hogerhuis, Muckleshoot Indian Tribe	Telephone Conversation
4/5/02	Cathy Bialas, HRA to Donna Hogerhuis, Muckleshoot Indian Tribe	Telephone Conversation
4/9/02	Jamia HansenMurray, Mt. Baker Snoqualmie National Forest to Gail Thompson, HRA	Letter
4/26/02	Cathy Bialas, HRA to Warren KingGeorge, Muckleshoot Indian Tribe	Telephone Conversation
5/1/02	HRA and Muckleshoot Tribal Elders, Ethnohistoric Interview	Meeting
6/21/02	Donna Hogerhuis, Muckleshoot Indian Tribe to Cathy Bialas, HRA	Letter
7/17/02	HRA, Gilbert and Warren KingGeorge, Ethnohistoric Interview	Meeting
7/29/02	BPA, HRA, and Muckleshoot Tribe Cultural Committee	Meeting
7/30/02	BPA, HRA, and Snoqualmie Tribal Representatives	Meeting
10/15/02	Gail Thompson, HRA, and Donna Hogerhuis, Muckleshoot Indian Tribe	Emails

Appendix X Unanticipated Discovery Plan

PLAN AND PROCEDURES FOR ARCHAEOLOGICAL MONITORING AND THE UNANTICIPATED DISCOVERY OF HUMAN REMAINS AND CULTURAL RESOURCES DURING CONSTRUCTION OF THE BPA KANGLEY-ECHO LAKE TRANSMISSION LINE PROJECT, KING COUNTY, WASHINGTON

1 INTRODUCTION

Bonneville Power Administration (BPA) is planning to construct the Kangley-Echo Lake Transmission Line Project, a powerline that will run from Kangley to the Echo Lake Substation in King County. Construction of the transmission line will also include modifications to the Echo Lake Substation as well as some access roads and work spaces. BPA has conducted cultural resource work for the Project that has consisted of background research, inventory survey, and site evaluation. The work also has included a review of ethnographic sources and interviews with Muckleshoot tribal elders and staff members. Agency consultation has been conducted with the Washington State Office of Archaeology and Historic Preservation. Tribal consultation began with correspondence to a number of tribes, and has included several meetings and a field trip with the Muckleshoot and Snoqualmie Tribes, which are considered to be the affected tribes for the Project.

This document describes procedures for archaeological monitoring and the unanticipated discoveries of human remains and cultural resources during Project construction. It is intended to:

- Comply with applicable Federal and State laws and regulations, particularly 36 CFR 800.13 of the regulations that implement Section 106 of the National Historic Preservation Act of 1966, as amended; Title 27 Revised Code of Washington, Chapter 27.44 Indian Graves and Records; and Chapter 27.53 Archaeological Sites and Resources.
- Describe to regulatory and review agencies the procedures BPA will follow to conduct archaeological monitoring and deal with unanticipated discoveries, and
- Provide direction and guidance to Project personnel about the procedures to be followed should an unanticipated discovery occur.

2 Procedures for Archaeological Monitoring

A, Tower, road, and other construction locations to be monitored include those sensitive for occurrence of cultural resources: areas in alluvial settings, near waterbodies, and on terraces above them.

B. Monitoring will be for the area of soil disturbance at each location up to the depth at which sterile (glacial) deposits are reached.

C. Monitoring will be conducted by a professional archaeologist with experience in construction excavation monitoring.

D. BPA will offer for the Muckleshoot and Snoqualmie tribes also to provide a monitor. Tribal monitors will need to follow the Project's Health and Safety Plan, and bring necessary safety equipment such as a hard hat.

E. The archaeological monitor will follow the Project's Health and Safety Plan.

F. The archaeological monitor will observe soils, including excavations and backdirt piles. Equipment used in examining the soils will include, as appropriate, a shovel, trowel, and screen of 1/4-inch mesh. The archaeologist will watch for prehistoric or historic-period artifacts or layers/lenses of organic material, or organically enriched soils that might indicate past human use. BPA will inform the construction contractor(s) about the archaeologist's monitoring work and will authorize the archaeologist to stop equipment working periodically as needed for a closer examination of the soils.

6. The archaeologist will record the monitoring work using notes, photographs, maps, and drawings, as appropriate.

7. When the monitoring work has been finished, the archaeologist will prepare a report discussing the methods and results of the work. The report will be provided to BPA and the Muckleshoot and Snoqulamie tribes for review, and then to the State Office of Archaeology and Historic Preservation and the tribes for filing.

8. If intact cultural features or deposits are identified, the archaeologist will establish another datum to record observed or recovered materials.

9. If finds are made of human remains, prehistoric materials, or historic-period materials that are 50 years or older, BPA will follow the procedures in Sections 3 and 4 below.

3 PROCEDURES FOR HUMAN SKELETAL REMAINS

Any human remains that are discovered during construction will at all times be treated with dignity and respect. The affected Indian Tribes are the Muckleshoot Indian Tribe and the Snoqualmie Tribe.

A. If any member of the construction work force believes he or she has made an unanticipated discovery of human skeletal remains, any Construction Inspector or Supervisor present will be responsible for stopping construction work adjacent to the discovery. The area of work stoppage will be adequate to provide for the security, protection, and integrity of the remains.

B. The Inspector or Supervisor will be responsible for taking appropriate steps to protect the discovery by installing a physical barrier such as exclusionary fencing, and prohibiting vehicles and equipment from traversing the discovery site.

C. BPA will immediately call the King County Sheriff's office and a cultural resource consultant who can identify human bones. The Sheriff's office may arrange for a representative of the King County

Medical Examiner's office to examine the discovery and will determine whether it should be treated as a crime scene or as a human burial. A discovery located on Seattle Public Utility (SPU) property will be reported to the SPU archaeologist at this time.

D. If the remains are determined to be Native American, BPA will notify the State Office of Archaeology and Historic Preservation and the affected Indian Tribes as listed in Attachment A. These parties and BPA will consult to determine what treatment is appropriate for the remains. If the human remains are located on the Cedar River Municipal Watershed (CRMW), the conditions of Seattle Public Utilities' draft Cultural Resource Management Plan requires the following additional protocols:

    - No analysis of the human remains, other than measurements and documentation, will be undertaken without the written consent of the affected Indian Tribes.
    - No human remains that have been determined to be Native American in origin will be transported beyond the boundaries of the State of Washington, without written consent of the affected Indian Tribes and the State Historic Preservation Officer.
    - If it is a desirable option to the affected Indian Tribes, SPU will offer for reburial to occur on SPU land. The location of any reburial will be strictly confidential and the future plans for SPU activity will be considered in selecting that location.

E. If disinterment of Native American human remains outside the CRWM is necessary, the consulting parties, which will include the State Office of Archaeology and Historic Preservation, the affected Indian Tribes, and the BPA, will jointly determine the final custodian of the human remains.

F. BPA will make a good faith effort to accommodate requests from the affected Indian Tribes that they be present during the implementation of mitigation measures related to human remains.

G. BPA will resume construction in the area of the discovery only after completion of treatment.

4 PROCEDURES FOR THE FINDING OF CULTURAL RESOURCES

A. If any member of the construction work force believes that he or she has found a cultural resource, any BPA Inspector or Supervisor will be responsible for stopping construction work adjacent to the discovery. The area of work stoppage will be adequate to provide for the security, protection, and integrity of the remains. A cultural resource discovery could consist of (but is not limited to) to the following examples:

    - An area of charcoal or charcoal-stained soil
    - An arrowhead, stone tool, or stone chips
    - A cluster of bones or burned rocks in association with stone tools or chips
    - A cluster of tin cans or bottles older than 50 years

B. If the Inspector or Supervisor believes that the discovery is a cultural resource, the Environmental Inspector will take appropriate steps to protect the discovery site by installing a physical barrier such as exclusionary fencing, and prohibiting vehicles and equipment from traversing the discovery site. A

discovery located on Seattle Public Utility (SPU) property will be reported to the SPU archaeologist at this time.

C. BPA will arrange for the discovery to be evaluated by a professional archeologist. The archeologist will recommend whether the discovery is potentially eligible for listing in the National Register of Historic Places.

D. BPA will immediately contact the State Office of Archaeology and Historic Preservation to seek consultation regarding the National Register -eligibility of the discovery. If the OAHP representatives determine that the discovery is an eligible Native American deposit, they and the affected Indian Tribes will consult to determine appropriate treatment of it. Treatment measures may include mapping, photography, limited probing and sample collection, or other activity.

E. The professional archaeologist will implement the appropriate treatment measure(s) and later provide a report on their methods and results.

F. BPA will resume construction in the area of the discovery only after it has been evaluated and treated.

Attachment A -- List of Contacts

King County Sheriff's Office
911 (State that the situation is not life-threatening)

Archaeological Consultant
Historical Research Associates, Inc.
Gail Thompson or Jim Carter
206-343-0226

State Office of Archaeology and Historic Preservation
Dr. Robert G. Whitlam, State Archaeologist
360-407-0771

Melissa Calvert
Coordinator Cultural Resources & Wildlife Programs
Muckleshoot Indian Tribe
360-802-2202 x105

Ray Mullen
Cultural Program Director
Snoqualmie Tribe
425-222-6900

In addition, if the discovery is made within the Cedar River Watershed contact:

Tom Minichillo
Archaeologist
Seattle Public Utilities
206-233-0032